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Annual Report of the Colorado River Board of California, 1978

Colorado River Board of California

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ANNUAL REPORT

Colorado River Board
of California

Year Ending December 31, 1978

NON-CIRCULATING

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COLORADO RIVER BOARD OF CALIFORNIA

107 SOUTH BROADWAY, ROOM 8103
LOS ANGELES, CALIFORNIA 90012
(213) 620-4480



August 3, 1979

Honorable Edmund G. Brown, Jr.
Governor of California
State Capitol
Sacramento, California 95814

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GOLDEN GATE UNIVERSITY

Dear Governor Brown:

We are pleased to present to you and the Legislature the Colorado River Board's Annual Report for Calendar Year 1978.

In my letter to you dated June 27, 1978, transmitting the Board's 1977 Annual Report, I pointed out the importance of California's Colorado River water supply in alleviating a critical water supply problem during the 1977 drought year. I am now pleased to report that both the 1978 and 1979 water years resulted in above normal runoff in the Colorado River Basin and that the major water storage reservoirs now have more water in storage than they did before the drought. Anticipating the reduced deliveries to California that will occur when the Central Arizona Project is completed in about six years, the Board is cooperatively investigating with the Department of Water Resources and the Metropolitan Water District a program whereby in years of good supply from the State Water Project, MWD would take more State water, reduce its Colorado River water use and obtain credits in an account to be established in Lake Mead. In years of poor water supply, MWD would reduce its taking of State Project water and divert additional Colorado River water.

The Board's engineering staff played a major role in conducting the studies and preparing the report of the seven-state Colorado River Basin Salinity Control Forum for the first triennial revision of the water quality standards for the Colorado River System. The Board continued its close working relationships with federal agencies and others involved in the Colorado River Basin Salinity Control Program. There was considerable activity in the lawsuit, Environmental Defense Fund vs. the Environmental Protection Agency, Department of the Interior and the seven basin states to set aside the approved Colorado River salinity standards.

A new phase of the open-ended Arizona v. California litigation commenced in December 1978 with the filing by the United States of a motion with the U. S. Supreme Court to permit diversion of almost 200,000 acre-feet of additional Colorado River mainstream water to the five Indian reservations for irrigation use along the lower Colorado River. These tribes were allocated 1,000,000 acre-feet of diversion rights by the U. S. Supreme Court in 1964. The new claims include about 86,000 acre-feet in California that would have to be taken away from existing users. An old issue, that of Present Perfected Rights (pre-1929 Colorado River water rights), was resolved on January 9, 1979, when the Court entered a supplemental decree for their determination that was identical to one that had been agreed to by the state parties and the United States.

These and other activities in the Colorado River Basin are described in the report which follows and in a separate supplemental appendix.

Sincerely yours,

A handwritten signature in cursive script that reads "Patricia C. Nagle".

PATRICIA C. NAGLE, Chairman
and Colorado River Commissioner

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On the cover: Vegetation is scarce beyond the banks of the Colorado River in the lower basin.

Edmund G. Brown Jr.
Governor
State of California

Huey D. Johnson
Secretary for Resources
The Resources Agency

Myron B. Holburt
Chief Engineer
Colorado River Board of California

Colorado River Board of California

City of Los Angeles, Department of Water and Power

The City of Los Angeles, Department of Water and Power, supplies water and electric service to over 3 million residents of the third largest city in the United States. The Department's assets in 1978 were \$3.3 billion, making it the nation's largest municipal water and power utility system.

The City normally imports approximately 80% of its water supply from the Owens Valley through the First and Second Los Angeles Aqueducts. The remaining supplies are derived from local groundwater basins (15%) and The Metropolitan Water District of Southern California (5%).

The City is the founder and one of the original member cities of the Metropolitan Water District and receives Colorado River water through the Colorado River Aqueduct. Water use in Los Angeles averages 434 million gallons a day.

Palo Verde Irrigation District

The Palo Verde Irrigation District is located along the Colorado River in eastern Riverside County. The principal city is Blythe. It includes 120,500 acres, of which 92,000 in the valley and 5,000 on the lower Palo Verde Mesa are under cultivation.

The District obtains its irrigation water from the Colorado River and has one of the oldest water diversion rights on the entire river system. Use of Colorado River water for the irrigation of lands in the Blythe area dates back to 1877. The expenditures on Colorado River water facilities by the District and its predecessors amount to approximately \$25 million.

Principal agricultural products of the Palo Verde Irrigation District are alfalfa, wheat, cotton, lettuce, cantaloupes, watermelons, onions, and citrus. In 1977 these crops had a value of \$70 million. Livestock values from cattle and sheep feeding operations during the year amounted to about \$26 million.

San Diego County Water Authority

The San Diego County Water Authority encompasses approximately 897,806 acres and includes most of the developed areas in San Diego County. It has a population of about 1,665,200 and an assessed valuation of \$7,533,884,334.

The Authority is a member of The Metropolitan Water District of Southern California, having annexed to the District in 1946. At that time, the Authority merged its right to 112,000 acre-feet of Colorado River water annually with the District's original right of 1,100,000 acre-feet.

Colorado River water is delivered to the Authority through two branch aqueducts which carry the water south from the main Colorado River Aqueduct. Approximately 90 percent of all water distributed by the Authority's 23 member agencies is delivered through the San Diego Aqueducts.

The Metropolitan Water District of Southern California

The Metropolitan Water District of Southern California built and operates the 242-mile-long Colorado River Aqueduct which, for more than a decade, has delivered over 1,000,000 acre-feet of water annually to the coastal plain. The District is the largest of 31 contractors for Northern California water from the State Water Project. Since northern water became available to the District in 1972, it has gradually decreased pumping on the Colorado River Aqueduct and increased the amount of northern water. Blending increasing quantities of northern water with lesser amounts of Colorado River water enabled the District to supply a good quality municipal and industrial water and, at the same time, discontinue expensive softening treatment. In 1976, MWD had adjusted its take of water from the two sources to about 780,000 acre-feet from the Colorado and 638,000 from the State Project. The impact of the great drought, however, abruptly turned things around. In 1977, the District imported about 1,290,000 acre-feet from the Colorado and took only 190,000 from the state.

The coastal plain service area of the District covers 5,100 square miles, with a population of nearly 11 million and an assessed valuation of about \$53.6 billion. To deliver northern water to its member agencies, the District is expanding its facilities at a cost of more than one billion dollars. It has an investment of more than \$500 million in its Colorado River Aqueduct and its distribution system.

Imperial Irrigation District

Imperial Irrigation District, in the Southeastern corner of the state, is located in Imperial and Riverside Counties, and is bordered by Mexico on the south and by the Colorado River on the east. The gross acreage within the District boundaries—in Imperial County—is 1,062,290 of which 502,300 acres now receive water, making the I.I.D. one of the largest irrigation projects in the western hemisphere.

The 80-mile-long All-American Canal delivers Colorado River water to the District's 1,627 mile distribution system, and is the sole source of water for all agricultural, industrial, and domestic purposes. The canal, placed in service in 1942, replaced the old Alamo Canal, which was in service from 1901 and traveled much of its distance through Mexico. In addition to its Canal and distribution system, the District also maintains a 1,454-mile drainage network.

Imperial Valley, known as the "Winter Garden of America—Where the Sun Spends the Winter", annually produces crops valued at approximately \$500 million with the livestock industry contributing a substantial part of this amount. Imperial Valley cattle-feeding operations are the largest in the world.

The Colorado River, via the All-American Canal, has made possible the production of high-quality winter and early spring vegetables and fruits in large quantities. Other multi-million dollar crops include sugar beets, alfalfa, wheat, cotton, barley, and sorghum.

The All-American Canal also provides a second service, i.e., production of electric power—from hydro plants located along its channel—to the extent of 250,000,000 kwh per annum supplementing a 1,400,000,000 kwh power requirement to serve 140,000 consumers situated in Imperial and Riverside Counties.

Coachella Valley County Water District

The Coachella Valley County Water District is located west and north of the Salton Sea in California. More than 135,000 of its 620,451 acres could be irrigated from the 123-mile Coachella Branch of the All American Canal. There are presently 67,300 acres under irrigation rotation.

The Coachella Branch of the All American Canal brings vital Colorado River water to the fertile valley. The investment of the District in works dependent upon the water of the Colorado River system totals approximately \$34 million, including the underground distribution system and terminal reservoir at Lake Cahuilla.

Principal agricultural products of the Coachella Valley are dates, grapefruit, grapes, vegetables, alfalfa, cotton and grain which in 1978 had a value of \$128,000,000.

In 1978 the per acre crop value exceeded \$2,275.

Water for the district's 20,000 urban customers is supplied by deep wells. CVCWD has a contract for Northern California water to be used for groundwater recharge.

Through an exchange agreement with Metropolitan Water District of Southern California, CVCWD is using water from the Colorado River Aqueduct for groundwater recharge until facilities are constructed to extend the California Aqueduct to Coachella Valley. MWD, in turn, takes CVCWD's State Water Project entitlement.

In addition to irrigation and urban water service, Coachella Valley County Water District maintains regional stormwater control facilities, wastewater reclamation facilities and irrigation drainage facilities.

Membership

Patricia C. Nagle, Chairman
(Department of Water and Power, City of Los Angeles)

Raymond R. Rummonds,
Vice Chairman
(Coachella Valley County Water District)

John M. Cranston, Member
(San Diego County Water Authority)

Howard H. Hawkins, Member
(The Metropolitan Water District of Southern California)

Virgil L. Jones, Member
(Palo Verde Irrigation District)

Paul A. Mitchell, Member
(Imperial Irrigation District)

Helen K. Burke, Public Member

Milton N. Nathanson,
Public Member

Sanford K. Smith,
Public Member

E. Charles Fullerton, (Director,
Department of Fish and Game)

Ronald B. Robie, (Director,
Department of Water Resources)

Executive Staff

Myron B. Holburt,
Chief Engineer

Dennis B. Underwood
Executive Secretary

Introduction

The Colorado River Board of California is the State agency created by the Legislature in 1937 for the purpose of protecting the rights and interests of the State, its agencies, and its citizens in the water and hydroelectric power resources of the Colorado River System. The duties of the Board are set forth in Sections 12527 through 12533 of the California Water Code. The activities of the 13-member staff are directed by the Chief Engineer. The California Attorney General is legal counsel to the Board.

The Board consists of a total of 11 members. Six members are appointed by the Governor from the agencies with Colorado River water and power rights—City of Los Angeles Department of Water and Power, Coachella Valley County Water District, Imperial Irrigation District, The Metropolitan Water District of Southern California, Palo Verde Irrigation District, and San Diego County Water Authority. Three additional members are appointed by the Governor from the public and the Directors of the Departments of Water Resources and Fish and Game, or their designees are ex-officio members of the Board. The Governor annually appoints a Chairman from among the members of the Board other than the latter two members or their designees. Patricia C. Nagle continued as Chairman of the Board during 1978. Harold F. Pellegrin, Executive Secretary of the Board since 1953, retired in September 1978 and Dennis B. Underwood was appointed as the new Executive Secretary.

Colorado River Operations

Operations During 1978

The estimated virgin flow of the Colorado River at Lee Ferry during the 1977–78 water year (October 1

through September 30) was 15,268,000 acre-feet. This was 111 percent of the long-time average flow of 13,786,000 acre-feet for the 57-year period from 1922 to 1978.

During the water year, storage in Upper Basin reservoirs increased by 1,900,000 acre-feet, and storage in Lower Basin reservoirs increased by 694,000 acre-feet. As of September 30, 1978, the total active storage in the major Upper Basin reservoirs was 21,812,000 acre-feet and the active storage in the Lower Basin reservoirs was 22,932,000 acre-feet. The actual flow of the river below Glen Canyon Dam at Lee Ferry for the water year was 8,244,000 acre-feet.

The Bureau of Reclamation estimated the 1977–78 water year Upper Basin depletions by the Upper Basin States (Colorado, New Mexico, Utah, and Wyoming) at 3,906,000 acre-feet, 473,000 acre-feet more than the previous year.

Diversions less measured returns from the mainstream for the major water users of the Lower Basin States (Arizona, California, and Nevada) were 5,771,000 acre-feet for calendar year 1978, 315,000 acre-feet less than in 1977. Data for major California users show diversions less returns for calendar year 1978 at 4,596,000 acre-feet, 376,000 acre-feet less than 1977.

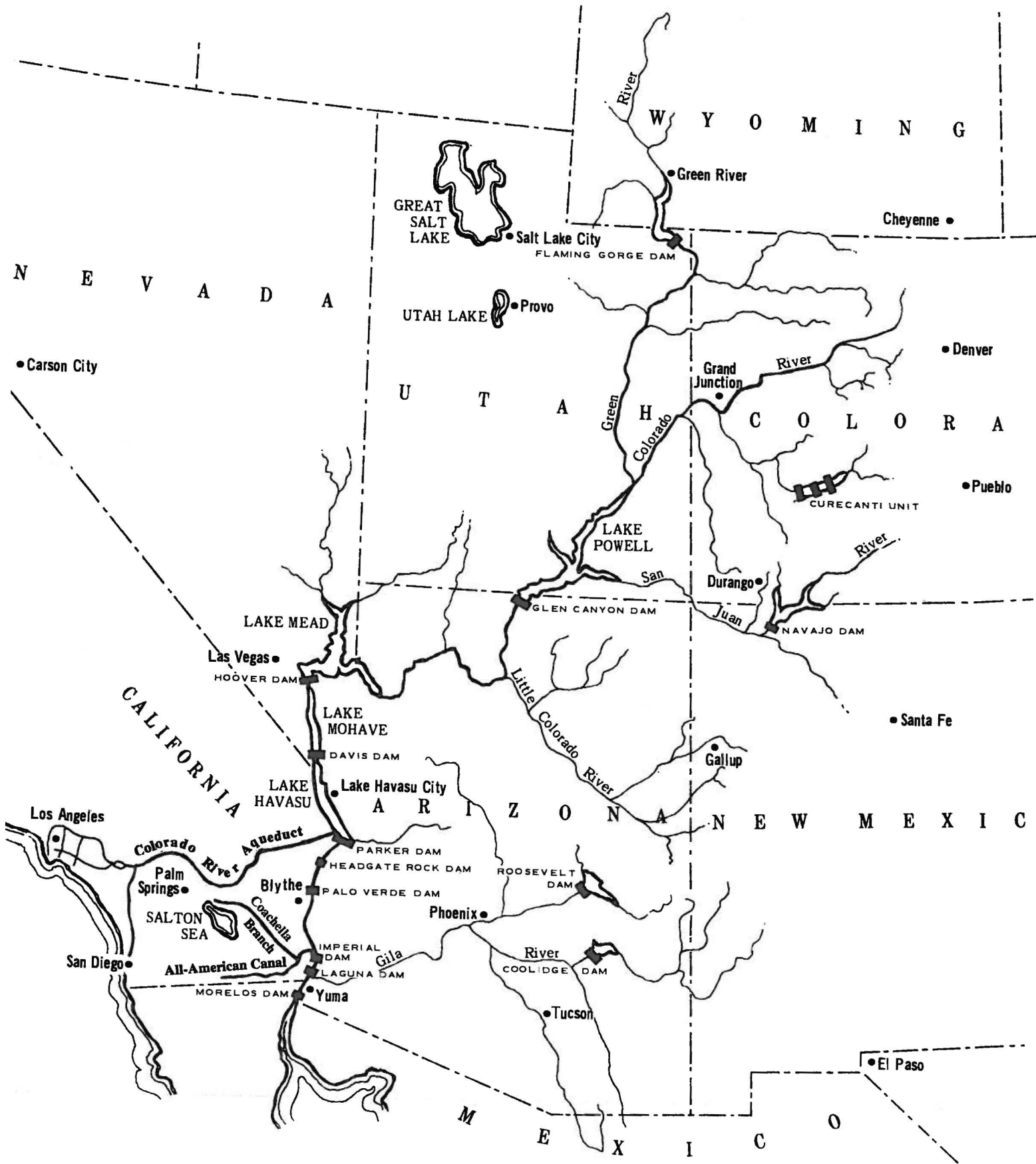
Deliveries of Colorado River water to Mexico in accordance with the 1944 Mexican Water Treaty totalled 1,727,000 acre-feet during calendar year 1978 or 227,000 acre-feet in excess of the Treaty's guaranteed annual quantity. Of this amount, 6,176 acre-feet was conveyed on an interim basis to the City of Tijuana through facilities of the Metropolitan Water District and other agencies in accordance with Minute No. 240 of the International Boundary and Water Commission. Of the 227,000 acre-feet of delivery in excess of the Treaty's guaranteed annual quantity, about 180,000 acre-feet was covered under provisions of the Commission's Minute No. 242, the 1973 agreement with Mexico, and about 47,000 acre-feet was chargeable to operational control of the river and to

U.S. users not taking ordered water. Most of the excess deliveries chargeable to operational control were due to uncontrollable floodwaters from tributaries entering the Colorado River below Hoover Dam. Minute No. 240 is described in the Board's 1972 Annual Report and Minute No. 242 is described in the Board's 1973 Annual Report.

The Colorado River Basin Salinity Control Act of 1974 recognized "replacement of the reject stream from the desalting plant and of any Wellton-Mohawk drainage water bypassed to the Santa Clara Slough . . . as a national obligation . . .". The Santa Clara Slough is adjacent to the Gulf of California and is the terminus of the canal constructed to convey Wellton-Mohawk drainage water and the reject stream from the desalting plant through Mexico. Since passage of the Act, the following amount of water has been discharged from the Wellton-Mohawk Drain below Morelos Dam, Mexico's diversion structure on the river, with the drainage water flowing through the lined canal to the Santa Clara Slough since its completion on June 23, 1977:

<i>Period</i>	<i>Drainage Water Released Below Morelos Dam (Acre-feet)</i>
June 25 to December 31, 1974 ..	113,645
1975 Calendar Year.....	214,729
1976 Calendar Year.....	205,395
1977 Calendar Year.....	206,822
1978 Calendar Year.....	<u>180,374</u>
Total through 1978	920,965

The Department of the Interior's Final Environmental Statement on the Title I facilities, Colorado River Basin Salinity Control Project, recognizes these bypassed quantities as a debit against the water to be salvaged by lining the Coachella Canal. The Statement indicates that credits from the Coachella Canal lining salvage would be used to offset past debits, to credit against brine discharge from the future desalting plant, and to accumulate credits to offset future brine discharges.



Recovery from the 1977 Dry Year

The Board's 1977 Annual Report noted that the virgin flow of the Colorado River at Lee Ferry for water year 1976-77 set a new record for historical low flows and created severe demands on Colorado River system water supplies. The above average runoff during the 1977-78 water year increased Basin reservoir storage by about 2.6 million acre-feet. Preliminary estimates of 1978-79 runoff, based upon Upper Colorado River Basin snowpack conditions as of January 1, 1979, point to another year of above-average runoff. This, combined with unusually high streamflows during December 1978 on the Bill Williams and Gila Rivers in the Lower Basin, indicate a full recovery from the effects of the 1977 dry year.

Potential Future Surplus Flows

The Board's 1977 Annual Report described joint Bureau of Reclamation-Corps of Engineers studies of alternative reservoir operating strategies during the years prior to completion of the Central Arizona Project when surplus flows are imminent and reservoir spills are likely to occur. These studies continued during 1978 but, due to a lack of urgency resulting from the drawdown of about 5.6 million acre-feet of water from storage in 1977, no meetings were held on their findings.

Program for Banking Water in Lake Mead

During 1978, meetings were held between the California State Department of Water Resources, The Metropolitan Water District of Southern California, and the Board to discuss a concept for banking, or storing, water in Lake Mead. Briefly, the concept involves Metropolitan increasing its deliveries from the State during years of good supply for the State Water Project, taking less than its annual Colorado River apportionment, and

having a like amount credited to its account in Lake Mead. In years of low water supply from the State Water Project, in addition to its annual apportionment, Metropolitan would divert water credited to its account in Lake Mead.

The proposal was also discussed with representatives of the other California Colorado River water contractors and the States of Nevada and Arizona and it was agreed to commence studies on this concept.

Water Quality

Colorado River Salinity Standards

The Colorado River Basin states in 1975 adopted numerical standards for salinity in the Colorado River. Under the provisions of Section 303(c)(1) of Public Law 92-500, the states are to review these standards at least once during each three-year period and, as appropriate, to modify them.

The seven-state Colorado River Basin Salinity Control Forum, through its permanent Work Group, which is chaired by the Board's Chief Engineer, conducted engineering studies of factors affecting future salinity in the Colorado River and prepared a draft of the report entitled "1978 Revision, Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System". The report constitutes the first triennial revision of the standards and plan of implementation.

Following approval of the report by the Forum on August 29, two regional public hearings were held on November 14 and 16, in Las Vegas, Nevada, and Grand Junction, Colorado. A supplement to the report was then prepared containing a summary and analysis of the comments received during and after the meeting and appropriate modifications to the report. On December 18, the Forum approved the supplement and directed that the report and supplement be sent to the individual states for adoption.

The Forum found no reason to recommend changes in the numeric sa-

linity criteria adopted in 1975 at the lower mainstem stations, which are:

	Salinity in mg/l
Below Hoover Dam.....	723
Below Parker Dam.....	747
Imperial Dam	879

Salinities at each of the stations have been decreasing almost consistently since 1972. In 1978, the flow-weighted salinity at Imperial Dam, for example, was 67 mg/l below the numeric criteria. The current and projected rate of basin-wide water development is slower than estimated in the 1975 report. Although progress on the salinity control program also has been slower than anticipated, there is no reason to believe that the numeric criteria will be exceeded during the next three-year revision period.

Colorado River Basin Salinity Control Program

The Bureau of Reclamation continued its efforts on Colorado River salinity control projects and the Colorado River Water Quality Improvement Program in accordance with the Colorado River Basin Salinity Control Act of 1974, P.L. 93-320. The Soil Conservation Service continued its active role in salinity control through its on-farm water management program.

A draft contract for the operation and maintenance of the *Grand Valley Unit* by local agencies was completed by the Bureau. Execution of the contract, which includes economic penalties for excessive water diversions, is required before construction can begin on this unit. The Soil Conservation Service continued its activities in the Valley and issued its final report describing its proposed on-farm program for salinity control. Current plans call for completion of the salinity control programs of the Bureau of Reclamation and Soil Conservation Service in 1990 and an estimated reduction of the salts picked up in the Grand Valley by 410,000 tons annually.

The Bureau completed the Environmental Impact Statement and the Definite Plan Report for the *Paradox Valley Unit*. Construction of a temporary brine conveyance pipeline and

brine holding pond was initiated. The temporary facilities will be used during a two-year testing period of 18 extraction wells that were completed in 1977 to determine the optimal pumping configuration and rates of extraction required to control the brine flow. The permanent brine pipeline and evaporation reservoir are scheduled for completion in 1983, at which time it is estimated that the unit will be able to remove 180,000 tons of salt annually.

Construction of the *Las Vegas Wash Unit* was postponed pending completion of an 18-month program of additional data collection activities and hydro-salinity studies and the finalization of local waste water management plans.

Basin Water Quality Control Plans

Section 208 of the Clean Water Act of 1977 requires procedures for continuing planning for improving the nation's water quality. These "208 planning studies" are being carried on throughout the Basin. The 208 studies are to consider salinity as part of the overall plan. The salinity portions of the plans are being reviewed by the Forum Work Group for the purpose of obtaining salinity portions of plans that are consistent throughout the Basin and will be consistent with the Forum's policies. During the year, a number of 208 plans were completed, two in Utah, two in Colorado, one in Wyoming and one in Nevada. The Clark County, Nevada, 208 plan has been conditionally certified by the Governor of Nevada and submitted to the Environmental Protection Agency for evaluation and approval. None of the other 208 plans within the Basin have received state certification.

The 208 planning study for the Colorado River region in California to minimize salt return to the river is scheduled for completion in late 1979. The study is a cooperative effort by the California Regional Water Quality Control Board—Colorado River Region, U.S. Geological Survey, Palo Verde Irrigation District and the Colorado River Board.

The Salinity portions of the 208 plans, after certification by the respec-

tive states and approval by the EPA, will become a part of the Salinity Control Forum's plan of implementation for salinity control.

Denver Research Institute

The Denver Research Institute (DRI), under a grant from the Office of Water Research and Technology, conducted a study entitled "Overcoming Legal and Institutional Barriers to Consumptive Reuse of Low Quality Water in the Colorado River Basin". A draft report describing the study is scheduled for release in January 1979. The Chief Engineer of the Colorado River Board served as a member of the DRI Advisory Board.

Salinity Measures for Mexico

The Bureau of Reclamation continued its work on engineering plans and specifications for the desalting plant and other facilities and measures necessary to implement the 1973 agreement with Mexico on Colorado River salinity. The desalting plant and other measures were authorized by Title I of P.L. 93-320 and described in the Board's 1974 Annual Report.

The Bureau awarded two contracts totalling \$27,887,554 to two California firms, Fluid Systems Division of Universal Oil Products, Inc., and Hydranautics, for the purchase of membrane desalting equipment for the Yuma desalting plant. The determination for these awards was made in September 1977. However, awards were delayed for a year because of protests filed with the General Accounting Office by unsuccessful bidders.

The Coachella Valley County Water District (CVCWD) and the Department of the Interior signed a repayment contract for replacement of a 49-mile unlined section of the Coachella Canal. A \$15.4 million contract was awarded by the Bureau of Reclamation for construction of the first 33-mile section of the concrete lined canal replacement. When completed, the 49-mile replacement will save an estimated 132,000 acre-feet of water

lost annually to seepage in the unlined canal. This salvaged water will initially be used for deliveries of Colorado River water to Mexico required to meet the salinity control objectives of Minute 242 of the International Boundary and Water Commission. Later, the water savings will be utilized by CVCWD or The Metropolitan Water District of Southern California who signed an agreement with CVCWD in 1977 allowing it to use that part of salvaged water than exceeds the needs of CVCWD.

Yuma Desalting Plant Reject Stream Replacement

The 1974 Colorado River Basin Salinity Control Act, Public Law 93-320, declared the replacement of the reject stream from the Yuma Desalting Plant to be a national obligation and directed the Secretary of the Interior to identify feasible measures to provide adequate replacement water by June 30, 1980. The potential sources for the replacement must be from within the States of Arizona, California, Colorado, and New Mexico, and those portions of Nevada, Utah, and Wyoming that are within the natural drainage of the Colorado River Basin.

The Bureau of Reclamation continued its studies of potential sources during 1978, and in May held a public meeting in El Centro which was attended by a Board staff member. A presentation was made by the Bureau on the alternatives being studied and comments were requested from the audience.

In June, the Chief Engineer discussed the studies with Bureau of Reclamation personnel and suggested additional studies be performed of seepage from the All-American Canal, amortization of the costs of a new lined canal for varying interim periods, procedures whereby California agencies could recover salvaged water after an interim period of use by the United States, and a proposal to pump groundwater from

areas adjacent to the All-American Canal. The Bureau agreed to make the additional studies and to meet with the California water agencies that would be directly involved in any proposed water exchange.

Establishment of Critical Habitat for Endangered Species in Basin

The Board's Annual Report for 1977 described the publishing in the Federal Register by the U.S. Fish and Wildlife Service of a proposed regulation to designate the Virgin River from Lake Mead to north of Hurricane, Utah, as a critical habitat for an endangered species of fish, the woundfin. The report also described the opposition of the Colorado River Basin states to this proposal.

On April 24, 1978, the Fish and Wildlife Service also published in the Federal Register a proposed regulation to designate the bonytail chub an endangered species and the razorback sucker a threatened species, both of which are native to the Colorado River System. If this regulation is finalized, it could jeopardize many funded and proposed programs for the development of further water uses in the Colorado River Basin and proposed programs for the improvement of water quality such as for salinity control.

On May 23, 1978, the Secretary-Engineer of the Colorado River Water Conservation District of Glenwood Springs, Colorado, sent a letter to the Secretary of the Interior giving notice of intent to file a citizen's suit under the Endangered Species Act in the event the Secretary of Interior fails to correct alleged violations of the Act or associated regulations by the Department of the Interior's own programs which conflict with each other and are in violation of the Act. The Fish and Wildlife Service recognized that the proposed suit had merit and put an immediate stop on all stocking of non-native species of fish. A review was made of all fish stocking operations, and it was decided that in

the future stocking would be allowed only: (1) if there would be no effect on the endangered species, (2) if there is a barrier to migration of the stocked species to other reaches of the stream, or (3) if it is determined by firm data that the stocked species uses a different habitat than the endangered or threatened species in the same reach of stream. Stocking of trout was later resumed everywhere in the Basin except Lake Havasu, but stocking of channel catfish and other warm water fishes was resumed only in those areas where there are no endangered species.

On July 21, 1978, and again on August 11, 1978, the Chief Engineer, in letters to the Director of the Fish and Wildlife Service, recommended that the proposed rule-making relative to the bonytail chub and the razorback sucker be held in abeyance, and that studies be initiated that would identify the life cycle of these species in the lower Colorado River mainstem, to the extent that clear conclusions may be drawn relative to their status as threatened or endangered species.

In the Federal Register of August 23, 1978, there was published a proposed rule to designate the Virgin River Chub as an endangered species and to designate all of the Virgin River below LaVerkin Springs, Utah, in the States of Nevada, Arizona and Utah as critical habitat for the chub. On November 9, 1978, the Chief Engineer, in a letter to the Director of the Fish and Wildlife Service, stated that the Board concluded that the evidence presented does not support the designation as critical habitat of two reaches of the Virgin River: (1) from Lake Mead to an undefined point immediately downstream of the Town of Mesquite, Nevada, and (2) through the Beaver Dam Mountains, commonly called the Virgin River Narrows. In these two reaches of the river, there are no flows over substantial periods of each year; thus, these reaches could not be critical for the survival of the Virgin River Chub and should not be included in any designation of critical habitat. Since Congress had just enacted several

changes in the Endangered Species Act, the letter also recommended that the proposed rule-making be held in abeyance until the impacts of these changes on such rule-making can be fully evaluated.

In a letter dated November 22, 1978, to the Fish and Wildlife Service, the Colorado River Basin Salinity Control Forum also supported the Colorado River Board's conclusions regarding the Virgin River Chub.

Chemehuevi Indian Reservation Wastewater Facility

The concern of the Board and all of California's Colorado River water users regarding the proposed aquaculture wastewater treatment plant was described in the 1977 Annual Report. The Tribe cancelled plans to construct the facility in 1978 because the federal Economic Development Administration would not release its grant funds of \$2.4 million because of the concerns of federal agencies and Colorado River water users over the use of water hyacinth or duckweed as a nutrient stripping agent.

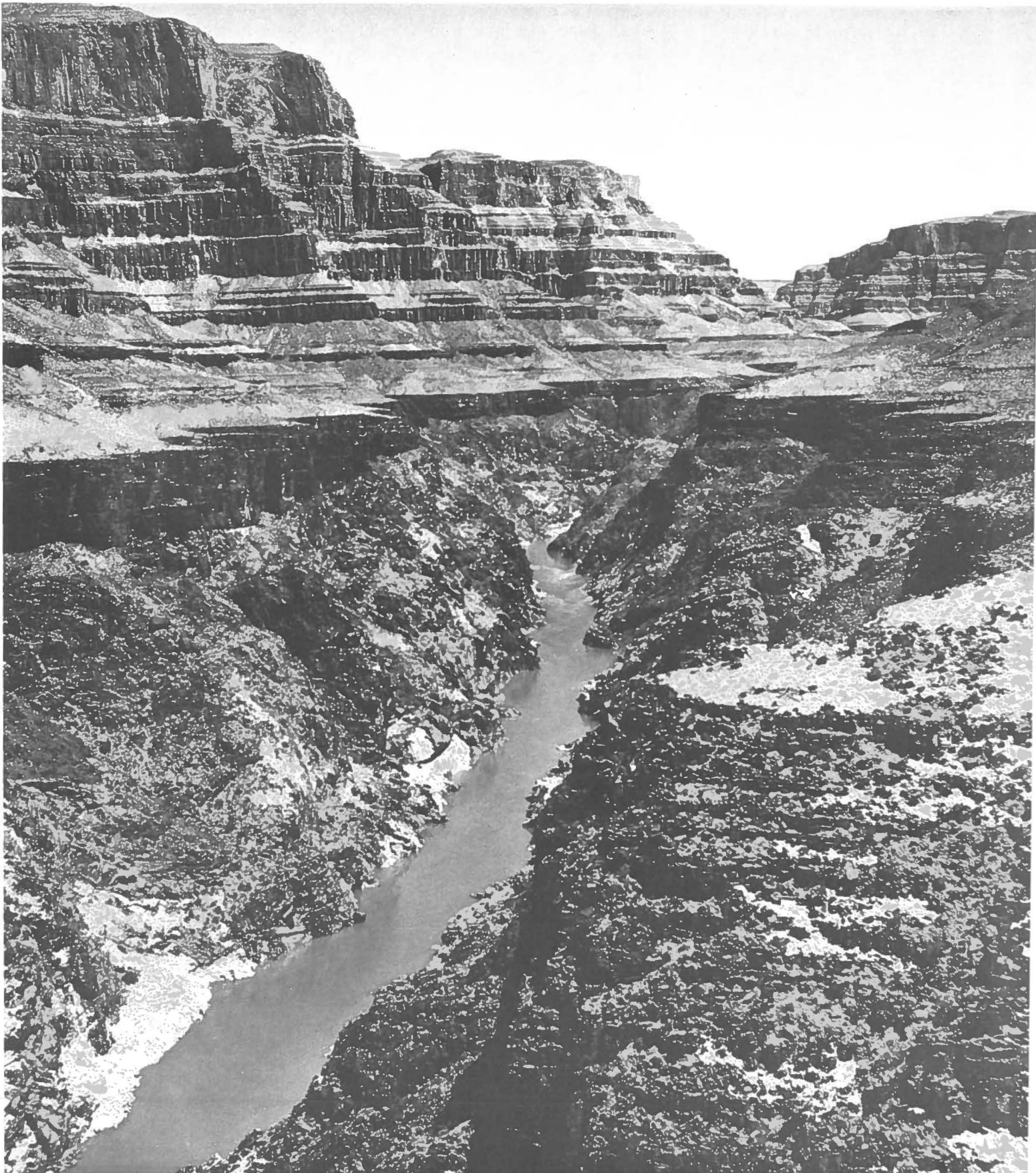
The Chemehuevi Tribe has submitted a grant application for \$2.5 million for a plant using conventional wastewater treatment technology. The new facilities will include lagoons for fish and shellfish culture.

Consortium of Water Institutes and Centers

The Consortium of Water Institutes and Centers is an organization of universities in the Colorado River Basin states that perform water related research in the Basin. The Board's Assistant Chief Engineer is a member of the Consortium's Technical Advisory Committee. Many of the Research projects currently being conducted by the various members of the Consortium have been described in previous annual reports.

The Chief Engineer gave a presentation on April 11, 1978, at Reno, Nevada, at the Southwest

The Colorado River cuts a deep channel emerging from the southern end of Grand Canyon.



Technology Transfer Workshop. In his talk, the Chief Engineer described examples of water research that the Board supported and which were helpful in making decisions regarding Colorado River water problems. He also gave examples of proposals which the board opposed because they were redundant, or would not provide information on current problems in the Colorado River Basin.

Regional Developments

The Board's staff continued to review plans for water and energy development projects in the Colorado River Basin to determine their effect on California's Colorado River water rights and interests, and, if necessary, to attempt to obtain changes in the projects. A trend that appeared during 1975 and continued through 1978 was a slowdown in earlier plans for the development of the Colorado River Basin's coal and oil shale resources, which has the effect of reducing projections of future water use. The President's new water policy, which was sent to Congress in June 1978, should also affect Basin development.

GAO Report on Colorado River Basin Water Problems

During 1978, the United States General Accounting Office (GAO) prepared a draft report to Congress entitled "Colorado River Basin Water Problems: Proposals to Reduce Their Impact". The proposed report analyzed several of the major current and future Colorado River problems and issues, but revealed a lack of understanding of some of these problems. The GAO's study principally consisted of a superficial analysis of complex issues which led to erroneous conclusions and recommendations.

In December, the Chief Engineer sent a letter of comment which covered the report's overly pessimistic view of the timing of water shortages in the Basin, which resulted in

erroneous conclusions about the need for immediate federal actions on the Colorado River operating criteria and other matters. The letter also identified the misconceptions that underlay the recommendation for a halt in the funding of the salinity control projects, and recommended significant changes in the report's conclusions and recommendations. The other area of major significance was in regard to the report's conclusion that an overall management and decision-making agency is needed in the Basin in order to mandate solutions to the many problems of Colorado River Compact interpretations, water supply, salinity, and conservation. The letter opposed the creation of such an agency and pointed out that the problems are being worked on by existing state and federal agencies.

Upper Basin Developments

Environmental Impact Statements (EIS) or Assessments on several Upper Basin projects were drafted by federal agencies during 1978, and the Board's staff reviewed and commented on these statements. The projects and some highlights of the Board's comments are presented in the following paragraphs:

1. An Environmental Assessment on the *Grand Valley Unit* of the Colorado River Basin Salinity Control Project was reviewed. The Board recommended that the Bureau of Reclamation prepare a negative determination for the Unit and proceed with construction because the mitigation measures proposed should provide more than adequate compensation for any negative environmental aspects of the Unit.

2. The Draft EIS for the *Paradox Valley Unit* of the Colorado River Basin Salinity Control Project was reviewed and the Board supported the Bureau of Reclamation's recommendation for the location of an evaporation pond site.

3. The Draft EIS for the *Uintah Unit, Central Utah Project*, was reviewed and the Board recommended that the project include

an educational program to inform farmers of crop needs and optimum irrigation scheduling in order to improve irrigation efficiency and to reduce the present tendencies to overirrigate when there is more than sufficient water available.

4. The Draft EIS concerning the proposed *Development of Coal Resources in Southern Utah* was reviewed and the Board recommended the adoption of the Colorado River Basin Salinity Control Forum's objective for industrial discharges of a no-salt return policy, wherever practicable, because this policy has been followed at other recently completed projects in the Colorado River Basin.

5. The Forum's policy, mentioned above, was also stressed in the Board's comments on the Draft EIS for the proposed *Development of Coal Resources in Central Utah*.

In a ruling concerning the *Fryingpan-Arkansas Project* in Colorado, the Department of the Interior Solicitor ruled that the Bureau of Reclamation must seek Congressional authority before it could increase the diversion from Hunter Creek tributaries in the Upper Colorado River Basin from 3,000 to 10,300 acre-feet annually and use the water for a different purpose than Congress intended when it authorized the Project. Construction of works for the larger diversion was estimated to be 90 percent complete at the time of the ruling.

The Bureau of Reclamation awarded a \$4.5 million contract for construction of Strawberry and Currant Creek Reservoir recreation roads and facilities as a part of the *Bonneville Unit* of the *Central Utah Project*.

Lower Basin Developments

The Bureau of Reclamation awarded a \$34 million contract for construction of the *Central Arizona Project's Havasu Pumping Plant* located on the Bill Williams arm of Lake Havasu. Also awarded was a \$15.3 million contract for the construction of a 13½-mile reach of the *Granite Reef Aqueduct*.

Two contracts were awarded totalling \$33.6 million for construction of the 20.2-mile-long Pittman Lateral on the *Second Stage of the Southern Nevada Water Project* and a \$14.1 million contract for the construction of three pumping plants and the modification of an existing pumping plant.

A \$15.4 million contract was awarded for construction of the first 33 miles of concrete-lined canal to replace an unlined section of the *Coachella Canal*. This is discussed further under "Salinity Measures for Mexico".

Two contracts totalling about \$27.9 million were awarded for the purchase of membrane desalting equipment for the *Yuma Desalting Plant*. This is discussed further under "Salinity Measures for Mexico".

The California Energy Commission, on February 15, 1978, approved the Notice of Intent for the Sundesert Nuclear Project, for one unit of the proposed multiple unit project, subject to conditions and modifications set forth in an appendix to the decision. This decision, with its conditions and modifications, superseded the recommendations in the Commission's Final Report, on which hearings were held in December 1977.

Because of the many costly restrictions and conditions imposed by this decision, the San Diego Gas and Electric Company decided to abandon further work upon this project at this time. In late 1978, the Department of the Interior approved the Company's water supply plans.

Weather Modification Activities

The Bureau of Reclamation continued its planning for the proposed Colorado River Weather Modification Demonstration Project. The Bureau plans to retain outside consultants to prepare the design and plans for the initial stages of operations for the Project, and will revise the design and operations as the project progresses in order to maximize its effectiveness. While completion of all phases outlined for

the program would take until the mid-1990's, the program contemplates that sufficient information would be available by the mid-1980's in order to arrive at a firm decision as to the feasibility of augmenting the Colorado River by weather modification. The Colorado River Board supported a write-in appropriation of \$500,000 for the Project in the fiscal year 1979 budget, and letters of support were sent to California's Senators and Congressmen.

A report entitled "The Management of Weather Resources" prepared by the federal Weather Modification Advisory Board was reviewed by the Colorado River Board staff. This Advisory Board was appointed by the Secretary of Commerce in 1977, pursuant to P.L. 94-490, to conduct a comprehensive investigation of the state of scientific knowledge concerning weather modification in order to develop a national policy and program of research and development. The report reaches positive conclusions regarding the possibility of increasing precipitation by cloud seeding on western orographic clouds, but concludes that detailed operational projects need to be conducted in order to verify these conclusions. The report strongly supports the Bureau of Reclamation's weather modification demonstration program for the Colorado River Basin. A 20-year program is recommended, including a first-year appropriation of \$37 million increasing to \$90 million by the fifth year, which would include full funding for the Colorado River Weather Modification Demonstration Project.

Vegetation Management for Increased Water Yield

The Board staff reviewed a draft report entitled "Vegetation Management for Water Yield Improvement in the Colorado River Basin", prepared by the U.S. Forest Service for the Pacific Southwest Inter-Agency Committee. In a letter of

comment, the Staff recommended that additional feasibility level studies should be conducted, and in these studies close coordination should be developed with the Bureau of Reclamation's Colorado River weather modification augmentation studies to obtain full benefits from the synergistic effects of simultaneous cloud-seeding and vegetation management activities that were identified in the report.

Lower Colorado River Management Program

The Federal-State Lower Colorado River Management Program Work Group met twice during 1978 to continue coordination of problems of river control, channelization, and environmental preservation and enhancement. The Coordinating Committee did not meet during the year. The functions of these groups have been described in the Colorado River Board's previous Annual Reports.

During 1978, the California Department of Fish and Game proposed to develop a backwater at Beal Slough on the California side of the Colorado River between Needles and Topock. It would involve a cooperative effort of federal, state, and local agencies and would consist of three phases: dredging about 30 acres to deepen the backwater at low river stages, improvement of habitat for fish and wildlife, and development of recreational facilities. The proposal was approved by the Work Group after a hydrologic analysis was prepared showing that no net increase in water use would occur. The Bureau of Reclamation's dredge will begin the dredging phase of the work in early 1979.

Also during 1978, the Work Group approved construction of artificial reefs to improve fish habitat in Lake Havasu and Colorado River

backwaters, approved a continuation of dredging in Topock Marsh to improve fish and wildlife habitat, and discussed a demonstration revegetation project for wildlife habitat near Blythe and a proposed vegetation clearing program in the Colorado River flood plain near Yuma. A subcommittee of the Work Group was reactivated to study the river channel stabilization plan for the lower portion of the Parker Division on the Colorado River Indian Reservation. The subcommittee will utilize the new principles and standards of the federal Water Resources Council in their analysis of the alternative plans for the project.

Legal Issues

Arizona v. California

On December 21, 1978, the United States filed a motion with the U.S. Supreme Court for modification of the Decree to permit diversion of an additional 199,443 acre-feet of Colorado River water to the five Indian reservations along the lower Colorado River, including 112,362 acre-feet in Arizona, 86,112 acre-feet in California, and 969 acre-feet in Nevada. The motion was filed pursuant to Article IX of the March 9, 1964, U.S. Supreme Court Decree in *Arizona v. California* which provides:

"Any of the parties may apply at the foot of this decree for its amendment or for further relief. The Court retains jurisdiction of this suit for the purpose of any order, direction, or modification of the decree, or any supplementary decree, that may at any time be deemed proper in relation to the subject matter in controversy."

This is the first time in the 15-year life of the Decree that any of the parties has invoked Article IX.

Within California, the claims are for 65,806 acre-feet for "boundary adjustments" and 20,306 acre-feet for

"omitted lands". The additional consumptive use resulting from 86,112 acre-feet of diversions is estimated to be between 43,000 and 59,000 acre-feet. The filing of the motion was only one day after Secretary of the Interior Andrus signed a Secretarial Order which purportedly restored the original 1884 boundaries of the Yuma Indian Reservation, which action is described in a subsequent section.

On January 9, 1979, the Court referred this motion, and the December 1977 and April 1978 motions for leave to intervene by the five lower Colorado River Indian tribes through their own counsel, to a Special Master for hearing. These motions are described in the next section on Present Perfected Rights. Elbert Tuttle, a judge of the Fifth Circuit Court of Appeals in Atlanta, Georgia, was appointed Special Master.

Present Perfected Rights

Progress continued to be made during 1978 in the settlement of the issues of present perfected rights in the *Arizona v. California* litigation. As defined in the 1964 U.S. Supreme Court Decree, present perfected rights are mainstream water rights acquired under state law and exercised by an actual diversion, or federal reserved water rights, both established prior to June 25, 1929, the effective date of the Boulder Canyon Project Act.

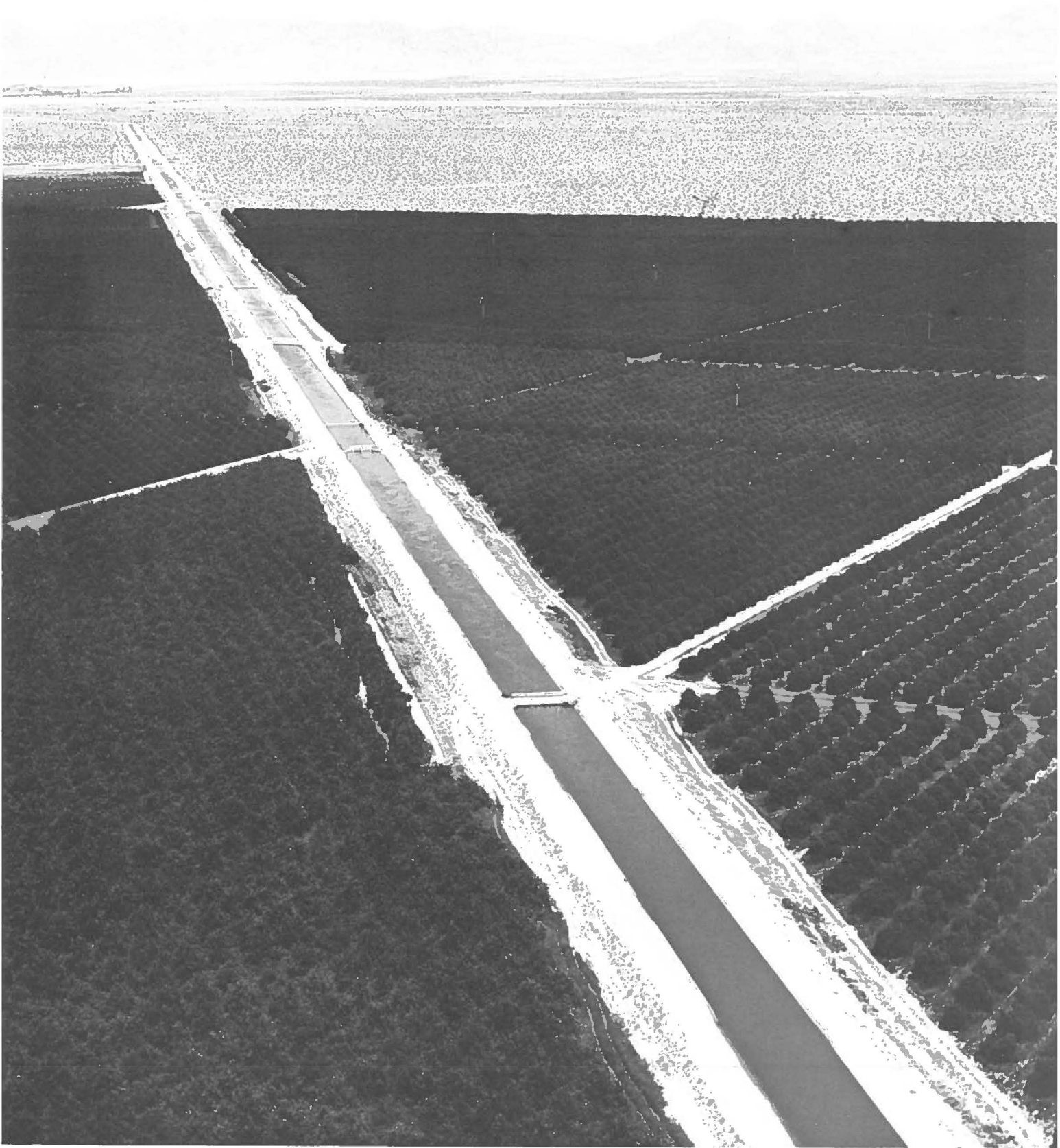
The Board's 1977 Annual Report described a motion for leave to intervene filed with the Supreme Court in late December 1977, by three of the five Lower Colorado River Indian tribes holding decreed present perfected rights under *Arizona v. California* and the United States' November 1977 response to the state parties' May 2, 1977, joint motion for determination of present perfected rights. The state parties filed a joint response to the Court on January 25, 1978, opposing the motion of the three tribes and contending that proceedings toward carrying out the Court's mandate under Article VI of the 1964 Decree should be allowed to

continue between the existing parties. On February 27, 1978, the state parties filed a reply with the Court stating that the United States' November 1977 proposal was acceptable and that the United States and the state parties intended to file a joint motion for entry of a supplemental decree. This was accomplished on May 26, 1978, when a "Joint Motion for the Entry of a Supplemental Decree", a "Proposed Supplemental Decree", and a "Memorandum in Support of Proposed Supplemental Decree" was filed with the Court.

On April 7, 1978, the three Indian tribes that filed the December 1977 motion for leave to intervene (Fort Mojave, Chemehuevi, and Quechan) also filed with the Court a petition of intervention and a brief in support of the petition. The petition asked the Court to allow the Indians to intervene and to not grant the state parties' joint motion for determination of present perfected rights. The petition also asserted claims for up to 605,300 acre-feet of additional mainstream Colorado River water for four tribes (Fort Mojave, Colorado River, Chemehuevi, and Quechan) in the States of Arizona, California, and Nevada. Although no breakdown of the claims was made between the States, it was apparent that over 200,000 acre-feet of the additional claims were in California.

On April 10, 1978, a motion to intervene and a petition of intervention was filed with the Court by the two other Lower Colorado River Indian Tribes holding decreed present perfected rights (Cocopah and Colorado River). The two tribes seek to intervene for purposes of litigating additional Indian claims under Article IX and Article II(D)(5) of the Decree, but agree that the joint motion for determination of present perfected rights should be adopted by the Court. The motion asserted claims for 4,969 acre-feet of additional mainstream Colorado River water for the Cocopah Indian Reservation (all

Irrigation from the Coachella Branch of the All-American Canal makes agriculture flourish near the Salton Sea.



in Arizona) and 18,076 acre-feet for the Colorado River Indian Reservation (all in California) due to boundary changes. In addition, claims were made for an unspecified amount of water for irrigable lands within the undisputed boundaries of the two reservations.

Responses to the various motions and petitions were filed with the Court by the parties.

On September 8, 1978, a new motion for leave to file an amicus curiae brief was filed with the Court by an attorney for private parties involved in judicial proceedings relating to Indian land claims along the lower Colorado River. The Court accepted the amicus brief. The Court heard oral arguments concerning present perfected rights and the various motions on October 10, 1978, in Washington, D.C.

On January 9, 1979, the Court entered a supplemental decree for determination of present perfected rights that was identical to one which had been agreed to by the state parties and the United States. In so doing, the Court denied the portion of the motion of the three tribes that opposed the entry of a supplemental decree. Thus, the supplemental decree was entered 14 years and 10 months after the basic Decree, which was entered on March 9, 1964. At that time, the Court gave the parties two years to present their lists of claimed present perfected rights. The supplemental decree was accomplished without a trial and presentation of evidence, but required an enormous amount of staff time, fact-finding, and negotiations.

Other portions of the motions of the three tribes and the two tribes regarding bases for intervention were referred to a Special Master, as previously indicated.

Yuma Indian Reservation Boundary

The Board's Annual Reports for the years 1974-77 described efforts of the Quechan Tribe of the Yuma Indian Reservation to expand, by means of a Secretarial Order, the boundaries of

the Reservation by some 32,000 acres of land which the Tribe has previously transferred to the United States.

On December 20, 1978, Secretary of the Interior Cecil D. Andrus signed a Secretarial Order which purportedly restored the original 1884 boundaries of the Reservation. This Order followed a new Solicitor's Opinion by Leo M. Krulitz which reversed three former Opinions by Solicitors Margold in 1936, Weinberg in 1968, and Austin in 1977. None of the California or Arizona affected parties were informed of the pending action nor were given an opportunity to comment on the draft Opinion, as had been promised by Solicitor Krulitz on March 30, 1977.

As noted in the previous section, the next day, December 21, 1978, the United States Department of Justice included the Secretarial Order in its motion filed with the Supreme Court for modification of the Decree in *Arizona v. California* to provide additional water rights to the Reservation based upon additional irrigable acreage in the "restored" boundaries. The United States claimed additional reserved water rights for 5,500 acres, 4,200 in California and 1,300 in Arizona. A total of 28,017 acre-feet of diversions is claimed in California, the estimated consumptive use of which would be between 13,900 and 18,900 acre-feet per year.

The 1977 Austin Opinion supported the earlier Opinions of Margold and Weinberg and was very comprehensive. It concluded that the 1893 agreement between the Quechan Indians and the United States, ratified by Congress in 1894, was an absolute cession of the Indians' title to the non-irrigable lands of the Reservation; that the Indians' interests in the irrigable lands were limited to the allotments made to individuals comprising the Tribe; and that, even if the cession was conditional, all material conditions on the part of the United States were met and the cession had occurred.

Solicitor Krulitz's Opinion bases its conclusion that the 1884 boundaries of the Reservation are still valid on his finding that the 1893 agreement and

the act of Congress in 1894 in ratifying that agreement were conditional actions. The Opinion holds that, since the specified conditions were not implemented, the agreement was void.

Termination of Unauthorized Colorado River Water Use

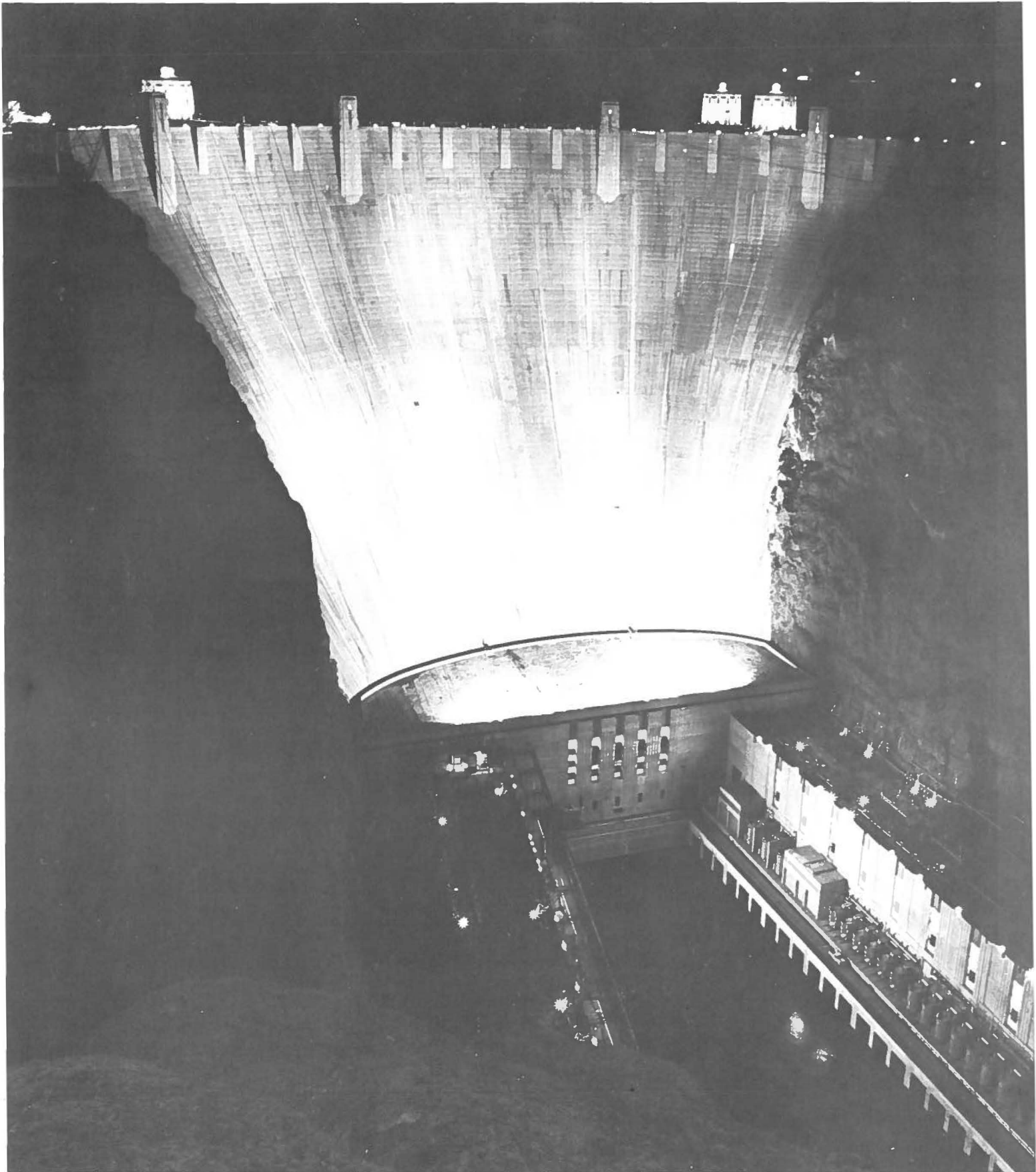
On June 7, 1978, the Department of the Interior, Bureau of Reclamation, published in the *Federal Register* a notice of intent to propose rule-making entitled "Procedural Methods for Implementing Colorado River Water Conservation Measures with Lower Basin Contractors and Others". The notice asks for suggestions and recommendations on how the Secretary of the Interior may best pursue the termination of noncontract uses. Letters were sent to unauthorized water users to notify them of the proposed termination of illegal diversions. Arizona users were advised to contact appropriate State agencies to determine the availability of water for contracting purposes. For unauthorized water users in California, notice was given that ultimately domestic users (but not agricultural users) may be able to contract with the Secretary of the Interior for a permanent water supply if the United States is able to develop a water supply for that purpose pursuant to investigations now in progress.

An environmental assessment will be prepared prior to publication of the final regulations.

Lower Colorado River Return Flow Study

The activities of the Federal-State Task Force on Ground Water Return Flows to the Lower Colorado River have been described in the Board's previous annual reports. Although the Task Force has been in existence since 1970 in an advisory capacity to the Bureau of Reclamation and the U.S. Geological Survey, it has not met regularly in recent years due to the slow pace in developing information which can be used to determine

Hoover power plant near Las Vegas provides much of the energy for pumping Colorado River water.



unmeasured return flows in the Lower Basin.

The Board's Chief engineer attended a meeting of the Task Force on March 23, 1978, in Phoenix, Arizona, at which time the progress was discussed. It was agreed that a program will be established whereby the Bureau of Reclamation will establish the specific information required from the Geological Survey so that unmeasured return flows by districts and by states can be determined in the Yuma area. The Geological Survey is continuing to develop the mathematical models and computer techniques for evaluating the magnitude of return flows in the area. The piezometer drilling program has been completed in the Palo Verde and Cibola Valleys, but the measuring instruments and river-stage stations had not yet been installed. The Bureau of Indian Affairs began setting well points on the Fort Mojave Indian Reservation to obtain data for development of an irrigation drainage system.

Proposed Restudy of Colorado River Operating Criteria

On May 19, 1978, Secretary of the Interior Cecil Andrus wrote letters to the Governors of the seven Colorado River Basin states requesting them to send representatives to a meeting in June in Salt Lake City with Bureau of Reclamation representatives. The purpose of the meeting would be to discuss engineering studies that would assist the Secretary in making the annual decisions in regard to the amount of storage in Upper Basin reservoirs required pursuant to the operating criteria for Colorado River reservoirs under Section 602(a) of the 1968 Colorado River Basin Project Act (called "602(a) storage").

Reclamation representatives proposed new studies to develop hydrologic data and the interaction between 602(a) storage and the Hoover Dam flood control releases required by the Corps of Engineers. They also suggested forming an advisory committee, with a charter to be published in the Federal Register along with notices of all committee

meetings. State representatives questioned the need for any studies at this time and suggested that the formal procedure of forming a committee be avoided because it is too cumbersome and is not needed.

It was agreed that formal studies would not be undertaken at this time, but that Upper Basin and Lower Basin representatives would prepare separate statements on criteria which the Bureau of Reclamation could use for a short study to analyze how urgent it is to conduct any new studies of 602(a) storage. Arizona, Nevada, and California representatives met in June and July to discuss a draft statement prepared by the Board's staff. After revision, the statement was transmitted to the Bureau of Reclamation by the Board's Chief Engineer on behalf of the three states on July 26, 1978. The statement concluded that there is no need to restudy the Operating Criteria at this time.

EDF v. Costle, et al

The suit filed by the Environmental Defense Fund (EDF) against the Environmental Protection Agency (EPA), the Department of the Interior, and the Bureau of Reclamation on August 22, 1977, is proceeding. In late 1977, Attorney General Younger filed a motion, on behalf of the People of the State of California, to intervene as a defendant in the suit. On January 18, 1978, Judge Flannery granted the motion for intervention by California, as well as similar motions by the other Basin states. Each of the Basin states was given full status as party defendants.

Discovery, mainly the collection of federal, state, and Salinity Control Forum documents related to the salinity standards, is in progress by all parties and is expected to be completed in early 1979 as is the filing of the Administrative Record.

It is anticipated that rulings will be made on the major issues in the suit within the next year.

EDF, et al v. Higginson, et al

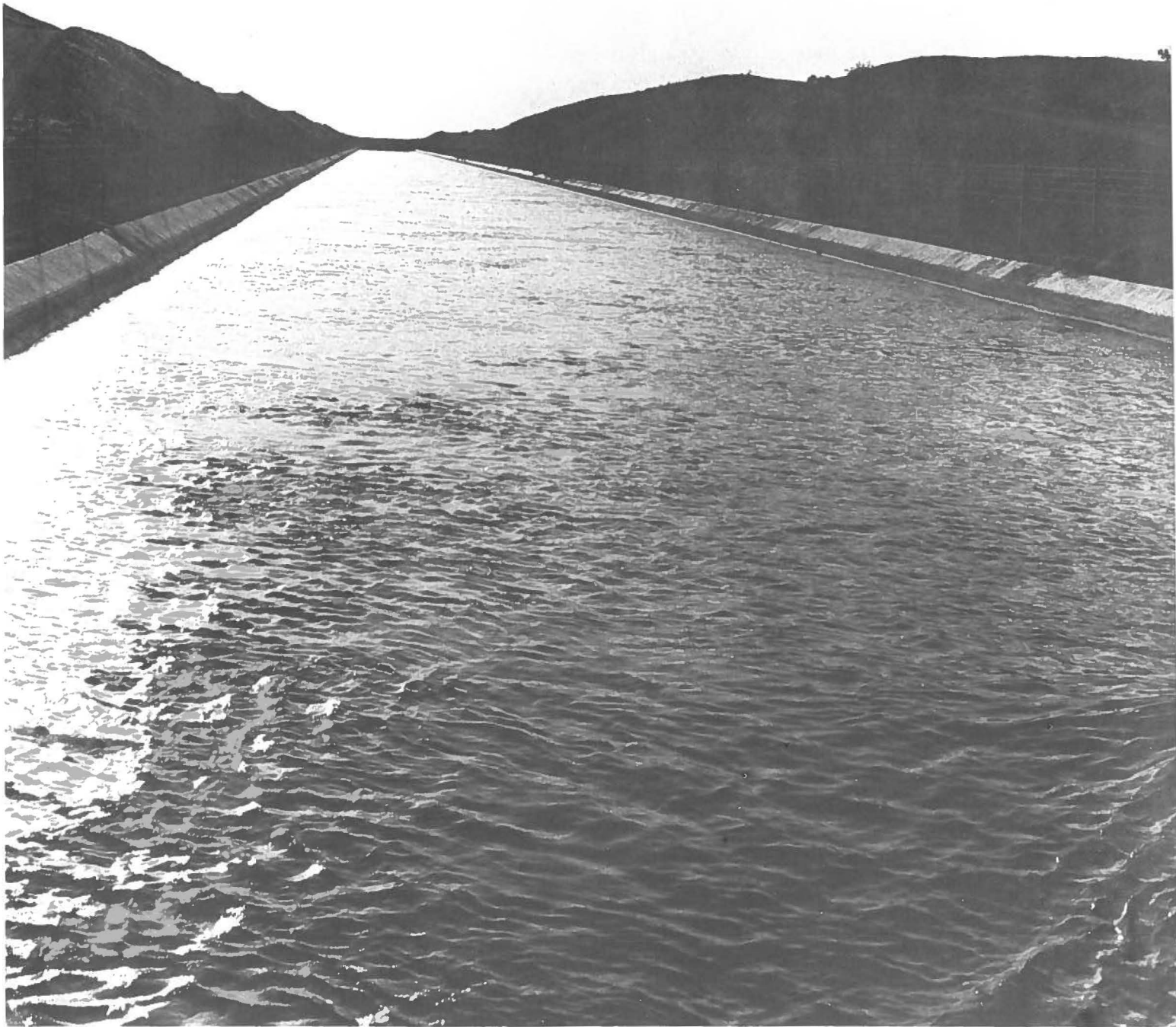
On June 21, 1978, Environmental Defense Fund, Inc. (EDF), Trout Unlimited, and the Wilderness Society

filed suit in federal district court in Washington, D.C., against R. Keith Higginson, Commissioner of Reclamation, and Cecil D. Andrus, Secretary of the Interior, to require preparation of a comprehensive environmental impact statement (EIS) analyzing existing and future water resource projects and operations in the Colorado River basin. The suit also sought to enjoin construction of several new federal water resource projects in the Basin (except salinity control projects) until the comprehensive EIS is completed. Included in a list of new projects were several units of the Central Arizona Project and the Central Utah Project. The Coachella Canal Unit of the Colorado River Basin Salinity Control Project, located in California, was specifically exempted from the injunction request as were the other salinity control projects.

The States of Arizona, Colorado, Nevada, and Wyoming, and the Utah Power and Light Company intervened as defendants. California did not intervene.

The Department of the Interior had previously agreed that a comprehensive EIS is required and began regional public meetings in 1977, including a meeting in the Los Angeles area. Because of the high estimated cost of developing the statement, in excess of \$4 million, and because it was proposed to be funded by overhead charges applied to all Colorado River Basin Projects, Basin state Congressmen questioned the validity of the EIS without a specific budget request. The Chairman of the House Public Works Subcommittee concluded that no funds had been approved by Congress for the EIS, so Interior stopped work on the EIS pending approval of funds. In 1978, Congress enacted legislation which provided that as long as site specific EIS's were completed, the projects could go ahead regardless of a requirement for a comprehensive EIS. However, no funds were appropriated for a comprehensive EIS.

Water flows 242 miles from Lake Havasu through MWD's Colorado River Aqueduct to Lake Mathews in Riverside County.



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