

FINAL

ENVIRONMENTAL STATEMENT

INT FES 75 - 57

COLORADO RIVER BASIN SALINITY CONTROL PROJECT TITLE I

Prepared by
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

Lower Colorado Region

ES-6



United States Department of the Interior

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June 18, 1975

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NOTICE

Enclosed for your information is a copy of the Final Environmental Statement on the Colorado River Basin Salinity Control Project, Title I. The statement has been prepared by the Bureau of Reclamation in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190. The statement was assigned Control Number FES 75-57, and filed with the Council on Environmental Quality on June 18, 1975.

The final statement incorporates comments which were received from individuals and Federal, State, and local entities on the draft environmental statement dated April 1, 1974, Control Number DES 74-39, and its Supplement dated August 27, 1974, Control Number DES 74-83. Copies of these comments are bound within the statement.

Manuel Lopez, Jr.
Acting Regional Director

Enclosure



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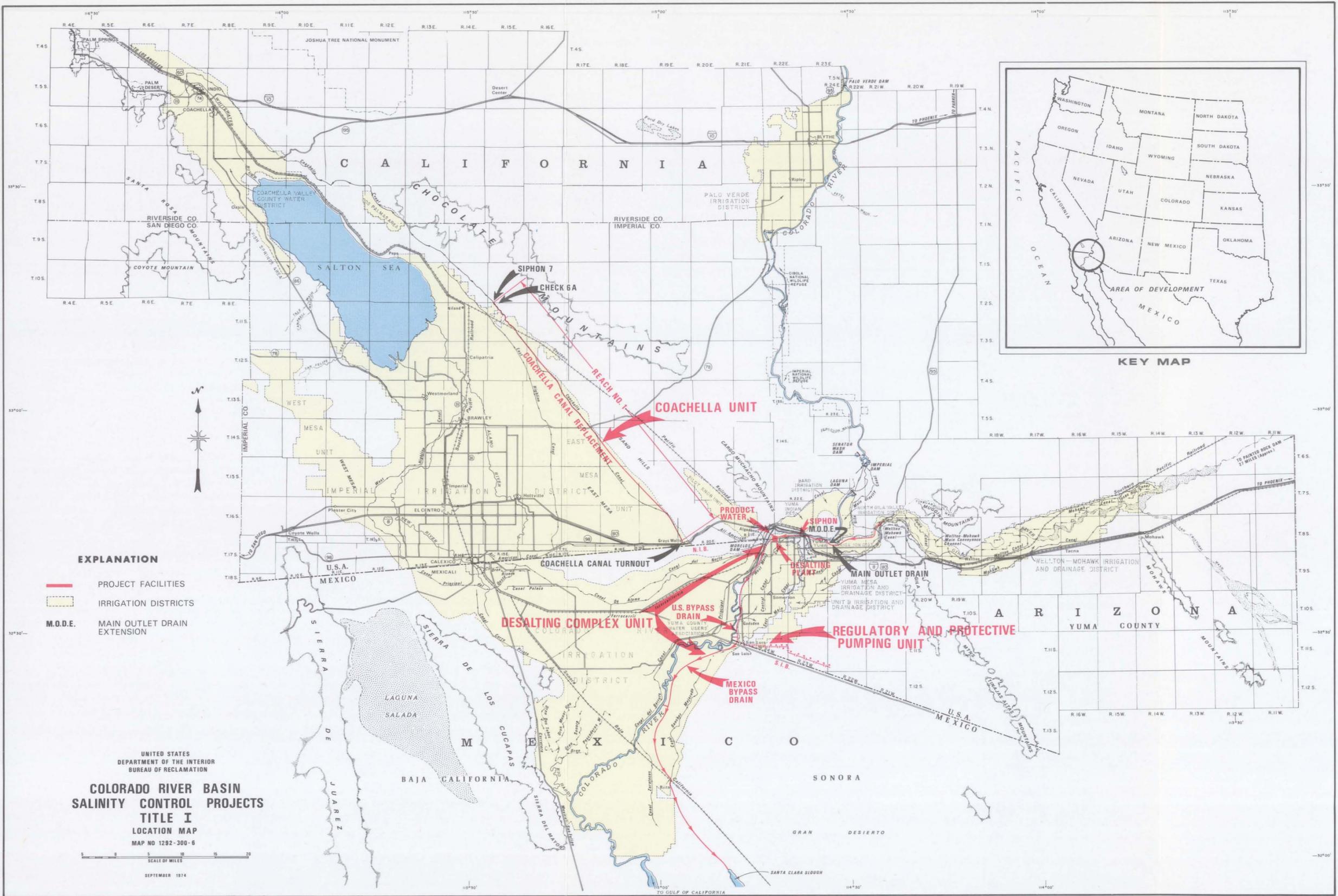
Prepared by

Bureau of Reclamation
Department of the Interior

JUN 18 1975

in Support of P.L. 93-320


G. G. Stamm
Commissioner



KEY MAP

EXPLANATION

- PROJECT FACILITIES
- IRRIGATION DISTRICTS
- M.O.D.E. MAIN OUTLET DRAIN EXTENSION

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

**COLORADO RIVER BASIN
SALINITY CONTROL PROJECTS
TITLE I
LOCATION MAP**

MAP NO 1292-300-6



SEPTEMBER 1974

SUMMARY

() Draft (X) Final Environmental Statement

Prepared by Department of the Interior, Bureau of Reclamation, Lower Colorado Region

1. Type of Action:

(X) Administrative () Legislative

2. Brief description of action:

The project was authorized by Title I of Public Law 93-320, Colorado River Basin Salinity Control Act, of June 24, 1974. Title I provides for a program of works to enhance and protect the quality of water available in the Colorado River for use in the United States and Mexico and to enable the United States to comply with its obligations under agreement with Mexico under Minute No. 242 of the International Boundary and Water Commission, United States and Mexico. Objectives are: reduce the salinity of Colorado River water delivered to Mexico; more efficiently utilize water resources; and manage ground-water withdrawal.

The three major features are: (1) the desalting complex which will consist of: (a) a membrane-process desalting plant of approximately 100-million gallons per day capacity to treat Wellton-Mohawk Division, Gila Project drainage water; (b) the extension of the concrete-lined bypass drain from Morelos Dam to Santa Clara Slough in Mexico; and (c) replacement of an existing metal flume in the Main Outlet Drain Extension with a concrete siphon. Nonstructural measures consist of: (a) an irrigation efficiency improvement program in the Wellton-Mohawk Division, a cooperative program of irrigation management services, and Federal cost-sharing assistance for on-farm irrigation system improvements; (b) an irrigable acreage reduction program in the Wellton-Mohawk Division; and (c) acquisition of land, if needed, in Painted Rock Reservoir. (2) Construction of a concrete-lined replacement canal for the first 49 miles of unlined Coachella Canal. Nonstructural measures provide for acquisition of lands involving 4,200 acres, on the Imperial East Mesa which received or have the right to receive irrigation water. (3) Protective and regulatory ground-water pumping plan which includes two well fields within 5 miles of the Arizona-Sonora Boundary with a designed capacity to pump 160,000 acre-feet per year. Nonstructural measures include acquisition of 23,500 acres of land or interests therein that lie within 5 miles of the Boundary. Project features will be located in Yuma County, Arizona; Imperial County, California; and Sonora, Mexico. Construction is scheduled to begin in 1975 and completed in 1981 at an estimated cost of \$155,500,000 (April 1973 prices).

3. Summary of environmental impacts and adverse environmental effects:

The project will result in the savings of 424,000 acre-feet per year of Colorado River water. Electrical energy requirements will amount to a maximum of 424,000,000 kWh per year. Fish and wildlife habitat losses will amount to about 297 surface acres of open water and 5,200 acres of riparian vegetation. Mitigation measures will be provided on up to 3,500 acres of land. These measures will compensate for all fish losses and most wildlife losses. There will be retirement from agricultural uses or restrictions on future agricultural development of 37,300 acres of land. Rights-of-way amounting to a maximum of about 2,700 acres of land will be required for construction of new project facilities.

4. Alternatives considered:

1. Total shutdown of the Wellton-Mohawk Division
2. Augmentation of the Colorado River
3. A moratorium on future development in the Colorado River Basin
4. No Action
5. Other

5. List of entities from whom comments were requested: See attached list.

6. Date made available to CEQ and the public:

Draft statement (DES 74-39): April 1, 1974
Supplement to Draft statement (DES 74-83): August 27, 1974
Final Statement:

JUN 18 1975

DISTRIBUTION LIST FOR FINAL ENVIRONMENTAL STATEMENT
COLORADO RIVER BASIN SALINITY CONTROL PROJECT, TITLE I

LISTING OF FEDERAL, STATE, AND LOCAL AGENCIES AND PRIVATE ENTITIES TO WHOM COPIES OF THE DRAFT STATEMENT AND SUPPLEMENT TO THE DRAFT HAVE BEEN SENT WITH THOSE RESPONDING INDICATED BY "*".

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- Director, National Park Service
- *Director, Bureau of Outdoor Recreation

*Advisory Council on Historic Preservation, Washington, D.C.

*Department of Agriculture, Washington, D.C.

*Department of the Army, Office of the Corps of Engineers, Washington, D.C.

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Division of River Basin Studies, Fish and Wildlife Service, Laguna Niguel,
California

*Geological Survey, Reston National Center, Reston, Virginia

*State Director, Bureau of Land Management, Phoenix, Arizona

District Manager, Bureau of Land Management, Yuma, Arizona

District Conservationist, Soil Conservation Service, Yuma, Arizona

*Los Angeles District, Corps of Engineers, Los Angeles, California

*Regional Office, Department of Health, Education, and Welfare,
San Francisco, California

*Environmental Protection Agency, San Francisco, California

Engineer-in-Charge, International Boundary and Water Commission, Yuma,
Arizona

NOTE: Although distribution to Federal agencies by the Regional Director were intended as information copies with official responses anticipated from their Washington offices, some comments were received directly from the field offices.

State Agencies

Governors of Arizona, California, Colorado, *Nevada, New Mexico, Utah,
and *Wyoming

Clearinghouses of *Arizona, California *Colorado, Nevada, New Mexico,
Utah, and Wyoming

- Advisory Commission on Arizona Environment, Phoenix, Arizona
- *Arizona Game and Fish Department, Phoenix, Arizona
 - Regional Supervisor, Arizona Game and Fish Department, Yuma, Arizona
- *Arizona Highway Department, Phoenix, Arizona
- Arizona Outdoor Recreation Coordinating Commission, Phoenix, Arizona
- *Arizona Department of Transportation, Phoenix, Arizona
- *Arizona State Land Department, Phoenix, Arizona
 - Arizona State Parks Board, Phoenix, Arizona
 - Arizona State Soil Conservation Service, Phoenix, Arizona
- *Arizona Water Commission, Phoenix, Arizona
 - Department of Economic Planning and Development, Phoenix, Arizona
- California Department of Fish and Game, Sacramento, California
 - California Department of Fish and Game, Blythe, California
 - California Department of Water Resources, Sacramento, California
- Colorado River Board of California, Los Angeles, California
- *Department of Parks and Recreation, Sacramento, California
- *The Resources Agency of California, Sacramento, California
 - Colorado Water Conservation Board, Denver, Colorado
- *Division of Colorado River Resources, Las Vegas, Nevada
 - Department of Conservation and Natural Resources, Carson City, Nevada
- New Mexico Interstate Stream Commission, Santa Fe, New Mexico
- Department of Natural Resources, Salt Lake City, Utah
- *State Engineer, State Engineer Office, Santa Fe, New Mexico
- State Engineer, Cheyenne, Wyoming

Local Agencies

- Imperial County, El Centro, California
- Maricopa County Board of Supervisors, Phoenix, Arizona
- Maricopa County Flood Control District, Phoenix, Arizona
- Yuma County Board of Supervisors, Yuma, Arizona
- Yuma County Chamber of Commerce, Yuma, Arizona
- Yuma County Highway Department, Yuma, Arizona
- Yuma County Natural Resources Committee, Yuma, Arizona
- Yuma County Parks and Recreation Department, Yuma, Arizona
- Yuma County Public Works Department, Yuma, Arizona
- Honorable Herman Magana, Mayor of Somerton, Arizona
- Honorable Doug Morris, Mayor of Wellton, Arizona
- Honorable Ersel Byrd, Mayor of Yuma, Arizona
- Chairman, Cocopah Indian Tribe, Somerton, Arizona
- President, Quechan Tribal Council, Winterhaven, California
- *The Colorado River Water Conservation District, Glenwood Springs, Colorado

Coachella Valley County Water District, Coachella California
Imperial Irrigation District, El Centro, California
North Gila Valley Irrigation District, Yuma, Arizona
Unit "B" Irrigation and Drainage District, Somerton, Arizona
Wellton-Mohawk Irrigation and Drainage District, Wellton, Arizona
Yuma County Water Users' Association, Yuma, Arizona
Yuma Irrigation District, Yuma, Arizona
Yuma Mesa Irrigation and Drainage District, Yuma, Arizona
*Arizona Conservation Council, Phoenix, Arizona
Arizona Public Service Company, Phoenix, Arizona
*California Farm Bureau Federation, Sacramento, California
*District #4, Council of Governments, Yuma, Arizona
Department of Water and Power, The City of Los Angeles, California
*The Maricopa Audubon Society, Phoenix, Arizona
Metropolitan Water District of Southern California, Los Angeles, California
Southern California Edison Company, Rosemead, California
Arizona State Reclamation Association, Phoenix, Arizona
Arizona Wildlife Federation, Phoenix, Arizona
Fluor Corporation, East Los Angeles, California
*Fortuna Water Company, Inc., % Law Offices of Byrne and Ellsworth,
Yuma, Arizona
Friends of the Earth, San Francisco, California
National Wildlife Federation, Phoenix, Arizona
National Wildlife Federation, Western Regional Office, Sacramento,
California
Native American Rights Fund, Boulder, Colorado
*Sierra Club, National Water Resources Committee, Santa Fe, New Mexico
Sierra Club, Southern California Representative, Los Angeles, California
*Sierra Club, Southwest Representative, Tucson, Arizona
*The Wildlife Society, Arizona Chapter, Phoenix, Arizona
*Yuma Natural Resources Conservation District, Yuma, Arizona
Yuma Valley Rod and Gun Club, Yuma, Arizona

Private Entities

*Mr. C. E. Brabyn, Corona del Mar, California
*Ms. JoAnne Dombrowski, Somerton, Arizona
*Ms. Caroline Jessen, Yuma, Arizona
*Mr. John R. Nicholson, Hemet, California
*Mr. and Mrs. R. J. Robinson, Somerton, Arizona

LISTING OF LIBRARIES

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Tempe, Arizona 85281

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350 South 3rd Street
Yuma, Arizona 85364

PREFACE

The Draft Environmental Statement entitled the "Colorado River International Salinity Control Project" was filed with the Council on Environmental Quality (CEQ), and distributed for review and comment on April 1, 1974. The statement was prepared for Legislative action in support of H.R. 12834 and S. 3094. Subsequently, H.R. 12165, introduced as a separate bill, was passed into Public Law 93-320 on June 24, 1974. In addition to covering those features that were in the original bills, H.R. 12165 also included in Title I of the Act the additional feature of protective and regulatory ground-water pumping.

Following the enactment of H.R. 12165 into Law as the Colorado River Basin Salinity Control Act, a supplement to the Draft Environmental Statement was filed with CEQ and made available for review and comment on August 27, 1974. The purpose of the supplement was to describe the environmental impact of the feature of protective and regulatory ground-water pumping in order to remain consistent with the requirements of the National Environmental Policy Act (NEPA) of 1969, CEQ guidelines and Reclamation Instructions. On October 5, 1974, a public hearing on the draft environmental statement and the supplemental draft environmental statement was conducted in Yuma, Arizona.

To be consistent with Public Law 93-320, the title of this Final Environmental Statement has been changed from Colorado River International Salinity Control Project to Colorado River Basin Salinity Control Project - Title I. Title II features of P.L. 93-320 will be covered under a separate environmental statement.

The major physical features included in Title I are:

1. Construction and operation of a desalting complex on the Main Outlet Drain Extension to treat agricultural drainage flows from the Wellton-Mohawk Division, Gila Project, Arizona.
2. Construction of a lined canal for replacing the first 49 miles of the unlined Coachella Canal, Imperial County, California.
3. Development of two protective and regulatory ground-water pumping well fields within 5 miles of the Arizona-Sonora Boundary in the extreme southwest corner of Yuma County, Arizona.

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APPENDIX B

Appendix B contains copies of comments received by the Bureau of Reclamation from Federal, State, and local entities and from individuals on the August 27, 1974, supplement to the draft (DES 74-83), together with separate replies which have been prepared thereto, where required or appropriate.

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Projects, Title I, Draft Environmental Statement and its
Supplement

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**I. DESCRIPTION
OF THE PROJECT**

I. DESCRIPTION OF THE PROJECT

A. Introduction

This final environmental statement entitled "Colorado River Basin Salinity Control Project, Title I," was prepared by the Department of the Interior, Bureau of Reclamation, Lower Colorado Region in support of Title I of Public Law 93-320, which authorizes and directs the Secretary of the Interior to proceed with a program of works of improvement for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and the Republic of Mexico, and enables the United States to comply with its obligations under the agreement with Mexico of August 30, 1973, (Minute No. 242 of the International Boundary and Water Commission, United States and Mexico) concluded pursuant to the Mexican Water Treaty of February 3, 1944.

The United States of America and the United Mexican States in 1944 adopted a Treaty for the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande. The Treaty allotted to Mexico 1,500,000 acre-feet annually "...of the waters of the Colorado River, from any and all sources...."

Of the total, approximately 1,360,000 acre-feet annually are delivered to Mexico in the limitrophe section of the Colorado River upstream from Morelos Dam.^{1/} The remaining approximately 140,000 acre-feet annually are delivered at the Southerly International Boundary, 17 miles to the south, and in the limitrophe section of the river below Morelos Dam.

The 1944 Water Treaty contains no specific provisions regarding the quality of water the United States may deliver to Mexico, and Mexico and the United States have had differing interpretations of the intent of the Treaty as it may affect water quality. The Treaty does provide for the settlement of differences with respect to the interpretation or application of the Treaty, and Minute No. 242 of the International Boundary and Water Commission constitutes such a settlement.

The delivery of Treaty waters to Mexico began in 1950 with the completion of Morelos Dam, Mexico's major diversion structure on the Colorado River. Eleven years later, two events occurred to make water quality a serious issue between the two countries. There were delivered to Mexico above Morelos Dam highly saline drainage waters pumped by the

^{1/} With the exception that temporary emergency deliveries of less than 20,000 acre-feet are being made to the City of Tijuana, Mexico, pursuant to Minute No. 240, IBWC. The limitrophe section is the section of the river which forms the boundary between the United States and Mexico.

Wellton-Mohawk Irrigation and Drainage District from an aquifer that underlies the District. These waters, initially averaging 6,000 p/m TDS,^{1/} were pumped to maintain ground-water levels below the crop root zone. In addition, excess flows which Mexico had received prior to 1961 came to a near end in that year. These flows had diluted the more saline drainage waters that were then being discharged to the river below Imperial Dam with the result that the quality of water delivered to Mexico above Morelos Dam was very nearly the same as that used in the Lower Colorado River Basin of the United States.

The effect of these developments was to increase the salinity of Colorado River waters made available to Mexico at the Northerly International Boundary from an annual average of about 800 p/m TDS to nearly 1,500 p/m TDS in 1962.

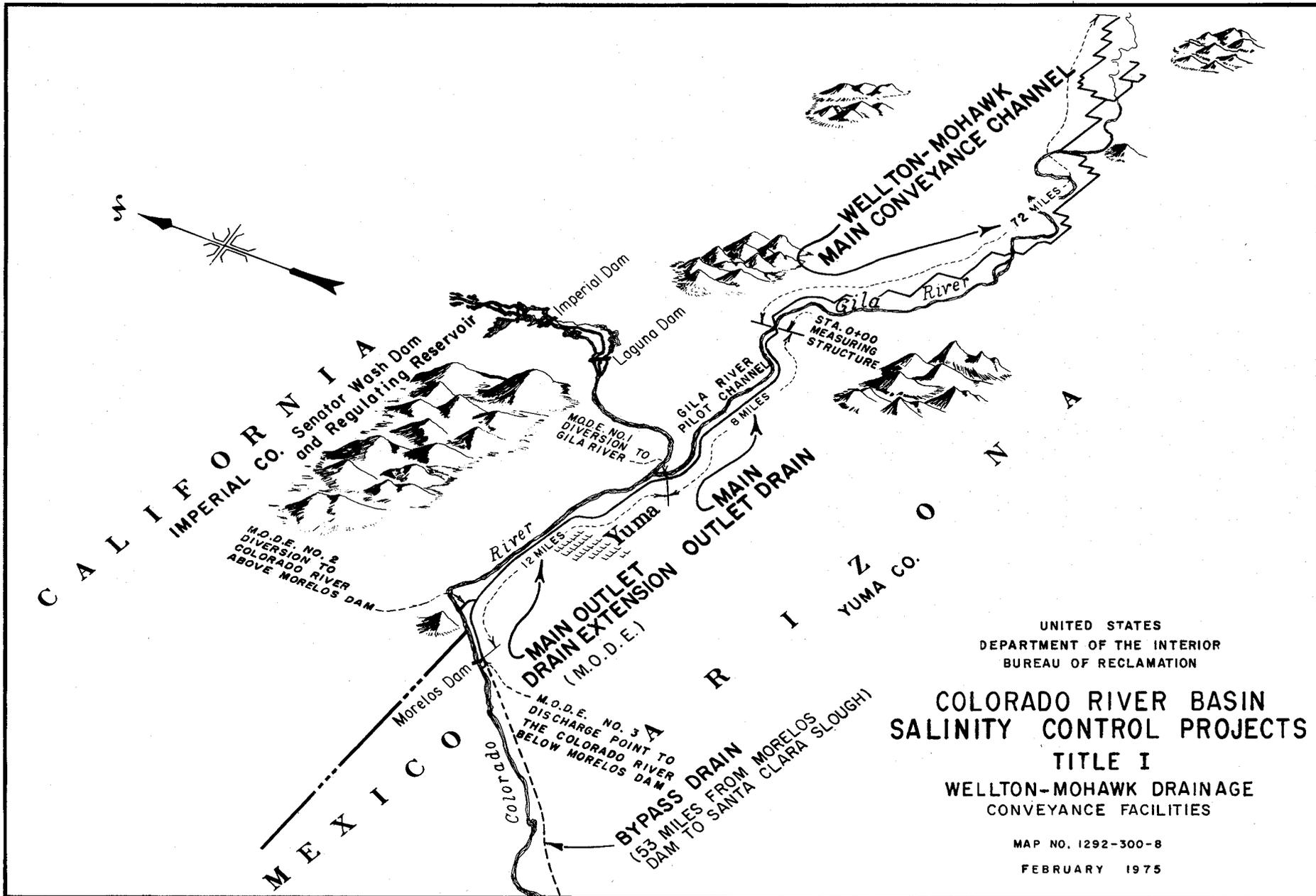
In a note dated November 9, 1961, Mexico formally protested that "...the delivery of water that is harmful for the purposes stated in the Treaty constitutes a violation of the Treaty" and that "any contamination of international water by one of the riparian countries that cause damage or loss to the other riparian party is in itself an act clearly and specifically condemned by International Law...." Mexico continued to press its case thereafter.

In response to the Mexican protest, the United States began in 1963 to alter river operations to reduce the salinity of Colorado River water delivered to Mexico. By 1965, a 5-year agreement was reached by the two Governments, referred to as Minute No. 218 of the International Boundary and Water Commission (IBWC).

This Minute, which became effective on November 16, 1965, provided for practical measures to further reduce the salinity of waters reaching Mexico. Under the Minute, each country reserved its legal rights. The measures consisted of the construction and operation of a 12-mile-long channel known as the Main Outlet Drain Extension to enable the United States to discharge Wellton-Mohawk drainage waters to the Colorado River either above or below Morelos Dam (see Plate A), and the installation and operation of additional drainage wells in the Wellton-Mohawk area to make possible selective pumping. The concrete lined Wellton-Mohawk drainage conveyance facilities are shown on Plate 4. During periods when scheduled deliveries to Mexico were the Treaty minimum of 900 ft³/s,^{2/} the United States discharged all Wellton-Mohawk drainage below Morelos Dam, amounting to about 50,000 acre-feet per year. These bypass waters were replaced by other waters, largely from above Imperial Dam. By the end

^{1/} All stated salinity concentrations are based on U.S. method of analysis and reporting unless otherwise noted. The references are to parts per million of total dissolved solids.

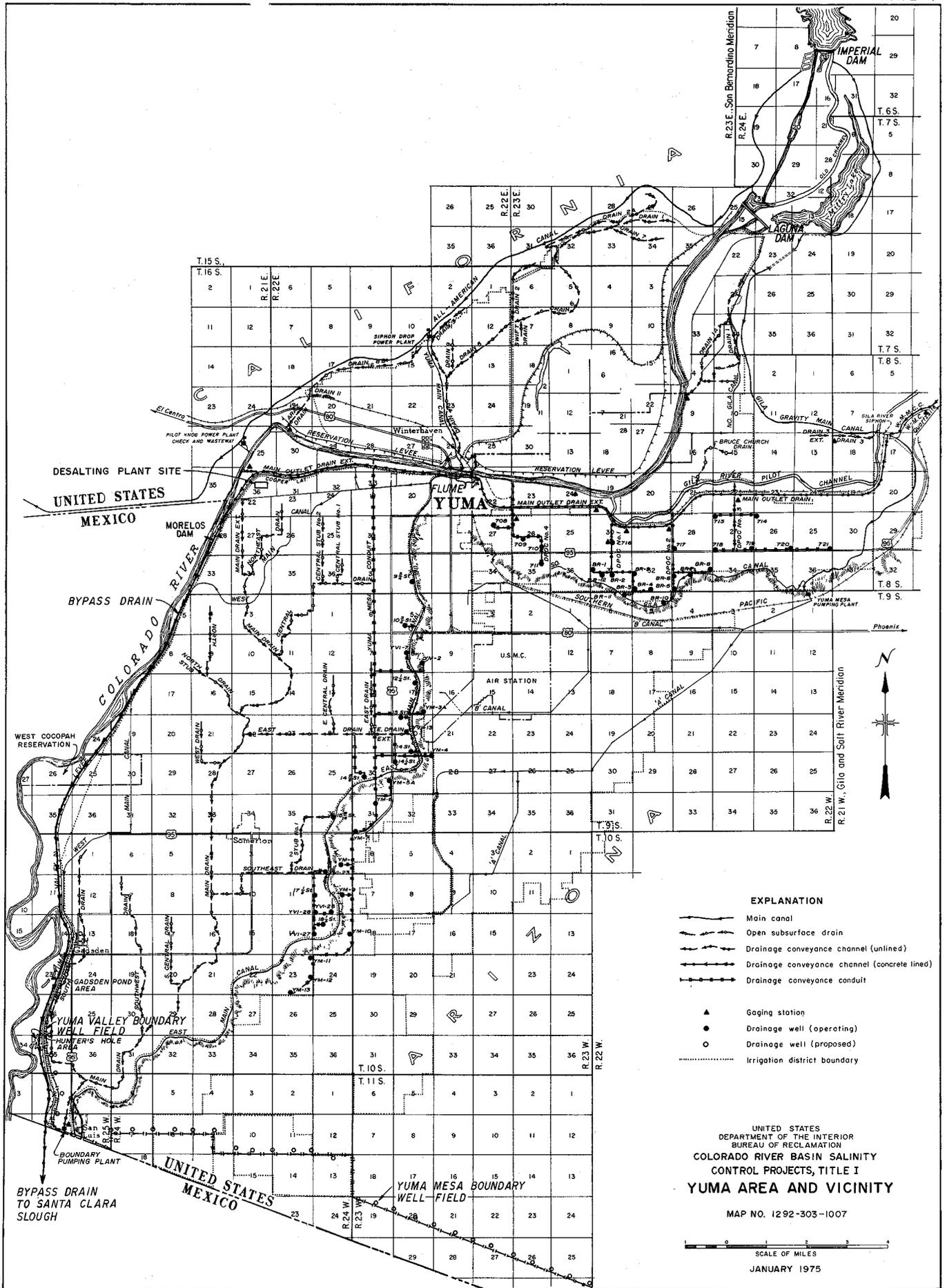
^{2/} Cubic feet per second.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

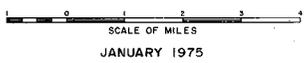
**COLORADO RIVER BASIN
SALINITY CONTROL PROJECTS
TITLE I
WELLTON-MOHAWK DRAINAGE
CONVEYANCE FACILITIES**

MAP NO. 1292-300-8
FEBRUARY 1975



- EXPLANATION**
- Main canal
 - - - Open subsurface drain
 - Drainage conveyance channel (unlined)
 - Drainage conveyance channel (concrete lined)
 - Drainage conveyance conduit
 - ▲ Gaging station
 - Drainage well (operating)
 - Drainage well (proposed)
 - Irrigation district boundary

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 COLORADO RIVER BASIN SALINITY
 CONTROL PROJECTS, TITLE I
YUMA AREA AND VICINITY
 MAP NO. 1292-303-1007



of 1971, these operations, coupled with a gradual improvement in the quality of Wellton-Mohawk drainage water, had reduced the average annual salinity of waters made available to Mexico to about 1,245 p/m TDS, with monthly averages varying from 1,105 to nearly 1,500 p/m TDS.

Meanwhile, Mexico concluded that it would not use waters with salinity greater than about 1,240 p/m TDS (1,300 p/m, Mexican count) in the Mexicali Valley and asked the United States under terms of Minute No. 218 to bypass an additional 40,000 to 75,000 acre-feet of Wellton-Mohawk drainage flows annually. The effect was to further reduce the average salinity of waters diverted by Mexico at Morelos Dam in 1971 to about 1,160 p/m TDS.

Before Minute No. 218 was to have expired on November 15, 1970, the United States proposed a new 5-year agreement to further reduce salinity. The United States offered to bypass additional volumes of Wellton-Mohawk drainage water and to substitute equal volumes of better waters to reduce the average annual salinity of waters delivered to Mexico at the Northerly International Boundary to about 1,140 p/m TDS, subject to increases in salinity at Imperial Dam. This salinity would approximate that of waters delivered to Mexico above Morelos Dam if all United States projects below Imperial Dam were operating in salt balance.^{1/} The administration of President Diaz Ordaz of Mexico considered the proposal constructive, but decided to leave the matter to the administration of President Echeverria, who took office in December 1970. Minute No. 218 was therefore extended for 1 year.

In 1971 and early 1972, the Governments exchanged several proposals in an attempt to reach an agreement, extending Minute No. 218 in November 1971 for another year so that the discussions might continue. After further conversations in early 1972, Mexico requested a prompt, permanent settlement.

The Presidents of the United States and Mexico met and issued a joint communique on June 17, 1972. With this communique the search for a solution entered another phase. President Nixon assured President Echeverria of his desire for a definitive, equitable and just solution to the problem, announced that he was prepared to undertake certain actions to improve the salinity of waters delivered to Mexico, and indicated he would designate a special representative to develop a solution and to submit a report to him. Once approved by the United States Government, the report would be submitted to President Echeverria for his consideration and approval.

^{1/} Salt balance in this context means that the same tonnage of salt is returned to a river from an irrigation project in drainage as is diverted to it in irrigation waters.

The President, on August 16, 1972, designated as his Special Representative former Attorney General Herbert Brownell, Jr. He was assisted by an Interagency Task Force comprised of representatives of the Department of State; Department of the Interior; Department of Defense (Corps of Engineers); Environmental Protection Agency; Council on Environmental Quality; Office of Science and Technology; Office of Management and Budget; Domestic Advisory Council; and U.S. Section, International Boundary and Water Commission. The seven-state Committee of Fourteen also met and consulted with Mr. Brownell and advised him during his deliberations.

To immediately further improve the quality of water delivered to Mexico above Morelos Dam, the two Governments approved a new Minute, No. 241, signed July 14, 1972. It provided for the bypass of 118,000 acre-feet of Wellton-Mohawk drainage waters annually without charge against Mexico's guaranteed Treaty allotment, more than twice the rate of the United States bypass under Minute No. 218, and their replacement by other waters from above Imperial Dam and from wells on the Yuma Mesa. The operations under Minute No. 241 reduced the average annual salinity of waters made available to Mexico from 1,245 p/m TDS in 1971 to 1,140 p/m TDS for the year ending June 30, 1973.

The provisions and operations for bypassing waters, described in the preceding paragraph, without charge against Mexico's guaranteed Treaty allotment was with prior notice to and consent of the Colorado River Basin States.

In addition to the United States operations under Minute No. 241, Mexico requested the United States to bypass without replacement the remaining drainage waters from the Wellton-Mohawk Irrigation and Drainage District to the Colorado River below Morelos Dam. This additional bypass amounted to about 100,000 acre-feet annually. This further reduced the average salinity of water diverted by Mexico at Morelos Dam from 1,160 p/m TDS in 1971 to less than 1,000 p/m TDS for the year ending June 30, 1973.

Upon completion of the study for solution of the salinity problem, Mr. Brownell presented his recommendations to President Nixon. After acceptance of the recommendations by the United States Government, the President appointed Mr. Brownell as Special Ambassador for the purpose of negotiating an agreement with Mexico.

At the conclusion of negotiations, operations under Minute No. 241 were terminated by provisions of a new agreement between the United States

and Mexico, designated Minute No. 242, and approved on August 30, 1973. Minute No. 242 is recognized by both governments as the permanent and definitive solution of the salinity problem on the Colorado River.

During negotiations to resolve the salinity problem, the United States brought to the attention of the Mexican authorities the fact that ground water underlying the United States was being withdrawn by Mexican pumping. This withdrawal was due to operations of a ground-water well field that Mexico had installed immediately south of the International Boundary separating Arizona and Sonora, Mexico, and in which significant pumping began in December 1972. It was recognized by the United States that this withdrawal of ground water would significantly affect the United States in several areas, particularly as Mexico expressed her intentions to continue pumping from the well field at the rate of 160,000 acre-feet per year.

The well field consists of 63 wells with pumps which pump ground water into concrete-lined laterals. Water from the laterals is collected in a canal which carries the water westerly to the San Luis, Sonora area for irrigation of Mexican agricultural lands.

Mexico's pumping from the underground water reservoir will result in the depletion of the reservoir which underlies lands in both Mexico and the United States. Mexico is using these waters by means of its pumping program at no charge to Colorado River Water Treaty allocations, since the underground flow across the boundary is not considered as "deliveries" in satisfaction of the Treaty.

Yuma Valley agricultural drainage and irrigation wasteway flows delivered to Mexico at the Southerly International Boundary near San Luis, Arizona, and San Luis, Sonora, Mexico, have historically been credited toward the 1,500,000 acre-feet per year delivery requirement of Colorado River water to Mexico. Historically, these flows have been about 125,000 acre-feet of drain flow and 15,000 acre-feet of wasteway flow annually. Pumping by Mexico will lower ground-water elevations and in time will significantly reduce the amount of drainage flows from the Yuma Valley. The present annual flow of about 105,000 acre-feet at the Southerly International Boundary will gradually be reduced to about 15,000 acre-feet of canal wasteway flow. In order to maintain the Treaty flows to Mexico, any reduction in the deliveries at the Southerly International Boundary have to be made up by corresponding increased deliveries at the Northerly International Boundary with water from other sources. Under present conditions, this can be done only by releasing additional river storage waters not now committed to Mexico.

Extensive investigations of the geology and ground-water hydrology of the Yuma area conducted by the U.S. Geological Survey, the United States Section of the International Boundary and Water Commission, and the Bureau of Reclamation, indicate that by 1969 about 1.5 million acre-feet of ground water had accumulated to form a ground-water storage mound underlying the Yuma Mesa as a result of percolating waters from irrigation of mesa lands. This quantity of ground water is in addition to a much larger quantity of ground water in storage under the Yuma area. The ground-water reservoir underlying the Yuma area is hydraulically connected to the ground-water reservoir underlying lands in Mexico to the south of the International Boundary separating Arizona and Sonora, Mexico and to the west of the Colorado River separating Arizona from Baja California, Mexico. In gross aspect, the ground-water reservoir extends over an area of approximately 2,800 square miles, about one-third in the United States and two-thirds in Mexico. Based on available data, it has been estimated there are more than 300 million acre-feet of recoverable and usable ground water in the vast subterranean system, approximately 100 million acre-feet in the United States and 200 million acre-feet in Mexico.^{1/}

With base conditions as of 1969 analog model studies conducted by the U.S. Geological Survey indicate that pumping on the Sonora Mesa in Mexico, in addition to withdrawing ground water accumulated in Mexico, will draw ground water from the adjacent Yuma Mesa and Yuma Valley in the United States. These studies indicate that by the end of 10 years there would be withdrawn from the ground-water basin in the United States a total of about 465,000 acre-feet of water, and by the end of 50 years the quantity withdrawn would be about 2,610,000 acre-feet.

B. The Agreement with Mexico

At the conclusion of negotiations, the joint recommendations of the Special Representative of President Nixon, Ambassador Herbert Brownell, Jr., and the Secretary of Foreign Relations of Mexico, Lic. Emilio O. Rabasa, were approved by the Presidents and incorporated in Minute No. 242 of the International Boundary and Water Commission, United States and Mexico. The Minute entitled "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River" was formally approved by the two Governments on August 30, 1973.

The full text of Minute No. 242 is included in Appendix D. Among other things the Minute provides that the United States shall adopt

^{1/} Memorandum Report, MR-73-1, Feb. 17, 1973, Harshbarger and Associates, Tucson, AZ, Consultants to the U.S. Section, International Boundary and Water Commission.

measures to assure that the approximately 1,360,000 acre-feet of the Treaty water annually delivered to Mexico upstream of Morelos Dam have an annual average salinity of no more than $115 \text{ p/m} + 30 \text{ p/m}$ over the annual average salinity of Colorado River water arriving at Imperial Dam. It further provides for the United States to deliver to Mexico on the land boundary at San Luis and in the limitrophe section of the Colorado River downstream from Morelos Dam approximately 140,000 acre-feet annually with a salinity substantially the same as that of waters customarily delivered there. As a part of the measures required to assure the quality control at Morelos Dam, the Minute provides that the concrete-lined Main Outlet Drain Extension (M.O.D.E.) be extended from Morelos Dam to the Santa Clara Slough in Mexico at United States expense.

Those provisions of the Minute that are dependent for their implementation on construction of works or on other measures which require expenditure of funds by the United States became effective upon authorization by the United States Congress and notification by the United States to Mexico of such authorization. This authorization was encompassed in Public Law 93-320, enacted June 24, 1974, and notification was given to Mexico on the same day.

Between August 30, 1973, and notification by the United States to Mexico of authorization for construction of the necessary works, the United States agreed to discharge to the Colorado River downstream from Morelos Dam volumes of drainage water from the Wellton-Mohawk Division, Gila Project at the annual rate of 118,000 acre-feet and to substitute therefor, an equal volume of other waters to be discharged to the Colorado River above Morelos Dam, and to discharge the remaining volume of Wellton-Mohawk drainage waters below Morelos Dam without replacement by substitute waters. Subsequent to the notification to Mexico of the enactment of the authorizing legislation, the criteria has been in effect that the salinity of the Treaty waters delivered to Mexico upstream of Morelos Dam have an annual average salinity of no more than $115 \text{ p/m} + 30 \text{ p/m}$ over the annual average salinity of Colorado River waters arriving at Imperial Dam.

Minute No. 242 has another provision that, pending the conclusion by the Governments of the United States and Mexico of a comprehensive agreement on ground water in the border areas, each country agrees to limit pumping of ground waters in its territory within 5 miles of the Arizona-Sonora boundary near San Luis to 160,000 acre-feet annually.

C. Colorado River Basin Salinity Control Act (P.L. 93-320)

Public Law 93-320 authorizes the construction, operation, and maintenance of certain works in the Colorado River Basin to control the salinity of water delivered to users in the United States and Mexico. Title I of the Act provides for programs downstream from Imperial Dam to implement the provisions of Minute No. 242 and Title II provides for programs upstream from Imperial Dam. The full text of P.L. 93-320 is included in Appendix D; however, as previously stated, only Title I measures are covered by this statement.

Title I of the Act authorizes three major features: (1) a desalting complex, (2) a new concrete-lined canal or lining of the presently unlined canal to replace the first 49 miles of the Coachella Canal, and (3) protective and regulatory ground-water well fields.

Included in the desalting complex are structural measures consisting of: (1) a membrane-process desalting plant of approximately 100 million gallons per day capacity with a pretreatment plant and the necessary appurtenant works to treat Wellton-Mohawk Division, Gila Project drainage water, (2) the extension of the concrete-lined bypass drain from Morelos Dam to Santa Clara Slough in Mexico, and (3) replacement of an existing metal flume in the Main Outlet Drain Extension with a concrete siphon. Nonstructural measures consist of: (1) an irrigation efficiency improvement program in the Wellton-Mohawk Division to minimize the quantity of drainage return flow by accelerating a cooperative program of irrigation management services and providing Federal cost-sharing assistance for on-farm irrigation system improvements, (2) an irrigable acreage reduction program in the Wellton-Mohawk Division to eliminate potential increases in drainage return flows associated with additional development, and (3) acquisition of land, if needed, in Painted Rock Reservoir^{1/} to permit a change in operational releases to minimize infiltration in the Wellton-Mohawk Division. As compensation to the Cocopah Tribe of Indians for rights-of-way for project features, the Act provides for ceding approximately 340 acres of Federal land to the Tribe in Sections 25, 26 and 27, Township 9 south, Range 25 west, Gila and Salt River Meridian, Arizona.

In connection with the reconstruction of the Coachella Canal, the Act provides, as a nonstructural measure, for the acquisition of land on the Imperial East Mesa which receives, or has been granted a right to receive, water from Imperial Irrigation District's capacity in the Coachella Canal. Approximately 4,200 acres of land are involved.

^{1/} Painted Rock Dam authorized and constructed under the Flood Control Act of 1950 is operated and maintained by the Corps of Engineers.

The capacity of the protective and regulatory ground-water well fields authorized by the Act is 160,000 acre-feet per year within 5 miles of the Arizona-Sonora boundary, which quantity is consistent with Minute No. 242. As a nonstructural measure, it authorizes the acquisition of approximately 23,500 acres of land or interests therein within 5 miles of the Mexican border on the Yuma Mesa.

D. Management of the Colorado River Waters

Management of the water resources of the Colorado River is a complex and challenging undertaking involving physical, socioeconomic, contractual and legal restraints. The management of the river is governed by international, interstate, and irrigation district formal agreements and contracts, and power and water contracts with entities other than irrigation districts.

1. International Agreements

a. International Treaty of 1944

The Treaty of 1944 between the United States and the United Mexican States provides Mexico with a guaranteed quantity of 1,500,000 acre-feet of Colorado River water annually.

b. Minute No. 242

Minute No. 242 was approved and became effective on August 30, 1973, and provides, upon authorization for construction of the necessary works, that the approximately 1,360,000 acre-feet of Colorado River water delivered to Mexico upstream of Morelos Dam have an annual average salinity of no more than $115 \text{ p/m} \pm 30 \text{ p/m}$ TDS over the annual average salinity of Colorado River waters arriving at Imperial Dam. As previously stated, authorization for construction of the necessary works is contained in Public Law 93-320, dated June 24, 1974.

2. Major Compacts, Legislation, and Court Decisions in the United States

The following compacts, public laws, a supreme court decision, etc., constitute the institutional framework under which the waters of the Colorado River are managed:

- (1) Colorado River Compact (45 Stat. 1057)
- (2) Boulder Canyon Project Act (45 Stat. 1057)

- (3) Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 USC 618a)
- (4) Upper Colorado River Basin Compact (63 Stat. 31)
- (5) Gila Reauthorization Act (61 Stat. 628)
- (6) Section 15 of the Colorado River Storage Project Act (70 Stat. 111; 43 USC 620n)
- (7) Arizona vs. California and others (376 US. 340)
- (8) Colorado River Basin Project Act (82 Stat. 885)
- (9) Section 6 of the Fryingpan-Arkansas Project Act (76 Stat. 393)
- (10) Section 15, Navajo Indian Irrigation Project and initial stage of the San Juan-Chama Project Act (76 Stat. 102)

3. Irrigation Districts Contracts

Irrigation districts which have contracts for Lower Colorado River water from Imperial Dam are as follows:

- (1) Coachella Valley County Water District
- (2) Imperial Irrigation District
- (3) Wellton-Mohawk Irrigation and Drainage District
- (4) Yuma Mesa Irrigation and Drainage District
- (5) Yuma County Water Users' Association
- (6) Yuma Irrigation District
- (7) Unit "B" Irrigation and Drainage District
- (8) North Gila Valley Irrigation District

4. Other Contracts

Other entities which have water contracts for Lower Colorado River water are as follows:

State of Nevada, March 30, 1942, as supplemented
January 3, 1944

Colorado River Commission of Nevada (Now Division of Colorado River Resources), October 26, 1966, for delivery to Southern California Edison Company

Colorado River Commission of Nevada (Now Division of Colorado River Resources), August 25, 1967, Southern Nevada Water Project

Basic Management, Incorporated, September 18, 1969

Las Vegas Valley Water District, September 22, 1969

(In addition to those contracts listed above, Reclamation has entered into eleven other contracts for relatively small water deliveries in the State of Nevada.)

Metropolitan Water District of Southern California, April 24, 1930, as supplemented September 28, 1931

Palo Verde Irrigation District, February 7, 1933

State of Arizona, February 9, 1944

Hayes and Lukes - Salt Mine Development, July 22, 1974

City of Kingman, November 14, 1968

Lake Havasu Irrigation and Drainage District, November 14, 1968

Mohave Valley Irrigation and Drainage District, November 14, 1968

Central Arizona Water Conservation District, December 15, 1972

City of Yuma, November 12, 1959

Entities which have contracts with Reclamation for power dependent upon management of the Lower Colorado River are numerous. Those include the states of Arizona and Nevada, municipalities, other Government agencies, private power companies, and irrigation districts.

E. Authority for Study

This statement has been prepared in compliance with the National Environmental Policy Act of 1969 (83 Stat. 852, 42 USC 4321, et. seq.).

the Council on Environmental Quality Guidelines (38 FR 20550, August 1, 1973, et. seq.), Department of the Interior regulations (36 FR 19343, October 2, 1971, et. seq.), and Bureau of Reclamation instructions (37 FR 1126, January 25, 1972) superseded by revised instructions (37 FR 24910, November 23, 1972).

F. The Relationship of the Interagency Task Force Report to this Study

Ambassador Brownell's report to President Nixon considered a large number of possible measures which would lead to a resolution of the United States-Mexico Colorado River salinity problem. The impacts of these measures have been discussed in the Final Environmental Impact Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico, prepared by the U.S. Department of State. From the report, specific features that have been included in Public Law 93-320 are evaluated further herein.

G. The Project

1. Introduction

The Project consists of three major features; (1) a desalting complex; (2) a concrete-lined canal to replace the first 49 miles of the unlined Coachella Canal, and (3) a protective and regulatory ground-water pumping well fields. Each of these features contains structural and non-structural components.

2. Project Objectives

The objectives of the Project are to reduce the salinity of water delivered to Mexico, more efficiently utilize water resources, and manage ground-water withdrawal.

Desalting Complex objectives are to meet an annual average salinity differential of Colorado River waters delivered to Mexico as provided in Minute 242, conserve 132,000 acre-feet per year of water resources by desalting irrigation return flows now being wasted, preserve interstate harmony through utilization of most of the return flows thereby freeing an equal amount of water for use in the United States, preserve international harmony by providing means to meet an international agreement, and to enhance development of membrane desalting technology.

The objective of lining the Coachella Canal is to conserve for beneficial use an additional 132,000 acre-feet of Colorado River water

now being lost annually through canal seepage. The salvaged water will be credited to the United States for the purpose of delivering water to Mexico as a replacement for the bypassed Wellton-Mohawk drain water on an interim basis until such time as the Secretary of Interior does not meet all the water delivery requests of the California agencies holding Colorado River water rights up to a total of 4.4 million acre-feet per year. After the desalting plant is in operation, any credits from the savings due to Coachella Canal lining would be used to offset past debits, credit against brine discharge from the desalting plant and accumulate credits to offset future brine discharges. Public Law 93-320 provides that credits of the water saved by the lining of the first 49 miles of the Coachella Canal will commence upon completion of the lining and will terminate the first year that the Secretary of Interior delivers mainstream Colorado River water to California in an amount less than the sum of the quantities requested by (1) the California agencies under contracts made pursuant to Section 5 of the Boulder Canyon Project Act (45 Stat. 1057), and (2) Federal establishments to meet their water rights acquired in California in accordance with the Supreme Court decree in Arizona vs. California.

The objectives of the Protective and Regulatory Ground-water Pumping plan are to manage and preserve United States ground-water resources for the benefit of the United States, and to provide water deliveries to Mexico, thereby conserving upstream Colorado River water. The underflow of ground water to Mexico caused by Mexican pumping will be reduced, and thus a valuable water resource will be protected. A substantial portion of the pumped water will be delivered to Mexico in satisfaction of Treaty requirements. This will not increase delivery of water to Mexico, but will maintain delivery at the amounts specified by the Treaty and maintain water deliveries across the land boundary at San Luis at approximately 140,000 acre-feet per year as provided in Minute No. 242.

3. Project Costs and Schedule

a. Installation Costs

The project cost as authorized and based on April 1973 prices is \$155,500,000 plus or minus such amounts as may be justified by reason of ordinary fluctuations in construction costs. The Secretary of Interior is authorized to provide for modifications of the project to the extent determined appropriate to meet the objectives of Public Law 93-320 at the lowest overall cost to the United States. No funds for any such modifications shall be expended until the expiration of 60 days after the proposed

modification has been submitted to the appropriate committees of the Congress, unless the Congress approves the earlier date by concurrent resolution. The estimated costs are:

1.	DESALTING COMPLEX	\$ 98,050,000
	Desalting Plant	62,080,000
	Pretreatment Plant	16,150,000
	Desalting Plant	37,086,000
	Appurtenant Works	8,844,000
	Associated Features Outside Plant Boundary.	35,970,000
	Bypass Drain	15,370,000
	M.O.D.E. Siphon	3,100,000
	Wellton-Mohawk Irrigation Efficiency	
	Improvement Measures and Acreage	
	Reduction	12,500,000
	Gila River Control Measures at Painted	
	Rock Dam	5,000,000
2.	BRINE REPLACEMENT STUDIES	2,000,000
3.	COACHELLA CANAL LINING	21,450,000
	Canal Construction and Appurtenant Works.	20,400,000
	Acquisition of Undeveloped Private Land	
	on Imperial East Mesa	750,000
	Fish and Wildlife Facilities	300,000
4.	PROTECTIVE AND REGULATORY GROUND-WATER	
	PUMPING	34,000,000
	Yuma Mesa Boundary Well Field	13,050,000
	Yuma Valley Boundary Well Field	3,250,000
	Transmission Facilities	1,300,000
	Acquisition of 23,500 acres of Yuma	
	Mesa Land	16,400,000
	TOTAL ESTIMATED COSTS	\$155,500,000

Costs associated with the desalting complex and protective and regulatory ground-water pumping are nonreimbursable, except for certain provisions of the legislation.

The total construction cost for the Coachella Canal lining is repayable without interest in 40 equal annual installments beginning the year following completion of construction. The repayment is to be pro rated between the United States and the Coachella Valley County Water District. The annual repayment installments will be nonreimbursable until such time as the United States no longer receives credit for the saved water.

b. Operation, Maintenance, Replacements and Power Costs

Estimated operation, maintenance, replacements and power costs for the desalting complex range from about \$9,800,000 to \$11,700,000 annually. Annual operating, maintenance, replacements and power costs for protective and regulatory ground-water pumping are estimated to be about \$940,000 annually. Operation, maintenance and replacement costs for the Coachella Canal lining have not been estimated since these costs will be the responsibility of the Coachella Valley County Water District. Generally, these costs are less for a concrete-lined canal than for a comparable unlined canal.

c. Construction Schedule

The estimated construction program of the major features is presented in the following schedule:

Estimated Construction Schedule

Feature	Calendar Year						
	1975	1976	1977	1978	1979	1980	1981
Desalting Complex:							
M.O.D.E. Siphon		██████████					
Bypass Drain			██████████				
Desalting Equipment				██████████			
Desalting Membranes				██████████			
Desalting Plant ^{1/}					██████████		
Transmission Line ^{2/}						██████████	
Coachella Canal		██████████					
Protective and Regulatory Ground-Water Pumping				██████████			

It is anticipated that construction of the bypass drain in Mexico will coincide with the United States bypass drain construction.

Nonstructural measures of the Project scheduled to be consistent with the completion of the desalting plant are the Wellton-Mohawk irrigation efficiency program and land retirement; Wellton-Mohawk on-farm improvements, and land retirement on the Imperial East Mesa.

^{1/} Includes construction of pretreatment plant and other work at the desalting plant site.

^{2/} Transmission line to connect the desalting plant switchyard to the existing transmission system at the Yuma-Axis (Yucca) Powerplant Switchyard and the Knob Switching Station.

Wellton-Mohawk irrigation management services will be continuous and Painted Rock Reservoir land acquisition is indefinite.

H. Description of the Project Features

1. Desalting Complex

a. Description

The Desalting Complex comprises the desalting plant facilities within the plant boundary and other associated facilities. The desalting plant facilities within the plant boundary include the pre-treatment plant, the desalting plant, and appurtenant works (see Plate 1). Other associated facilities include a bypass drain, Main Outlet Drain Extension siphon, an irrigation efficiency improvement program, acreage reduction and on-farm irrigation system improvements, and Gila River control measures at Painted Rock Dam, some 60 miles upstream from the Wellton-Mohawk area.

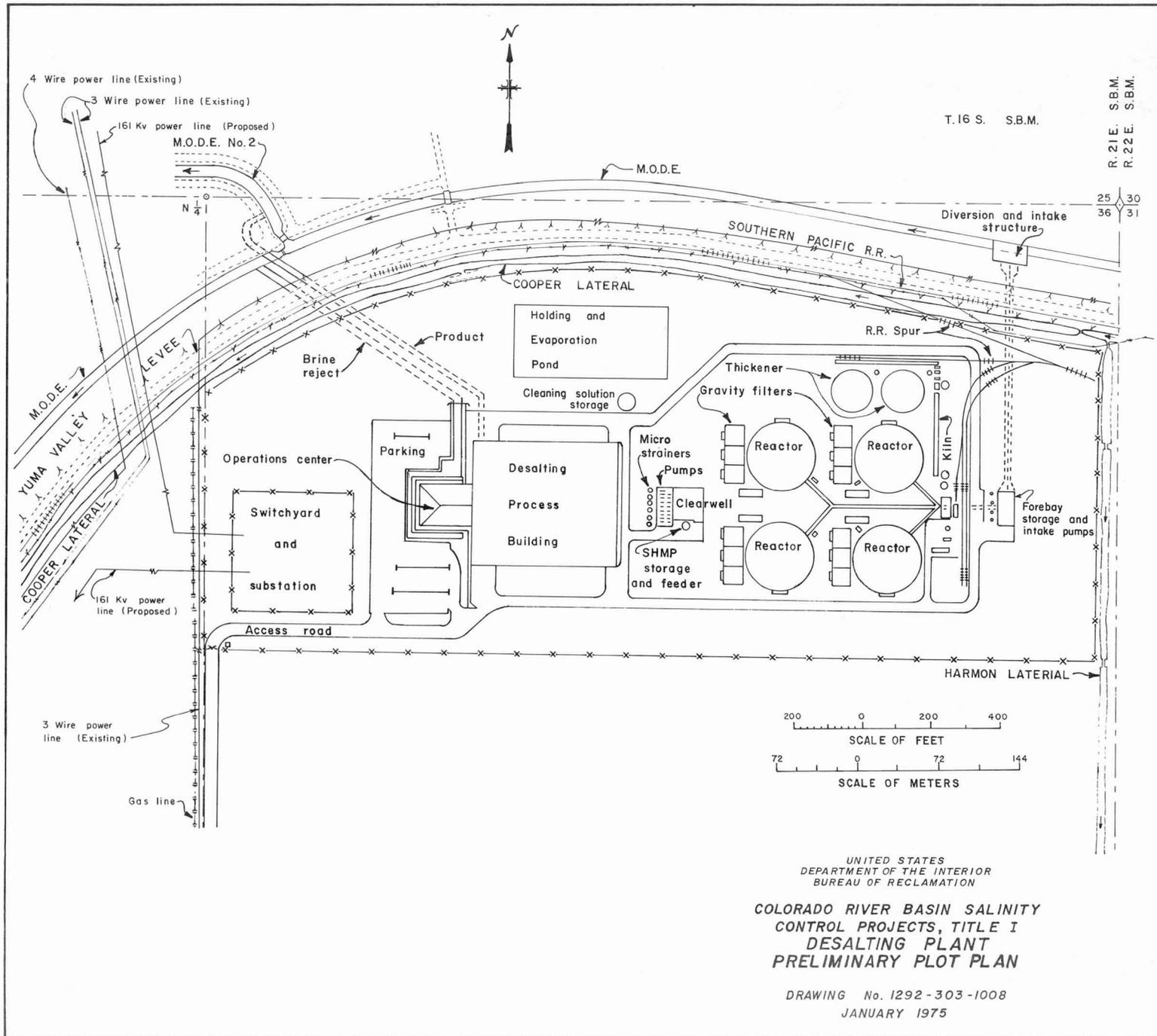
b. Desalting Plant

(1) Location

The primary location being considered for the desalting plant facilities is immediately adjacent to the M.O.D.E. and the Yuma Valley Levee about 4 miles west of Yuma, Arizona, and about 2 miles north of Morelos Dam (see Frontispiece). The plot, which is farmland with a history of field crop production, consists of about 60 acres. The north and west boundaries follow the curve of the Cooper Lateral and the Yuma Valley Levee. Service roads and a spur of the Southern Pacific Railroad are located nearby, the existing Arizona Public Service Company's Yuma-Axis (Yucca) Powerplant is about 800 feet to the south and the Cocopah Indian community is located north of the M.O.D.E. The proposed site is outlined on Photograph P1292-300-01058NA.

Two alternative sites are also under consideration if the above desalting plant site proves unsuitable.

The first alternate desalting plant site under consideration is located about 11 miles east of the City of Yuma in the vicinity of the Gila River narrows between the Laguna Mountains on the north and the Gila Mountains on the south. The plant would require a plot of about 60 acres of land located within a portion of those lands of Sections 8, 9, 16, and 17, T. 8 S., R. 21 W., G&SRM, a total of about 300 acres,



UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION

**COLORADO RIVER BASIN SALINITY
 CONTROL PROJECTS, TITLE I
 DESALTING PLANT
 PRELIMINARY PLOT PLAN**

DRAWING No. 1292-303-1008
 JANUARY 1975



Aerial view looking west showing the proposed site for the desalting plant (center of photo). Yuma area, Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P1292-300-01058 NA.

which are bordered on the north by the Wellton-Mohawk Main Conveyance Channel and the Wellton-Mohawk Canal, on the west by the Gila Gravity Main Canal, and on the east by the Southern Pacific Railroad. The area is mostly desert habitat with very sparse vegetative cover. There is easy access to the area via U.S. Highway 95 which passes through the site.

The second alternate site being considered for the location of the desalting plant is immediately east of the City of Yuma and just south of Prison Hill in portions of Sections 22 and/or 27, T. 8 S., R. 23 W., G&SRM. At this site are two possible locations for the plant. One location is an area of about 45 acres of fallow land in Section 22 on the east side of the unfinished portion of Interstate 8. The M.O.D.E. makes a sharp bend to the north adjacent to the north end of the location. The other location is in Section 27 and consists of about 65 acres of vacated private lands between the unfinished portion of Interstate 8 on the east and the Southern Pacific Railroad on the west.

In the event that the desalting plant were built at the Gila River narrows, this would require the additional construction of about 18 miles of bypass drain to convey the reject stream. The drain would be constructed within existing levee and other rights-of-way adjacent to the M.O.D. and M.O.D.E. This would also require the construction of another siphon at the site of the existing metal flume to carry the reject water. Construction of the desalting plant at the Prison Hill alternate site would also require the construction of an additional reach of bypass drain amounting to about 6 miles plus the extra siphon to convey the reject water around Prison Hill and past the Yuma Crossing.

(2) Feedwater System

Using existing gate structures on the M.O.D.E. to form a forebay, raw feed water will be diverted by an intake structure through the Yuma Valley Levee. The average drainage flow is expected to be 175,000 acre-feet per year (156 Mgal/d) or less when plant operations commence, and the rate of ground-water pumping in the Wellton-Mohawk Division of the Gila Project will be regulated to maintain adequate ground-water elevations in the District. During normal operations, 138 Mgal/d will be diverted to the plant as feed water, with the remaining 18 Mgal/d used to blend with the product water as shown on Plate 3.

The quantity and quality data shown on Plate 3 and used throughout this statement are approximate using estimated Wellton-Mohawk Division drainage flow conditions that will prevail when the desalting plant is operational and a plant process design based on two-thirds reverse

osmosis equipment and one-third electro dialysis equipment. More precise data and design features will be developed later, but these estimates and assumptions are considered reasonable to evaluate the effects of the authorized plant on the environment.

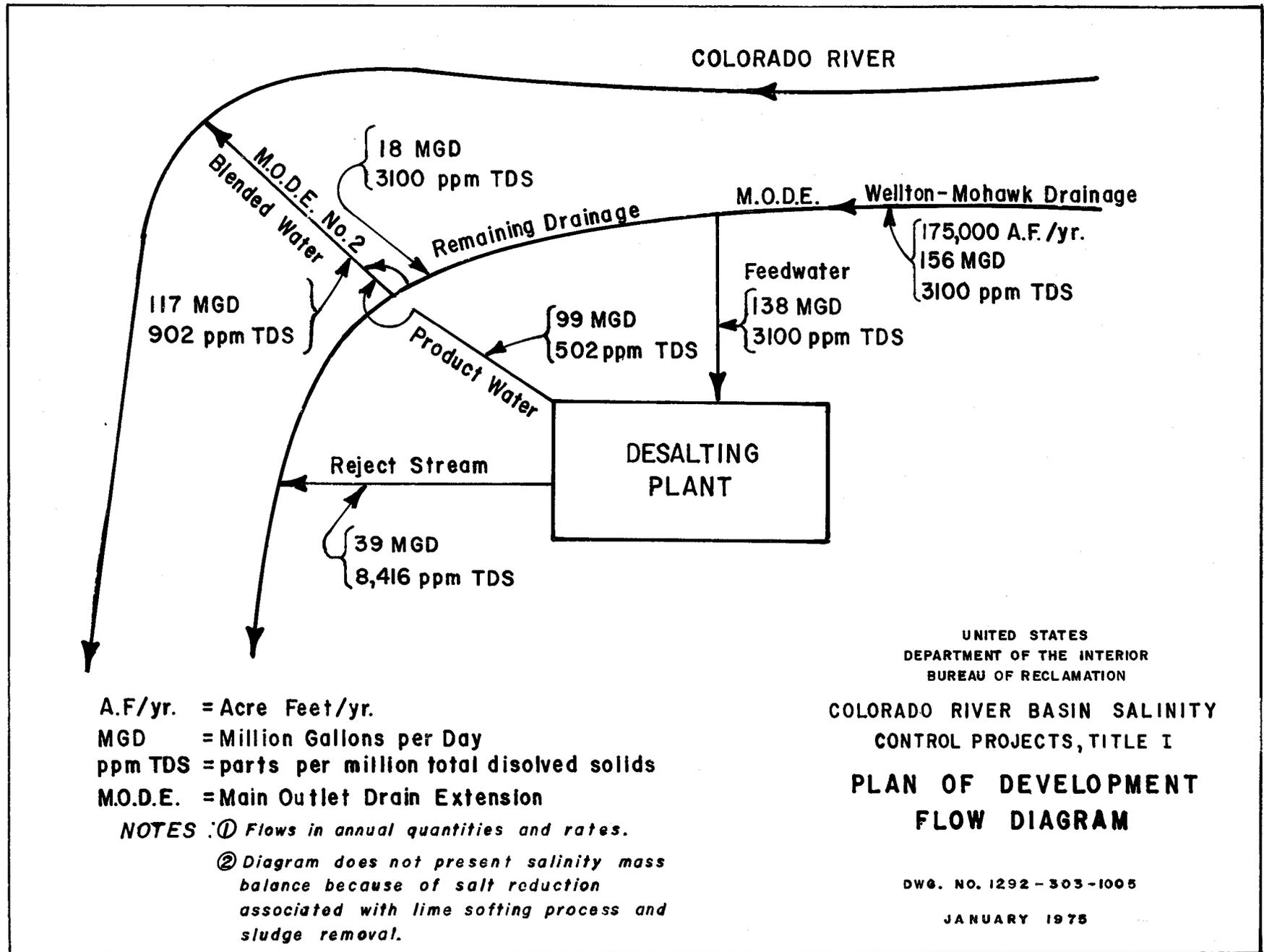
The intake system which includes trash racks, grit basin, traveling screens, and an intake pumping plant will remove all floating debris and quantities of large particles of suspended matter and coarse sand. Disposal of these materials will be required. The materials collected in the trash racks (approximately 1.5 tons per day after drying) will amount to about 13,000 cubic yards of landfill material per year, or about 650,000 cubic yards over the 50 year life of the project. The materials collected in the grit basins (approximately 40 tons per day after drying) will amount to about 9,600 cubic yards of landfill material per year, or about 480,000 cubic yards over the 50 year life of the project.

(3) Pretreatment

Due to the salinity levels of the return flows from the Wellton-Mohawk Division, Gila Project, these flows can most economically be desalted by the use of a membrane process: either electro dialysis or reverse osmosis. In order to protect the membrane desalting equipment and to maintain efficient operation, the raw feedwater must be pretreated to remove undissolved solids and objectionable dissolved solids which adversely affect plant performance.

Final determination has not been completed on the exact pretreatment process or combination of processes to be used, and field testing of the various pretreatment methods and chemical requirements is still in progress. However, a preliminary engineering report has been completed which discusses the pretreatment process and the use of chemicals that will probably be required. The following discussion presents some of the findings of the preliminary report. Plate 2 shows a schematic diagram of the pretreatment process being considered.

The flow enters from the M.O.D.E. passing through trash racks, which prevent any large foreign object from entering the system, and flows to the grit basins where it will be chlorinated (algaecide process) to prevent algae and other organic growths within the plant. From there, the feed water is pumped to sludge reactors. Coagulated impurities will precipitate along with calcium carbonate. The test results so far do not indicate that there will be a need for using a coagulant aid. However, the preliminary engineering report is based on the use of 10 to 20 p/m of polyelectrolyte to aid in settling. The overflow from the sludge



A.F./yr. = Acre Feet/yr.
 MGD = Million Gallons per Day
 ppm TDS = parts per million total dissolved solids
 M.O.D.E. = Main Outlet Drain Extension

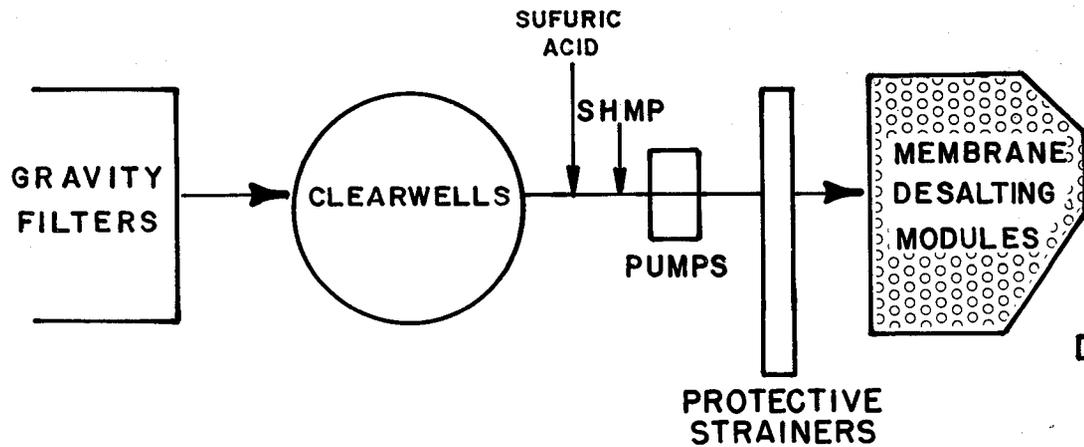
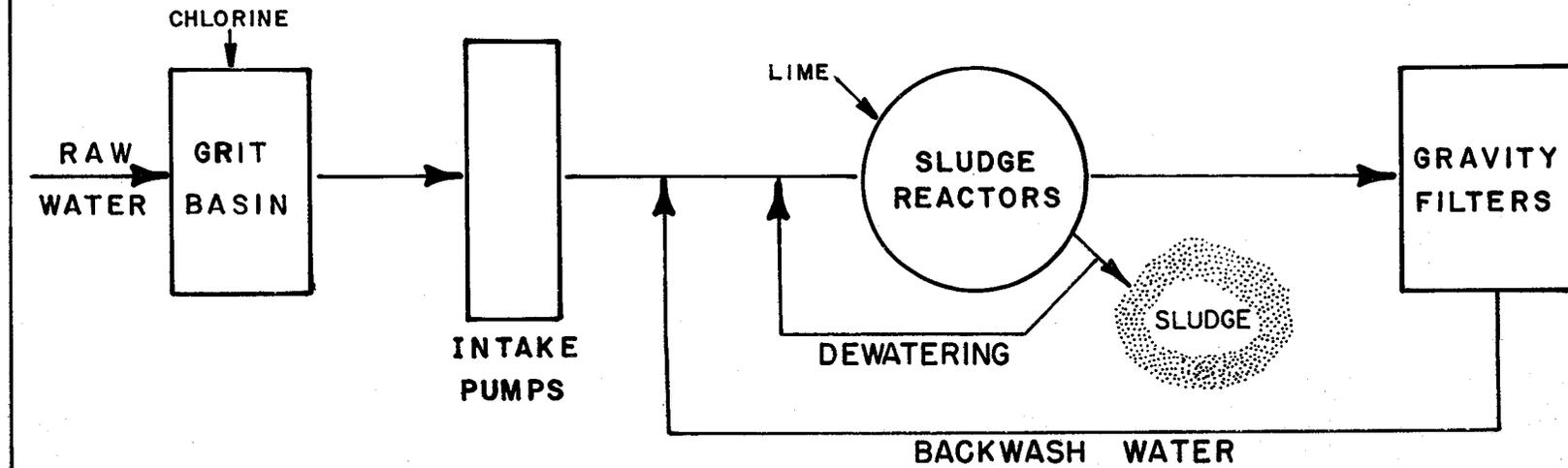
NOTES : ① Flows in annual quantities and rates.
 ② Diagram does not present salinity mass balance because of salt reduction associated with lime softing process and sludge removal.

UNITED STATES
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 COLORADO RIVER BASIN SALINITY
 CONTROL PROJECTS, TITLE I
 PLAN OF DEVELOPMENT
 FLOW DIAGRAM

DWG. NO. 1292 - 303 - 1005
 JANUARY 1975

DESALTING PLANT SCHEMATIC

PRETREATMENT



UNITED STATES
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COLORADO RIVER BASIN SALINITY
CONTROL PROJECTS, TITLE I
DESALTING PLANT SCHEMATIC
PRETREATMENT

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reactors is then percolated through gravity sand filters for removal of any suspended matter remaining in the reactor effluent. Individual filters will be backwashed when required and the backwash waters will be returned to the sludge reactors. From the gravity filters the water flows to clearwells where it will be ready for use in the membrane desalting plant with the addition of sulfuric acid for pH adjustment and the possible addition of SHMP (sodium hexametaphosphate) for scale control. Testing of pretreatment and desalting equipment at this time indicates that pH adjustment will be required but that the use of SHMP is still questionable and may not be required. Some of the desalting units being tested are performing satisfactorily without the use of SHMP and further studies are being undertaken to determine if the use of SHMP can be eliminated due to the environmental and cost consequences of the chemical. Furthermore, as the water is pumped from the clearwells there will be a final filtration through protective strainers as a safety device to prevent any remaining suspended solids from reaching the membrane desalting units.

One variation of this process being considered, recalcining of all the calcium carbonate sludge, will greatly reduce and may eliminate the need for the use of sulfuric acid by substituting CO_2 for pH control. The sludge from sludge contact reactors would be dewatered by centrifuges and then introduced into a calcining kiln where hot gases pass over the sludge and convert the calcium carbonate to lime and carbon dioxide. The flue gases will be scrubbed, as an emission control measure, and CO_2 may be collected from the recalcining process. The lime produced through the recalcining process will be partly reused in the pretreatment process, and the excess lime could be sold. The recalcining process would eliminate the need for costly transport and disposal of approximately 610 tons per day of calcium carbonate sludge.

Another method of handling the sludge would be to recalcine only that sludge required to produce enough lime for the pretreatment process (partial recalcining) and dispose of the remaining sludge (approximately 274 tons per day) by possible sale or at a landfill or other sludge disposal site.

Recalcining all of the sludge will require 8,500,000 BTU of energy per ton of lime and about 66,000 tons per year of lime could be produced. About 41,000 tons of lime per year are required in the pretreatment process leaving 25,000 tons per year for sale. The energy for recalcining would probably be supplied from fuel oil and would require about 22,000 tons or 157,000 barrels per year. Partial recalcining would require 9,900 tons or 70,400 barrels per year of fuel oil. A study will be undertaken to determine the feasibility of the recalcining process.

The weight and volume of the sludge obtained as part of the pretreatment process described above will be mostly dependent upon the quantity of lime used for clarification and to a lesser extent upon the amount of solids in the Wellton-Mohawk drainage. It is estimated that the density of the sludge after mechanical dewatering will be 100 pounds per cubic foot. Therefore, if the sludge is used for landfill purposes, every ton per day of sludge will yield about 0.75 cubic yards per day of landfill.

If all of the sludge produced during the desalting process (610 tons per day) were to be disposed of for landfill purposes it would amount to approximately 165,000 cubic yards per year or 8,250,000 cubic yards over the 50-year life of the project. If, as mentioned earlier, the sludge required to produce enough lime for the pretreatment process were recalcined, the remaining sludge (approximately 274 tons per day) would amount to about 75,000 cubic yards of landfill material per year, or about 3,700,000 cubic yards over the 50-year life of the project.

If the sludge disposal is necessary, a site will be selected to minimize environmental impacts. Three potential landfill disposal sites under consideration are located on undeveloped and relatively flat desertlands; two on the Yuma Mesa and one on the Pilot Knob Mesa. These three sites are discussed later under Rights-of-way.

(4) Membrane Desalting Process

Dissolved salts will be removed by means of a thin film membrane process, either reverse osmosis or electrodialysis, or more probably a combination of the two. Final determination has not been completed on the exact membrane desalting process or combination of processes to be used; and field testing concerning the various methods available is still in progress.

The preliminary engineering report is based on a combination plant consisting of two reverse osmosis sections and one electrodialysis section. The flow of water from the pretreatment process, described earlier, will be divided into three approximately equal flows, two of which will flow to the two reverse osmosis membrane sections, and one of which will flow to the electrodialysis membrane section. The product flow from each of these three sections will then be discharged and mixed into a combined desalting plant product waterflow. Likewise, the reject or brine flow from each of the three membrane sections will be mixed into a combined desalting plant reject flow. The reject flow from the reverse osmosis section will be used to generate 2 megawatts of electricity.

A recovery ratio (Product Flow/Plant Feed Flow) of 72 percent of the feedwater results from the preliminary design of the desalting plant. The operation of the desalting plant will result in a computed average of about 99 Mgal/d of product water with a composite salinity of 502 p/m TDS and 39 Mgal/d of reject water with a salinity of 8,416 p/m TDS, less than one-fourth seawater salinity, as indicated by the "Flow Diagram" in Plate 3. It is anticipated that the plant will operate with a plant factor (Design Flow/Installed Capacity) of 85 percent. With adequate pretreatment there should be no major problems to preclude operation of the desalting plant within these parameters. Typically the plant will be shut down about 2 weeks each year to facilitate inspection and maintenance on the drains and reject channels. This will also permit plant maintenance. An additional week will be required for plant startup each year after the scheduled downtime.

The current data on reverse osmosis membranes indicate that the salinity of the product water from the two reverse osmosis sections will be about 250 p/m TDS (92 percent salt rejection of the 3,100 p/m TDS - feedwater). The one electrodialysis section will operate most economically when producing a product water with a salinity of 904 p/m TDS (71 percent salt rejection).

Both membrane desalting processes have advanced from the laboratory to the small municipal and industrial water treatment plant size. The technology has now advanced to the stage where the economics of large-scale application are practical. The applicability of large-scale membrane desalting processes to the solution of the salinity problem addressed by the Colorado River Basin Salinity Control Project, Title I, is economical and will demonstrate the state of the art for applications nationally and worldwide.

A system for cleaning the membrane units will be permanently installed to obtain the maximum practicable membrane life and performance. The cleaning solution that will be used can only be determined after the membrane desalting manufacturer is selected. Most manufacturers have their own recommendations as to which cleaning solutions or procedures work best for their particular product. In general, however, they are 0.5 percent to a 2 percent acid, caustic, or detergent solutions. Furthermore, some of the solutions are proprietary and information concerning their chemical constituents is not available. The cleaning solutions will be stored in holding tanks with a total estimated capacity of 60,000 gallons and will be used periodically when membrane cleaning is required. Most cleaning solutions can be reused. Cleaning solution wastes can be collected in a special holding pond and evaporated. The possibility of neutralizing them by recycling through the sludge reactors is under investigation.

(5) Product Stream

The estimated TDS composition for the M.O.D.E. raw feed water, product water, blend and reject streams is presented in Table 1. Under normal operations, 99 Mgal/d of desalted product water with a salt concentration of 502 p/m TDS will be discharged into M.O.D.E. No. 2 downstream from the intake gates, as shown in Plate 3. This existing drain has been used at certain times in the past to discharge Wellton-Mohawk drainage water into the Colorado River above Morelos Dam. This water will be blended with the bypassed 18 Mgal/d of untreated drainage flow, resulting in a combined product stream of 117 Mgal/d, with a salinity of 902 p/m TDS. An existing modified Parshall flume will be used to measure the flows at the discharge point.

Present indications are that the product water will contain no pesticide or herbicide residues of significant levels. The exact concentration of nutrients in the product stream which discharges to the Colorado River will be dependent on the concentration of nutrients in the Wellton-Mohawk drainage water and the desalting process that will be applied. Based on the preliminary engineering report and the process described therein, the blended water stream that discharges to the Colorado River upstream of Morelos Dam will contain approximately the following concentrations of nutrients:

Nitrates at 3 p/m
Phosphates at 2 p/m

The phosphate concentration will primarily be dependent on the use of SHMP for scale control in the desalting membranes. As previously discussed under Section H.1.b.(3), the use of SHMP may not be required. If SHMP is not required the phosphate concentration will be dependent on the amount of phosphates in the drain water.

Federal water quality standards have not yet been promulgated for the lower Colorado River; however, proposed nutrient standards have been published in the Federal Register^{1/} by the Environmental Protection Agency. For the Colorado River from Imperial Dam to Morelos Dam, the proposed mean annual concentration for phosphates is 0.10 p/m and for nitrates it is 5.0 p/m. Upon promulgation of these and other water quality standards for the lower Colorado River, every effort will be made to comply with the standards established for discharges to the Colorado River.

1/ Federal Register, Vol. 39, No. 200, Oct. 15, 1974, p. 36866-7.

TABLE 1

ESTIMATED TDS (P/M) COMPOSITION FOR M.O.D.E.
 RAW FEED WATER AND FOR THE PRODUCT WATER
 AND REJECT AND BLENDED STREAMS RESULTING FROM
 THE DESALTING PROCESS

Component	M.O.D.E. Raw Feed	Product	Reject	Blended
Ca ++	221	13	431	45
Mg ++	73	8	217	18
Na +	706	153	2,167	240
K +	13	2	42	4
Sr ++	12	3	36	4
HCO ₃ ⁻	379	5	12	62
SO ₄ ⁻⁻	818	134	2,738	239
Cl -	847	166	2,700	269
NO ₃ ⁻	5	2	13	3
PO ₄	0.1	2 ^{1/}	13 ^{1/}	2 ^{1/}
SiO ₂	26	14	47	16
Total Dissolved Solids	3,100	502	8,416	902
pH	8.0	6.3	7.0	7.5

^{1/} Phosphate values are maximums based on the use of sodium hexametaphosphate (SHMP) in the pretreatment process. If SHMP is not used these values will depend on the phosphate concentration in the raw feed water.

The desalting process will raise the temperature of the product water 1⁰ to 2⁰ F. over that of the feed water. It is anticipated that the blending process and transit to the river will reduce the temperature to ambient conditions as the blended water enters the river.

(6) Reject Stream

The desalting operations will produce a reject stream averaging 39 Mgal/d (60 ft³/s) with a salt concentration of 8,416 p/m TDS which will be conveyed in a concrete-lined bypass drain to Santa Clara Slough located north of the Gulf of California. This channel, which will have a design capacity of 353 ft³/s, will extend 53 miles from the terminus of the existing M.O.D.E. No. 3 at Morelos Dam to the Slough.

The reject stream will contain the salts that will be rejected from the Wellton-Mohawk drainage plus a portion of the chemical additives introduced during the desalting process. Present indications are that the reject stream will contain no pesticide or herbicide residues at significant levels. It is estimated that two nutrients will be found in the reject stream with approximately the following concentrations:

Nitrates @ 13 p/m

Phosphates @ 13 p/m

Waste heat from the desalting process will raise the temperature of the reject stream an estimated 2⁰ to 3⁰ F. over the original feedwater temperature. It is expected that the temperature of the water in the reject stream will return to normal during its 53 miles of transit in the lined drain to the Santa Clara Slough.

(7) Chemical Storage

The main chemical storage area, shown on Plate 1, is located and designed to meet all applicable regulations of the Occupational Safety and Health Act of 1970 concerning storage of bulk chemicals and delivery by railroad cars, bulk hopper trucks or tank trucks. The various suppliers and haulers would be required to meet the established Federal and State safety regulations for the various chemicals in transit.

The chlorine would be conveyed directly from chlorine tank railroad cars to the chlorine house for use according to the preliminary engineering report. It is assumed that one railroad tank car would hold from 1 to 2 week's storage of chlorine. The actual demand for chlorine is expected to range from between 4,000 to 6,000 pounds per day depending upon seasonal changes in the canal water composition.

It is estimated that the lime process will require 120 tons of lime per day which would be delivered in pebble form by hopper-bottom railroad cars unless lime is produced through recalcining. A combination vacuum-pressure conveyor system would unload the cars and the lime will probably be stored in two 12,000 cubic-foot silos which will provide 5 to 6 days' storage.

The ferric sulfate, if required, will probably be received in bulk trucks provided with their own pneumatic unloading system. A 5,000 cubic-foot storage silo would provide reserve storage capacity for about 15 days.

It is anticipated that the SHMP will be delivered in bulk trucks with pneumatic unloading. The SHMP would be stored in a 5,000 cubic-foot silo.

The sulfuric acid, if required, will be stored in a 35,000-gallon storage tank which will provide a reserve capacity of approximately 30 days. The storage tank would be located for ease of filling from railroad cars or tank trucks.

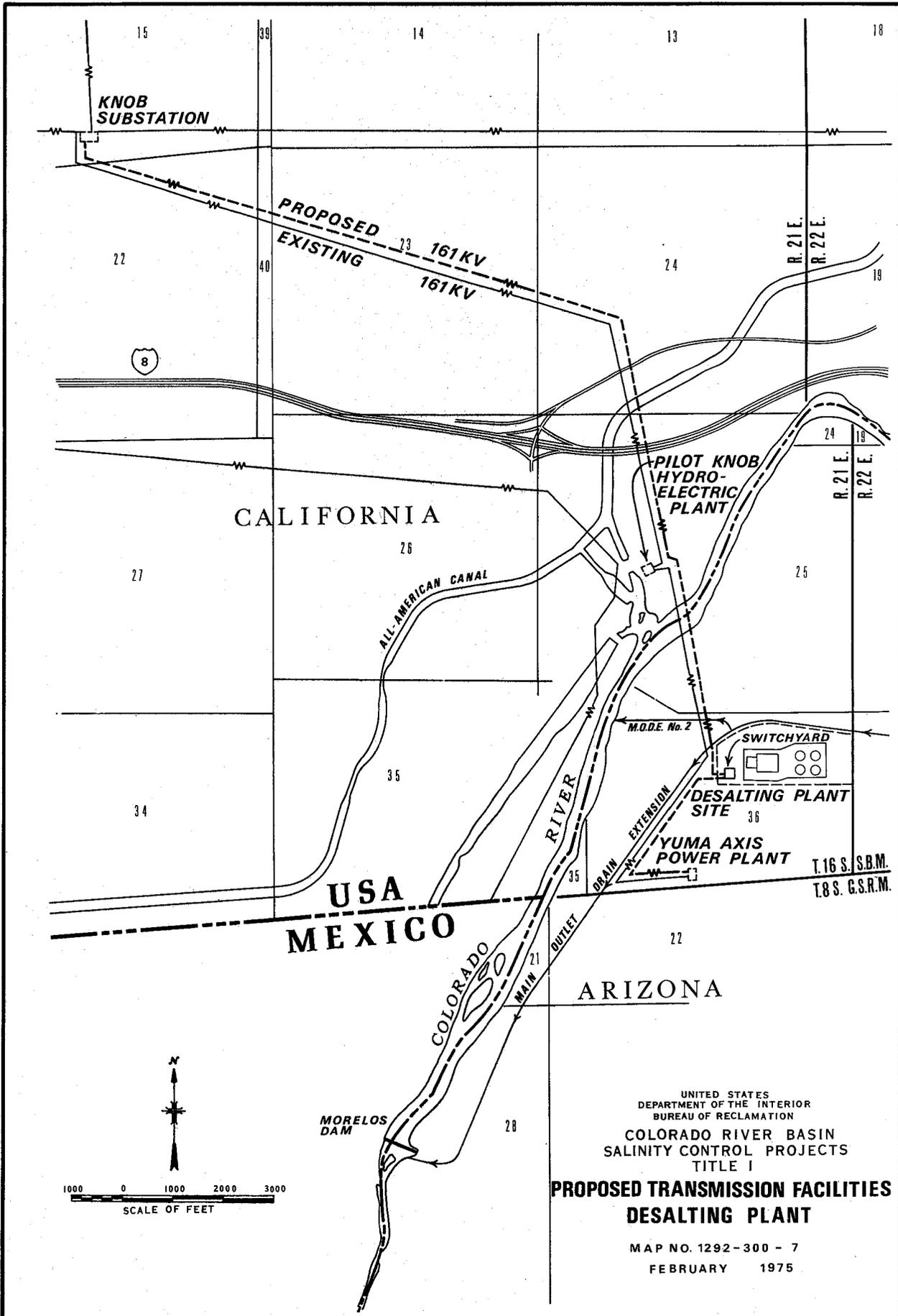
The feed rate of the various chemicals to the raw water in the pretreatment process will be automatically proportioned to the raw water flow rate.

(8) Power and Transmission Requirements

Based on an 85 percent plant factor, the desalting plant and associated pumps and structures will have an estimated demand of about 45 megawatts (MW) depending on the desalting process or combination of processes selected. The electric energy requirement, including losses, will be about 372,000,000 kilowatthours per year (kWh/yr). Additions to the USBR Parker-Davis Project transmission system will be required to serve the desalting complex load adequately. Transmission line lengths will be as follows:

<u>Transmission Line</u>	<u>Length</u>
Knob Switching Station -Desalter Substation 161-kV	4.0 miles
Yucca Powerplant Substation -Desalter Substation 161-kV	0.8 mile

See Plate No. 16 for the transmission lines to be constructed. The lines will be of wood-pole H-frame construction except for the crossing of the



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 MAP NO. 1292-300 - 7
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Colorado River which may require steel towers. Each of the three-phase conductors will be one ACSR (Aluminum Conductor, Steel Reinforced) conductor and will be supported by suspension insulators attached to the cross-arms of the structures. Two overhead ground wires will be installed near the tops of the poles. To terminate these lines, additional circuit breakers will be required at the Knob Switching Station and at the Yucca Powerplant Substation. A low profile 161-kV switchyard will be located within the desalting plant site. All circuits from the Desalter Substation to the desalting plant, pretreatment area and intake pumping plant will be installed underground.

The power source for the desalting complex is presently under study. In addition to evaluating costs associated with the purchase of power and energy from utilities, the potential of developing geothermal resources in the area is being evaluated. Also being considered is the interim use of a portion of the United States entitlement of the Navajo Project in which the Bureau is a participant. This source was developed to supply the power requirements of the Central Arizona Project (CAP) and to augment the Lower Colorado River Basin Development Fund. Because the in-service dates of the Navajo Project generating units occur prior to the need for CAP pumping power, the United States entered into contracts with other Navajo Project Participants and Southern California Edison Company for interim sale of the United States entitlement of the Navajo Project power. Although these contracts remain in effect for 20 years, the United States can, on five-year notice, recapture all or a portion of this entitlement for other purposes such as improving the quality of river water which, of course, the desalting complex would accomplish. The plan being considered will utilize Navajo Project power from the in-service date of 1980 through such time as the power may be required for use by CAP. By use of Navajo Project power as an interim resource, additional time can be allotted to properly perform geothermal power investigations on power production potential; or if geothermal power development does not materialize within the proper time frame, alternative permanent resources can be obtained.

There will not be any increase in the investment cost of the project due to the utilization of the above-mentioned resource. The investment costs of the Navajo Project are being borne by the Central Arizona Project. The use of Navajo Project power and energy by the desalting plant will be paid for as an annual operational expense of the desalting plant.

The Navajo Project transmission system extends to the McCullough Substation in Southern Nevada and to the Westwing Substation near Phoenix, Arizona. The Bureau of Reclamation has transmission facilities from or near these points to the Yuma area.

(9) Rights-of-Way

About 60 acres south of the existing Yuma Valley Levee rights-of-way will be required for the primary desalting plant site location. All of this land is presently irrigated farmland. The rights-of-way requirements for the alternative desalting plant locations, including pertinent features for product water and reject drainage discharge lines and transmission facilities have not been estimated.

An additional 50 acres will be required for transmission line rights-of-way. The alignment will parallel an existing line and will pass through approximately 1/4 mile of fallow land immediately northwest of the desalting plant site.

Additional land will probably be required for disposal of the wastes produced during the desalting process. The landfill requirements will be dependent upon what extent, if at all, the sludge is recalcined as mentioned earlier. If all the sludge produced from the desalting plant were recalcined, there would still be disposal required of the grit basins and trash rack wastes. Following are estimates of annual disposal requirements depending on the amount of sludge recalcining used in the operation of the plant.

<u>No recalcining</u>	
Sludge	165,000 cubic yards
Trash	13,000 cubic yards
Grit	9,600 cubic yards
Total	<u>187,600</u> cubic yards

The number of acres required for disposal using a ten-foot cut and cover operation would be about 600 acres.

<u>Partial recalcining</u>	
Sludge	75,000 cubic yards
Trash	13,000 cubic yards
Grit	9,600 cubic yards
Total	<u>97,600</u> cubic yards

The number of acres required for disposal using a ten-foot cut and cover operation would be about 300 acres.

<u>Total recalcining</u>	
Trash	13,000 cubic yards
Grit	9,600 cubic yards
Total	<u>22,600</u> cubic yards

The number of acres required for disposal using a ten-foot cut and cover operation would be about 72 acres.

One of the proposed landfill sites is about 2 miles east of the town of Somerton, Arizona, in Section 31, T. 9 S., R. 23 W., G&SRM. An estimated 275 acres of land in this section northwest of U.S. 95 is available for landfill. Disposal will be made by a ten-foot cut and cover operation. This site would be sufficient for landfill disposal for 45 years if the sludge required to produce enough lime for the pretreatment process were recalcined (partial recalcination). If none of the sludge is recalcined, then this particular site would hold about 23 years of the total waste output from the desalting plant. If all of the sludge is recalcined, this site would be sufficient for waste disposal for the 50-year life of the desalting plant.

Another proposed landfill site on the Yuma Mesa is in Section 2, T. 9 S., R. 22 W., G&SRM. This site, on approximately 95 acres, was used for borrow material for construction of Highway I-8. The borrow pit has a maximum storage capacity of about 1,275 acre-feet with an average depth of about 25 feet. The landfill capacity of the borrow pit would be adequate for about 20 years disposal if there were partial recalcining of the sludge produced at the desalting plant and about 10 years disposal if none of the sludge were recalcined. If all the sludge is recalcined, this site would also be sufficient for waste disposal for the 50-year life of the desalting plant.

The third alternative site for sludge disposal is located on the Pilot Knob Mesa in California in Sections 20, 28, 29, 30, and 33 of T. 16 S., R. 21 E., SBM. This site contains over 2,000 acres of land that would be sufficient for waste disposal for the 50-year life of the desalting plant whether or not sludge were recalcined. Disposal will be made by a ten-foot cut and cover operation.

(10) Construction Materials

Materials for concrete are available from several commercial sources in the Yuma area.

The membranes and the electrical and mechanical equipment required for the pretreatment and desalting systems will be fabricated, for the most part, at various locations in the United States and will be assembled and installed at the plant site.

c. Main Outlet Drain Extension Replacement Siphon

(1) Description

In order to maintain a reliable flow through the Main Outlet Drain Extension to the desalting plant, the existing metal flume adjacent to the river in the vicinity of Prison Hill at Yuma will be replaced. The new structure will be a 3,300-foot-long concrete siphon 120 inches in diameter with inlet and outlet transitions. The siphon will be located adjacent to the present structure on the southerly side. It will tie into the present concrete-lined drain channel about 300 feet upstream from the beginning of the present structure, lie adjacent to the base of Prison Hill, and extend under the railroad bridge and U.S. Highway 80 alternate bridge. From this point it will extend downstream along the bank of the Colorado River and terminate at the approximate location of the outlet of the present structure.

The siphon will be buried with about 3 feet of cover and be protected on the river side with a layer of rock riprap. For a pleasing appearance the riprap will be covered with a layer of earth. The entire area will be graded to the appearance of a natural riverbank.

Portions of the City of Yuma water treatment plant and storm water system will have to be relocated for the siphon construction. Inlets from the river or discharge pipes to the river will be reconstructed above or below the new siphon.

The present flume structure will be kept in service during construction, except that two short water outages of about 2 weeks each will be required during construction. Following completion of the new siphon structure, the existing elevated metal flume will be removed.

(2) Rights-of-way

The buried concrete siphon will require approximately 6 acres of rights-of-way within or adjacent to the Colorado River channel as it bounds the city of Yuma on the north. The rights-of-way will be about 80 feet wide for the length of the structure, beginning just easterly of Prison Hill and extending downstream approximately 3,300 feet.

(3) Construction Materials

Although the siphon will be a buried structure, earth borrow material will be required during the construction period to

construct a short bypass channel toward the downstream end of the present structure. After the siphon is in place and operational, that earth material will be used as embankment to cover the siphon with a minimum of 3 feet of material. The earth borrow will either be taken from an area adjacent to the construction or from the river flood plain immediately upstream.

Concrete aggregate will be obtained from commercial sources in Yuma or possibly elsewhere if precast pipe is used. Riprap will be obtained from Black Hill on the easterly boundary of the City of Yuma, Yuma County, Arizona, or from an established Bureau of Reclamation quarry at Pilot Knob, Imperial County, California.

d. Bypass Drain

(1) Description

The reject stream from the desalting plant will discharge into the existing concrete-lined Main Outlet Drain Extension (M.O.D.E.) downstream of the bifurcation for M.O.D.E. No. 2, as depicted on Plate 1. Currently, the M.O.D.E. terminates at Morelos Dam and the Wellton-Mohawk drainage water presently discharges to the river immediately downstream from the dam. A bifurcation structure will be provided just above the terminus of the M.O.D.E. to divert desalting plant reject water into the new bypass drain. The bypass drain will extend from Morelos Dam to the Arizona-Sonora Boundary. From there, the drain will extend into Mexico to Santa Clara Slough upstream from the Gulf of California. This section of the drain will be constructed by Mexico.

Check structures and gated wasteways to the river channel will be provided for maintenance purposes and for emergency situations. Anticipated locations for the wasteways are at the existing M.O.D.E. terminus below Morelos Dam, at the Arizona-Sonora Boundary and one about halfway between the Boundary and Santa Clara Slough.

The concrete-lined drain will be 53 miles long and will have a maximum capacity of 353 ft³/s in order to bypass, if necessary, the maximum Wellton-Mohawk drainage flow.

The drain will have a bottom width of about 10 feet and side slopes of 1-1/2:1, with the exception of areas where the alignment will be adjacent to the Colorado River. The slope of the drain will be approximately 0.0002 in the United States and perhaps

a little greater in Mexico. The depth of water will be about 6.0 feet at a maximum flow of 353 ft³/s. Under normal conditions the flow will consist of the reject stream, amounting to about 60 ft³/s at 8,416 p/m TDS which will produce a normal water depth of about 2 feet.

(2) Operation of Bypass Drain

As stated above, the normal operating condition of the bypass drain will be to carry the reject stream from the desalting plant, which will amount to 60 ft³/s of 8,416 p/m TDS water. Annually the flow is expected to be about 43,000 acre-feet. However, on some occasions other operating conditions will occur, which are described hereafter.

After construction of the bypass drain in the United States and Mexico, there will be about a 3-year time interval before completion of the desalting plant. The Wellton-Mohawk Division drainage water is expected to be removed from the Colorado River below Morelos Dam and discharged into the bypass drain as soon as construction is completed. Should the United States portion be completed prior to the Mexican portion, it is expected that the drainage water will be carried to the wasteway structure near the Arizona-Sonora border and discharged to the Colorado River at that point until the portion in Mexico is completed. During this approximately 3-year period it is expected that the Wellton-Mohawk Division drainage will be reducing as a result of irrigation efficiency measures from about 220,000 acre-feet to 175,000 acre-feet annually. The salinity will be decreasing from about 3,400 p/m TDS to 3,100 p/m TDS. The drainage water would discharge to the Santa Clara Slough unless Mexico would elect to divert it to the Colorado River at its wasteway structure or request the United States to discharge it to the river at one of the wasteways in the United States.

After completion of the desalting plant, there will be periods that the bypass drain will carry other than the normal reject stream flow. During emergency conditions, which will most likely be short and intermittent and may result from power interruptions at the desalting plant or other emergencies that would render the plant inoperative, the full flow of the Wellton-Mohawk Division would be conveyed past the desalting plant and carried in the bypass drain.

There can also be an operating condition whereby part of the Wellton-Mohawk Division drainage water would have to be bypassed around the desalting plant to the bypass drain where it would mix with reject stream flow. This condition could result from: insufficient capacity of the desalting plant, a need to improve the quality of returns to the

Colorado River above Morelos Dam to meet salinity criteria of Minute No. 242 or additional Wellton-Mohawk Division pumping requirements resulting from the infiltration of Gila River floodflows. In this situation the quantity and quality of the water in the bypass drain would depend on the amount of extra water conveyed.

During certain hydrologic conditions it may be necessary to make flood control releases from storage reservoirs on the Colorado River. If it can be foreseen that the flood control releases will continue for an extended period of time, it is expected that the desalting plant will be shut down, should the quantity of the releases be great enough to permit this. This would reduce operating costs of the plant and would allow a period of time for maintenance of plant facilities. During the shut-down period, the Wellton-Mohawk Division drainage water would be bypassed and carried in the bypass drain.

During the construction of the desalting plant and appurtenant facilities it will be necessary to have one or more water outages in the bypass drain to connect plant facilities to the existing bypass drain channel. The duration of the outages will be about two weeks each. It is also possible that power failures in the Wellton-Mohawk Division may cause short intermittent interruptions of part or all of the drainage pumping.

A final condition that is expected is the complete curtailment of all Wellton-Mohawk Division pumping for about two weeks each year to allow for maintenance of the channels and for maintenance of those portions of the desalting plant that can only be performed during a complete water outage. Experience over a period of years will dictate whether the length or frequency of the outage periods can be changed.

(3) Morelos Dam to Southerly International Boundary

This reach of the alignment will be 16 miles long, including approximately 3,000 feet of buried pipe siphon or concrete bench flume section. The drain will be adjacent and parallel to the west side of the Yuma Valley Levee except possibly the southerly two miles. No major roads cross the proposed alignment, but a sufficient number of bridges will be required for local traffic on private roads. Three bridges will be located to serve the Cocopah Indian Reservation, as specified in P.L. 93-320. The number of additional bridges required will be determined after consultation with responsible public entities and landowners or lessees of the land in the area. A Parshall flume will be installed to measure the flow into Mexico at the international boundary. Ladders and

other escape devices will be included in the design for the safety of humans.

(4) Rights-of-Way

The precise alignment and rights-of-way requirements have not been finalized. For the most part, however, the bypass drain will be located within existing Yuma Valley Levee rights-of-way, except possibly for the last two miles. The drain and operating road will require about 260 acres of existing levee rights-of-way and about 70 acres of additional rights-of-way immediately adjacent to the levee. Rights-of-way for the last two miles will be approximately 200 feet wide and will require 60 acres of land for rights-of-way. Additional rights-of-way on Federal land will be required for borrow areas.

(5) Construction Material

The bypass drain construction will be by cut and fill to form the embankments that will support the concrete-lined section. The required excavation for the drain will not provide the necessary amounts of material for embankments. Earth material will be from borrow areas within the Colorado River flood plain.

To protect the structure, riprap may be placed on the westerly embankment. Potential riprap source sites are Pilot Knob, Imperial County, California, and Black Hill on the easterly boundary of the city of Yuma, Yuma County, Arizona. Materials for concrete are available from commercial sources in the Yuma area.

(6) Southerly International Boundary to Santa Clara Slough

The 37 miles of the bypass drain in Mexico will also be primarily open channel with bridges and some siphons. The rights-of-way widths have not yet been set but may be about 165 feet. This would total about 750 acres of rights-of-way. This reach, like the section in the United States, will include ladders or other escape devices to protect humans.

Materials for construction of the bypass drain in Mexico have not been identified. Unprocessed gravel for use in concrete can be obtained from pits at Mesa Andrade, approximately 3 miles south of Riito in Sonora, Mexico. This deposit probably corresponds to the thick gravel deposits in the Yuma, Arizona, area.

e. Other Components

The feedwater for the desalting plant originates primarily as drainage return flows from the Wellton-Mohawk Division of the Gila Project. Colorado River water is diverted at Imperial Dam into the Gila Gravity Main Canal that serves the irrigation districts that comprise the Gila Project. The irrigation water for the Wellton-Mohawk Division is thence diverted to the Wellton-Mohawk Canal at the Wellton-Mohawk Check and Turnout about 15 miles south of Imperial Dam. The irrigation water distribution facilities and drainage facilities of the Wellton-Mohawk Division are operated by the Wellton-Mohawk Irrigation and Drainage District.

The applications of irrigation water not used consumptively by the crops percolates to the ground-water reservoir underlying the District lands. The ground-water elevation in the District is maintained by pumping from the reservoir. The water is discharged from the District in concrete-lined conveyance channels.

Other components of the desalting complex are those measures to be undertaken to minimize the amount of drainage return flows from the Wellton-Mohawk Division. If the volume of Wellton-Mohawk drainage is reduced, desalting plant size and desalting costs will also be reduced.

In recent years, drainage from the Division has approached 220,000 acre-feet annually. The salinity of the drainage water is improving due to freshening of the ground-water reservoir. The salinity of the drainage water averaged about 3,700 p/m TDS in 1974 and is anticipated to be about 3,100 p/m TDS by the time the desalting plant becomes operational. Under salt balance conditions the salinity is expected to be about 2,000 p/m TDS to 3,000 p/m TDS dependent primarily on irrigation efficiencies prevailing at the time.

Details of the program to reduce drainage return flows have been developed and are included in the "Special Report, Measures for Reducing the Return Flows from the Wellton-Mohawk Irrigation and Drainage District" dated September 1974. The special report was prepared under the direction of the Advisory Committee on Irrigation Efficiency, established at the direction of President Nixon and composed of representatives of the Department of the Interior, Department of Agriculture, Environmental Protection Agency, and the Office of Management and Budget. The Advisory Committee is highly confident that return flows due to drainage requirements will be reduced to 175,000 acre-feet per year by the time the desalting plant is operational.

The objective of the recommended program is to reduce return flows to 136,000 acre-feet annually. However, there are uncertainties in reaching this objective. They are (1) imprecision in the calculations of return flow quantities, (2) reservations that not all projected on-farm improvements will be fully implemented prior to the plant startup date or that measures will be as effective in increasing irrigation efficiencies as estimated, and (3) changes in cropping patterns.

(1) Acreage Reduction

Public Law 93-320 provides for reducing the authorized irrigable acreage in the Wellton-Mohawk Division from 75,000 to 65,000 acres and provides for further reduction with the consent of the District. This will preclude increased return flow from additional development.

Another consideration in acreage reduction is the Wellton-Mohawk Division's allocation of Colorado River water under the Gila Reauthorization Act. Water budget analyses reflect that about 65,000 acres of land in irrigation rotation can be irrigated with the Division's allocation of Colorado River water based on the definition of consumptive use contained in the Supreme Court Decree Arizona vs. California and the cropping pattern that prevailed in 1970, 1971 and 1972.

Based on the foregoing, 10,000 irrigable acres of land will be retired from the Division. Of the 10,000 acres to be retired, about 3,800 are Federally owned and the remaining are in State and private ownership. Should the reduction in acreage and other measures fail to reduce the return flows to the desired 175,000 acre-feet or less annually and should the Division require more Colorado River water than is allocated for consumptive use associated with 65,000 irrigable acres, an additional 5,000 acres may have to be purchased from landowners. The additional acreage reduction of 5,000 acres is not anticipated, however.

(2) Improved Water Management

On May 15, 1973, the Wellton-Mohawk Irrigation and Drainage District and the Bureau of Reclamation initiated an Irrigation Management Services (IMS) program to evaluate the effectiveness of the type of scheduling to increase production and to improve irrigation efficiencies. The program is being conducted jointly on a demonstration basis. The program will be expanded so that most of the cropped land in the Division will be included in the program as soon as practicable.

The IMS program uses a field sampling procedure substantiated by a computerized technique that integrates climate, crop, and soil data to determine the timing and quantity of water for each irrigation. This provides predictive capacity which is combined with direct farmer contacts by irrigation scientists to assure that the many variables are properly handled. The program thus provides farmers with the decision-making information required for optimum irrigation management. Expected benefits include increased crop yields and reduced water deliveries and labor requirements, fertilizer costs, and drainage requirements.

(3) Onfarm Irrigation System Improvements

In order to apply the optimum amount of water to the crops, onfarm irrigation system improvements are required. The previously mentioned Special Report recommends onfarm gravity system improvements on about 19,800 acres of farmland. The improvements include concrete lining of farm ditches, land leveling, installation of additional farm turnouts and measuring devices, and automation of farm water deliveries. The Special Report also recommends installation of pressure irrigation systems such as trickle or bubbler systems, on about 4,000 acres of citrus.

The design and proper installation of improved onfarm irrigation systems require knowledge of the same soils information required for good management, use of appropriate hydraulic and structural engineering design principles, crop water and agronomic requirements, and the adaption of this information to each farm situation and desires of the landowner. Technical assistance of this type is available from the Soil Conservation Service and will be accelerated to meet the needs of this project. This assistance will be provided in cooperation with the Wellton-Mohawk Valley Natural Resource Conservation District. Conservation irrigation plans will need to be developed with each farmer who will improve his irrigation system to meet the objective of reducing return flows. These plans will provide the basis for joint farmer-Federal government cost sharing arrangements for implementation of the needed improvements and practices.

(4) Research and Demonstrations

The implementation of the onfarm irrigation efficiency improvement program required demonstration of known techniques to make them more acceptable to farmers/owners or, in some cases, requires evaluation of less well established techniques. Under the direction of the Agricultural Research Service appropriate organizations and agencies are carrying out those parts of this program most suited to their competence. These programs are not only important in helping achieve the goal

of minimizing return flows from the Wellton-Mohawk Division, but also are of basin-wide concern as they relate to water use and agriculture.

(5) Education and Information

The success of any program which depends upon the cooperation of individual landowners and farm operators is dependent upon how well these individuals can become informed on the merits of the program. Many landowners and farmers will readily avail themselves of assistance and strive to help meet the objectives of such a worthy program. Others may require more information about the program and how he benefits or is involved. The Arizona Cooperative Extension Service has accepted the responsibility for such educational programs and will work effectively with local organizations and State and Federal agencies.

(6) Painted Rock Reservoir

Floodflows of the Gila River traverse the entire length of the Wellton-Mohawk Division and infiltrate the aquifer underlying the lands in the district. This can significantly aggravate drainage conditions, and requires the pumping of additional water from the aquifer. In the past flows in excess of the Main Outlet Drain capacity have been pumped directly into the Gila River, from which they enter the Colorado River and affect the water delivered to Mexico at Morelos Dam. Under Minute No. 242, this could seriously impair the ability of the United States to meet the stipulated salinity differential. Consequently, the plan of development includes measures at Painted Rock Dam to control the Gila River.

Painted Rock Dam, authorized and constructed under the Flood Control Act of 1950, is located approximately 60 miles up the Gila River from the Wellton-Mohawk Division and provides flood protection to downstream areas. Normally dry, the reservoir has a gross capacity to the spillway crest of 2,492,000 acre-feet, which includes 200,000 acre-feet allocated to sediment control. The Corps of Engineers has acquired fee title to sufficient land to store about 100,000 acre-feet with flowage easements on the additional reservoir area. The operating criteria have provided for controlled releases to minimize flood damage and for prompt evacuation of the reservoir after the occurrence of each flood.

Ownership in fee of sufficient land in the reservoir area to temporarily store about 600,000 acre-feet of water would greatly extend the flexibility of operation and use of Painted Rock Reservoir to minimize the infiltration of floodwaters into the Wellton-Mohawk aquifer. By detaining floodwaters in the reservoir for a longer

period of time, the extent of infiltration of Gila River waters into the Wellton-Mohawk aquifer could be reduced. This would have the effect of dissipating the waters more slowly by evaporation and through smaller releases, which would infiltrate the ground-water aquifer between Painted Rock Dam and the Wellton-Mohawk Division.

Public Law 93-320 authorizes the Corps of Engineers to operate Painted Rock Dam in accordance with the obligations of the United States under Minute No. 242, minimizing infiltration of flood-water releases in the Wellton-Mohawk Irrigation and Drainage District, and to acquire fee title or other necessary interests in reservoir lands for this purpose. The legislation precludes the use of any funds for acquisition of land or interests therein, however, until a Federal court of competent jurisdiction has determined that the Corps presently lacks legal authority to operate Painted Rock Dam in this manner.

Lands within the temporary storage capacity of 600,000 acre-feet consist of 12,800 acres of Federal land (2,600 of which are leased for irrigated agriculture), 500 acres of undeveloped Arizona State land, and 8,800 acres of private land (4,000 of which are under irrigation). It is estimated that \$5,000,000 will be required to purchase fee title to the private land or to cover the cost of a combined program of land purchase. Land use may not necessarily change as a result of the purchase, since the management of the reservoir could allow present uses to continue. The only effect on the land use may be the longer periods of inundation.

2. First 49 Miles of the Coachella Canal

a. Existing Unlined Canal

(1) Description

The Coachella Canal is a division of the All-American Canal System, which conveys water diverted from the Colorado River at Imperial Dam and Desilting Works to points of delivery in the Imperial and Coachella Valleys of southern California (see Frontispiece). From the Coachella Canal Turnout on the Imperial East Mesa, shown on Photograph P212-300-12613 NA, the canal extends 123 miles to the northwest to supply irrigation water to approximately 67,000 acres of agricultural land in Coachella Valley. The canal also contains six turnouts to serve 8,500 acres of non-Federal land on the Imperial East Mesa, but only about 500 acres have been developed.

The first 86 miles of the canal are unlined. A typical view is shown in Photograph P212-300-4804 NA. The remaining 37 miles are lined with a 3-1/2-inch thickness of concrete reinforced with wire mesh. The capacity is 2,500 ft³/s at the turnout from the All-American Canal and decreases through successive reaches to 1,300 ft³/s at the beginning of the lined section. Appurtenant features include inverted siphons with storm water overpasses, bridges, check structures, spillway structures, flood control channels, training dikes, and maintenance roads.

(2) Water Losses

Since becoming operational in 1949, the canal has had a record of excessive conveyance losses, primarily due to seepage from the 86-mile unlined reach. Of the average historical (1955-1970) diversions of 498,340 acre-feet per year at the Coachella Canal turnout, an estimated average of 160,460 acre-feet per year has been lost. Project appraisal investigations have indicated that about 141,000 acre-feet per year have been lost along the first 49 miles of the canal where the alignment traverses the coarse sandy soils of the Imperial East Mesa. Losses in the remaining 37 miles of unlined canal, which are nearer to the Salton Sea, have averaged 19,460 acre-feet per year.

b. Replacement Lined Canal

(1) Description

The new structure will be generally parallel with and adjacent to the existing canal and will return to the present alignment to utilize existing siphons and other structures which are very costly to replace. Since construction activities must be closely coordinated with year-round irrigation practices, the new canal will first be completed exclusive of the connections to existing structures, after which the tie-ins will be accomplished with only short water outages. Bypass channels around structures may be used. Any water outages will be coordinated with Coachella Valley County Water District and with the California Department of Fish and Game.

Existing structures that will be abandoned by construction of the new canal are the Coachella Canal Drop No. 1, two operating bridges and possibly five irrigation turnouts. The unlined existing reach of the canal will be abandoned after the new lined canal reaches are constructed and placed in service.



Aerial view showing the Coachella Canal Diversion from the All-American Canal in the foreground. The Coachella Main Canal extends up the center of the photograph. California--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P212-300-12613 NA.



Typical view of an unlined portion of the Coachella Canal. California--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P212-300-4804 NA.

The new canal will have a design capacity of about 1,500 ft³/s and will be lined with a 3-1/2-inch thickness of unreinforced concrete. The bottom width will be in the range of 14 to 18 feet, and the sides will be on a slope of 1-1/2:1. An operating road, probably 16-feet wide and gravel surfaced, will be constructed on the left (south-west) bank along the entire 49 mile section. A Parshall flume will be constructed a short distance downstream from the Coachella Canal turnout from the All-American Canal to provide an accurate measurement of the flow.

(2) Water Savings

By replacing the first 49 miles of the unlined canal with a new concrete-lined canal, approximately 132,000 acre-feet of water per year will be saved. Using the historic average flows passing Check 6A (near the end of the 49-mile reach) for the period of 1955 through 1970, the quantity of water that would have been saved along the first 49 miles had a lined canal been in service is: (figures rounded)

Average annual loss from canal, unlined (measured)	141,000 acre-feet
Average annual loss from canal, lined (estimated)	<u>9,000 acre-feet</u>
Average annual water saved with lined canal	132,000 acre-feet

Since this quantity of water will not have to be diverted into the All-American Canal at Imperial Dam, it can be retained in upstream storage reservoirs and utilized to meet the project objectives.

(3) Land Acquisition

The Imperial Irrigation District has an obligation to serve non-Federal lands on the Imperial East Mesa lying within the District. There are about 8,500 acres of such land, although approximately one-half of that acreage is located some distance from the Coachella Canal and could not be served due to the requirement for crossing Federal lands with water conveyance facilities. Regulations issued by the Secretary (43CFR, 2871.0-8) preclude issuance of rights-of-way for such purposes. However, approximately 4,200 acres of private land on Imperial East Mesa are located adjacent to the Coachella Canal and are capable of receiving water from the District. P.L. 93-320 authorizes the

United States to acquire these lands by purchase, eminent domain or exchange, or to acquire an interest therein, thus relieving the District of the responsibility to provide irrigation service. A sum of \$750,000 has been included in the cost estimates to purchase the undeveloped lands, which at the time of authorization amounted to about 3,800 acres. The remaining approximately 400 acres was planted in citrus utilizing trickle irrigation systems to supply irrigation water. Since the legislative authorization, some of the present operators have continued the expansion of the citrus acreage in accordance with their scheduled development plans, so that at the present time about 500 acres have been planted to citrus and additional lands are being developed. The development plans of these operators contemplate an eventual development on their present holdings of about 1,300 acres. Through negotiations with Imperial Irrigation District and the Coachella Valley County Water District, it may be possible to continue service to the developed lands from the lined canal. The cost of purchasing the developed lands was therefore not included in the cost estimates.

(4) Construction Materials

Aggregate for concrete may be obtained from commercial sources or from previously undeveloped deposits. Upon completion of removal of the required material from new sites, the pit area will be leveled or shaped to blend with the surrounding landscape. The required excavation for construction should provide the necessary amounts of material for embankment along the canal. The feature will be designed so that excavation and embankment will essentially balance, resulting in no or few borrow and disposal areas as a result of the construction.

(5) Rights-of-Way

The proposal will require only about 1,020 acres of additional land for rights-of-way consisting of approximately 100 acres of patented land and 920 acres of Federal withdrawn land. These additional lands are undeveloped desert. The average width of the right-of-way will be 400 feet.

3. Protective and Regulatory Ground-Water Pumping

a. Description

The Bureau of Reclamation, in cooperation with the United States Section, International Boundary and Water Commission,

has located potential well fields on the south Yuma Mesa and in the southwestern portion of the Yuma Valley, as shown on Plate 5, capable of pumping 160,000 acre-feet of ground water per year. It is proposed to develop this potential into two well fields; the Yuma Mesa Boundary Well Field and the Yuma Valley Boundary Well Field. Both fields will be drilled within 5 miles of the Arizona-Sonora International Boundary near San Luis.

The disposition of the pumped water will be to maintain Southerly International Boundary deliveries near levels experienced in recent years, as provided under Minute No. 242, and to furnish water for agricultural and other uses to existing water users. The utilization of the pumped ground water in the United States is projected as follows:

Agricultural or other use in the United States	35,000 acre-feet
Delivery to Mexico at Southerly International Boundary	<u>125,000</u> acre-feet
Total	160,000 acre-feet

In addition to the 125,000 acre-feet of pumped water for delivery to Mexico at the Southerly International Boundary, there is about 15,000 acre-feet of canal wasteway water currently being delivered at this point. Together they will comprise the 140,000 acre-feet provided for in Minute No. 242.

The estimated salinity of the pumped waters is 1,000 to 1,100 p/m TDS in the Yuma Mesa Boundary Well Field and 1,000 to 1,500 p/m TDS in the Yuma Valley Boundary Well Field. The salinity of waters from drainage and wasteway flows presently delivered to Mexico at the Southerly International Boundary ranges from 1,400 to 1,600 p/m TDS. In composite, therefore, waters delivered to Mexico at that point are expected to be of better quality.

It is anticipated that private users pumping ground water for irrigation within the 5-mile limit imposed by the agreement will buy water pumped from the United States wells, because well-field drawdown may require a lower pump bowl setting than now used and will increase their pumping costs. Sales of water will not be limited to existing users, however, if additional water is available. The cost of water to present users, and any others for which water may be available, will be negotiated.

b. Yuma Mesa Boundary Well Field

The Yuma Mesa Boundary Well Field provides for 25 wells in the southern portion of the Yuma Mesa. Photographs P998-300-01009 NA and P998-300-01010 NA show an existing drainage well plot on the Yuma Mesa which is typical of the proposed installations. The wells will be located generally about 1 mile north of the International Boundary and spaced at about 1/2-mile intervals. Each well will be about 500 feet deep and the lower 200 feet screened to pump water from the underlying ground-water reservoir. Each well will be designed to pump 7.5 ft³/s. The wells will be connected by a 15.3 mile underground pipeline which will carry water westerly to the afterbay of the existing Boundary Pumping Plant where it will then flow by gravity across the Southerly International Boundary. The underground pipeline will have at least 2 feet of earth cover. The pipeline alinement and well site locations are shown on Plate 5.

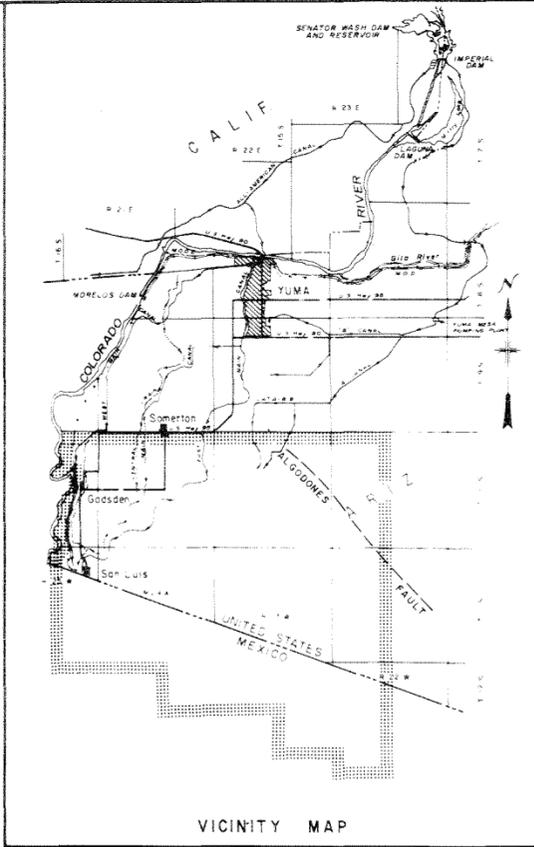
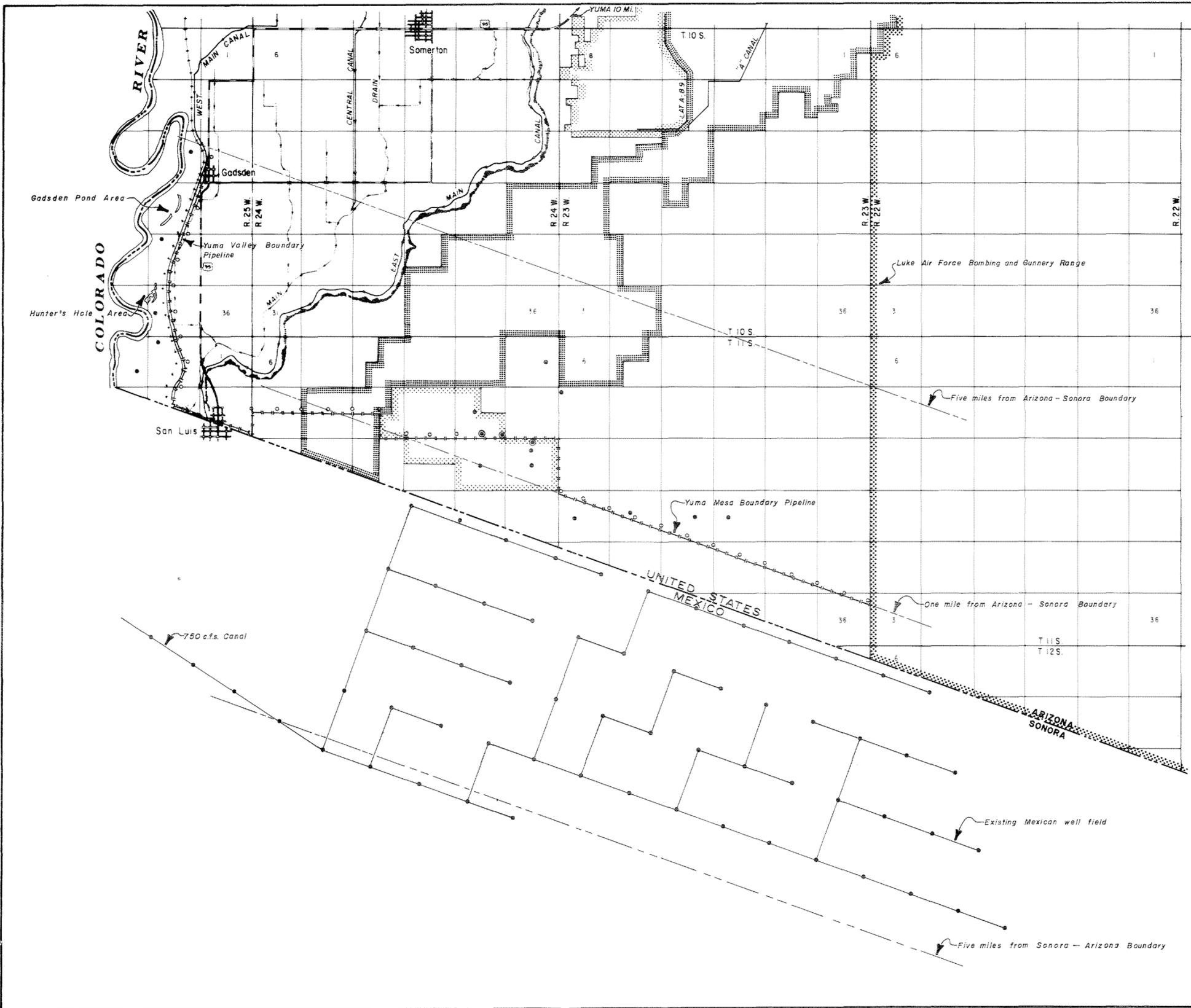
c. Yuma Valley Boundary Well Field

The Yuma Valley Boundary Well Field provides for the drilling of 10 wells in the westerly portion of Yuma Valley along the east side of the Yuma Valley Levee and adjacent to the West Main Canal. Each well will be about 400 feet deep with the lower 200 feet screened to draw water from the underground reservoir. Each well will be designed to pump 7.5 ft³/s. The underground pipeline connecting these wells will extend 5.3 miles and will carry water southerly to the afterbay of the Boundary Pumping Plant. The underground pipeline will have a minimum of 4 feet of earth cover to allow farming operations over the pipeline. The pipeline alinement and well site locations are also shown on Plate 5.

d. Power Requirements

The protective and regulatory ground-water pumping well fields will have a peak demand of about 7 megawatts (MW) and an electrical energy requirement of about 52,000,000 kilowatthours per year (kWh/yr.). These figures are based on an 85 percent plant factor. The well fields will be served by a 35-mile 34.5-kV transmission line originating at the desalting plant switchyard. The transmission line will be erected on wooden poles and each well will have its own stepdown transformer.

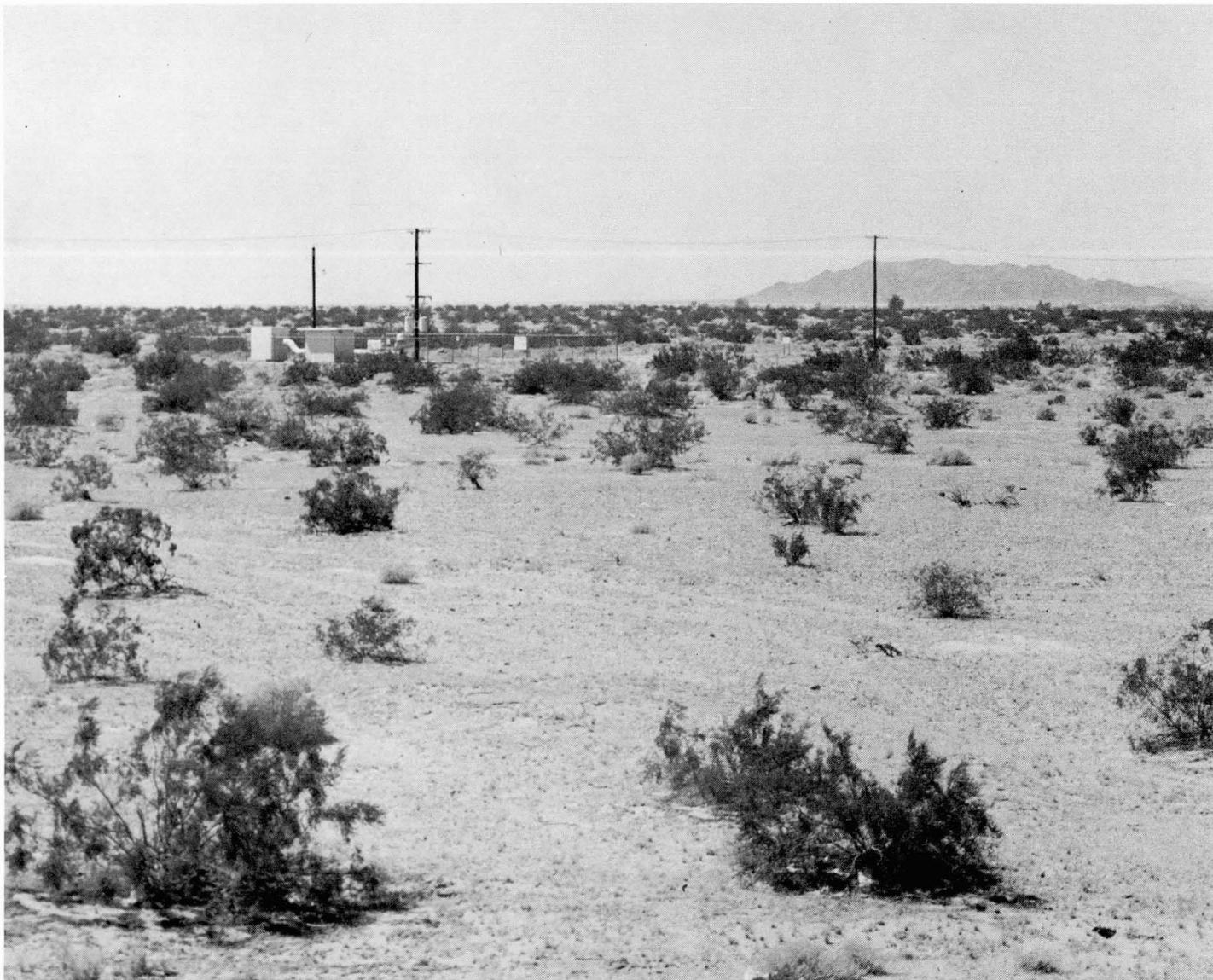
The power supply for operating the pumps in the well fields will eventually be served from the same source as that of the desalting plant, as described in Section H.1.b.(8) of this chapter. Because of the earlier in-service date associated with the protective pumping well



- EXPLANATION**
- Hilander "C" Irrigation and Drainage District Boundary
 - Yuma Mesa Irrigation and Drainage District Boundary
 - Unit "B" Irrigation and Drainage District Boundary
 - - - - - Proposed pipeline
 - o Proposed well
 - Existing well
 - ⊙ Existing well to be replaced with project well

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
 TITLE I - ARIZONA
**PROTECTIVE AND REGULATORY
 GROUND-WATER PUMPING
 YUMA BOUNDARY WELL FIELDS**
 LOCATION MAP
 Drawing No. 1292-303-3006
 NOVEMBER 26, 1974

SCALE OF MILES



View of a Yuma Mesa drainage well showing the typical surrounding desert vegetation. Yuma vicinity, Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01009 NA.



View of a typical Yuma Mesa drainage well and related facilities. Yuma vicinity, Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo P998-300-01010 NA.

field, however, and the fact that Navajo Project power will not be available prior to 1980, the initial power requirements will be purchased from an area utility.

e. Land Acquisition

A nonstructural provision of the protective and regulatory ground-water pumping plan is the acquisition of approximately 23,500 acres of the approximately 36,400 acres of land within 5 miles of the Mexican border on the Yuma Mesa. Acquisition may be by purchase, eminent domain, or exchange for Federal lands. Table 2 lists land status and approximate acreage of various ownerships within the 5 mile area.

f. Rights-of-way

Approximately 105 acres will be required as rights-of-way for access roads, powerline routes, well sites, and the pipeline route. It is estimated that each well site plot will be about 60 feet by 100 feet and the rights-of-way for the pipelines will be 40 feet wide. The major portion of the power transmission line will be constructed within existing levee rights-of-way. Additional transmission line rights-of-way will be on existing Reclamation-withdrawn lands or be within rights-of-way required for the pipeline and well sites. The access roads to the Yuma Mesa wells will be located on pipeline rights-of-way and will have a width of about 20 feet. Existing roads will be utilized for access to the Yuma Valley wells.

Approximate acreage requirements for rights-of-way of the protective and regulatory ground-water pumping facilities are as follows:

Yuma Mesa Boundary Well Field:

	<u>Acres</u>
Federal and State Lands (Desertshrub):	
Well Plots	3
Pipeline (of which about 35 acres required for access roads)	64
	<u>67</u>
Private Land (Cultivated-citrus groves):	
Well Plots	1
Pipeline	10
	<u>11</u>
Total Yuma Mesa	78

Yuma Valley Boundary Well Field:

Private Land (Cultivated-misc. crops):	
Well Plots	2
Pipeline	<u>25</u>
Total Yuma Valley	27

4. Potential Mitigation Features - Fish and Wildlife

Mitigation requirements were not included in the legislation that culminated in the Act authorizing the project. Subsequent to the enactment of P.L. 93-320, fish and wildlife mitigation concepts have been developed and potential sites defined. All fish and wildlife mitigation concepts have been coordinated with the Fish and Wildlife Service, State fish and game agencies, and two separate fish and wildlife Ad Hoc Committees. Development of the final details of site location and design of the concepts are being coordinated through these committees. Details of the status of development are included in Chapter IV.

Fish and wildlife mitigation for impacts that will result from Title I, P.L. 93-320, are separated into two distinct categories, i.e., (1) the desalting complex and protective and regulatory ground-water pumping, and (2) the lining of the first 49 miles of the Coachella Canal in California.

a. Desalting Complex and Protective and Regulatory Ground-Water Pumping

(1) Hunter's Hole Pond Complex

In order to maintain the water level of the existing 12 acres of surface water in the Hunter's Hole Pond Complex, a well equipped with up to a 5 ft³/s capacity pump will be installed adjacent to the ponds to supply freshwater to the ponds on a demand basis. Use of the well water will not be an infringement on any water right. A water control structure will be installed on the river outlet to prevent excessive outflow of water and to assist in maintaining the upper 3-foot elevation of the pond's water surface.

(2) Gila River Wildlife Management Area and Fish Rearing Facility

Approximately 900 acres of land will be acquired by Reclamation and assigned to Arizona Game and Fish Department for designation and use as a wildlife and recreation management area. The preferred

Table 2

Status of Lands and Approximate Acreage of Various
 Ownerships on the South Yuma Mesa within 5 Miles
 of the Arizona-Sonora International Boundary

<u>Status</u>	<u>Acres</u>
State unencumbered	10,200
State lease without improvements <u>1/</u>	10,400
State lease with improvements <u>1/</u>	600
State lease, certificate of purchase	2,500
State lease, commercial	400
Patented lands (private)	1,400
Reclamation withdrawn	<u>10,900</u>
Total	<u>36,400</u>

1/ Leased for agricultural purposes

lands are along the Gila River within the narrows created by the Laguna Mountains on the north and the Gila Mountains on the south. This area will support a program for developing ponded areas for recreation, fish and wildlife use, marsh and riparian wildlife habitat, wildlife crops, a pumped supply of ground water, and a site for a fish rearing facility. There are several suitable sites within the area for construction and operation of the fish rearing facility. It is tentatively anticipated that the facility will be designed and developed to provide for the annual stocking of between 200 and 300 surface areas of water including ponds, lakes, rivers, and canals in the Yuma area. The facility will include buildings that will accommodate fish incubation, inside raceways, food and equipment storage and office space. Exterior development will include concrete-lined raceways, earthen ponds, and an open fish sorting area. The water supply for the hatchery will be from wells having a combined minimum capacity of 5 ft³/s. Energy required for the fish rearing facility will be supplied from existing utilities.

5. First 49 Miles of Coachella Canal

a. Maintaining Select Riparian Habitat

The better quality wildlife habitat within the washes and low-lying areas adjacent to the Coachella Canal will be defined and designated as permanent wildlife management areas if the selected areas are now under unencumbered Federal ownership. Within the selected acreage the fish and game agencies will designate sites for placement of approximately 10 wildlife watering devices which will be equipped with 1,200 gallon tanks with overflow spill blocks. Water for the tanks will be provided by ground water pumped from wells equipped with mechanical windmills.

b. Lake Development

Approximately 280 acres of land on the northwest edge of the Salton Sea will be leased. On this land will be developed a 10- to 20-acre recreation and fishing lake and possibly some additional wildlife habitat. The lake will be designed for varying depths of from 4 to 12 feet, with an irregular shoreline, fishing jetties, spawning areas, vehicle access and limited to day-use recreational facilities. The water source will be either ground water or irrigation drain flows.

c. Finney-Ramer Unit

A channel and waterway system will be constructed by means of a dredge in the 200 acres of deteriorating marsh habitat of Finney Lake

and Culver Pond areas of the Finney-Ramer Unit of the Imperial Wildlife Area located along the Alamo River about 1 mile south of Calipatria, California. The plan of development will include a complex of channels and waterways totaling about 2 miles in length. The channels will be an average of 70 feet wide and 8 to 10 feet in depth. This total of 17 surface acres of dredged waterways will be irregular in shape. Spoil from the operation will be placed to create low sloping dikes and minimum slope islands to create suitable habitat for shore and wading birds, and specifically for the Yuma clapper rail. A silt catchment basin will be constructed at the inlet to Finney Lake.

d. Salton Sea National Wildlife Refuge

A portion or all of the approximately 364 acres of land which have been identified and selected for addition to the Salton Sea National Wildlife Refuge will be acquired by the project. The amount to actually be acquired will have to be determined at a later date. The lands which are acquired will be at least partially designated for the establishment of ponded and marsh areas by the Fish and Wildlife Service. Water for the development will either be acquired through the use of irrigation drainage water or through the purchase of water from the Imperial Irrigation District.

**II. DESCRIPTION
OF THE ENVIRONMENT**

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A. General

The project area is located in the historic flood plain and delta of the Lower Colorado and Gila Rivers and encompasses the Yuma area in Arizona, Imperial Valley in California, and Mexicali-San Luis Valley down to the Gulf of California in Mexico. Except for the area along the Gila River from its mouth to Painted Rock Dam, the project area is bounded by the Gila Mountains on the east and the Sierra de los Cucapas on the west. The region is characterized primarily by sparse Sonoran Desert habitat, with irrigated tracts in the river valleys and strips of riparian vegetation along the streams, canals, and drainage channels. The largest communities in the area are Yuma, Arizona, with a population of approximately 35,000; El Centro, California, with a population of about 21,000; Mexicali, Mexico, with a population of about 400,000; and San Luis, Mexico, with a population of about 70,000.

1. Physical Environment

a. Climate

The climate of the region is hot and dry and provides a year-round growing season with an average frost-free period of 348 days a year. Average maximum temperatures from June to August are 104°F. to 108°F., and average minimum temperatures in January are 39°F. to 41°F. Precipitation varies from a yearly average of 2 to 3 inches in the Mexicali Valley to 3 to 6 inches in the vicinity of Yuma and occurs as brief rains within a primary period of July to October and a secondary period during the winter. Although summer rains normally occur in the form of local thunderstorms, heavy general precipitation can occur late in the summer with the arrival of tropical air from off the west coast of Mexico. These storms occur on an average of once every seven years in the delta region. In the project area, the predominant wind direction is from the south during the warmer part of the year (June through August) and from the north during the colder months (November through February).

b. Topography and Soils

The terrain is characterized by flat flood plains and terraces crossed by many arroyos and washes and separated into valleys by low, rugged hills and mountains which are oriented in a north-south, or northwest-southeast direction.

The soils in the project area are developed in a wide range of topographic environments. The soils have developed primarily from alluvial materials derived from igneous and sedimentary rocks throughout the Colorado River Basin and from the nearby mountain ranges. The nearby mountains are steep and composed essentially of bare rock and have little vegetal cover. In the gently sloping alluvium-filled valleys, the soils are deep, quite heterogeneous in texture, and nearly flat in topography. They are quite low in organic material and have not been leached of nutrients. With irrigation, many of them can be adapted to the agricultural production of a wide range of crops, particularly cotton, wheat, citrus and fruits.

c. Geology

The project area is in a sediment filled structural trough roughly 100 miles wide and 800 miles long. The trough extends from the Transverse Ranges of San Bernardino County in southern California south-eastward through Imperial County, California and Yuma County, Arizona, into Mexico. Deltaic deposits of at least 10,600 feet of sand, silt and clay were laid down in the Salton Trough by ancestral streams of the present Colorado River system. Intermittent marine incursions into the Salton Trough have taken place at least since Late Miocene-Early Pliocene times (10 to 14 million years ago), at which time the 3,000-foot-thick Imperial formation was deposited. Marine and deltaic deposits are inter-fingered with coarse-grained alluvial deposits at the edges of the trough. The present delta of the Colorado and Gila Rivers began to form at the beginning of the Quaternary period, or roughly a million years ago.

The Salton Trough is intimately associated with a major rift in the earth's crust. This rift is a series of northwest trending faults known collectively as the San Andreas fault system. There is intense seismic activity in the trough. Hundreds of seismic events are recorded daily but rarely do they reach the magnitude of a damaging earthquake. Seismic activity in the project area is the manifestation of plate tectonics. Two crustal plates are drifting apart and drifting by each other. Complimentary rock terranes have been displaced substantially along a northwest trending line of departure.

The San Andreas fault system is comprised of many individual faults. These faults form the border of the trough and cut the sediments in the interior of the trough. The most prominent border faults are the San Andreas on the northeast and the San Jacinto on the southwest. Movement on both border and interior faults is more or less continuous primarily by creep. Occasionally large displacements trigger damaging earthquakes.

The Algodones fault is the southeast extension of the San Andreas fault and forms the poorly defined northeast border of the Salton Trough in the Yuma area. Trending northwest-southeast, the fault lies just west of Yuma and evidently divides an area of moderate seismic risk on the east from one of major risk on the west. The fault is not traceable on the surface of the lower Yuma Mesa, a late Pleistocene terrace in Arizona, the Altar Desert in Sonora, Mexico. Little or no activity is thought to have occurred along this fault in the last 11,000 to 15,000 years.

The closest known active fault is the Imperial fault, which is situated about 35 miles southwest of Yuma and trends in a northwest-southeast direction parallel to the Algodones fault. The epicenter of an earthquake which occurred in May 1940, was located on this fault near Holtville, California. This earthquake caused damage to roads and irrigation facilities in the Yuma Valley. Since December 6, 1974, numerous low intensity earthquakes have been reported on the Brawley fault in the vicinity of Brawley, California.

The primary mineral resources in the project area are sand, gravel and rock. These resources are used extensively for construction in the project area. Occurrences of bentonite, mica, copper, gold, silver, tungsten, beryllium and uranium are listed^{1/} in the project area. There are numerous oil and gas leases filed with the Bureau of Land Management in the Imperial Valley but there are no known strikes.

The Imperial Valley in California has geothermal resources but there is no known geothermal resource in the Arizona part of the project area. The deepest test hole, the Exxon well drilled near San Luis, Arizona, has an estimated equilibrated bottom hole temperature of about 320°F. at more than 10,000 feet.

d. Hydrology

Surface waters in the project area are comprised mainly of waters of the Colorado River which are distributed throughout the area through irrigation canals and laterals and agricultural drainage channels. The major canals are shown on the frontispiece. The locations of the main canals, drains, and river channels in the Yuma area are shown on Plate 4. During periods of intense rainfall, floodflows from normally dry channels reach the river. In addition flood control releases from Painted Rock Reservoir occasionally reach the Colorado River.

^{1/} Arizona Bureau of Mines, "Maps of Known Metallic and Nonmetallic Occurrences of Arizona, 1961; and the Mineral Industry of California," Bureau of Mines Minerals Yearbook, 1965

The dominant source of ground water under predevelopment conditions was the Colorado River. Percolating losses and overflows from the limitrophe section of the river charged the ground-water basin underlying the Mexicali Valley on the west and the Yuma Valley on the east. In both areas, the water table was near the surface.

Irrigation in the valleys on both sides of the river commenced in the early 1900's, resulting in manmade recharge to the ground-water systems. The construction of the dams on the Colorado River and the resulting conservation and flood control reservoirs permitted control of flows and utilization of the water for irrigation, municipal and industrial uses. Construction of Morelos Dam in 1950, approximately 1 mile south of the Northerly International Boundary, has resulted in practically all flow of the river being diverted at that point in recent years. At the present time, the only flow below Morelos Dam, except for very infrequent stormflows, is the brackish drainage water from the Wellton-Mohawk area that is bypassed around the dam. Percolation from irrigated lands and seepage from canals have replaced the Colorado River as the predominant source of recharge to the ground-water basin.

By 1965, irrigation on the Yuma Mesa had increased storage under the mesa by about 1.5 million acre-feet, creating a ground-water mound with its crest some 30 feet above historical ground-water levels. Flow emanates in all directions from the mound, including underflow westward to Yuma Valley and northward to South Gila Valley. This has created drainage problems in these areas. As a result, drainage wells were drilled along the base of the mesa escarpment in Yuma Valley in 1947, and in the South Gila Valley in 1961. Additional wells have been added from time to time. There are now 24 drainage wells in South Gila Valley and 17 in Yuma Valley. In addition, the Bureau of Reclamation drilled 12 wells along the western escarpment of the Yuma Mesa in 1967-1968 (see Plate 4). Pumping from these wells began in 1972. In 1972, Mexico started pumping from recently installed wells on the Sonora Mesa south of the Arizona border. Studies indicate that the ground-water mound was essentially in balance prior to pumping the existing Yuma Mesa wells and the Mexican wells. It has been estimated that in 1970 approximately 70,000 acre-feet of ground water flowed from the Yuma area to Mexico across the Arizona-Sonora Boundary and the limitrophe section of the Colorado River. Of this quantity, approximately 45,000 acre-feet flowed across the Arizona-Sonora Boundary. This latter flow was induced primarily from the buildup of the Yuma Mesa ground-water mound. It is estimated that with the pumping by Mexico on San Luis Mesa and the present pumping in the United States, the flow across the Southerly International Boundary in ten year's time will increase to about 80,000 acre-feet per year and in 50 years the flow will increase to about 90,000 acre-feet per year.

2. Biological Environment

a. Vegetation

Indigenous southern Sonoran Desert vegetation is characteristic of a large part of the project area. This growth is typically sparse and consists basically of creosote bush, mesquite, catclaw, big saltbush, spring aster, alkali heliotrope, cholla, barrel cactus, ironwood, palo-verde, and ocotillo. Creosote bush is the dominant vegetal type, with some bursage growing in open stands with little or no perennial ground cover. Numerous annual forbs and grasses may occur during periods of favorable moisture.

Riparian vegetation grows along irrigation canals, streams, lakes, and marshes. Characteristic species include saltcedar, arrowweed, mesquite, cottonwood, catclaw, seepwillow, Gooding willow, Bermuda grass, saltgrass, cattail, bulrush, giant reed and common reed.

There are approximately 168,839 acres of irrigated land in the Yuma area (1973), 54,082 acres in Coachella Valley (1973), 444,163 acres in Imperial Valley (1973), and approximately 430,000 acres in the Mexicali-San Luis Valley in Mexico. The principal cultivated crops are wheat, alfalfa, citrus, cotton, lettuce, sorghum, grass seed, melons, and irrigated pasture. In 1971 the top three money crops in the Yuma area were lettuce, citrus, and cotton. Wheat and alfalfa have partially replaced the cotton acreage in the Mexicali Valley.

Table 3 lists the indigenous plants which are protected by the Arizona State law.^{1/} Project studies have not discovered any of these species at the proposed sites of structural features in Arizona.

b. Fish

The principal fish species which have recently been found to occur in the project area and the respective bodies of water in which they were found are listed in Appendix E. Other species not listed in the aforementioned appendix but which may occur in the waters of the Lower Colorado River are the Pacific Tenpounder,^{2/} striped bass, rainbow trout, black bullhead, brown bullhead, white bass, small-mouth bass,^{2/} white crappie, flathead minnow, roundtail chub,^{2/} bonytail chub,^{2/} razorback sucker,^{2/} and the Colorado River squawfish.^{2/} The

^{1/} "Arizona Native Plant Law," Arizona Revised Statutes, Chapter 7, Article 1, Section 3-901.

^{2/} Presence would be rare.

Colorado River squawfish is included on the Secretary's List of Endangered Species. There is no recent evidence that the squawfish occurs in the project area. According to the Lower Colorado River Drainage Endangered Fishes Recovery Team the species no longer exists in the river below Hoover Dam.

c. Wildlife

The two big game species in the general area are the mule deer and the desert bighorn sheep. The mule deer is found in limited numbers in desert washes and provides limited hunting. The bighorn inhabits some of the rugged mountains in the project area, particularly the Chocolate Mountains, in small numbers.

Feral burros are also found in the area, but most commonly inhabit desert habitat adjacent to the Colorado River and other riparian communities.

Small carnivores are common in the area. The coyote, grey fox, kit fox, and striped skunk, ringtail cat and raccoon are present in lower numbers. Beaver and muskrat are found along waterways and in marshy areas. The black-tailed jackrabbit is present in the area, and the cottontail is especially abundant in the agricultural-riparian communities.

Small mammals in the area are represented by the Merriam kangaroo rat, desert kangaroo rat, desert pocket mouse, spiny pocket mouse, cactus mouse, grasshopper mouse, hispid cottonrat, white-throated wood rat, deer mouse, house mouse, roundtailed ground squirrel, Yuma antelope squirrel, whitetail antelope squirrel, and valley pocket gopher. A more complete list of mammals expected to occur in the project area is presented in Appendix E.

The desert tortoise inhabits the project area, but is considered to be somewhat depleted in numbers. The soft-shelled turtle and the bullfrog are fairly numerous in marshy areas and along the Colorado River and unlined irrigation canals and agricultural drainage channels. Several species of toad and numerous lizards and snakes occur throughout the project area. The most common toads are the great plains toad, red-spotted toad, western spadefoot toad, and woodhouse's toad. The most common lizards are the zebra-tailed lizard, western shiptail, desert iguana, side-blotched lizard, long-tailed brush lizard, and desert banded Gecko. Snake species most common to the general project area are the shovel-nosed snake,

Table 3
PLANTS PROTECTED BY ARIZONA STATE LAW

Protected Native Plants

Washingtonia filifera (fan palm)
Lysiloma Thornberi (ornamental tree)
Bursera fagaroides (elephant tree)
Lophoceros Schottii (senita or "old one")
Lamaireocereus Thurberi (organpipe cactus)
Toumeyia papyracantha (paper spined)
Toumeyia Peeblesiana (Navajoa)
Pediocactus Paradinei (bristly plains cactus)

Protected Families

All species of:
Liliaceae (lily family)
Amaryllidaceae (amaryllis family)
Orchidaceae (orchid family)
Crassulaceae (orpine family)
Cactaceae (cactus family)

Protected Genera

All species of:
Aquilegia (columbine)
Lobelia (lobelia)
Dodecatheon (shooting-star)
Primula (primrose)
Fouquieria (ocotillo)

Protected Species

Atriplex hymenelytra (desert-holly)
Cercis occidentalis (western redbud)
Dalea spinosa (smoke tree)
Holacantha Emoryi (crucifixion-thorn)
Fremontis californica (flannel-bush)
Pinus aristata (bristle-cone pine)

coachwhip, western leaf-nosed snake, western blind snake, glossy snake, common king snake, gopher snake, western diamondback rattlesnake, Mohave Desert sidewinder, and Mohave rattlesnake. A more complete list of the herpetofauna expected to occur in the project area is included in Appendix E.

The dominant upland game birds in the area are the mourning dove, white-winged dove, and Gambel's quail, all of which are found in fairly high concentration in the riparian-agricultural communities and are extensively hunted. Migratory waterfowl are present in the area during the fall, winter, and spring months, and receive some hunting pressure. A list of birds expected to occur in the project area is presented in Appendix E.

Species which the Secretary of the Interior has determined to be endangered have been listed in the Federal Register.^{1/} Among those designated are several species which inhabit or visit the project area.

The Yuma clapper rail (Rallus longirostris yumanensis) is found during the breeding season in the many cattail-tule marshes along the Lower Colorado River, in two small marshes along the lower Gila River, in two small marshes immediately south of Phoenix, Arizona, along the lower end of the Salton Sea, and in a few marshy areas adjacent to the Coachella Canal. Rails are seldom seen, and little is known about their life history. The bird inhabits marsh vegetation near areas of open water and is a wader rather than a swimmer. The birds are generally migratory, arriving in late April and departing in late September, and their winter range is generally south of the International Boundary toward the Gulf of California. Some clapper rails are known to winter north of the International Boundary along the Colorado River, and in particular, at Topock Marsh located southeast of Needles, California. A 1973 joint agency^{2/} inventory of the population density of the Yuma clapper rail resulted in a count of 889 individuals along the Colorado River from Davis Dam to the Gulf of California. The final official count for 1974 has not been published, but at an October 23, 1974, meeting of the Yuma Clapper Rail Recovery Team^{2/} it was reported that 921 birds were counted in the census. The 1974 census covered only the river from

^{1/} United States List of Endangered Native Fish and Wildlife, Federal Register, Vol. 39, No. 3 (Friday, Jan. 4, 1974), p. 1175.

^{2/} U.S. Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, Arizona Game and Fish Department, and California Department of Fish and Game

Davis Dam to the Arizona-Sonora Boundary, a distance of 274 river miles, and did not include the river and delta in Mexico to the Gulf of California. The 1974 count did include 134 Yuma clapper rail in the Imperial Valley of California. It was generally believed that the 1974 figure was low and that 300 additional birds could be added, yielding a total of approximately 1,200 Yuma clapper rail on the lower Colorado River.

The California least tern (*Sterna albifrons browni*), the American peregrine falcon (*Falco peregrinus anatum*), the brown pelican (*Pelicanus occidentalis*), the southern bald eagle (*Haliaeetus l. leucocephalus*), and the tule white-fronted goose (*Anser albifrons gambelli*) are endangered birds which occasionally visit the general area. None of these, however, have known breeding sites in the project area.

The United States Fish and Wildlife Service has classified the California black rail (*Laterallus jamaicensis coturniculus*) as a threatened species.^{1/} This bird, which is associated with semidry marshlands, is so elusive that little is known about its distribution, although there are substantial numbers along the Colorado River. In a recent study of the population density of this species, researchers from Arizona State University have counted over 100 individuals along the lower Colorado River between Ferguson Lake and Laguna Dam, a distance of approximately 15 river miles, during the period from April to September 1973. This is approximately two times the number previously recorded in the area. Historically, this bird was not known to exist along the river.

Invertebrates, especially insects, have successfully established themselves in every environmental niche. Invertebrates common in the area include spiders, scorpions, ants, leaf beetles, cicadas, grasshoppers and crickets, and pest species associated with cultivated crops.

3. Cultural Environment

a. Land Use

With the exception of most irrigation acreages, lands in the area in the United States are largely under Federal or States ownership. Along the Colorado and Gila Rivers, the Yuma area contains approximately 195,543 acres (1973) of privately owned agricultural lands of which only 168,839 acres are irrigated. In the Salton Sea

^{1/} Fish and Wildlife Service, Threatened Wildlife of the United States, Resource Publication 144 (U.S. Govt. Prnt. Office, March 1973).

Basin, Imperial Valley contains 530,000 acres (1973) of agricultural lands of which 444,163 acres are irrigated, and Coachella Valley contains 78,530 acres (1973) of agricultural lands of which 54,082 acres are irrigated. In the Mexicali-San Luis Valley of Mexico, landownership is divided between private parties and the government of that country. There are approximately 430,000 acres of irrigated agricultural lands in the area. The land-use pattern is predominantly rural, with a few larger centers of urban development. Yuma, El Centro, Mexicali, and San Luis are the main urban communities in the vicinity.

The leading sector of the economy in the United States portion of the project area is agriculture. Approximately 34 percent of the work force in the Yuma area is employed in agricultural activities, and the gross crop value in the Yuma area in 1973 was \$99,078,075. Agricultural developments in the Yuma area consist of the Reservation and Valley Divisions of the Yuma Project, the Yuma Mesa and Wellton-Mohawk Divisions of the Gila Project, the Yuma Auxiliary Project, and a limited amount of nonproject lands. In the Salton Sea Basin the agricultural developments are the Coachella Division and the Imperial Division of the All-American Canal system, Boulder Canyon Project, which had a 1973 gross crop value of \$67,569,464 and \$317,538,831, respectively.

b. Recreation

The Lower Colorado River below Imperial Dam and adjacent lands have been extensively used for recreation purposes for many years and have attracted a larger number of visitors from outside the area, despite the low flow in the river below Imperial Dam. Fishing, swimming, boating, hunting, camping, and picnicking are the most prominent recreational activities along the river. Many of the visitors to the area bring campers and trailers and set up living quarters on public land during the winter months, while others either utilize trailer courts or rent facilities in the communities. In recent years, residents have become increasingly aware of the needs of tourists and have built new motels and improved dining facilities. Winter visitors are currently overtaking the developed recreation facilities along the river and have created litter and public health problems on public lands during periods of high use. The Yuma County Chamber of Commerce registered a total of from 8,000 to 9,000 visitors residing in the city of Yuma for 1 week or more between November and April of 1972-1973, which did not include the weekend or 2-weekend visitors who camped in the surrounding area. It has been estimated that river-oriented recreation use in the area at and below Imperial Dam was 205,000 visitor days from July 1972 to June 1973. The Yuma Territorial Prison, Arizona State Park, was visited by approximately

200,000 people from June 1972 to June 1973. About 75 percent of these visitors were from outside the city of Yuma and the state of Arizona.

Recreational use of off road vehicles (ORV) during the cooler fall, winter, and spring months is becoming increasingly popular in the project area, and in particular, along the Coachella Canal and sandhills of Imperial East Mesa, Imperial County, California. Large scale recreation centering around off road vehicles, i.e., dune buggies, four-wheel drive vehicles, and motorcycles, is a fairly recent phenomenon in Imperial County. In the late 50's and 60's there was a limited use of dune buggies in the area. More recently, during the 1970 Thanksgiving holiday weekend, a period of 5 days, about 8,800 vehicles were counted in the area with an estimated total of 35,200 people. The holiday weekends such as Veteran's Day, Thanksgiving, and Memorial Day appear to receive the most recreational pressure from ORV enthusiasts.

c. Archeological and Historical

Although southern California, southern Arizona, and Mexico are all noted for early Indian history, there are no known archeological sites in the vicinity of the project features. Prior to the construction of the dams along the Colorado River, the river channel moved back and forth across the valley floor, destroying many archeological sites, and the past developments of man in the area have caused further losses. Archeological inventories have been conducted and archeological clearance has been obtained from the National Park Service on the sites of all the features to be constructed.

The National Register of Historic Places^{1/} currently lists only one historical site in the project area. This is the Yuma Crossing and Associated Sites, a National Registered Landmark located along the banks of the Colorado River in Imperial County, California, and Yuma County, Arizona, where the river passes adjacent to the northern edge of the city of Yuma, Arizona.

The Southern Pacific Railroad Depot at Yuma, Arizona, and the Chocolate Mountain Archeological District in Imperial County, California, are listed as eligible for inclusion in the National Register. The January 1972 National Registry of National Landmarks lists the sandhills of Imperial County, California, as a natural landmark. These three properties are in the general area of the project but totally outside the area of project influence. Consultation with the California

^{1/} Federal Register, of February 4, 1975, Vol. No. 24, revised by additions, deletions, or corrections by Federal Register of March 11, 1975, Vol. 40, No. 48.

and Arizona State Liaison Officers for Historic Preservation has been accomplished in accordance with the National Historic Preservation Act.

4. Environmental Quality

a. Air

Even in this predominantly rural area, some increase in air pollution is becoming apparent. Typical air quality problems result from burning agricultural waste products, automobile and airplane exhaust emissions, occasional sandstorms, and dust from cultivated fields. Visibility in the project area has decreased in recent years, particularly during calm periods. The aerial particulate matter in the Yuma area exceeds the Federal standards over 98 percent of the time. Yuma County Health Department shows the following listing of 1973 standards and measurements for ambient (air) particulate matter:

Ambient Particulate Matter - 1973 (Micrograms/meter ³)				
	Federal Standards		Arizona Standards	Actual Measurement at Yuma
	Primary	Secondary		
24-hour average ^{1/}	260	150	100	287 ^{2/}
Annual geometric mean	75	60	60	110

^{1/} Samples are taken every 6 days for a 24-hour period.

^{2/} 287 was the maximum, the second high was 277.

b. Water

With few exceptions, most surface- and ground-water supplies throughout the project area have mineral concentrations exceeding 500 p/m TDS and many exceed 1,000 p/m TDS. The Colorado River enters the lower basin at Lees Ferry, Arizona with an average of approximately 560 p/m TDS. Irrigation and domestic water diverted at Imperial Dam may range from 780 to 1,100 p/m TDS; the 1974 mean was 835 p/m TDS. Concentrations of TDS at the Northerly International Boundary have averaged about 970 p/m TDS in 1974. The increase in salinity is due principally to inputs from saline springs, concentrating effects of consumptive use, drainage practices, and reservoir evaporation.

The salinity of the entire Colorado River is currently being studied by the Department of the Interior under a 10-year Colorado River Water Quality Improvement Program instituted in 1971. The Department of Agriculture, and the Environmental Protection Agency, as well as the seven basin states, are cooperating in the endeavor. The objective of the program as listed by the Environmental Protection Agency in the Federal Register, Vol. 39, No. 244 (pp. 43721-43723), dated December 18, 1974, is to maintain salinity concentrations at or below the levels found in the lower main stem of the Colorado River. In implementing this objective, salinity control will be treated as a basinwide problem, recognizing that unless the control measures are made effective, salinity levels may rise as the upper basin continues to develop its compact-appor-tioned waters. Both long- and short-range solutions will be considered in the course of this improvement program. These studies will be integrated with allied programs involving desalting, weather modification, the development of geothermal resources, and basinwide water resources management.

Title II of Public Law 93-320 provides for construction of four salinity control units as well as expediting investigation of twelve other units in areas upstream from Imperial Dam. Title II controls will address point, diffuse, and irrigation salinity sources in the Basin. Also included as a part of Title II is on-farm irrigation management aimed at the more efficient use of irrigation water and reduction of return flow. A description of the environment of the area that will be affected by Title II of Public Law 93-320 will be discussed in detail in a separate environmental statement now being prepared.

Although the waters of the lower Colorado River and its associated receiving waters are suspected of containing pesticide and herbicide residue, no significant residue levels have been detected. The Environmental Protection Agency found no significant pesticide levels during its studies^{1/} along the lower Colorado River in 1973.

c. Noise

Sound levels vary within the area but are generally acceptable. Since the project is located in a generally rural area, the natural sounds generated by animals, winds, thunder, and rain are an integral part of the background. In and around Yuma the most common noises created by man are airplanes using the air fields. In addition to the normal commercial facilities, the activities at the Marine Corps Air Station and test flights of commercial aircraft

^{1/} Environmental Protection Agency, Office of Enforcement, An Investigation of Pesticide Pollution in the Lower Colorado River Basin - 1973, National Field Investigations Center, Denver, Colorado, and Region IX, San Francisco, California, December 1973.

contribute to noise levels. Other factors include vehicles using the highways and agricultural noise generated by farm machinery, cars, water pumps, and agricultural industrial plants. Urban and industrial areas have higher noise levels with machinery, cars, and other forms of transportation (railroads and buses) in operation.

d. Esthetics

The sparsely vegetated brown desert and the stark rugged mountains that border the project area are in marked contrast to the emerald green hue projected by the intensive agriculture that surrounds Yuma and extends up the Gila River and Colorado River flood plains. The riparian community along the Colorado River below its junction with the Gila River continues downstream as a narrow green band to Morelos Dam and to the Arizona-Sonora Boundary. Morelos Dam and the diversion structures of Mexico's Alamo Canal, present an abrupt modulation in the skyline that stretches unbroken for miles to the south and west over the broad San Luis and Mexicali Valleys.

Although there are no designated scenic or esthetic sites located in the project area there are many varied uses of the land. These uses result in a variety of esthetic settings which differ from the sand dunes east of the Coachella Canal to the maze of irrigated and drainage canals emanating from the Colorado River. These canals provide lifegiving water for the agricultural, municipal and domestic habitation of the area. The obvious demarcation between the mesa and the valley add further contrast to the area. In summary, a description of the esthetics of the project area as a result of irrigation may be a pleasant visual relief to that of the dry desert.

B. Desalting Complex

1. Desalting Plant

a. Physical Environment

(1) Topography

The desalting plant will be located on the historic flood plain of the Colorado River. The site is on the northern edge of Yuma Valley about 4 miles west of Yuma, Arizona. The natural terrain is generally flat and regular. The channel of the river is separated from the site by the Yuma Valley Levee.

The first alternate site at the Gila River narrows consists of low flat areas mingled with rolling hills, gullies, and some steep granite outcrops. Elevations vary from about 160 feet above mean sea level at the Gila River floodplain to about 250 feet at the peak of the highest granite outcrop.

The Prison Hill alternate location site for the desalting plant is mostly level.

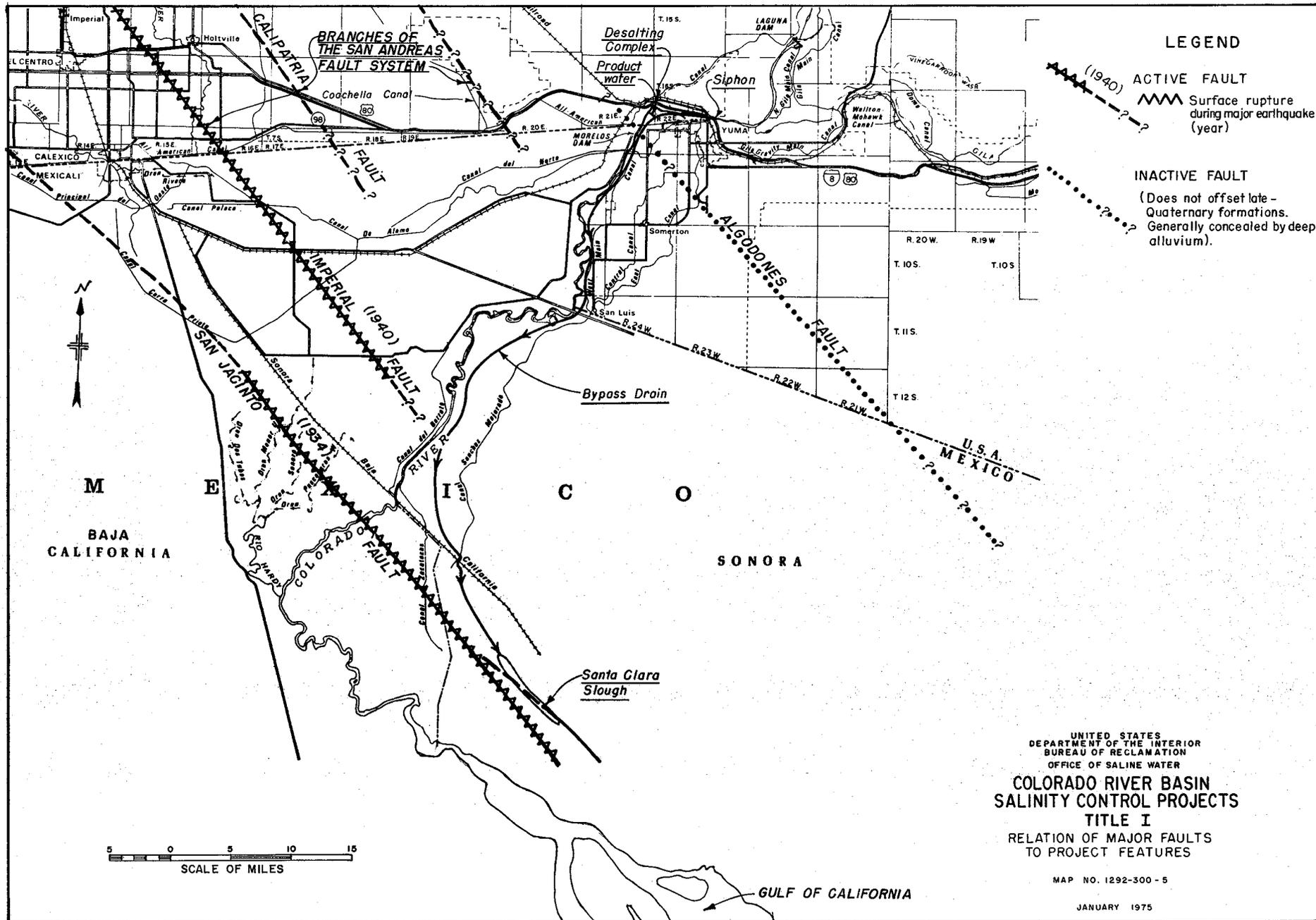
(2) Geology

The proposed site for the Desalting Plant is located on the upper part of the Colorado River Delta and is underlain by alluvial deposits of Pleistocene age which are saturated to form a substantial ground-water reservoir. The foundation will consist of approximately 10 feet of silt and clay underlain by about 1,000 feet of poorly graded, unconsolidated sands interspersed with layers of gravel, silt, and clay. A significant gravel aquifer approximately 30 feet thick is believed to be about 120 feet below the ground surface. The depth to the water table is about 12 feet.

The foundation of the Gila River narrows alternate site is comprised of recent floodplain deposits, terrace sand and gravel, some boulder conglomerate and some granite bedrock.

At the Prison Hill alternate site, the foundation is floodplain alluvium, mostly silt or silty sand on the surface. Logs of wells and test holes show the recent alluvium to be about 100 to 130 feet thick. It is mostly clean sand with some clay interbeds beneath the upper 10 to 20 feet. The recent alluvium is underlain by about 20 feet, more or less, of gravel. Beneath the gravel is sand and weakly cemented sand. The depth to ground water is 12 to 14 feet.

The nearest major fault is the Algodones fault, which is believed to lie about 2 to 3 miles south of the site (see Plate 6). Regional geologic mapping indicates that the fault is older than Late Pleistocene, and historical records show no seismicity associated with the feature. However, the Yuma area and the Colorado River Delta have a potential for strong shaking by major earthquakes originating on the San Andreas and San Jacinto fault systems in the Imperial Valley area, and earthquakes of large magnitude have been recorded in the western part of the project area. The most severe well-documented earthquake occurred in May 1940, on the Imperial fault, about 45 miles west of the site. This event, which produced 40 miles of ground-surface rupturing with a maximum



horizontal displacement of about 14 feet, had a Richter magnitude of 7.1 and an Epicentral Intensity of X. In the vicinity of Yuma, where some roads and irrigation systems were damaged, the intensity was VII. Due to saturated unconsolidated alluvium at the proposed site, a severe earthquake could cause soil failure (liquefaction, compaction, and fissuring) in addition to the normal vibratory effects.

(3) Hydrology

The Wellton-Mohawk Main Outlet Drain Extension M.O.D.E., lies adjacent to the desalting plant site, and will carry water to the plant. If an alternate desalting plant site at the Gila River narrows is used the M.O.D. or Wellton-Mohawk Main Conveyance Channel will carry water to the plant. These drainage conveyance channels have a design capacity of about 353 ft³/s and have conveyed average drainage flows of about 220,000 acre-feet per year since 1966. The water is obtained from about 107 wells in the Wellton-Mohawk Division. The salinity of the drainage flows has gradually decreased from an average of 5,500 p/m TDS in 1963 to an average of 3,700 p/m TDS in 1973 due to refreshing of the aquifer from application of Colorado River water for irrigation. In the latter year, levels ranged from a minimum of about 2,900 p/m TDS to a maximum of about 4,200 p/m TDS. This decrease in salinity is expected to continue to a level of about 3,100 p/m TDS at about the time the desalting plant begins operating, but will gradually increase after that time as a result of improved irrigation efficiency.

b. Biological Environment

(1) Vegetation

Photograph No. P998-300-5970 NA shows the typical agricultural lands and associated irrigation and drainage channels along the northern edge of Yuma Valley. The proposed site for the desalting plant is near the center of the photograph. The proposed site is located in the Valley Division of the Yuma Project and is presently an irrigated field planted in sudan grass and wheat. Other major crops produced in the adjacent areas include cotton, sorghum, alfalfa, winter vegetables, and citrus. Vegetation along the Colorado River channel to the west of the site consists primarily of giant reed, saltcedar, seepwillow, mesquite, quailbrush, some willow, and scattered cottonwood.

The alternate site being considered for the desalting plant at the Gila River narrows consists mostly of sparse desert habitat. The low areas among the hills are typical desert wash habitat with sparse

growths of paloverde, ironwood, creosote bush, applopappus, saltbush, and some patches of mesquite and seepweed. The low hills are mostly void of vegetation with only a few small creosote bushes, some ocotillo, and an occasional small paloverde. There is a small area of riparian growth totaling about 40 acres situated adjacent to the Wellton-Mohawk Canal. This riparian growth consists of an open to fairly dense stand of saltcedar (both the 5-stamen and athel species), quailbrush, seepweed, some arrowweed and mesquite. Approximately 60 acres of the site have been cleared of native vegetation due to various land uses and now lie fallow or barren.

The Prison Hill alternate desalting plant site has been previously cleared of native vegetation. The site has partially revegetated to very sparse growths of quailbrush and arrowweed with some seepweed and various other weedy species.

(2) Fish

The desalting plant will be located in Yuma Valley adjacent to the M.O.D.E. The M.O.D.E. supports populations of largemouth bass, catfish, bluegill, and tilapia. The tilapia is a warm-water herbivorous species introduced from South Africa and thrives in the temperate water temperatures of the area. This species is a mouth brooder and a prolific breeder and its abundance plays a major role in controlling aquatic weeds and algae, thereby reducing the requirement for mechanical or other means of aquatic vegetation control in canals, drains, and laterals. The tilapia has also become a popular game species for fishermen in the area. If an alternate desalting plant site is used the desalting plant will be located in South Gila Valley or at the Gila River narrows. The fish in these areas and in the M.O.D. are the same as those described above.

(3) Wildlife

A general discussion of wildlife inhabiting the general project area has been included earlier in this chapter under A.2.c. Although the desalting plant will be located on irrigated agricultural lands and will contain only a few of these species, depending upon the crops produced, some of the area's wildlife may use the site as a food source. A more quantitative discussion of the wildlife species in the Yuma area and specifically those in Yuma Valley is included later in this chapter under D.2.c.

Due to the sparse vegetative nature of the alternative desalting plant site at the Gila River narrows, wildlife species are



Aerial view looking east from the Colorado River showing the M.O.D.E. 2 diversion channel of the Wellton-Mohawk Main Outlet Drain Extension about 2 miles upstream from Morelos Dam. The bifurcation structure is shown left of center. The proposed site for the desalting plant is located near the center of the photograph within the curve of the Yuma Valley Levee. Yuma, Arizona, is in the background--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. 998-300-5970 NA.

very low in diversity and number. There are very few rodents due to the coarse edaphic conditions. There are only a few lizards and snakes. An occasional cottontail and some quail and doves use the limited cover afforded by that portion of the area which has riparian cover. A few mourning doves and various small birds utilize perching and resting places in the desert vegetation and on the secluded hillsides adjacent to the Gila Gravity Main Canal.

Wildlife species at the Prison Hill alternate desalting plant site are generally low in diversity and number due to lack of vegetative cover. However, due to the close proximity of cultivated fields and the Colorado River flood plain the site is visited by small numbers of various wildlife species such as doves, rabbits, and roadrunners. Rodents, lizards, and snakes are also present in low numbers.

c. Cultural Environment

(1) Land Use

Land at the proposed site of the desalting plant is used exclusively for the cultivation of irrigated crops, as are most of the surrounding lands east of the river. The area to the northwest of the river lies outside the valley and is generally unimproved desertland. Within a two-mile radius of the desalting plant site, other land uses and existing features include the Arizona Public Service Yuma-Axis (Yucca) Powerplant; Imperial Irrigation District's Pilot Knob Hydroelectric Plant; the University of Arizona Agricultural Experimental Station; Morelos Dam; the All-American Canal; the Alamo Canal in Mexico; the Yuma Valley Levee; the Southern Pacific Railroad; Interstate Highway 8; the Main Outlet Drain Extension; the townsites of Andrade, California; and Algodones, Mexico; 80 acres of housing project and small rural residential areas, including a small community of Cocopah Indians.

Of the total 300 acres of land under consideration for alternative desalting plant sites at the Gila River narrows, approximately 90 acres are private, 50 acres are Arizona state land, and 160 acres are Federal. All of these lands are uncultivated and essentially undeveloped. However, of the Federal acreage, about 30 acres are encumbered by a materials site granted to Arizona State Highway Department by the Bureau of Land Management, and another 40 acres are under a materials permit to Yuma County issued by the Bureau of Reclamation.

That portion of the Prison Hill alternate desalting plant site located in Section 22 on the east side of Interstate 8 is under private ownership. It is currently fallow land not being used for any purpose. The portion of the site located in Section 27 between the Interstate and the Southern Pacific Railroad is also under private ownership and has previously been used but has subsequently been vacated.

(2) Recreation

Recreational activities on the proposed desalting plant site are negligible but the general Yuma area has a high recreational potential.

Recreation potential and activities at the Gila River narrows alternate desalting plant site are limited. There is potential for some rock collecting, hiking, and possibly a small amount of hunting. Fishing along the canals which border the site is the main recreational activity in the immediate area.

The recreational potential for the Prison Hill alternate desalting plant site is very minimal due to a low number of animals in these areas and due to the close proximity of the interstate and railroad.

(3) Archeological and Historical

A detailed archeological survey has been conducted on the sites of all desalting complex features proposed for construction. The survey was contracted by the Bureau of Reclamation through the Arizona Archeological Center, National Park Service, and conducted by Prescott College Archeological Survey, Prescott, Arizona. On the basis of the archeological survey report, archeological clearance of the project sites has been granted.^{1/}

There are no registered sites listed on the most current National Register of Historic Places in the immediate vicinity of the desalting plant site. In accordance with the National Historic Preservation Act, consultation has been made with the California and Arizona State Liaison Officers for Historic Preservation to determine the effect the project will have upon any sites under nominations to the Register or any site deemed historically important.

There are no known archeological or historical sites within the area under consideration as an alternate desalting plant site at the

^{1/} Letter dated February 19, 1974, enclosing Archeological Survey Report to Project Manager, Yuma Projects Office, Bureau of Reclamation, Yuma, Arizona, from Acting Chief, Arizona Archeological Center, National Park Service, Tucson, Arizona.

Gila River narrows. There have been no archeological surveys conducted at the site.

There are no known archeological sites in the area of the alternate desalting plant site south of Prison Hill. There has been no archeological survey of the area. Prison Hill located about one quarter to one half mile north of the site is the site of the Yuma Territorial Prison, an Arizona State Park. The Historic Yuma Crossing, a National Registered Landmark, and its associated sites, are located less than a mile away. Discussion of these historic sites is included later in this chapter under discussion of the Metal Flume.

d. Environmental Quality

(1) Water

Wellton-Mohawk drainage flows which will pass through the desalting plant and which are currently discharged into the Colorado River below Morelos Dam via the Main Outlet Drain Extension have concentrations of 2,900 to 4,200 p/m TDS. The drain water is pumped from underground and contains no significant pesticide or herbicide residues.

(2) Noise

As discussed earlier in this chapter, sound levels vary within the project area but are generally acceptable. The results of a base sound level study near the desalting plant site are presented on Table 4.

(3) Esthetics

There are no designated scenic or esthetic sites at the proposed or alternate desalting plant sites.

2. M.O.D.E. Metal Flume

a. Physical Environment

The proposed siphon will be more or less parallel to and south of the alignment of an existing metal flume structure and will be located in a narrow section of the Colorado River adjacent to the northern end of Yuma, Arizona. The river at this location passes between Prison Hill and Indian Hill on the Arizona and California sides, respectively. The structure will be buried in river-deposited sediments

adjacent to the low-water channel, where the topography consists generally of a flat narrow flood plain.

b. Biological Environment

(1) Vegetation

The proposed site is shown on Photograph P998-300-01012. Although there is no vegetation on the alinement of the existing flume, which is above ground, there is a narrow strip of riparian growth consisting predominantly of saltcedar, between the structure and the developed areas of the city of Yuma. There is a narrow strip of cattail, bulrush, and giant reed between the flume and the river channel, a portion of which is shown in Photograph P998-300-01011.

(2) Fish

The M.O.D.E. supports populations of tilapia, largemouth bass, catfish, and bluegill. The tilapia, a warm-water game fish imported from South Africa, comprises the greatest part of the fish biomass in the drain. Due to the high water velocity, however, there are probably few fish in the flume itself.

(3) Wildlife

Since the flume alinement is located adjacent to a developed area of Yuma and has sparse vegetation, there are few wildlife species. Those which do inhabit the riparian growth between the structure and the river consist of a few amphibians and nongame birds common to the Yuma area.

c. Cultural Environment

(1) Land Use

The existing metal flume rights-of-way in the river bottom is utilized solely for the flume and a maintenance access road. Between these rights-of-way and the toe of the south riverbank, there is a small marshy area that supports riparian vegetation. The slope and top of the bank are used for an above-ground water supply line, a buried sewerline and storm drain, an unimproved maintenance road, powerlines, a buried gasline, and footings for a highway and a railroad bridge. The proposed Interstate 8 Highway bridge will cross over the alinement.

Table 4
 COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
 TITLE I
 BASE SOUND LEVEL STUDY 1/

Site No.	Location	Date	Starting Time	Time Interval Min.	Sound Level Measurement dBA <u>2/</u>		
					Mean	Minimum	Maximum
1	Yuma Desalting Test Facility, Sec. 17, T. 8 S., R. 21 W., G&SRM	9/5/73	9:58 a.m.	21	55	51	62
2	Proposed Desalting Plant Site along north fence of Yuma-Axis (Yucca) Powerplant, Sec. 36, T. 8 S., R. 24 W., G&SRM	9/5/73	11:13 a.m.	21	59	52	69
3	Proposed Desalting Plant Site 1,200' north of Yuma-Axis (Yucca) Powerplant north fence, Sec. 36, T. 8 S., R. 24 W., G&SRM	9/5/73	11:42 a.m.	20	40	38	71
4	Yuma Mesa Pump No. YM8	9/5/73	12:58 p.m.	24	50	45	75

1/ The recordings were made with an impulse precision sound level meter attached to a level recorder.

2/ A light gusty wind was blowing with speeds up to 10 mph from the southwest direction but was not noticeable in the readings.



Aerial view looking east showing the existing metal flume and the replacement siphon location on the Main Outlet Drain Extension on the north edge of Yuma, Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01012 NA.



View showing the flume of the Wellton-Mohawk Main Outlet Drain Extension with the Colorado River alongside. Yuma, Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01011 NA.

(2) Archeological and Historical

Although the southwestern United States has a remarkable Indian history, there are no known archeological sites near the proposed feature. The Arizona State Liaison Officer has been consulted in this matter, and an archeological survey has been conducted along the proposed siphon alignment. Archeological clearance has been granted for this project feature.^{1/}

The existing metal flume passes through the Yuma Crossing and Associated Sites, which is listed as a historical landmark in the National Register of Historic Places.^{2/} The Yuma Crossing and Associated Sites, being a National Registered Landmark, is afforded full protection under Section 106 of the National Historic Preservation Act of 1966. This historic site is located along the banks of the Colorado River in Imperial County, California and Yuma County, Arizona, where the river passes adjacent to the northern edge of the city of Yuma, Arizona. The entire length of the existing metal flume to be replaced with a buried concrete pipe siphon coincides with the historic site's location.

The Yuma Crossing is located between the existing new and old U.S. Highway 80 bridges. The crossing has been historically significant as a transportation and communication gateway. The site was associated with the discovery of the Colorado River in 1540 by Hernando de Alarcon, who gave the stream the name "El Rio de Buena Guia," or River of Good Guidance. The first crossing of the river at this site by Europeans was made in the same year by a detachment of Francisco Vasquez de Coronado's expedition in its search for the fabled Seven Golden Cities of Cibola. This constituted the first overland journey into California by Europeans. The crossing was subsequently used as a route between New Spain and Alta California during the Spanish colonial period and later between the American Southwest and California during westward expansion. The only surviving structure is a bridge pier on the Arizona side remaining from the first railroad crossing (1877). A ferry crossing established in 1849 continued in service until the construction of the railroad bridge.

The associated sites consist of the Arizona Territorial Prison (1876), Fort Yuma (1850), which is the site of Mission Purisima

1/ Letter dated February 19, 1974, enclosing Archeological Survey Report to Project Manager, Yuma Projects Office, Bureau of Reclamation, Yuma, Arizona, from Acting Chief, Arizona Archeological Center, National Park Service, Tucson, Arizona.

2/ Federal Register of February 4, 1975, Vol. 4, No. 24, as amended or revised by additions, deletions or corrections by Federal Register of March 11, 1975, Vol. 40, No. 48.

Concepcion (1780), and the U.S. Army Quartermaster Depot (1864); all of which have surviving buildings. These three landmarks are under the care and protection of the Arizona State Parks, the Bureau of Indian Affairs, and the Bureau of Reclamation, respectively. A part of the U.S. Army Quartermaster Depot, the Custom House, has been transferred to Arizona State Parks, however. The prison is located on Prison Hill on the Arizona side of the Colorado River, and Fort Yuma is on Indian Hill on the California side. Both sites are upstream from the Yuma Crossing. The Quartermaster Depot lies downstream from the crossing on the Arizona side.

Fort Yuma and the sites of Mission Concepcion and the Hernando de Alarcon expedition are all California State historical landmarks.

The Quechan Indian Tribe operates a museum in an original Fort Yuma building, which was visited by about 175-200 people per week from November 1972 to April 1973. The Customs House at the Quartermaster Depot received an estimated 400 visitors during the 1972 calendar year.

d. Environmental Quality

Although the site of the metal flume is not an area of special esthetic quality, the Colorado River does present a picturesque setting at the site as it flows between densely vegetated banklines and is decorated by numerous small vegetated islands and intermittent mudflats. This riparian community is a visual relief from the comparatively barren aspect of the extensive desert habitat in the project area. A panoramic view of this section of the river and its adjoining flood plain can be viewed from Prison Hill on the Arizona side of the river or from Indian Hill on the California side.

3. Bypass Drain

a. Morelos Dam to Southerly International Boundary

(1) Physical Environment

(a) Topography

The alinement of the structure lies in the flood plain of the Colorado River, and the terrain is generally flat and regular. The Yuma Valley Levee parallels the alinement on the east

for approximately 16 miles along the limitrophe section of the river. Photograph P998-300-01014, a view of the Colorado River looking north over Morelos Dam, shows the M.O.D.E. No. 3 outlet on the east (right) side of the river channel. The drain will begin at the terminus of this structure. Photograph P998-300-01019 shows the dam looking south down the river. The alignment in this view will lie on the left side of the stream through irrigated fields and limited riparian vegetation.

(b) Geology

Surface materials at the site consist of alluvial deposits of the Colorado River, composed primarily of clayey and silty soil. There may be some sand, silty sand, and buried riprap. The depth to ground water is more than 15 feet along most of the alignment and at least 13 feet in other reaches.

The existing M.O.D.E. No. 3, which will be utilized as part of the drain, may cross the Algodones Fault west of Yuma. This fault has evidently been inactive in recent geologic time.

(2) Biological Environment

(a) Vegetation

Vegetation along or adjacent to the alignment is comprised of riparian vegetation interspersed with tracts of irrigated agricultural land. The riparian growth consists chiefly of saltcedar, arrowweed, quailbush, mesquite, cottonwood, catclaw, seepwillow, Goodding willow, Bermuda grass, saltgrass, bulrush, cattails, and giant reed. A detailed discussion of the existing vegetative communities and acreages of each vegetation type along the river is discussed later in this chapter.

(b) Fish

The existing M.O.D.E., which will be used as a part of the bypass channel, supports populations of tilapia, catfish, largemouth bass, and bluegill. Tilapia makes up the greatest part of the fish biomass. The Colorado River lies to the west of the proposed alignment and is discussed in detail later in this chapter.

(c) Wildlife

Wildlife along the bypass drain alignment consists mainly of small animal species such as rodents, lizards,

snakes, rabbits, quail, roadrunners, and doves. A complete discussion of the animal population in the riparian habitat adjacent to the Colorado River is included later in this chapter.

(3) Cultural Environment

(a) Land Use

Lands in the vicinity of the bypass drain are the cultivated farmlands of the Valley Division, Yuma Project, and the Colorado River floodplain. The floodplain, isolated from the Valley Division by the Yuma Valley Levee, is predominantly undeveloped. However, there are about 2,000 acres of cleared farmlands. The floodplain also includes a portion of the Cocopah Indian Tribe Reservation which was provided for under P.L. 93-320.

(b) Archeological and Historical

There are no known archeological or historical sites along this reach of the alignment. In accordance with the National Historic Preservation Act, the Arizona State Liaison Officer for Historic Preservation has been contacted for information concerning possible effects of the project on sites under nomination to the National Register of Historic Places or any site considered historically important. Archeological clearance has been obtained for the area.^{1/}

b. Southerly International Boundary to Santa Clara Slough

(1) Physical Environment

The alignment of the proposed drain lies in the flood plain of the Colorado River, and the natural terrain is generally flat and regular. Surface materials consist of alluvial deposits of the Colorado River. From the boundary to about halfway between San Luis and Riito, surface soils appear to be primarily clay and silt. Below this reach, silt evidently predominates with silty sand in some places. There is some clay in Santa Clara Slough.

In addition to local surface fracturing, a large earthquake in the area may cause liquefaction and subsidence because of the deep wet alluvial deposits. The Imperial Fault, whose movement caused a major earthquake in Imperial Valley in 1940, may also cross the alignment.

^{1/} Letter dated February 19, 1974, enclosing Archeological Survey Report to Project Manager, Yuma Projects Office, Bureau of Reclamation, Yuma, Arizona, from Acting Chief, Arizona Archeological Center, National Park Service, Tucson, Arizona.



Aerial view looking upstream on the Colorado River showing Morelos Dam in the foreground. The Wellton-Mohawk Main Outlet Drain Extension, the Yuma Valley Levee, the West Main Canal, and a portion of the Valley Division of the Yuma Project are shown to the right. The Yuma-Axis (Yucca) Powerplant is visible in the background next to the levee. Yuma area, Arizona-Mexico-Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01014 NA.



Aerial view looking downstream showing the terminal structure of the Wellton-Mohawk Main Outlet Drain Extension in the left foreground. Morelos Dam and the Colorado River are to the right. Mexico's Alamo Canal is shown in the upper right portion of the photograph. Yuma area, Arizona-Mexico--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01019 NA.

(2) Biological Environment

The drain will traverse irrigated land in the eastern portion of the Mexicali-San Luis Valley and undeveloped land characterized by southern Sonoran Desert vegetation, then terminate in the area of the Santa Clara Slough marshlands. The desert vegetation is characterized primarily by creosote bush and bursage. The vegetation in the slough is described in paragraph B.3.c. of this section.

There are no fish species along the alignment. Wildlife in the area are characteristic of the southern Sonoran Desert as described earlier.

(3) Cultural Environment

Rights-of-way for the proposed drain will involve approximately 550 acres of privately owned land and 200 acres of undeveloped desertland owned by the Mexican government. It is estimated that approximately 370 acres of the private land are under cultivation and the remaining 180 undeveloped. With few exceptions, the developed areas are rural. Santa Clara Slough consists of a relatively small marshy area surrounded by extensive salt flats and is located at the terminus of the proposed alignment.

There are no known archeological sites along the alignment in Mexico. The Arizona State Liaison Officer for Historical Preservation has been contacted, and Mexican officials will be notified in order to obtain information regarding compliance with that country's standards concerning archeological or historical sites.

c. Santa Clara Slough

Santa Clara Slough is a low-lying area of approximately 103,000 acres extending approximately 27 miles upstream from the Gulf of California. The slough is for the most part, a large, dry, salt flat. Hydrophytic and phreatophytic plant life totals only 450 acres, however, and is confined primarily to the east side of the slough along a mesa escarpment where it grows in a generally broken north-south ribbon 14 miles long. Interpretation of aerial photographs and a field reconnaissance suggest that the slough consists of a small upper and a larger lower section separated by a large area in which vegetation is either sparse or nonexistent.

The upper portion of the slough consists of a small marsh about 3-1/2 miles long and 150 feet wide with approximately 75 acres

of open water and vegetation. This marsh is fed by an agricultural drain from the north (shown in Photograph P998-300-01002), which enters the marsh at an estimated rate of 15 to 20 ft³/s with an average salinity of 5,200 p/m TDS. It is into this marsh that the bypass drain will discharge its water.

At the present, the viability of the small marsh appears to be totally dependent upon the agricultural drainage water. It is completely isolated from the Colorado River, the Gulf of California, and seep spring water along the mesa escarpment on the east side of Santa Clara Slough. At the terminus of the marsh in the salt flats, the water has salt concentrations as high as 82,800 p/m TDS. The open water of the marsh varies in depth from a few feet to under 2 inches. The water is bordered by mats of saltgrass, sedges, pickleweed, cattails, bulrush, and some giant reed as indicated by Photograph P998-300-01003. There are growths of saltcedar and mesquite along the outer limits of the east side of the marsh. To the west and south of the marsh are barren salt flats. The waters of the marsh are full of submerged vegetation comprized primarily of spiny naiad, with some chara and potamogeton. Without exception, the bottom of the marsh is covered with 6 to 20 inches of organic detritus.

Fish species found in the marsh are listed in Appendix E under Santa Clara Slough. They include carp, mosquito fish, red shiner, mollies, and desert pupfish. The most numerous species in the marsh is by far the desert pupfish, a species which is believed to be extirpated from its native range in the United States. The pupfish comprises about 80 to 90 percent of the fish fauna in the marsh, but is considerably less abundant in the agricultural drains which feed the marsh.

The most common wildlife species which inhabit the small marsh are various piscivorous birds such as the brown pelican, egrets and herons and numerous small shorebirds. The Virginia rail and the endangered Yuma clapper rail are known to be in the marsh. Gambel's quail inhabit the phreatophytic and desert vegetation along the east side of the marsh. Coyotes appear to be numerous in the area. Cattle and horses use the area for grazing.

In the lower section of the slough, along the mesa escarpment, the surface water seeps from the toe of the escarpment and is limited to narrow, interbraided channels clogged with bulrushes and cattails. The higher ground between the channels is characterized



View of the irrigation drain which leads into the east finger of the Santa Clara Slough. This photograph was taken looking north approximately 6 miles north of the slough. Sonora, Mexico-- Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01002 NA.



View of the open water area at the north end of the Santa Clara Slough. Sonora, Mexico--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01003 NA.

by sedges and saltgrass, and the area immediately adjacent to the slough supports some sparse saltcedar, giant reed, willow, and mesquite. The water is not open or flowing and is rarely deeper than 2 to 4 inches. Water samples taken in this area have yielded an average salinity of 1,200 p/m TDS, indicating that different sources of water feed each section of the slough. On the slightly higher areas between the channels, saltgrass predominates and appears to be semifloating. This limited area of semimars vegetation is replaced on the periphery of the slough by riparian vegetation of a low quality, with grasses and a few scattered mesquite and large saltcedar trees, but no large trees such as cottonwood or sycamore (Photographs P998-300-01005 and P998-300-01006). Wildlife and fish species in this area are similar to those described for the marsh area, except there are no large fish species along the mesa escarpment because of the shallow water and no desert pupfish have been found in this area.

To the west lies a vast salt flat which borders the slough throughout its length and extends to the horizon, as shown in Photograph P998-300-01004. The salt, which is so concentrated that it is being mined within 1 mile of the upper portion of the viable marsh, mixes with soil to give the area a dirty white appearance. Surface drainage from the eastern edge of the salt flat flows into the slough when precipitation is sufficient, as evidenced by existing runoff channels.

Lands to the east and north of the slough are generally characterized by vegetation of the southern Sonoran Desert, which has been previously discussed. Photograph P998-300-01001 shows a typical area of this habitat.

4. Other Components

a. Wellton-Mohawk Division Acreage Reduction

As outlined in Chapter I, the proposal will include the retirement of about 10,000 acres of irrigable land from the Wellton-Mohawk Division of the Gila Project. Approximately 3,400 acres will be undeveloped Federal land adjacent to the Gila River. This section is characterized predominantly by saltcedar and also supports other typical riparian vegetation. The habitat provides good cover and nesting areas for mourning and white-winged dove which use the surrounding croplands for feed. Other upland game includes cottontails and some Gambel's quail. The habitat may also support muskrats, raccoons, and striped skunks.

An additional 400 acres of undeveloped Federal land on the mesa will also be retired. The habitat of this land is typical of the Sonoran Desert and is comprised largely of sparse growths of creosote bush and bursage. Wildlife on this land is also typical of the desert areas in the general region.

The remaining 6,200 acres are privately owned, including about 2,000 acres of undeveloped land and about 4,200 acres of agricultural land.

b. Painted Rock Reservoir

Painted Rock Dam provides flood protection for downstream areas along the lower Gila and Colorado Rivers. It is normally dry, and significant impoundments of floodwater have occurred only in 1966 and 1973. The subsequent releases have partially infiltrated to the aquifer underlying the Wellton-Mohawk Irrigation and Drainage District and have been pumped in addition to the normal drainage resulting from irrigation in the District.

The flood of 1966 on the Gila River reached a maximum hourly inflow to Painted Rock Reservoir of 75,180 cubic feet per second on January 2. Official figures are not yet available for inflows to the dam resulting from the flood of spring 1973, but it is estimated that the total inflow was about 600,000 acre-feet. As of February 19, 1975, about 30,000 acre-feet of water remained in the reservoir.

At an elevation of 610 feet above mean sea level, the reservoir has a capacity of 600,000 acre-feet and inundates approximately 22,100 acres of land.

Ownership of the lands within the 610-foot contour is divided between the United States (about 12,800 acres), the State of Arizona (about 500 acres), and private land (about 8,800 acres). The United States presently has a flowage easement on these lands. Purchase of the 8,800 acres of private land may be required.

There are about 6,600 acres of irrigated diversified cropland under the 610-foot contour, including about 4,000 acres of the private lands and 2,600 acres of leased United States lands.

The remaining 15,500 acres produce native vegetation when not inundated.



View of the east side of the south end of the Santa Clara Slough. Vegetation can be seen extending out 300 to 500 feet from the escarpment in the foreground, with extensive salt flats in the background. Sonora, Mexico--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01005 NA.



View showing sparse riparian vegetation near the southeast corner of the Santa Clara Slough. Extensive salt flats leading to the Gulf of California can be seen in the background. Sonora, Mexico--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01006 NA.



View of the extensive old salt flats west of the north end of the Santa Clara Slough. The newer salt deposits and drainage pattern can be seen in the central portion of the photograph. Sonora, Mexico--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01004 NA.



View of typical desert vegetation and terrain in the vicinity of the Santa Clara Slough, Sonora, Mexico--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01001 NA.

c. Transmission System

The proposed alignment of the transmission system parallels an existing 161-kV transmission line for its entire length. The terrain is generally flat and regular, with habitat typical of the Sonoran Desert, as described earlier in this chapter. Approximately one-quarter mile of the transmission line will pass through fallow land immediately northwest of the desalting plant site.

C. First 49 Miles of the Coachella Canal

1. Physical Environment

a. Topography

For approximately the first 37 miles, the proposed alignment lies along the Imperial East Mesa of the Imperial Valley adjacent to the Sand Hills, as seen in Photograph P212-300-4908. This area ranges in elevation from about 160 feet above mean sea level at the base of the sand hills to 50 feet below mean sea level at the northerly end of the East Highline Canal. It is a fairly level mesa crossed by irregular washes. The final 12 miles of the alignment are situated along the western toe of the Chocolate Mountains, where the terrain is characterized by a series of relatively stable outwash fan deposits from the slopes.

b. Geology

Surficial deposits in the area between the East Highline and Coachella Canals as far north as Niland, California, include alluvium, lake deposits, and dune sand. The alluvium consists of Colorado River deltaic sediments as well as some fan deposits from local mountains. The Colorado River is believed to be the primary source of the lake deposits as well as most of the alluvium. The soils are predominantly sandy, unconsolidated, stratified, and intercalated with silt, clay, or gravel layers. Thickness of the unconsolidated sediments is probably more than 2,000 feet except in small local areas. The geologic age of the surficial deposits is recent.

Logs of test holes drilled near the Coachella Canal show the shallow soils to be more sandy to the south and more silty-clayey to the north; however, sand is the principal constituent everywhere. Clay or silty claybeds are less than 5 percent of the total footage

drilled in the upper 20 feet and great lateral continuity of the fine-grained beds is unlikely.

The structural feature known as the Salton Trough, within which the study area lies, is a high risk seismic zone. It contains numerous faults, several of which appear to lie near or cross the southerly 49 miles of the Coachella Canal. These faults do not appear to significantly affect the ground-water conditions within the study area. The most damaging earthquake in recent times originating near the southern part of the Coachella Canal was the 1940 Imperial quake whose epicenter was located about 20 miles to the west. Damaging earthquakes of lesser magnitude occurring in 1950 and 1951 had epicenters located near the Coachella Canal. The existing Coachella Canal crosses known or projected faults six times in its first 49 miles. The crossings occur approximately as follows:

<u>Canal Miles From All-American Canal</u>	<u>Name</u>	<u>Strike</u>
3.7	San Andreas (?)	N54 ⁰ W
5.4	San Andreas (?)	N54 ⁰ W
13.3	----	N67 ⁰ W
14.2	----	N67 ⁰ W
30.4	San Andreas (?)	N56 ⁰ W
43.0	Algodones	N50 ⁰ W

The existing Coachella Canal crosses about 2 miles of the dunes geothermal anomaly, from about 7 to 9 canal miles from the All-American Canal. Also, a smaller geothermal anomaly is crossed in the vicinity of Highway 78's Glamis Bridge at about 24 to 25 miles from the All-American Canal. This Glamis Bridge anomaly coincides with a zone of anomalously high resistivity gradient.

c. Hydrology^{1/}

Land irrigated in the Imperial Valley prior to the Reclamation Project was supplied via the Alamo Canal (River) to the valley distribution system. The East Highline Canal, the

^{1/} Discussion on hydrology taken from Preliminary Report of Ground-water Hydrology of Coachella Canal area prepared by U.S. Bureau of Reclamation, LC Region, Boulder City, Nevada, Yuma Projects Office, Yuma, AZ., for Fish and Wildlife Ad Hoc Committee for Coachella Canal Unit, November 1974.



Aerial view of the Coachella Canal looking southeast. Seepage areas can be seen along both sides of the canal near the center of the view and the Sand Hills at upper left. California--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P212-300-4908 NA.

most easterly branch of the system, carried water into the Niland area prior to 1930. The canal lies along the western edge of the East Mesa and leakage from it started building the ground-water mound under part of the East Mesa before any ground-water level data were available. Some of the observation wells established on the East Mesa in 1942 show that water levels were rising at that time.

The ground-water gradient was west from the Colorado River near Yuma into the Imperial Valley and superimposed on this system were the leakage mounds caused by the canals. The All-American Canal was operational by 1940 and some new land was irrigated in the valley due to the increased supply of water. Rising water levels in the valley as the result of increased irrigation reduced underflow from the East Mesa and contributed to rising water levels under the mesa. The new equilibrium condition, however, was not reached before the Coachella Canal went into operation in 1948. Plate No. 11 shows the water table in 1942, approximately 6 years before the Coachella Canal became operational.

The large leakage rates from the Coachella Canal, starting about 1948, accelerated the growth of the ground-water storage mound beneath the East Mesa. By 1963 the water table was essentially at equilibrium in the area between the Coachella and East Highline Canals, as indicated by a similar level in 1974. That is, the buildup of the ground-water mound was nearly complete. The rise from the 1942 base had ranged from a few feet near the East Highline Canal to more than 70 feet beneath the Coachella Canal. Water levels in 1963 are shown on Plate No. 12.

The water table had built up to land surface in areas near the canals and had formed numerous small, shallow ponds in areas between the canals opposite the last 10 to 15 miles of the area to be lined. Phreatophyte and hydrophyte growth was established in shallow water table areas. Plate No. 13 shows depths to ground water in 1974. This map is generalized because of the undulating land surface and scarcity of topographic control.

2. Biological Environment

a. Vegetation

The typical vegetative communities along the Coachella Canal are those native to the upland mesa areas of the Colorado Desert

(The Colorado Desert is considered by some authorities to be a subdivision of the Sonoran Desert). The major vegetative type in the area is the sparse desertshrub community, consisting primarily of different densities of creosote bush intermixed with either bursage, jointfir, or saltbush or with various combinations of the three. Desert annuals are abundant during periods of favorable moisture.

There are some mesquite hummocks in the area, but these are generally somewhat removed to the west of the canal. Photographs P212-300-4908 and P212-300-12613 show typical examples of the scattered desert vegetation along the alignment.

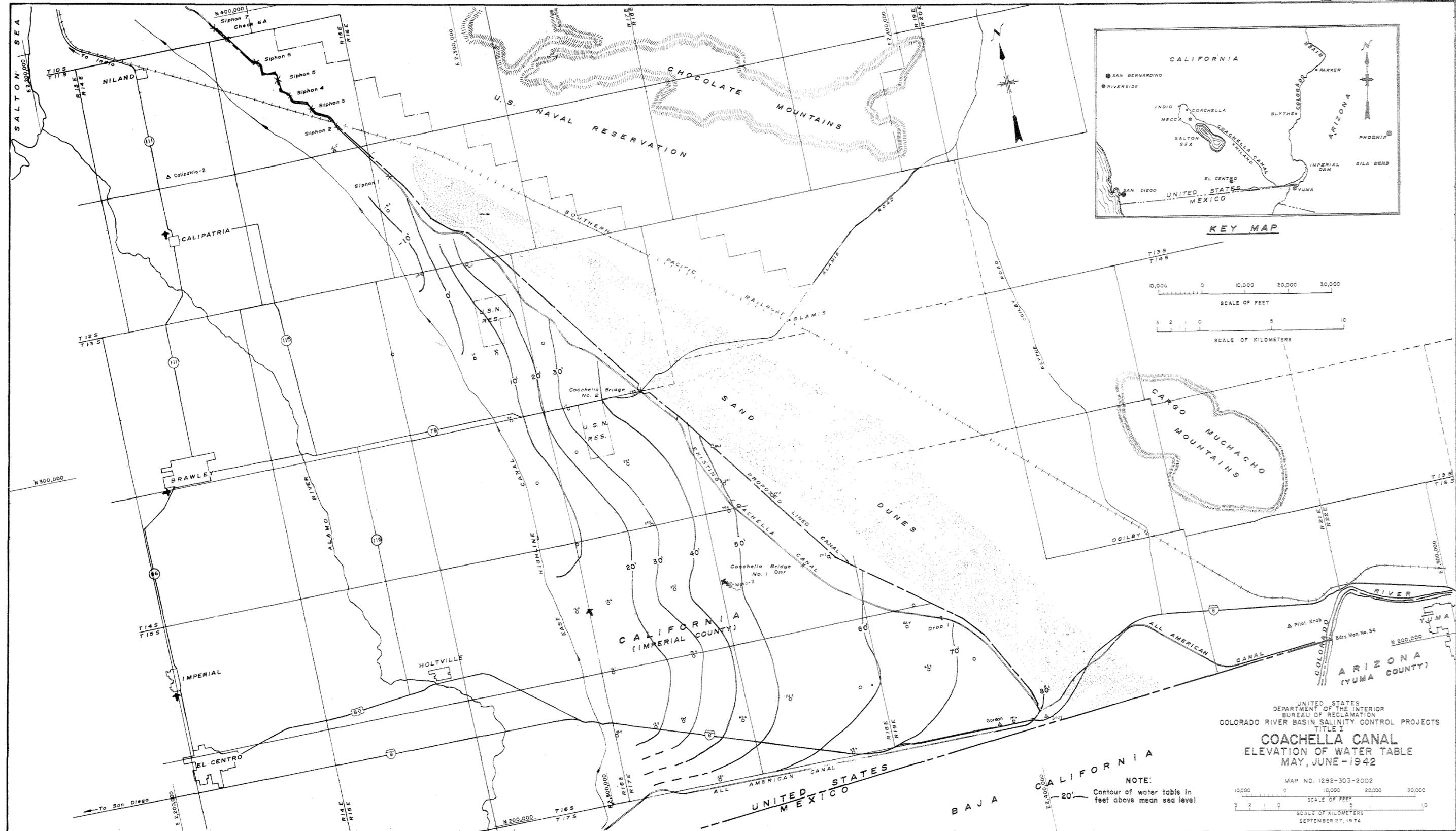
During a recent vegetation inventory^{1/} a strip of land, approximately 3 miles wide, along the first 49-mile reach of the Coachella Canal, was sampled. The acreages of different vegetative types and land uses within this study are presented in Table 5.

The desertshrub community was the largest plant community sampled. It represents the typical vegetative climax of the area. The average range of total vegetation cover for the desertshrub community along the Coachella Canal is from about 2.3 to 47.7 percent.

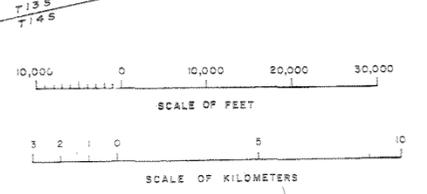
Closely associated with the desertshrub type and included in the desertshrub acreage is the desert wash community along the foothills of the Chocolate Mountains. The native wash vegetation occurs in these washes on the east side of the Coachella Canal between Siphons No. 1 and No. 7. The dominant plant species in the washes are ironwood, paloverde, creosote bush, and bursage. Other minor plant constituents in and along the washes are hymenoclea, big galleta grass, desert lavender, pencil cholla, teddybear cholla, brittlebush, krameria, catclaw, smoke tree, aplopappus, sacred datura, ocotillo, mammillaria cactus, scorpion weed, desert willow, and possibly some mesquite. The total vegetation cover in the washes averages about 10 percent.

Rising ground water elevation due to long-term seepage since the construction of the Coachella Canal in 1948 has resulted in the creation of dense stands of riparian vegetation in low-lying areas adjacent to both sides of the canal and along washes and areas of low topography between the Coachella and East Highline Canals, especially in the northerly 15 miles of the first 49 miles of the canal.

^{1/} Report of Vegetation Inventory prepared by U.S. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada, Yuma Projects Office, Yuma, Arizona, for Fish and Wildlife Ad Hoc Committee for the Coachella Canal Unit, November 1974.



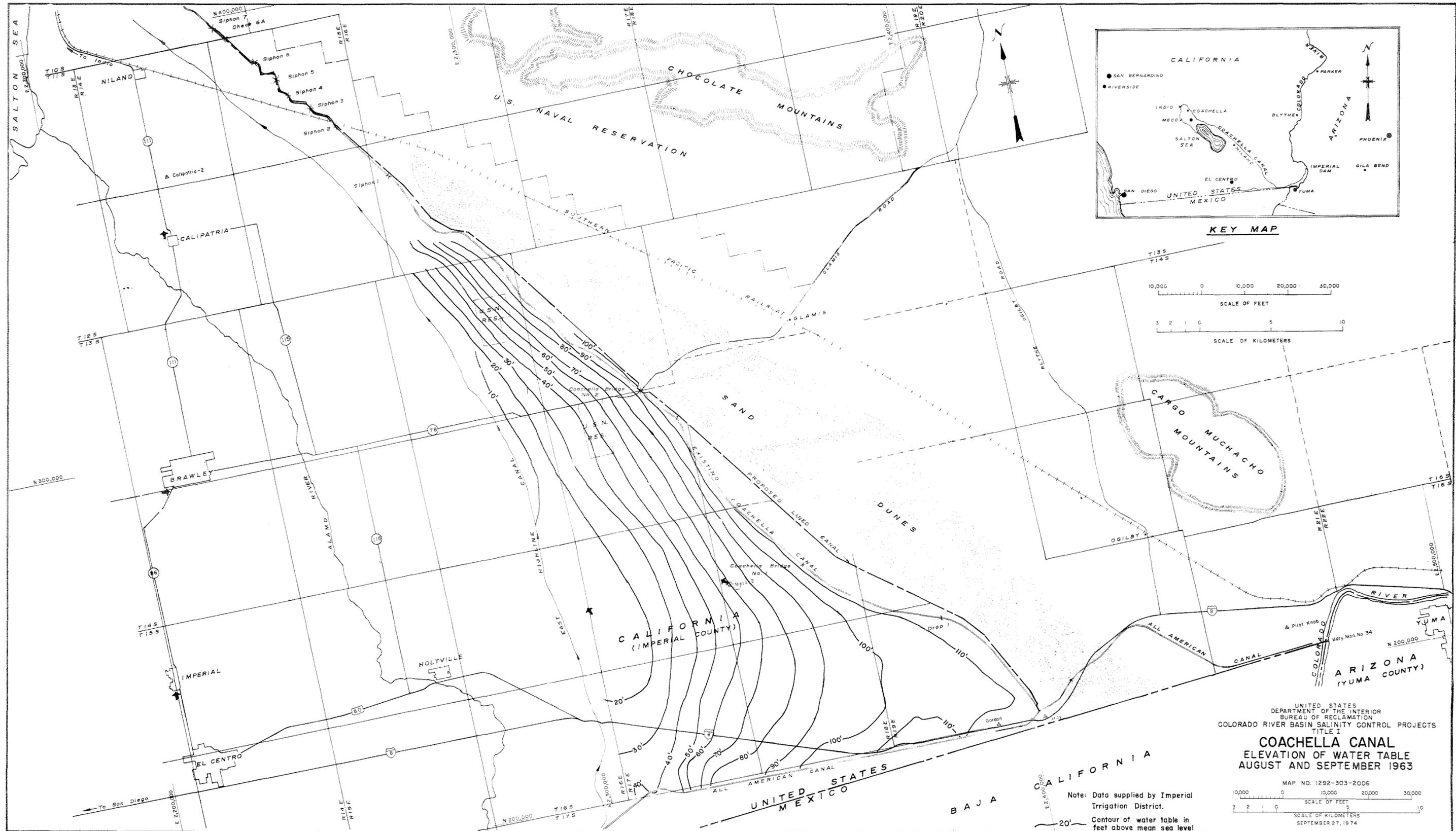
KEY MAP



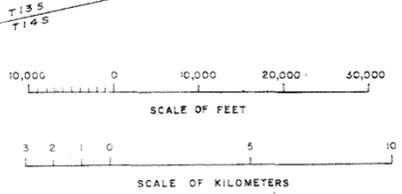
UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
 TITLE I
COACHELLA CANAL
 ELEVATION OF WATER TABLE
 MAY, JUNE - 1942

MAP NO. 1292-303-2002
 SCALE OF FEET 0 10,000 20,000 30,000
 SCALE OF KILOMETERS 0 5 10
 SEPTEMBER 27, 1944

NOTE:
 -20' Contour of water table in feet above mean sea level!



KEY MAP



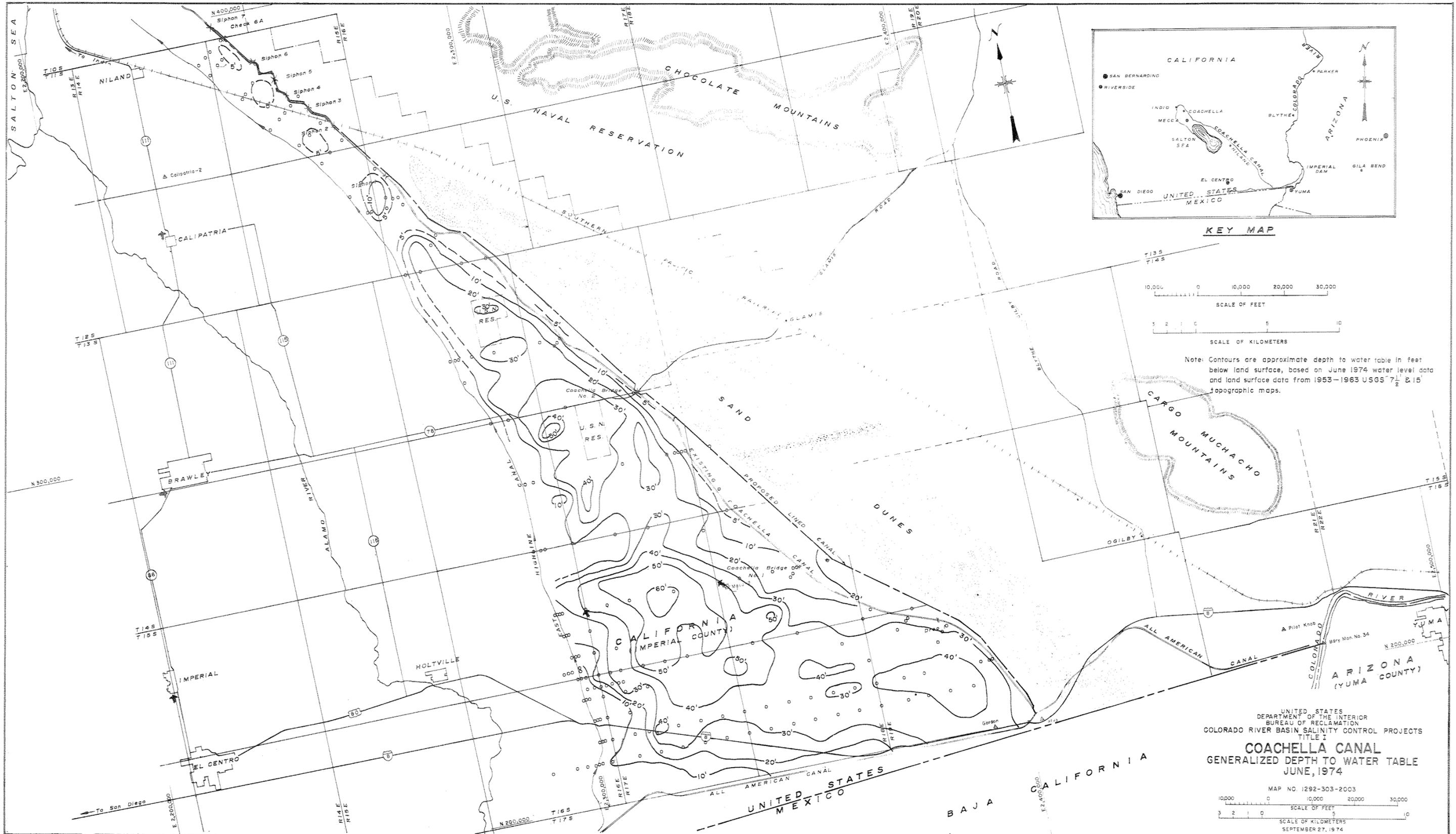
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
TITLE I

COACHELLA CANAL
ELEVATION OF WATER TABLE
AUGUST AND SEPTEMBER 1963

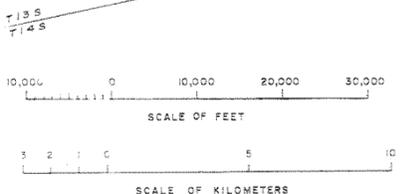
MAP NO. 1292-303-2006
SCALE OF FEET
SCALE OF KILOMETERS
SEPTEMBER 27, 1974

Note: Data supplied by Imperial Irrigation District.

20' Contour of water table in feet above mean sea level



KEY MAP



Note: Contours are approximate depth to water table in feet below land surface, based on June 1974 water level data and land surface data from 1953-1963 USGS 7 1/2' & 15' topographic maps.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
TITLE I
COACHELLA CANAL
GENERALIZED DEPTH TO WATER TABLE
JUNE, 1974

MAP NO. 1292-303-2003

SCALE OF FEET: 0, 10,000, 20,000, 30,000
SCALE OF KILOMETERS: 0, 5, 10

SEPTEMBER 27, 1974

TABLE 5

VEGETATION TYPES AND LAND USES IN VICINITY OF COACHELLA CANAL

	<u>Acres</u>	<u>% of Total</u>
Desertshrub	80,510	93.1
Riparian Areas	4,092	4.7
Citrus	500	0.6
Fallow Land	1,231	1.4
Private Fish Ponds	132	0.2
<hr/>		
Total Areas Sampled	85,465	100.0
<hr/> <hr/>		

Photographs P998-300-01016 and P998-300-01017 show several small seep areas adjacent to the canal. It is estimated from planimeter values that there is a total of 4,092 acres of riparian habitat which have been created by rising ground-water elevations. The breakdown of total riparian acreages is shown in Table 6. The 36 acres of open water are small ponds of various depths and sizes which contain some submergent and emergent vegetation. The 496 acres of hydrophytes or marsh vegetation is comprised mainly of cattails with some pampas grass, common reed, sedges, and rushes. The 3,560 acres of mixed phreatophytes is dominated by saltcedar, arrowweed, and screwbean mesquite. Other important phreatophytes in localized areas are Goodding willow, coyote willow, cottonwood, honey mesquite, and seepwillow.

The existing riparian areas are of a heterogeneous nature. There are many different mixtures of phreatophytic and hydrophytic plant growths. Some areas are more valuable as wildlife habitat than others. The areas which are more heterogeneous in plant composition, more open, and/or have had sustained fire burns within the last several years appear to be more suited for a larger variety of wildlife than those with more dense growths.

There are approximately 500 acres of citrus in the study area at the present time. All of the citrus in the area is watered by trickle irrigation. Some of the citrus has existed for several years while some has existed for only 1 year. In the area just downstream of Siphon No. 1, a landowner is currently clearing about 500 acres of desertshrub and desert wash vegetation in order to plant more citrus.

There are approximately 1,231 acres of fallow lands in the study area. Fallow lands as described herein are lands which have been cleared of native vegetation and then left to revegetate themselves. Most of the fallow lands in the study were presumably cleared for agricultural purposes. Some of the low-lying lands which were previously cleared are now covered with dense riparian growths and are not included as fallow lands in this report. The fallow lands have revegetated with various mixtures of bursage, coldenia, desert croton, dalea, saltbushes, seepweed, and other desert plants, including numerous annuals. Creosote, saltbush, and ephedra have not revegetated to any significant degree.

Noncontinuous narrow strips of vegetation averaging about 2 to 3 feet in width grow along the entire length of each bank of the Coachella Canal just above the high water mark. In some reaches where there is considerable sloughing of the canal bank, there

is no bankline vegetation. The larger concentrations of hydrophytes and phreatophytes which occur along the bankline are controlled by periodic herbicidal spraying. Some other vegetation is removed during regular operation and maintenance activities along the canal. The bankline vegetation is not significant in the amount of acres it covers but it is significant in its distribution along the entire 49-mile reach of the canal. The bankline vegetation and submerged aquatics provide food and cover for migratory and resident waterfowl, passerines, small mammals, small reptiles and amphibians, and fishes. Bankline vegetation also is an important factor in deterring bankline erosion along the presently unlined canal. The more common plant constituents along the bankline are hydrophytes--cattail, giant reed, and bulrushes, the phreatophytes--arrowweed and saltcedar, numerous grasses, miscellaneous annuals, and the aquatic submergents in the canal.

b. Fish

Appendix E lists the fishes found in the project area and indicates those which were recently found in the Coachella Canal and some associated seepage ponds during a recent survey.^{1/} A list of additional fishes which may be expected to occur in the waters of the Colorado River was included under the general description of the environment of the project earlier in this chapter.

The number of fish per mile of the Coachella Canal is estimated to be approximately 3,000. Table 7 presents the results of electrofishing data from the fishery survey of the Coachella Canal. The data yields good species composition and good relative abundance of species in the canal. Largemouth bass were by far the most abundant species in the canal with over 60 percent of their total being young-of-the-year, which indicates good reproductive success. It is estimated from the fishery inventory that the largemouth bass comprises 53 percent of the total numbers of game fish in the canal. Channel catfish are next at 33 percent, flathead catfish are 7 percent, and other gamefish, including bluegill, yellow bullhead, crappie, green sunfish, redear sunfish, and warmouth are 7 percent in the aggregate.

Largemouth bass and smaller sunfishes prefer the vegetated shoreline of the canal for their habitat. The deeper center of the canal is preferred by the channel catfish.

^{1/} Inventory of Fish and Wildlife Resources, Recreational Consumptive Use, and Habitat in and Adjacent to the Upper 49 Miles and Pondered Areas of the Coachella Canal, prepared for the U.S. Bureau of Reclamation by California Department of Fish and Game, November 15, 1974.

Table 6

Total Riparian Acreages
 Along the First 49-Mile Reach of the Coachella Canal

<u>Type of Riparian Area</u>	<u>Number of Acres^{1/}</u>	<u>% of Total</u>
Open Water	36	0.9%
Hydrophytes (Marsh)	496	12.1%
Mixed Phreatophytes	3,560	87.0%
Total Riparian	4,092	100.0%

^{1/} Planimetered acreages are subject to a plus or minus 10% planimeter error.

Table 7

Coachella Canal Electroshocking
10 One-half Mile Study Sections

Study Section	Shocking Time (minutes)	Species Collected						
		Largemouth Bass	Sunfish	Channel Catfish	Flathead Catfish	Carp	Yellow Bullhead	Bull Frogs
1	n/a ^{1/}	52 total YOY ^{2/} n/a	4	1	-	4	1	3
2	28.23	57 total YOY n/a	2	1	4	5	3	-
3	28.50	57 total YOY n/a	2	2	2	2	-	2
4	18.48	38 total 36 YOY	-	-	2	13	-	10
5	22.35	58 total 44 YOY	-	-	2	5	-	17
6	21.18	48 total 39 YOY	-	-	5	10	-	14
7	23.23	54 total 50 YOY	-	1	1	7	-	5
8	32.26	53 total 49 YOY	-	1	4	3	-	4
9	33.63	73 total 65 YOY	1	2	2	8	-	6
10	24.95	67 total 59 YOY	1	3	6	21	-	2
	Total	557 total	10	11	28	78	4	63
	Average per section	55.7	1.0	1.1	2.8	7.8	.4	6.3

^{1/} n/a - Not available^{2/} YOY - Young-of-the-year



A view of the unlined section of the Coachella Canal showing vegetative growth in seepage areas.
California--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation
Photo No. P998-300-01016 NA.



A view of the unlined section of the Coachella Canal showing vegetative growth in seepage areas. California--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01017 NA.

Some of the larger seepage ponds adjacent to the Coachella Canal support populations of largemouth bass, carp, yellow bullheads, and bluegill. Mosquito fish are found in almost all the seepage ponds and free-flowing seepage streams. Yellow bullheads are also found in the seepage stream in the wash below canal Siphon No. 1.

c. Wildlife

There are in the near vicinity of the project area, 132 acres of privately owned and operated fish ponds. Water for the ponds is pumped from the East Highline Canal. In addition to providing habitat for raising fish, the ponds are providing habitat for a variety of waterfowl, wading birds, and shore birds.

The discussion of wildlife in the general project area is applicable to the Coachella Canal area as are the lists of wildlife species in Appendix E.

Table 8 presents rodent trapping data and minimum densities of each species in the vegetative communities along the Coachella Canal as presented in the wildlife inventory report previously mentioned. Kangaroo rats are the most numerous rodents in the desertshrub or creosote-scrub habitat type. The cactus mouse, desert pocket mouse, and white-throated woodrat are the most numerous in the mixed phreatophyte habitat. In the marsh habitat, Merriam's kangaroo rat, the desert pocket mouse, and the deer mouse are the most numerous rodents.

Coyote, bobcat, kit fox, grayfox, badger, striped skunk, and spotted skunk are known to be present in the study area. Observations and density estimates of these mammals resulting from spotlight surveys in the different habitat types along the Coachella Canal and in other areas of similar habitat are presented in Table 9. Black-tailed jackrabbits and Audubon cottontail are the two upland game mammals present within the study area. Highest densities for these species are found within riparian and agricultural areas. Cottontails in good riparian habitat may occur in densities of from 10 to 100 per 100 acres.

The Coachella Canal area lies within the range of the mule deer, commonly referred to as the burro deer, in southern California. Burro deer are generally found within the area in the creosote-scrub and riparian communities. While burro deer do not migrate, they do shift locations of considerable distance across the desert. During dry seasons

the animals are forced to concentrate near sources of available water. The canal area does not support a sizable deer population. Less than one deer per square mile occurs in the creosote-scrub community and less than 6 per square mile in the riparian areas.

Occasionally there are reports from individuals who have observed desert bighorn sheep watering along the Coachella Canal; however, these animals generally prefer the more rugged slopes of the nearby Chocolate Mountains Range and therefore, are not considered to be dependent upon the habitat within the project area.

A limited number of feral burro occur in the agricultural and riparian lands found in the northern portion of the project area. While population densities are low, less than 1 per mile, the California Department of Fish and Game does receive 3 or 4 complaints each year of burro depredations on croplands in the Niland area.

Of the 236 species of birds known to occur within the Coachella Canal area (Appendix E), 119 species were observed during the wildlife inventory. Table 10 provides estimated bird densities by habitat type. Bird densities are fairly high, especially in the riparian communities. The mixed phreatophyte habitat type contains the most birds. Present in high numbers are swallows, verdins, warblers, blackbirds, orioles, and meadow larks. Up to 15 quail per acre of land were observed. Best quail densities occur in the riparian type where there are from 10 to 50 quail per 100 acres.

Imperial County is noted for its dove hunting. The County is consistently first in the State in hunter take of mourning doves. Best dove concentrations are in the agricultural and riparian areas where hunting season populations exceed 100 doves per 100 acres. It is estimated that along 66 miles of the Coachella Canal there are 5,280 acres of mourning dove nesting habitat. The actual nesting habitat in the project area would be less than 3,560 acres (total acreage of mixed phreatophytic growth attributable to seepage from the canal). Hunttable but smaller concentrations of white-winged dove also occur in the area.

The endangered Yuma clapper rail and the threatened California black rail are known to utilize certain marsh habitat within the project area along the Coachella Canal for nesting purposes. Quantitative data for these species in this area are not available; however, the black rail appears to be the most abundant of the two.

TABLE 8

COACHELLA CANAL INVENTORY
RESULTS OF RODENT TRAPPING
PROGRAM

Species Trapped	Vegetative Community		Marsh
	Creosote-Scrub	Mixed Phreatophytes	
Merriam's kangaroo rat <u>Dipodomys merriami</u>	32* (959)**	6 (218)	11 (1058)
Desert kangaroo rat <u>Dipodomys deserti</u>	18 (524)	0	0
White-throated woodrat <u>Neotoma albigula</u>	1 (29)	18 (655)	1 (96)
Hispid cotton rat <u>Sigmodon hispidus</u>	0	3 (109)	2 (192)
Desert pocket mouse <u>Perognathus penicillatus</u>	2 (58)	16 (582)	11 (1058)
Spiny pocket mouse <u>Perognathus spinatus</u>	2 (58)	1 (73)	0
Cactus mouse <u>Peromyscus eremicus</u>	1 (29)	25 (909)	9 (865)
Deer mouse <u>Peromyscus maniculatus</u>	0	1 (36)	11 (1058)
House mouse <u>Mus musculus</u>	0	1 (36)	0
Round-tailed ground squirrel <u>Spermophilus tereticaudus</u>	1 (29)	0	0

* Total number trapped

** Minimum density per 100 acres

TABLE 9
 COACHELLA CANAL INVENTORY
 SPOTLIGHT SURVEYS
 BY HABITAT TYPE

ANIMAL SPECIES	CREOSOTE SCRUB*		MIXED PHREATOPHYTES**		MARSH***	
	Number Seen	Number 100 Acres	Number Seen	Number 100 Acres	Number Seen	Number 100 Acres
<u>Canis latrans</u> Coyote	3	0.4	8	3.6	0	0
<u>Urocyon cinereoargenteus</u> Gray Fox	2	0.3	3	1.4	0	0
<u>Vulpes macrotis</u> Kit fox	6	0.8	1	0.4	0	0
<u>Procyon lotor</u> Raccoon	0	0	1	0.4	0	0
<u>Lynx rufus</u> Bobcat	1	0.1	0	0	0	0
<u>Felis domestica</u> Feral house cat	0	0	3	1.4	0	0
<u>Mephitis mephitis</u> Striped skunk	0	0	3	1.4	0	0
<u>Sylvilagus auduboni</u> Desert cottontail	14	1.9	58	46.1	10	13.8
<u>Lepus californicus</u> Black-tailed jackrabbit	37	5.2	9	4.1	0	0

TABLE 9 (Continued)

ANIMAL SPECIES	CREOSOTE SCRUB*		MIXED PHREATOPHYTES**		MARSH***	
	Number Seen	Number 100 Acres	Number Seen	Number 100 Acres	Number Seen	Number 100 Acres
<u>Dipodomys sp.</u> Kangaroo rat	569	80.1	2	0.9	0	0
<u>Ondatra zibethica</u> Muskrat	0	0	0	0	2	27.5
<u>Neotoma albigula</u> White-throated wood rat	2	0.3	2	0.9	0	0
Unclassified Bats	9	1.3	7	3.2	0	0
Unclassified Carnivores	4	0.5	2	0.9	0	0
Unclassified Rodents	8	1.1	5	2.2	0	0

* 63 Transects - 710.98 Acres

** 27 Transects - 222.38 Acres

*** 3 Transects - 7.26 Acres

TABLE 10

COACHELLA CANAL INVENTORY
 BIRD DENSITIES BY HABITAT TYPE
 (NUMBERS OF BIRDS PER 100 ACRE)

GENERAL SPECIES TYPE	HABITAT TYPE		
	CREOSOTE SCRUB	MIXED PHREATOPHYTES	MARSH
Herons, Egrets, Bitterns	-	30	440
Raptors	3	200	20
Quail	-	1470	60
Rails	-	20	360
Shorebirds	-	190	620
Doves	6	650	110
Roadrunners	-	120	-
Hummingbirds	-	120	20
Kingfishers	-	60	10
Woodpeckers	-	120	50
Flycatchers	11	900	30
Larks	-	40	-
Swallows	-	3400	60
Verdins	39	1500	80
Wrens	25	870	180
Mockingbirds & Thrashers	16	260	10
Thrushes	3	20	10
Pipits	-	-	40
Gnatcatchers & Kinglets	46	720	50
Shrikes	-	180	50
Vireos	-	130	20
Warblers	11	1650	260
Blackbirds, Orioles, Meadowlarks	3	4000	1880
Tanagers	-	40	10
Finches & Sparrows	244	2520	300
Unidentified Passerines	-	410	60

Imperial County, including much of the aquatic habitat occurring along the Coachella Canal and East Highline Canal, is considered by the California Department of Fish and Game to be important wintering habitat for waterfowl of the Pacific Flyway. However, the first 49-mile reach of the Coachella Canal and its 36 acres of associated seepage ponds are only a very small portion of the total aquatic habitat available for waterfowl in the Imperial Valley agricultural area, state wildlife management areas and the national wildlife refuge areas near the Salton Sea. The most numerous water oriented species which does utilize the canal and ponds is the American coot. Grebes have also been observed in the waters of the canal, as well as cormorants. Duck species observed on the canal are mainly the green-winged and cinnamon teal.

A list of the herpetofauna (reptiles and amphibians) found in the area along the Coachella Canal and the respective habitat type in which they occur is presented in Table 11.

Density data for these species is generally not available. No turtles were observed during the inventory and none were trapped. Bullfrogs and other amphibians were found in the marsh wetlands, ponds and free-flowing streams in the study area. Sixty-three bullfrogs were observed along the Coachella Canal during the electrofishing sampling (see Table 7). This averages to 6.3 frogs per one-half mile section of canal. The seepage ponds adjacent to the canal were found to be important areas for bullfrog reproduction.

3. Cultural Environment

a. Land Use

Of the 1,020 acres required for additional rights-of-way for the realignment of the Coachella Canal, 920 acres are Federally withdrawn and 100 acres are patented land. The majority of the withdrawn Federal land consists of desertshrub habitat. Of the 100 acres of patented land, there are approximately 36 acres of cultivated citrus with the remaining 64 acres primarily desertshrub habitat.

There are approximately 500 acres of cultivated citrus in the project area which is presently being watered via trickle irrigation practices with Coachella Canal water. Some of the citrus has existed for several years while some has existed for only one year. In the area just downstream from Siphon No. 1, a landowner is currently clearing about 500 acres of desertshrub and desert wash vegetation in order to plant more citrus.

The 3,800 acres of undeveloped private lands on the Imperial East Mesa which will be acquired by the project are primarily desertshrub habitat.

b. Recreation

The recreational activities discussed under the general project area are applicable to the project area along the first 49 miles of the Coachella Canal. A recent recreational inventory^{1/} of the area indicates that off road vehicle (ORV) use in the area is by far the most popular recreational activity along this reach of the canal. This is due to the close proximity of the sand hills and washes along the east side of the canal. The majority of ORV use is associated with the sand hills which lie just east of the canal. Use of the canal water and access roads is all trespass and incidental to the primary use of the sand hills.

Based on the Bureau of Land Management counts for October 1970 to May 1972, there is a cyclical pattern--undoubtedly correlated with temperatures and holidays--in the recreational use of the area. The area begins to be heavily visited with the month of October and the count increases to a peak during the Thanksgiving weekend. After this holiday there is a drop in December, but beginning with the New Year's weekend there is again another increase which generally peaks in February with either Lincoln's or Washington's birthday. Following February there is generally a drop in count, but it again climbs in May, reaching another peak during Memorial Day weekend. Despite widespread use of trailer and motor homes with air conditioning, the summer months do not attract many people to the area or to the desert in general.

The volume of ORV recreationists using the study area fluctuated between 100 in August 1971 and 4,080 for the month of April 1971. The count for Thanksgiving, 1970, a period of 5 days, was 8,800 vehicles, or a total of 35,200 people and 61,600 12-hour visitor days (total number of people times 1-3/4).

The 3-day weekend associated with Veterans Day, the national holiday on October 27, 1974, produced a volume of about 2,330 people in the entire study area. Some of these people were winter residents expecting to stay for the season--until May or June 1975.

^{1/} Preliminary Inventory of Recreational Usage in and Adjacent to the Upper 49 miles of the Coachella Canal, including Adjacent Seep Areas, prepared for the U.S. Bureau of Reclamation by R. Ayala and J. E. Harmon, San Diego State University, Calexico, California, November 1974.

TABLE 11

COACHELLA CANAL INVENTORY
VEGETATIVE ASSOCIATIONS

of

STUDY AREA HERPETOFAUNA

	Creosote scrub	Mixed Phreatophytes	Marsh
<u>Phrynosoma m'calli</u> Flat-tailed horned lizard	+		
<u>Phrynosoma platyrhinos calidiarum</u> Southern desert horned lizard	+		
<u>Callisaurus draconoides</u> Zebra-tiled lizard	*		
<u>Uma notata notata</u> Colorado desert fringe-toed lizard	+		
<u>Uta stansburiana stejnegeri</u> Desert side-blotched lizard	*	*	
<u>Urosaurus graciosus graciosus</u> Western brush lizard	+	*	
<u>Sceloporus magister magister</u> Yellow backed spiny lizard	*	+	
<u>Cnemidophorus tigris tigris</u> Great Basin whiptail lizard	*		
<u>Coleonyx variegatus</u> Desert banded gecko	*		
<u>Dipsosaurus dorsalis</u> Desert iguana	*		
<u>Crotaphytus wislizenii wislizenii</u> Long-nosed leopard lizard	*		
<u>Urosaurus ornatus</u> Tree lizard		+	+
<u>Gopherus agassizi</u> Desert tortoise	*		
<u>Trionyx spiniferus</u> Spiny softshell turtle			+
<u>Leptotyphlops humilis</u> Western blind snake	+	+	
<u>Lichanura trivirgata gracia</u> Desert rosy boa		+	+
<u>Phyllorhynchus decurtatus</u> Western leaf-nosed snake	+		
<u>Masticophis flagellum piceus</u> Red racer	*	+	
<u>Salvador hexalepis hexalepis</u> Desert patch-nosed snake	+		

TABLE 11 (Continued)

	Creosote scrub	Mixed Phreatophytes	Marsh
<u>Pituophis melanoleucus affinis</u> Sonora gopher snake	+	+	+
<u>Arizona elegans eburnata</u> Desert glossy snake	+		
<u>Lampropeltis getulus</u> Common kingsnake	+	+	+
<u>Rhinocheilus lecontei lecontei</u> Western long-nosed snake	+		
<u>Thamnophis marcianus</u> Checkered garter snake		+	+
<u>Sonora semiannulata</u> Western ground snake		+	+
<u>Chionactis occipitalis</u> Colorado Desert shovel-nosed snake	*		
<u>Hypsiglena torquata</u> Desert night snake	+	+	
<u>Trimorphodon lambda</u> Sonora lyre snake	+	+	
<u>Crotalus atrox</u> Western diamondback rattlesnake	+	+	+
<u>Crotalus cerastes laterorepens</u> Mohave Desert sidewinder	*		
<u>Crotalus scutulatus</u> Mojave rattlesnake	+		
<u>Bufo woodhousei</u> Woodhouse's toad		+	+
<u>Bufo cognatus</u> Great Plains toad		+	+
<u>Scaphiopus couchi</u> Couch's spadefoot toad	+	+	+
<u>Rana catesbeiana</u> Bullfrog			+
<u>Bufo punctatus</u> Red-spotted toad			+
<u>Rana pipiens</u> Leopard frog			+

* Observed locations during study period

+ Based on information from Dr. Mayhew, University of California, Riverside

The second Veterans Day weekend, celebrated by the State of California on November 11, made it possible for some people to come to the area during that weekend, but the numbers were lower than the national holiday 2 weeks before. The estimated population using the area over the weekend was 1,800 people.

Although the 1974 Thanksgiving weekend was not sampled in the recreational inventory, it was projected that the study area would have between 50,000 to 80,000 people. The California Off Road Vehicle Association, Southern Division, was having its yearly meeting at Glamis during the Thanksgiving weekend, and it is possible that 20,000 people were assembled there alone.

The pattern of recreational use concentration in the study area since 1973 is about the same as that which existed before. The area associated with the California Highway 78 bridge on the Coachella Canal and the nearby Gecko and Osborne Parks in the sand hills to the east is the most intensively used, mostly by dune buggies and motorcycles. The area south of Highway 78 to the turnout of the canal is less used by occasional fishermen, motorcycles, and some dune buggies. The area from Siphon No. 1 to Siphon No. 7 is used by retired semipermanent settlers (especially on the concrete slabs of the abandoned Naval Base just north of Siphon No. 7), some campers, street bikes, and a few fishermen. To the east of the canal in the washes of the Chocolate Mountains may be found motorcycles and four-wheel drive vehicles. Results from the recreational inventory and interviews with outdoor recreationist groups and individuals indicate that, with the exception of occasional fishing in the canal, the area under study is being used almost exclusively by devotees of vehicular recreation. Indications are such that nonconsumptive recreational activities as bird-watching, photography, painting, hiking, contemplation, and quiet family picnics are very low in number. The following listing enumerates the respective recreational activities observed during the recreational inventory from September 13 to November 10, 1974:

Location	Sand (ORV) Recreation	Swimming	Fishing	Hunting	Hiking	Nature Study*	Total
Area near turnout of canal and Interstate 8	16	0	6	0	0	0	22
Area near Highway 78 Bridge	3,276	184	16	0	0	0	3,476
Area of Mammoth Wash and canal siphons	1,412	22	79	10	0	1	1,524
Total	4,704 (93.67%)	206 (4.10%)	101 (2.01%)	10 (0.20%)	0	1 (0.02%)	5,022 (100%)

*Includes birdwatching, casual walking, rockhounding, etc.

NOTE: This listing is a summary of five separate enumerations.

The California Department of Fish and Game estimates that during the hunting years 1972-73, 50,000 man-days were expended in pursuit of game animals in the inventory area from Interstate 8 on the south to Siphon No. 7 on the north and between the East Highline Canal on the west and the sand hills and washes on the east (an area of approximately 184,454 acres containing about 178,560 acres of creosote-scrub vegetation, 532 acres of marsh and open ponded water, 3,560 acres of mixed phreatophytes, and about 1,766 acres of agricultural lands). The most popular game animal species hunted was dove, with an estimated 36,170 man-days of hunting. Second was quail, with 11,350 man-days of hunting, cottontail rabbits and jackrabbits followed respectively with 810 and 770 man-days of hunting. Best dove, quail and rabbit hunting was in the agricultural and riparian habitat types. Hunting of coyotes, bobcats and other predators accounted for about 400, waterfowl for 250, and deer for about 200 man-days of hunting annually.

The California Department of Fish and Game estimates the average total angler use expended on the first 49 miles of the Coachella Canal to be 6,100 angler use days per year, based on a 4-hour angler day. This total use figure was projected from data extracted from California Department of Fish and Game creel census completed on other Imperial Irrigation District waters.

All fishing, hunting, off road vehicular use, and other activities engaged in within the Coachella Canal rights-of-way are considered trespass by the Coachella Valley County Water District.

c. Archeological and Historical

Although there are no known archeological sites listed within the proposed canal alignment, it does lie within a general area of high potential for archeological resources. The State Liaison Officer for Historic Preservation has been contacted concerning archeological and historical sites.

Working through the National Park Service, Reclamation contracted for archeological studies along the Coachella Canal alignment. Two surface sites were located that required mapping and collecting, which was completed in January 1975. Another site which may be worthy of consideration for the National Register was located some distance from the canal alignment. This site is not in the canal rights-of-way and will not be affected by the project. Information and recommendations for the site were provided to the National Park Service for further consideration. Although no definite cultural or

temporal affiliations have been established, the above-mentioned sites appear to be temporary campsites used by Yuman speaking peoples within relatively recent times. Archeological clearance for construction on the first 49 miles of the Coachella Canal was received by letter from the National Park Service dated April 11, 1975.

According to the current National Register of Historic Places, there are no historic sites located within the project area in this part of the Imperial Valley. The January 1972 National Registry of National Landmarks^{1/} lists the sand hills of Imperial County, California, as a natural landmark. Located approximately 15 miles west of Yuma, Arizona, these hills are over 40 miles long and several miles wide and run parallel to the Coachella Canal several miles to the east of the alignment.

4. Environmental Quality

Water in the Coachella Canal is diverted from the Colorado River at Imperial Dam via the All-American Canal. The salinity levels of the diversions are approximately the same as those at Imperial Dam, or in the range of 850 p/m TDS; although a slight increase occurs as a result of evaporation and consumptive use by phreatophytes as the water passes through the canal.

Water qualities taken in ponds near the canal were fresh and indicate rapid exchange of water in the steep ground-water gradient area in the northern one-fourth to one-third of the project area. There are only a few small ponds near the canal along the southern half of the first 49 miles of the canal. Ponds near the junction of the All-American and East Highline Canals are saline and lie (about 10 miles west of the Coachella Canal) in a low ground-water gradient area where movement is very slow. Ground-water quality appears to range from about 700 to 2,200 p/m TDS in the upper several hundred feet of the saturated sediments although very shallow ground water in some areas near the East Highline Canal may exceed 7,000 p/m TDS.

1/ Memorandum of May 28, 1974, to the Commissioner, Bureau of Reclamation from the National Park Service, Washington, D.C.

The following tabulation lists sampling from deep wells that are believed to be representative:

<u>Location</u>	<u>Name</u>	<u>Depth Sampled</u>	<u>Date Sampled</u>	<u>P/M</u> ^{1/}
Sec. 23, T11S, R15E	--	25-150	6/13/63	2,190
Sec. 36, T15S, R16E	--	360-430	7/31/61	787
Sec. 15, T15S, R18E	LCRP-11	309-894	1/14/64	1,960
Sec. 32, T16S, R18E	--	140-630	6/30/64	874
Sec. 11, T16S, R19E	LCRP-12	300-610	1/14/64	854
Sec. 23, T16S, R19E	CH-4	240	5/26/67	720
		340	6/01/67	700
		410	6/06/67	660
		465	6/07/67	660
Sec. 31, T16S, R20E	LCRP-6	340-520	1/13/64	756

^{1/} CH-4 samples taken during drilling and p/m TDS computed from electrical conductivities using 0.62 factor. All other samples are from pumped wells and are USGS chemical analysis.

D. Protective and Regulatory Ground-Water Pumping

The protective and regulatory ground-water pumping facilities are located in the Yuma area within 5 miles of the Arizona-Sonora Boundary. The Yuma Mesa boundary well field will be primarily on undeveloped mesa lands on the southern portion of Yuma Mesa and will consist of 25 wells connected by 15.3 miles of underground pipelines. The Yuma Valley boundary well field will be located primarily on or adjacent to developed agricultural lands in the southwesterly portion of Yuma Valley and will consist of 10 wells connected by 5.3 miles of underground pipeline.

1. Physical Environment

a. Topography

The main geographic features in the protective and regulatory ground-water pumping area are the Yuma Valley, Yuma Mesa,

and the Colorado River channel. The terrain of Yuma Valley is mainly that of a flat flood plain which is extensively developed for irrigation. The channel of the Colorado River follows a meandering course along the west side of the valley and about 10 to 15 feet below the surface of the plain. Photograph P998-300-01013 shows a typical section of the Colorado River flood plain in the Yuma area. Bordering the plain on the east is the Yuma Mesa which is a gently rolling elevated delta-terrace transition between the valley and the Gila Mountains to the east.

The Yuma Mesa, southeast of the city of Yuma, is a typical example of this type of topography. Photograph P998-300-01008 shows the Yuma Mesa escarpment and the relative elevation difference between the valley and the mesa.

The lands in the Yuma Valley range from about 75 feet above mean sea level at the Southerly International Boundary to about 125 feet above mean sea level near Yuma. The Yuma Mesa ranges from about 125 feet above mean sea level near San Luis, Arizona, and about 200 feet above mean sea level near Yuma, Arizona, to about a 600-foot elevation at the outwashes of the Gila Mountains on the east. The Gila Mountains reach elevations of 2,700 feet above mean sea level.

b. Geology

The upper material of Yuma Mesa consists principally of unconsolidated, fine-grained sand deposited by the Colorado River and subsequently reworked by wind in the upper few feet. Sedimentary materials underlying this surface layer occur as lenses of sand, silt, and minor amounts of clay. These materials overlie a zone of coarse gravel and cobble deposits with interbeds of sand. This zone is the major gravel aquifer in the area. Ranging to more than 200 feet in thickness, the gravel aquifer is encountered at depths varying from more than 200 feet below the mesa land surface. However, the overall ground-water reservoir extends well beyond the limits of this major gravel aquifer. The depth to ground water on the mesa is presently about 80 feet in the 5-mile zone near the International border.

The upper 10 feet or so in Yuma Valley consists of silty and clayey backwater flood deposits. These fine-grained materials are underlain by sand and silty sand down to the coarse

gravel and sand aquifer, which is encountered at depths varying from more than 150 feet. The thickness of this major aquifer underlying the valley is essentially the same as that underlying the Yuma Mesa. The average depth to ground water is presently about 15 feet in the Yuma Valley.

c. Hydrology

Surface waters in the Yuma area are comprised mainly of the Colorado River and associated backwaters and off-river connectives, irrigation canals and laterals, and agricultural drainage channels. The locations of the main canals, drains, and river channels are shown on Plate No. 4. Some physical parameters of the surface waters in the Yuma Valley are presented in Table 12. Imported surface water in the Yuma area originates from the Colorado River and is used mainly for irrigation.

On the Yuma Mesa there is no surface drainage, so the portion of the supply which is not used consumptively percolates into the ground-water reservoir. In the Yuma area, the ground-water reservoir is contained in the granular-clastic sediments deposited by the ancestral Colorado River in the upstream portion of the delta. Since the only openings in the impermeable bedrock ranges to the north and east are narrow gaps cut by the Colorado and Gila Rivers, it appears that ground-water inflows from sources outside the basin are relatively insignificant.

2. Biological Environment

a. Vegetation

On the northern portion of Yuma Mesa in the vicinity of the city of Yuma, vegetation is comprised mainly of cultivated citrus groves. There are also about 1,000 acres of citrus on the southern portion of Yuma Mesa near the International Boundary. That portion of the mesa which remains uncultivated is characterized mainly by shrub vegetation of the southern Sonoran Desert with sparse growths of creosote bush, bursage, saltbush, big galleta grass, and some jointfir. During periods of favorable moisture, the area is carpeted with low-growing forbes and grasses.

Along the western toe of the Yuma Mesa escarpment on the east side of Yuma Valley are narrow strips of mesquite thickets interspersed by growths of creosote bush, saltbush, and some arrowweed. The mesa escarpment is shown in Photograph No. P998-300-01008 NA.

TABLE 12

SOME PHYSICAL DETAILS ON WATERS OF THE YUMA VALLEY, ARIZONA,
 BASED UPON GROUND STUDIES, 1" to 2,000' AERIAL PHOTOGRAPHS, AND OTHER
 MAPS, AERIAL PHOTOGRAPHS, AND INFORMATION PROVIDED BY THE U.S. BUREAU
 OF RECLAMATION

Aquatic Habitats	Total linear miles	Average width in feet	Surface area in acres	% Total surface
Colorado River below Morelos Dam	21.5	44.9	117.0	33.7 (37.1) ^{1/}
Major canals, at mean discharges	48.0	11.2	65.2	18.8 (20.7)
Major drains, at mean discharges	77.7	10.5	99.0	28.5 (31.4)
Lateral canals and minor drains	96.0	3.6	41.9 (10.5) ^{1/}	12.1 (3.3)
Backwaters, Gadsden Lake, Hunter's Hole, and off-river connectives	----	----	23.8	6.9 (7.5)
Totals ^{2/}	----	----	346.9	100 (100)

^{1/} Small, lateral canals and drains are used sporadically, or may retain water and an aquatic and semiaquatic biota only in certain segments. On the basis of ground studies, we found about 25.5% of these laterals to be quasi-permanent and calculated from this (rounded to 25%) the values given in parentheses.

^{2/} Total 315.5 acres using the 10.5 acre value for lateral canals and minor drains.



An aerial view looking north showing the Colorado River flood plain below Morelos Dam. Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01013 NA.



View looking southeast showing irrigated valley land in the foreground and the escarpment of the Yuma Mesa rising abruptly in the background: Yuma vicinity, Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01008 NA.

Vegetation in Yuma Valley is largely comprised of irrigated crops, including wheat, alfalfa, citrus, cotton, lettuce, sorghum, melons, and grass seed.

About 40 acres of intermittent riparian and emergent vegetation grow along the drainage and irrigation channels in the valley. The drains and canals are cleaned periodically and therefore, no permanent growths of vegetation are allowed to become established in or along the drains and canals. Plant species which do occur on a temporary basis along the canals, and specifically along the drains, are Bermuda grass, bulrush, cattail, giant reed, seepwillow, Goodding willow, catclaw acacia, mesquite, arrowweed, and saltcedar. In the narrow strip which lies between the Yuma Valley levee and the West Main Canal, the predominant vegetation is a fairly dense growth of quailbrush.

Adjacent to the Colorado River below Morelos Dam there are approximately 3,190 acres of riparian vegetation types. Acreages of the major vegetation types in the Yuma Valley are presented in Table 13. The more common plant species of the riparian community along the Colorado River channel are saltcedar, arrowweed, screwbean mesquite, honey mesquite, seepwillow, Goodding willow, and quailbrush. A few scattered groves of cottonwood trees also occur in the riparian community as do limited growths of Bermuda grass, saltgrass, catclaw acacia, and tree tobacco. Narrow successive layers of hydrophytic vegetation including bulrush, cattails, and giant reed occur along sections of the riverbank and around backwaters and seepage ponds. The hydrophytic growth along the river channel is less pronounced below Morelos Dam than above due to periodic floodway maintenance clearing from the dam to the Southerly International Boundary. A typical view of the Colorado River and its associated riparian habitat and cleared floodway below Morelos Dam is shown in Photograph 998-300-01013.

b. Fish

The fish species most commonly found in the Yuma area are listed in Appendix E, along with the respective habitats in which they are found. Tables 14, 15, 16, 17, and 18 show the relative abundance of the fishes in the waters of the Yuma Valley as determined by a recent inventory.^{1/} A total of 16 fish species presently occur in the Colorado River mainstream below Morelos Dam. Six species dominate the fauna in numbers and biomass. These are the red shiner, mosquito fish, sailfin molly, Mexican molly, striped mullet, (a catadromous species

^{1/} Inventory of Aquatic Habitats and Fishes of the Yuma Valley, Arizona, prepared for USBR by W. L. Minckley, Arizona State University.

which was the only native fish species found in the river during the inventory) and tilapia. Other game species found in the river include three species of catfish, and four species of sunfish in addition to the largemouth bass.

Approximately eleven species of fish occur in the irrigation canals of Yuma Valley. The dominant fish species in the canals are the same as those in the river with the exception of striped mullet which is not currently found in the canals. Channel catfish are more abundant (and tilapia are less abundant) in the canals than in the river.

The numbers and kinds of fishes in the main drains and laterals are lower than in the Colorado River and similar to the canals. There are about 13 species in the larger drains and 11 in the laterals. The dominant species are tilapia which represent most biomass, largemouth bass which occur in large numbers, and mosquito fish and mollies which are numerically dominant. The numbers of channel catfish are significantly less abundant in the drains and laterals than in the canals.

Backwaters and ponds along the Colorado River below Morelos Dam contain approximately 17 species of fish. The fish fauna of these areas are comparable to the fauna of the river mainstream in diversity and in population of larger species; however, numbers and weights of game and food-fish species are more abundant, in general, in these waters than in the mainstream of the river. Channel catfish appear to be present in only small numbers in the backwaters and ponds. Major species are shad, mullet, the smaller sunfishes, largemouth bass, crappie, (which are not found elsewhere in the Yuma area in any substantial numbers), tilapia, mosquito fish, and mollies.

One of the largest backwater areas in the Yuma area along the river south of Morelos Dam is Hunter's Hole, a series of 5 interconnected ponds with approximately 12 surface acres of open water. These ponds appear to be part of an old river meander and are located approximately 2.5 miles southwest of Gadsden, Arizona (see Plate No. 4 for location). A recent inventory^{1/} of the fishery in Hunter's Hole indicates a considerable species diversity. Data from the report are presented in Tables 19 and 20. The tables reflect the fish composition of Hunter's Hole per two different means of sampling (electrofishing and netting, respectively). Due to the high salinity (over 3,500 p/m TDS) and turbidity of waters in Hunter's Hole, and to the selectivity of each sampling method used, one set of data cannot be considered

^{1/} Fishes of Hunter's Hole, Yuma County, Arizona, submitted to USBR in April 1974 by W. L. Minckley, Arizona State University.

TABLE 13
 YUMA VALLEY
 RIPARIAN AND NONAGRICULTURAL
 VEGETATION TYPES (ACRES) 1/

Location	Mature dense Saltcedar	Saltcedar- Arrowweed	Dense Mature Mesquite (screwbean)	Desert Mesquite (honey)	Emergents and Saltgrass	Artificial ^{2/}	Total
Main Colorado River Channel	1,360	957	243	----	70	560	3,190
Drains	----	---	---	----	30	---	30
Canals	----	---	---	----	10	---	10
Other ^{3/}	----	---	---	944	---	---	944
Total	1,360 (32%)	957 (23%)	243 (6%)	944 (23%)	110 (3%)	560 (13%)	4,174 (100%)

1/ Acreages for emergents and saltgrass types along drains and canals include all of Yuma Valley. All other acreages include only that area from Morelos Dam to the Southerly International Boundary.

2/ Areas periodically cleared for floodway maintenance

3/ Excludes mesquite type along mesa escarpment to the east

TABLE 14

FISHES OF COLORADO RIVER MAINSTREAM
 MORELOS DAM TO THE SOUTHERLY INTERNATIONAL BOUNDARY

Sampling Method	Percent Catch Per Unit Effort ^{1/} by By Numbers and Weight		Percent Catch or Observation per 1,000 sq.yds. By Numbers and Weight ^{1/}		
	Small, Mesh, 1- Bar, Standard Trap Nets	Experimental Gill Nets with Meshes from 1/2 to 1-1/2- inch Bar in 25-Foot Panels, 6 Feet Deep	1/8-inch Seines (Bar Measure), 4 & 6 Feet Deep, 4 to 16 Feet Long, with Dou- bled Lead-lines	1/4- & 1/2-inch Seines (Bar Meas- ure), 4 to 8 Feet Deep, 10 to 60 Feet Long, with Doubled Lead- lines	Visual Counts in Selected Quadrants or, in the Case of Canals, Actual Counts of Fishes in Seine-blocked Reaches during Pesticide Kill
SPECIES			<u>3/</u>	<u>3/</u>	<u>3/</u>
Threadfin shad	19.8	79.7	0.9	0.9	0.9
<u>Dorosoma petenense</u>	0.8	19.5	3.1	3.1	3.1
Red shiner	---	---	74.7	74.7	74.7
<u>Notropis lutrensis</u>	---	---	5.4	5.4	5.4
Carp	11.2	4.2	0.1	0.1	0.1
<u>Cyprinus carpio</u>	12.7	26.9	6.3	6.3	6.3
Goldfish	---	---	---	---	---
<u>Carassius auratus</u>	---	---	---	---	---
Yellow bullhead	3.4	1.1	trace	trace	trace
<u>Ictalurus natalis</u>	0.7	1.1	trace	trace	trace
Channel catfish	6.0	2.4	trace	trace	trace
<u>Ictalurus punctatus</u>	4.2	9.5	0.5	0.5	0.5

TABLE 14
(Continued)

Striped mullet	25.0	5.4	0.4	0.4	0.4
<u>Mugil cephalus</u>	29.9	25.0	38.4	38.4	38.4
Bluegill	4.3	0.8	0.1	0.1	0.1
<u>Lepomis macrochirus</u>	0.3	0.2	0.5	0.5	0.5
Redear sunfish	1.7	1.4	trace	trace	trace
<u>Lepomis microlophus</u>	trace	2.1	0.6	0.6	0.6
Green sunfish	---	0.3	trace	trace	trace
<u>Chaenobryttus cyanelus</u>	---	0.2	0.2	0.2	0.2
Warmouth	---	1.8	---	---	---
<u>Chaenobryttus gulosus</u>	---	2.1	---	---	---
Largemouth bass	1.7	0.6	trace	trace	trace
<u>Micropterus salmoides</u>	0.8	0.6	1.4	1.4	1.4
Black crappie	---	---	---	---	---
<u>Pomoxis nigromaculatus</u>	---	---	---	---	---
Tilapia	6.9	2.4	14.9	14.9	14.9
<u>Tilapia mossambica</u>	0.4	0.6	42.7	42.7	42.7
Mosquito fish	---	---	3.2	3.2	3.2
<u>Gambusia affinis</u>	---	---	0.2	0.2	0.2

TABLE 14
(Continued)

Mollies	---	---	5.7	5.7	5.7
<u>Poecilia</u> spp. ^{2/}	---	---	0.6	0.6	0.6
Flathead catfish	19.8	---	---	---	---
<u>Pilodictis olivatis</u>	49.8	---	---	---	---

1/ The numerical percentage appears above the weight percentage for each species.

2/ Poecilia mexicana was discovered in preserved collections of mollies after fieldwork was over. It was assumed that all Poecilia were the sailfin molly, P. latipinna. In preserved collections, Poecilia mexicana makes up far less than 0.01 percent of all mollies taken.

3/ Data in this column is representative of a combination of the three sampling methods listed above.

TABLE 15

FISHES OF THE COLORADO RIVER BACKWATERS AND CUT-OFF LAKES
MORELOS DAM TO THE SOUTHERLY INTERNATIONAL BOUNDARY

Sampling Method	Percent Catch Per Unit Effort by By Numbers and Weight ^{1/}		Percent Catch or Observation per 1,000 sq.yds. By Numbers and Weight ^{1/}		
	Small, Mesh, 1- Bar, Standard Trap Nets	Experimental Gill Nets with Meshes from 1/2 to 1-1/2- inch Bar in 25-Foot Panels, 6 Feet Deep	1/8-inch Seines (Bar Measure), 4 & 6 Feet Deep, 4 to 16 Feet Long, with Dou- bled Lead-lines	1/4- & 1/2-inch Seines (Bar Meas- ure), 4 to 8 Feet Deep, 10 to 60 Feet Long, with Doubled Lead- lines	Visual Counts in Selected Quadrants or, in the Case of Canals, Actual Counts of Fishes in Seine-blocked Reaches during Pesticide Kill
SPECIES			<u>3/</u>	<u>3/</u>	<u>3/</u>
Threadfin shad	---	---	10.1	10.1	10.1
<u>Dorosoma petenense</u>	---	---	12.8	12.8	12.8
Red shiner	---	---	1.3	1.3	1.3
<u>Notropis lutrensis</u>	---	---	0.1	0.1	0.1
Carp	18.9	23.8	0.4	0.4	0.4
<u>Cyprinus carpio</u>	36.5	23.9	12.8	12.8	12.8
Goldfish	---	---	trace	trace	trace
<u>Carassius auratus</u>	---	---	trace	trace	trace
Yellow bullhead	0.7	4.7	trace	trace	trace
<u>Ictalurus natalis</u>	0.6	1.6	trace	trace	trace
Channel catfish	---	1.5	---	---	---
<u>Ictalurus punctatus</u>	---	0.4	---	---	---

TABLE 15
(Continued)

Striped mullet	19.6	63.4	0.8	0.8	0.8
<u>Mugil cephalus</u>	42.2	72.3	23.7	23.7	23.7
Bluegill	7.4	1.2	1.5	1.5	1.5
<u>Lepomis macrochirus</u>	0.8	0.1	2.0	2.0	2.0
Redear sunfish	3.4	0.1	trace	trace	trace
<u>Lepomis microlophus</u>	0.6	0.1	0.1	0.1	0.1
Green sunfish	---	0.4	trace	trace	trace
<u>Chaenobryttus cyanelus</u>	---	trace	0.3	0.3	0.3
Warmouth	---	0.2	---	---	---
<u>Chaenobryttus gulosus</u>	---	trace	---	---	---
Largemouth bass	7.4	2.3	0.5	0.5	0.5
<u>Micropterus salmoides</u>	7.9	1.2	6.9	6.9	6.9
Black crappie	6.1	---	0.2	0.2	0.2
<u>Pomoxis nigromaculatus</u>	2.0	---	1.0	1.0	1.0
Tilapia	36.5	2.3	10.3	10.3	10.3
<u>Tilapia mossambica</u>	9.5	0.3	37.5	37.5	37.5
Mosquito fish	---	---	31.0	31.0	31.0
<u>Gambusia affinis</u>	---	---	0.5	0.5	0.5

TABLE 15
(Continued)

Mollies	---	---	43.5	43.5	43.5
<u>Poecilia</u> spp. ^{2/}	---	---	2.1	2.1	2.1
Flathead catfish	---	---	---	---	---
<u>Pilodictis olivatis</u>	---	---	---	---	---

1/ The numerical percentage appears above the weight percentage for each species.

2/ Poecilia mexicana was discovered in preserved collections of mollies after fieldwork was over. It was assumed that all Poecilia were the sailfin molly, P. latipinna. In preserved collections, Poecilia mexicana makes up far less than 0.01 percent of all mollies taken.

3/ Data in this column is representative of a combination of the three sampling methods listed above.

TABLE 16

FISHES OF THE YUMA VALLEY CANALS

Sampling Method	Percent Catch Per Unit Effort by By Numbers and Weight ^{1/}		Percent Catch or Observation per 1,000 sq.yds. By Numbers and Weight ^{1/}		
	Small, Mesh, 1- Bar, Standard Trap Nets	Experimental Gill Nets with Meshes from 1/2 to 1-1/2- inch Bar in 25-Foot Panels, 6 Feet Deep	1/8-inch Seines (Bar Measure), 4 & 6 Feet Deep, 4 to 16 Feet Long, with Dou- bled Lead-lines	1/4- & 1/2-inch Seines (Bar Meas- ure), 4 to 8 Feet Deep, 10 to 60 Feet Long, with Doubled Lead- lines	Visual Counts in Selected Quadrants or, in the Case of Canals, Actual Counts of Fishes in Seine-blocked Reaches during Pesticide Kill
SPECIES			<u>3/</u>	<u>3/</u>	<u>3/</u>
Threadfin shad	METHOD NOT USED DUE TO PESTI- CIDE KILL IN CANALS		31.7	31.7	31.7
<u>Dorosoma petenense</u>			4.0	4.0	4.0
Red shiner	" "	" "	57.1	57.1	57.1
<u>Notropis lutrensis</u>	" "	" "	3.8	3.8	3.8
Carp	" "	" "	trace	trace	trace
<u>Cyprinus carpio</u>	" "	" "	7.9	7.9	7.9
Goldfish	" "	" "	---	---	---
<u>Carassius auratus</u>	" "	" "	---	---	---
Yellow bullhead	" "	" "	trace	trace	trace
<u>Ictalurus natalis</u>	" "	" "	0.1	0.1	0.1
Channel catfish	" "	" "	0.2	0.2	0.2
<u>Ictalurus punctatus</u>	" "	" "	13.5	13.5	13.5

TABLE 16
(Continued)

Striped mullet	METHOD NOT USED DUE TO PESTI- CIDE KILL IN CANALS		---	---	---
<u>Mugil cephalus</u>			---	---	---
Bluegill	" "	" "	trace	trace	trace
<u>Lepomis macrochirus</u>	" "	" "	0.1	0.1	0.1
Redear sunfish	" "	" "	---	---	---
<u>Lepomis microlophus</u>	" "	" "	---	---	---
Green sunfish	" "	" "	trace	trace	trace
<u>Chaenobryttus cyanelus</u>	" "	" "	0.1	0.1	0.1
warmouth	" "	" "	---	---	---
<u>Chaenobryttus gulosus</u>	" "	" "	---	---	---
Largemouth bass	" "	" "	trace	trace	trace
<u>Micropterus salmoides</u>	" "	" "	1.1	1.1	1.1
Black crappie	" "	" "	---	---	---
<u>Pomoxis nigromaculatus</u>	" "	" "	---	---	---
Tilapia	" "	" "	1.1	1.1	1.1
<u>Tilapia mossambica</u>	" "	" "	67.7	67.7	67.7
Mosquito fish	" "	" "	6.4	6.4	6.4
<u>Gambusia affinis</u>	" "	" "	0.4	0.4	0.4

TABLE 16
(Continued)

Mollies	METHOD NOT USED DUE TO PESTI- CIDE KILL IN CANALS		3.5	3.5	3.5
<u>Poecilia</u> spp. ^{2/}			1.5	1.5	1.5
Flathead catfish	" "	" "	---	---	---
<u>Pilodictis olivatis</u>	" "	" "	---	---	---

- 1/ The numerical percentage appears above the weight percentage for each species.
- 2/ Poecilia mexicana was discovered in preserved collections of mollies after fieldwork was over. It was assumed that all Poecilia were the sailfin molly, P. latipinna. In preserved collections, Poecilia mexicana makes up far less than 0.01 percent of all mollies taken.
- 3/ Data in this column is representative of a combination of the three sampling methods listed above.

TABLE 17

FISHES OF THE YUMA VALLEY MAIN DRAINS AND LATERALS

Sampling Method	Percent Catch Per Unit Effort by By Numbers and Weight				Percent Catch or Observation per 1,000 sq.yds. By Numbers and Weight					
	Small, Mesh, 1- Bar, Standard Trap Nets		Experimental Gill Nets with Meshes from 1/2 to 1-1/2- inch Bar in 25-Foot Panels, 6 Feet Deep		1/8-inch Seines (Bar Measure), 4 & 6 Feet Deep, 4 to 16 Feet Long, with Dou- bled Lead-lines		1/4- & 1/2-inch Seines (Bar Meas- ure), 4 to 8 Feet Deep, 10 to 60 Feet Long, with Doubled Lead- lines		Visual Counts in Selected Quadrants or, in the Case of Canals, Actual Counts of Fishes in Seine-blocked Reaches during Pesticide Kill	
SPECIES	Main Drains	Laterals	Main Drains	Laterals	Main ^{3/} Drains	Laterals ^{3/}	Main ^{3/} Drains	Laterals ^{3/}	Main ^{3/} Drains	Laterals ^{3/}
Threadfin shad	---	---	8.4	---	2.4	---	2.4	---	2.4	---
<u>Dorosoma petenense</u>	---	---	3.8	---	5.5	---	5.5	---	5.5	---
Red shiner	---	---	---	---	4.8	1.1	4.8	1.1	4.8	1.1
<u>Notropis lutrensis</u>	---	---	---	---	0.1	0.1	0.1	0.1	0.1	0.1
Carp	9.2	---	3.1	10.7	0.2	0.3	0.2	0.3	0.2	0.3
<u>Cyprinus carpio</u>	20.6	---	18.9	43.2	6.1	22.0	6.1	22.0	6.1	22.0
Goldfish	---	---	---	---	---	---	---	---	---	---
<u>Carassius auratus</u>	---	---	---	---	---	---	---	---	---	---
Yellow bullhead	---	---	0.8	32.1	---	trace	---	trace	---	trace
<u>Ictalurus natalis</u>	---	---	2.2	31.8	---	0.6	---	0.6	---	0.6
Channel catfish	---	---	7.6	---	trace	trace	trace	trace	trace	trace
<u>Ictalurus punctatus</u>	---	---	1.1	---	trace	0.1	trace	0.1	trace	0.1

TABLE 17
(Continued)

Striped mullet	---	---	---	---	---	---	---	---	---	---
<u>Mugil cephalus</u>	---	---	---	---	---	---	---	---	---	---
Bluegill	9.2	---	3.1	---	trace	trace	trace	trace	trace	trace
<u>Lepomis macrochirus</u>	4.7	---	4.9	---	0.3	0.4	0.3	0.4	0.3	0.4
Redear sunfish	---	---	---	---	trace	---	trace	---	trace	---
<u>Lepomis microlophus</u>	---	---	---	---	trace	---	trace	---	trace	---
Green sunfish	---	7.1	---	---	---	trace	---	trace	---	trace
<u>Chaenobryttus cyanelus</u>	---	6.8	---	---	---	trace	---	trace	---	trace
Warmouth	---	---	---	---	---	---	---	---	---	---
<u>Chaenobryttus gulosus</u>	---	---	---	---	---	---	---	---	---	---
Largemouth bass	5.9	---	1.5	---	trace	trace	trace	trace	trace	trace
<u>Micropterus salmoides</u>	7.4	---	5.9	---	0.7	1.3	0.7	1.3	0.7	1.3
Black crappie	---	---	---	---	---	---	---	---	---	---
<u>Pomoxis nigromaculatus</u>	---	---	---	---	---	---	---	---	---	---
Tilapia	70.6	50.0	75.6	---	19.2	5.9	19.2	5.9	19.2	5.9
<u>Tilapia mossambica</u>	20.2	18.2	63.2	---	80.1	32.7	80.1	32.7	80.1	32.7
Mosquito fish	---	---	---	---	13.4	26.0	13.4	26.0	13.4	26.0
<u>Gambusia affinis</u>	---	---	---	---	0.3	2.6	0.3	2.6	0.3	2.6

TABLE 17
(Continued)

Mollies	---	---	---	---	59.9	66.7	59.9	66.7	59.9	66.7
<u>Poecilia</u> spp. ^{2/}	---	---	---	---	6.8	40.3	6.8	40.3	6.8	40.3
Flathead catfish	5.0	---	---	---	---	---	---	---	---	---
<u>Pilodictis olivatis</u>	47.1	---	---	---	---	---	---	---	---	---

- 1/ The numerical percentage appears above the weight percentage for each species.
- 2/ Poecilia mexicana was discovered in preserved collections of mollies after fieldwork was over. It was assumed that all Poecilia were the sailfin molly, P. latipinna. In preserved collections, Poecilia mexicana makes up far less than 0.01 percent of all mollies taken.
- 3/ Data in this column is representative of a combination of the three sampling methods listed above.

TABLE 18

A COMPOSITE TABLE OF FISHES OF THE YUMA VALLEY AREA
INCLUDING THE COLORADO RIVER, YUMA VALLEY CANALS, MAIN DRAINS, AND LATERALS

Sampling Method	Percent Catch Per Unit Effort by By Numbers and Weight ^{1/}		Percent Catch or Observation per 1,000 sq.yds. By Numbers and Weight ^{1/}		
	Small, Mesh, 1- Bar, Standard Trap Nets	Experimental Gill Nets with Meshes from 1/2 to 1-1/2- inch Bar in 25-Foot Panels, 6 Feet Deep	1/8-inch Seines (Bar Measure), 4 & 6 Feet Deep, 4 to 16 Feet Long, with Dou- bled Lead-lines	1/4- & 1/2-inch Seines (Bar Meas- ure), 4 to 8 Feet Deep, 10 to 60 Feet Long, with Doubled Lead- lines	Visual Counts in Selected Quadrants or, in the Case of Canals, Actual Counts of Fishes in Seine-blocked Reaches during Pesticide Kill
SPECIES			<u>3/</u>	<u>3/</u>	<u>3/</u>
Threadfin shad	4.5	32.0	2.8	2.8	2.8
<u>Dorosoma petenense</u>	0.3	2.8	7.3	7.3	7.3
Red shiner	---	---	26.5	26.5	26.5
<u>Notropis lutrensis</u>	---	---	1.1	1.1	1.1
Carp	12.2	12.9	0.2	0.2	0.2
<u>Cyprinus carpio</u>	21.6	24.7	10.2	10.2	10.2
Goldfish	---	---	trace	trace	trace
<u>Carassius auratus</u>	---	---	trace	trace	trace
Yellow bullhead	1.0	6.8	trace	trace	trace
<u>Ictalurus natalis</u>	0.4	2.3	0.6	0.6	0.6
Channel catfish	1.4	2.0	trace	trace	trace
<u>Ictalurus punctatus</u>	1.8	1.7	2.4	2.4	2.4

TABLE 18
(Continued)

Striped mullet	11.2	27.6	0.2	0.2	0.2
<u>Mugil cephalus</u>	24.2	64.4	15.4	15.4	15.4
Bluegill	7.4	1.0	0.3	0.3	0.3
<u>Lepomis macrochirus</u>	1.8	0.2	1.0	1.0	1.0
Redear sunfish	1.4	0.6	trace	trace	trace
<u>Lepomis microlophus</u>	0.4	0.4	0.3	0.3	0.3
Green sunfish	---	1.2	trace	trace	trace
<u>Chaenobryttus cyanellus</u>	---	0.2	0.2	0.2	0.2
Warmouth	---	0.8	trace	trace	trace
<u>Chaenobryttus gulosus</u>	---	0.3	trace	trace	trace
Largemouth bass	8.1	1.3	0.1	0.1	0.1
<u>Micropterus salmoides</u>	4.8	1.2	3.4	3.4	3.4
Black crappie	1.7	---	trace	trace	trace
<u>Pomoxis nigromaculatus</u>	0.6	---	0.4	0.4	0.4
Tilapia	44.5	13.7	9.0	9.0	9.0
<u>Tilapia mossambica</u>	8.9	1.8	50.7	50.7	50.7
Mosquito fish	---	---	23.6	23.6	23.6
<u>Gambusia affinis</u>	---	---	0.6	0.6	0.6

TABLE 18
(Continued)

Mollies	---	---	37.2	37.2	37.2
<u>Poecilia</u> spp. ^{2/}	---	---	6.4	6.4	6.4
Flathead catfish	6.8	---	---	---	---
<u>Pilodictis olivatis</u>	35.4	---	---	---	---

1/ The numerical percentage appears above the weight percentage for each species.

2/ Poecilia mexicana was discovered in preserved collections of mollies after fieldwork was over. It was assumed that all Poecilia were the sailfin molly, P. latipinna. In preserved collections, Poecilia mexicana makes up far less than 0.01 percent of all mollies taken.

3/ Data in this column is representative of a combination of the three sampling methods listed above.

TABLE 19

SUMMARY OF ELECTROFISHING DATA FROM HUNTER'S HOLE OVER THE PERIOD 1968 THROUGH 1974, PROVIDED BY ARIZONA GAME AND FISH DEPARTMENT. EQUIPMENT FAILURE IN 1973 RESULTED IN NO INFORMATION BEING OBTAINED

Years	1968	1969	1970	1971	1972	1974 ^{1/}	1974	Summary
<u>Species</u>	<u>RELATIVE ABUNDANCE IN PERCENTAGE OF TOTAL CATCH</u>							
<u>Elops affinis</u> Pacific tenpounder	1	----	tr.	----	----	tr.	----	tr.
<u>Dorosoma petenense</u> Threadfin shad	28	5	20	11	5	13	12	12
<u>Cyprinus carpio + Carassius auratus</u> Carp and goldfish	13	32	20	26	34	20	8	26
<u>Chaenobryttus cyanelus</u> Green sunfish	6	----	tr. ^{3/}	tr.	tr.	----	----	1
<u>Ictalurus punctatus</u> Channel catfish	2	1	----	1	tr.	tr.	4	1
<u>Lepomis macrochirus + Lepomis microlophus</u> Bluegill and redear sunfish	15 ^{2/}	14	14	12	24	20	----	16
<u>Micropterus salmoides</u> Largemouth bass	14	32	19	16	28	22	20	23
<u>Mugil cephalus</u> Striped mullet	21	13	25	34	7	31	60	21
<u>Tilapia mossambica</u> Tilapia	2	4	----	----	----	----	----	1
<u>SAMPLE SIZE</u>	102	195	138	194	202	45	26	992

1/ The two samples for 1974 were not combined because of the vast difference between relative abundance of certain fishes in each collection.

2/ Redear sunfish comprise fewer than 10 specimens taken over the years.

3/ "tr." = a percentage of less than 0.5; all percentage values in the table are rounded to the nearest whole number.

TABLE 20

NUMBERS OF FISHES AND ESTIMATED TOTAL PERCENTAGE BIOMASS OF EACH SPECIES
 BASED ON NETTING OF HUNTER'S HOLE, YUMA COUNTY, ARIZONA, APRIL 1974

Species	Numbers Taken	Estimated Percentage Biomass
<u>Mugil cephalus</u> Striped mullet	1,000+	60
<u>Cyprinus carpio</u> Carp	400	34
<u>Dorosoma petenense</u> Threadfin shad	350	3
<u>Ictalurus natalis</u> Yellow bullhead	23	1
<u>Lepomis macrochirus</u> Bluegill	11	trace
<u>Tilapia mossambica</u> Tilapia	5	0.5
<u>Ictalurus punctatus</u> Channel catfish	5	0.5
<u>Lepomis microlophus</u> Redear sunfish	4	trace
<u>Pilodictis olivaris</u> Flathead catfish	2	1
<u>Pomoxis nigromaculatus</u> Black crappie	2	trace
Sunfish hybrids	2	"
<u>Micropterus salmoides</u> Largemouth bass	1	"
<u>Elops affinis</u> Pacific tenpounder	observed	"
<u>Carassius auratus</u> Goldfish	"	"

TABLE 20 (Continued)

<u>Species</u>	<u>Numbers Taken</u>	<u>Estimated Percentage Biomass</u>
<u>Notropis lutrensis</u> Red shiner	observed	trace
<u>Gambusia affinis</u> Mosquito fish	"	"
<u>Poecilia latipinna</u> Sailfin molly	"	"

without reference to the other. In light of this fact, the two tables indicate that in the ponds of Hunter's Hole the striped mullet, carp, largemouth bass, small sunfishes, and threadfin shad are the most abundant fish species in numbers and weight.

c. Wildlife

Wildlife communities of the Yuma area are typical of the southern Sonoran Desert. Lists of mammals, birds, and herpetofauna expected to occur in the area are included in Appendix E. Ground squirrels, rabbits, kangaroo rats, and pocket mice are the more common mammals in the desert scrub of the Yuma Mesa. Extensive dove nesting occurs in the citrus groves on the mesa. Both doves and quail inhabit the mesquite thickets along the mesa escarpment.

The dense vegetation of the riparian communities along the Colorado River and to a much lesser degree those along Yuma Valley drains and canals supports well established wildlife populations. A recent field inventory^{1/} of wildlife communities was conducted in the Yuma Valley, specifically in those riparian habitats associated with the Colorado River and the agricultural irrigation and drainage channels in the valley. Table 21 shows the estimated densities of small rodents as determined by trapping in the various vegetative types of the riverine community. The cactus mouse, Merriam's kangaroo rat and desert pocket mouse are overall the most common small rodents found throughout the different vegetative types. Table 22 lists the rodents and additional mammals observed during the inventory. Density estimates were not attainable for all species; however, general observations were noted. The abundance of tracks, scats, and sightings indicate that mammalia carnivores are quite common in the riverine community. The most common carnivore appears to be the striped skunk. Coyotes and grey foxes are also very common. Bobcats, raccoons, and badgers are present in lower numbers. Cottontail rabbits are very abundant, especially in areas where agriculture abuts heavy shrub cover. Rabbit counts at night on dirt roads parallel and adjacent to such cover indicate numbers ranging from 12-16 cottontails per mile of road. Jackrabbits are much less common and are observed in low numbers in the desert mesquite community. Round-tailed ground squirrels are common in the desert mesquite area and along levee roads. Muskrats and beaver occur in the area. Muskrats appear to be especially abundant in both the river and in vegetated portions of the main canals and drains. Beavers

^{1/} Wildlife Use and Density Inventory and Vegetation Types along the Colorado River from Morelos Dam to the Southerly International Boundary, prepared for USBR by Robert D. Ohmart, Arizona State University, November 1974.

and/or beaver signs are found at many locations along the river where emergent vegetation is fairly dense. A beaver dam of considerable size presently exists at Hunter's Hole between the two most northerly ponds.

No bats were observed in the Yuma Valley area during the wildlife inventory; however, those expected to visit the area are listed with the mammal list in Appendix E.

Due to the lack of signs and observation it appears that the mule deer, javelina, and wild burros are either absent from the area or are very uncommon.

Tables 23, 24, and 25 list the bird species observed during the wildlife inventory. In addition, Tables 14 and 15 give estimated densities of some bird species as determined from transect count. Of the 37 bird species observed during the late summer-early fall inventory, mourning doves, black-tailed gnatcatchers, verdins, and brown-headed cow birds were the most common.

Mourning doves use the tall saltcedar with intermixed mesquite habitat for nesting at the rate of approximately 4 nests per acre per year and do not use the low growing saltcedar communities to any extent; therefore, the productivity for mourning doves in the 1,360 acres of tall saltcedar type is approximately 5,440 young produced in the area along the United States side of the Colorado River below Morelos Dam. The tall saltcedar type with interlocking crowns and some mixed screwbean mesquite would have the potential of producing white-winged dove nests at the rate of 7 to 7.5 nests per acre per year which yields a total of about 9,860 nests per year for this vegetative type. The 957 acres of low growing saltcedar type along the United States side of the river has a potential for 3 white-winged nests per acre per year yielding a total of about 2,871 nests per year for the vegetative type.

Gambel's quail are abundant in the Yuma Valley and particularly along the Colorado River where there are areas of heavy cover adjacent to agriculture. Results from the wildlife inventory indicate that quail occur in densities of about 3 coveys per 100 acres with an average of 15 birds per covey; thus yielding a total of about 45 quail per 100 acres of dense riparian cover associated with agriculture.

Roadrunners are abundant throughout the area, especially along the Yuma Valley levee. They average about 18 birds per linear mile of levee road.

TABLE 21

APPROXIMATE AND RELATIVE DENSITIES OF RODENTS IN THE RIPARIAN HABITAT IN YUMA VALLEY IN
SEPTEMBER 1974 AS DETERMINED BY TRAPPING

	Relative Density and Number Per 10 Acres									
	Dense Salt Cedar		Dense Mesquite-Arrowweed		Sparse Mesquite		Desert Mesquite		Salt Grass	
	Appr.	Rel.	Appr.	Rel.	Appr.	Rel.	Appr.	Rel.	Appr.	Rel.
Cactus mouse <u>Peromyscus eremicus</u>	111.0	.64	179.7	.78	7.3	.09	14.5	.16	0	0
Deer mouse <u>Peromyscus maniculatus</u>	2.5	.01	0	0	0	0	0	0	25.3	.54
Merriam's kangaroo rat <u>Dipodomys merriami</u>	19.3	.11	0	0	25.3	.38	43.1	.45	0	0
Desert pocket mouse <u>Perognathus penicillatus</u>	25.3	.14	48.5	.22	32.9	.53	19.0	.17	0	0
House mouse <u>Mus musculus</u>	0	0	0	0	0	0	0	0	21.7	.46
Grasshopper mouse <u>Onychomys torridus</u>	4.9	.02	0	0	0	0	14.5	.16	0	0
White-throated woodrat <u>Neotoma albigula</u>	15.7	.08	0	0	0	0	5.9	.06	0	0
Number of trap-nights per vegative type	810		270		270		270		270	

TABLE 22

YUMA VALLEY WILDLIFE INVENTORY
LIST OF MAMMALS OBSERVED IN STUDY AREA

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>
Black-tailed Jackrabbit	<u>Lepus californicus</u>
Desert Cottontail	<u>Sylvilagus auduboni</u>
Round-tailed ground squirrel	<u>Spermophilus tereticaudus</u>
Desert pocket mouse	<u>Perognathus penicillatus</u>
Merriam's kangaroo rat	<u>Dipodomys merriami</u>
Beaver	<u>Castor canadensis</u>
Southern grasshopper mouse	<u>Onychomys torridua</u>
Cactus mouse	<u>Peromyscus eremicus</u>
House mouse	<u>Mus musculus</u>
Deer mouse	<u>Peromyscus maniculatus</u>
White-throated woodrat	<u>Neotoma albigula</u>
Muskrat	<u>Ondatra zibethica</u>
Coyote	<u>Canis latrans</u>
Gray fox	<u>Urocyon cinereoargenteus</u>
Raccoon	<u>Procyon lotor</u>
Badger	<u>Taxidea taxus</u>
Striped skunk	<u>Mephitis mephitis</u>
Bobcat	<u>Lynx rufus</u>

TABLE 23

ESTIMATED FALL DENSITIES OF COMMON BIRD SPECIES OBSERVED
ON SALT CEDAR TRANSECTS ALONG THE COLORADO RIVER BELOW MORELOS DAM

	<u>No. Per 100 Acres</u>
Gambel's quail <u>Colinus gambelii</u>	45
Cactus wren <u>Campylorhynchus brunneicapillus</u>	6
Black-tailed gnatcatcher <u>Polioptila melanura</u>	18
Verdin <u>Auriparus flaviceps</u>	11
Abert's towhee <u>Pipilo aberti</u>	2
Crissal thrasher <u>Toxostoma dorsale</u>	7
Mourning dove <u>Zenaida macroura</u>	15
Bewick's wren <u>Thryomanes bewickii</u>	2
Ladderbacked woodpecker <u>Dendrocopus scalaris</u>	1
Ash-throated flycatcher <u>Myiarchus cinerascens</u>	1
Swainson's hawk <u>Buteo swainsoni</u>	4
Say's phoebe <u>Sayornis saya</u>	1
Mockingbird <u>Mimus polyglottos</u>	1
Brewer's sparrow <u>Spizella breweri</u>	6

TABLE 24

ESTIMATED DENSITIES OF COMMON BIRD SPECIES OBSERVED ALONG 13.3-MILE
TRANSECT ROUTE THROUGH THE LIMITROPHE DIVISION OF THE COLORADO RIVER
(AUGUST 6, 1974)

	<u>No. per 100 Acres</u>
Burrowing owl <u>Speotyto cunicularia</u>	7
Gambel's quail <u>Colinus gambeli</u>	1
American coot <u>Fulica americana</u>	1
Green heron <u>Butorides virescens</u>	2
Ground dove <u>Columbina passerina</u>	11.8
Mourning dove <u>Zenaida macroura</u>	10
White-winged dove <u>Zenaida asiatica</u>	1
Roadrunner <u>Geococcyx californianus</u>	9
Mockingbird <u>Mimus polyglottos</u>	3
Western kingbird <u>Tyrannus verticalis</u>	1
Cactus wren <u>Campylorhynchus brunneicapillus</u>	3
Loggerhead shrike <u>Lanius ludovicianus</u>	4
Starling <u>Sturnus vulgaris</u>	1
Brown-headed cowbird <u>Molothrus ater</u>	38
House finch <u>Carpodacus mexicanus</u>	11

TABLE 25

AVIAN SPECIES OBSERVED IN THE YUMA AREA WHICH WERE
NOT OBSERVED ON THE CENSUS TRANSECTS

Marsh hawk	<u>Circus cyaneus</u>
Western flycatcher	<u>Empidonax difficilis</u>
Orange-crowned warbler	<u>Vermivora celata</u>
Olive-sided flycatcher	<u>Nuttallornis borealis</u>
Townsend's warbler	<u>Dendroica townsendi</u>
Wilson's warbler	<u>Wilsonia pusilla</u>
Long-billed curlew	<u>Numenius americanus</u>
Yuma clapper rail	<u>Rallus longirostris yumanensis</u>
Osprey	<u>Pandion haliaetus</u>

Associated with the aquatic habitat of the river, ponds, and drainage conveyance channel of the Yuma area are wading birds, which include the common egret, snowy egret, great blue heron, green heron, black-crowned night heron, and American bittern. Various species of waterfowl, including American coots and grebes, also inhabit the aquatic areas, especially in Hunter's Hole and vicinity, during the fall, winter and early spring. The most common duck species which use the area appear to be the teals. Larger duck species are less common. During a 1974 spring reconnaissance of Hunter's Hole area, flocks of American widgeons, pintails, redheads, Lesser scaups, American coots, and a flock of about 15 fulvous tree ducks were observed.

The Yuma clapper rail, an endangered species, has been reported along the Colorado River in the Yuma area. The 1973 Yuma Clapper Rail Recovery Team census on the lower Colorado River counted 8 birds responding to taped calls from Morelos Dam to the Southerly International Boundary. The 1974 survey resulted in a count of 7 to 11 responding rails for the same area. Included in the 1974 data, the Hunter's Hole area accounted for 4 birds responding on one occasion and 1 bird on another. It is estimated that there are approximately 30 to 40 acres of suitable habitat type for the Yuma clapper rail along the Colorado River from Morelos Dam to the Southerly International Boundary.

The California black rail, considered a threatened species by the United States Fish and Wildlife Service and considered rare by the California Department of Fish and Game, has not been reported as being along the Colorado River below Morelos Dam. Attempts to locate this species by recorded calls have not demonstrated their presence.

Reptiles and amphibians are common throughout the area and are represented by a variety of species. A list of herpetofauna, including those observed, collected, and expected to occur in the Yuma Valley area, is presented in Table 26 along with the expected present relative density of each species. The most important game species of amphibians is the bullfrog which is abundant especially along the river channel, around the backwater areas, and along the agricultural drains of Yuma Valley.

3. Cultural Environment

a. Land Use

The lands in the Yuma Valley east of the Yuma Valley levee, site of the proposed Yuma Valley boundary well field, are private

lands and basically consist of irrigated croplands. The lands between the levee and the Colorado River are predominantly Federal lands under Reclamation withdrawal. A portion of these Federal lands is leased for farming and irrigated with pumped ground water; the remaining portion consists of uncultivated riparian habitat. Landownership on the Yuma Mesa within 5 miles of the Arizona-Sonora International Boundary is shown on Table 1, Chapter I. The lands on the Yuma Mesa include State-owned lands with some lands under lease or certificate of purchase, Federal lands under Reclamation withdrawal and some private lands. Included are about 1,000 acres of combined leased and private lands that are presently being irrigated with pumped ground water. The predominant crop being irrigated is citrus. The proposed Yuma Mesa boundary well field site is bordered on the east by gunnery ranges of Luke Air Force Base.

Of the 36,400 acres of land within the area of the Mesa well field, the State of Arizona has some form of interest in 23,900 acres. Of these, 2,900 acres are leased for agricultural purposes and there are long-term plans for further agricultural development using ground water as a source of irrigation.

b. Recreation

Recreational use of the Yuma Mesa is very limited due to the sparse desert environment. Use of the Yuma Valley and associated riverine community for recreational purposes is much more pronounced. Upland game hunting, waterfowl hunting, fishing, and frog gigging are popular recreational activities in this area. A recent recreational survey^{1/} was performed in the Yuma Valley and results of that survey are presented in Tables 27 and 28. Table 27 shows that during the 6-week (August 19 to October 1, 1974) recreational inventory along the Arizona side of the Colorado River below Morelos Dam, 76 percent of the recreational activity was attributable to fishing, 13 percent was picnic-camping, 8 percent was swimming and 3 percent was other recreational activities such as hiking, horse riding, motorcycle riding, dune buggy riding, and interest visitation. Fishing alone accounted for 650 visitor-use days along the Arizona side of the river. Table 28 indicates the distribution of fishing pressure along the river. It is important to note that the Yuma Valley Levee is the major access route for recreational use of the Colorado River below Morelos Dam.

^{1/} A Special Report on: The Recreational Use of Areas Along the Lower Colorado River Valley; Limitrophe and Neighboring Areas, prepared for USBR by G. W. Greey and J. C. Jaten, Arizona State University.

TABLE 26

HERPETOFAUNA OF YUMA VALLEY BETWEEN MORELOS DAM AND THE
INTERNATIONAL BOUNDARY WITH PRESENT RELATIVE DENSITY

<u>Species</u>	<u>Present Relative Density</u>
<u>Amphibians</u>	
Tiger salamander <u>Ambystoma tigrinum</u>	moderate
Colorado River toad <u>Bufo alvarius</u>	low
Great Plains toad <u>Bufo cognatus</u>	high
Red-spotted toad <u>Bufo punctatus</u>	high, riparian only
Western spadefoot <u>Scaphiopus couchi</u>	high
Woodhouse's toad <u>Bufo woodhousei</u>	high
Bullfrog <u>Rana catesbiana</u>	high, riparian only
<u>Turtles</u>	
Desert tortoise <u>Gopherus agassizi</u>	low, if at all
Spiny soft-shelled <u>Trionyx spiniferus</u>	common, river only
<u>Lizards</u>	
Zebra-tailed lizard <u>Callisaurus draconoides</u>	high
Western whiptail <u>Cnemidophorus tigris</u>	high

TABLE 26 (Continued)

<u>Species</u>	<u>Present Relative Density</u>
Banded gecko <u>Coleonyx variegatus</u>	moderate
Desert iguana <u>Dipsosaurus dorsalis</u>	high
Leopard lizard <u>Gambelia wislizeni</u>	low
Flat-tailed lizard <u>Phrynosoma m'calli</u>	low
Desert horned lizard <u>Phrynosoma platyrhinos</u>	low
Desert spiny lizard <u>Sceloporus magister</u>	moderate
Colorado Desert sand lizard <u>Uma notata</u>	moderate
Long-tailed brush lizard <u>Urosaurus graciosus</u>	moderate
Ornate tree lizard <u>Urosaurus ornatus</u>	moderate
Side-blotched lizard <u>Uta stansburiana</u>	high density
<u>Snakes</u>	
Glossy snake <u>Arizona elegans</u>	moderate
Shovel-nosed snake <u>Chionactis occipitalis</u>	high
Banded sand snake <u>Chilomeniscus cinctus</u>	unknown

TABLE 26 (Continued)

<u>Species</u>	<u>Present Relative Density</u>
Western diamondback rattlesnake <u>Crotalus atrox</u>	moderate
Sidewinder rattlesnake <u>Crotalus cerastes</u>	moderate
Speckled rattlesnake <u>Crotalus mitchelli</u>	low
Mohave rattlesnake <u>Crotalus scutulatus</u>	low
Spotted night snake <u>Hypsiglena ochrorhyncha</u>	moderate
Common king snake <u>Lampropeltus getulus</u>	moderate
Blind snake <u>Leptotyphlops humilis</u>	high
Coachwhip <u>Masticophis flagellus</u>	moderate
Spotted leaf-nosed snake <u>Phyllorhynchus decurtatus</u>	moderate
Gopher snake <u>Pituophis melanoleucos</u>	moderate
Long-nosed snake <u>Rhinocheilus lecontei</u>	moderate
Patch-nosed snake <u>Salvadora hexalepis</u>	moderate
Western ground snake <u>Sonora semiannulata</u>	high
Checkered garter snake <u>Thamnophis marcianus</u>	moderate
Mexican garter snake <u>Thamnophis eques</u>	moderate

TABLE 27

RECREATIONAL USE OF THE YUMA VALLEY AND LIMITROPHE DIVISION
OF THE COLORADO RIVER DURING THE 6-WEEK PERIOD FROM
AUGUST 19, 1974 TO OCTOBER 1, 1974 (INCLUDING LABOR DAY WEEKEND)

Recreational Activities by Area	Visitor-Use Days ^{1/}	
	Number	Percent
Colorado River Mainstream and Associated backwaters:		
Fishing	650	76
Picnic-Camping	110.5	13
Swimming	68	8
Other ^{2/}	21.5	3
Total for River and Backwaters	850	100
Yuma Valley Canals and Drains:		
Fishing (32 incidents involving 100 people)	100	100
Total for Area	950^{3/}	

^{1/} For purposes of this table visitor-use day is defined as an hour time period of 24 hours from midnight to midnight, not inclusive of the total period.

^{2/} Other refers to boating, hunting, hiking, horse riding, motorcycle riding, dune buggy riding, and interest visitation.

^{3/} There were 1,000 visitor incidents which made up the total visitor-use days.

TABLE 28

DISTRIBUTION OF FISHING PRESSURE ALONG
THE LIMITROPHE DIVISION OF THE COLORADO RIVER
DURING RECREATION SURVEY FROM AUGUST 19 TO OCTOBER 1, 1974

Location	Fisherman-Use Day	
	Number	Percent
U.S. Side of River:		
Below Morelos Dam (M.O.D.E. No. 3)	260	40
River Near Hunter's Hole	78	12
Hunter's Hole	39	6
1 Mile North of Gadsden	78	12
Other Areas	195	30
Total for U.S. Side of River	650	100
Mexico Side of River:	40 ^{1/}	
Total for Limitrophe Division	690	

^{1/} Fisherman-use on the Mexican side of the river was secondary to swimming and bathing, which totaled 350 use-days.

According to the inventory, recreational activity on the agricultural lands of Yuma Valley is limited primarily to fishing. A total of 100 visitor-use-days occurred during the inventory period in the form of fishing along Yuma Valley canals and agricultural drains.

Projection of the recreational inventory use data over a years's time would be unrealistic since the inventory was performed during a portion of the hot season of the year when recreation activities are considerably lower than during the cooler but temperate winter months. However, the inventory does give a good indication of the recreational activities and relative importance in the area.

Fishing activity, especially, increases significantly during the winter months. Hunting also picks up in the fall and winter during the regularly scheduled game and waterfowl hunting seasons. The only activity which could be expected to decrease rather than increase during the winter months would be swimming. The decrease would be attributable to cooler air and water temperatures. Taking these factors into account it is estimated that there is a total annual angler-use of about 10,000 visitor-use days expended on the Colorado River below Morelos Dam and on the Yuma Valley Drains. The annual hunter-use of this same area is estimated to be approximately 7,500 visitor-use days.

c. Archeological and Historical

A detailed archeological survey has been conducted on the sites of all the features of the protective and regulatory ground-water pumping plan. The survey was contracted by the Bureau of Reclamation through the Arizona Archeological Center, National Park Service, and conducted by Prescott College Archeological survey, Prescott, Arizona. On the basis of the archeology survey report, archeological clearance of the project sites has been granted.^{1/}

The National Register of Historic Places lists only one historical site in the near vicinity. This is the Yuma Crossing and associated sites, a national registered landmark located along the banks of the Colorado River in Imperial County, California, and Yuma County, Arizona, where the river passes adjacent to the northern edge of the city of Yuma, Arizona, nearly 20 miles north of the immediate project area. The Southern Pacific Railroad Depot is a nomination to the register and is also located in the city of Yuma.

^{1/} Letter dated February 19, 1974, enclosing Archeological Survey Report to Project Manager, Yuma Projects Office, Bureau of Reclamation, Yuma, Arizona, from Acting Chief, Arizona Archeological Center, National Park Service, Tucson, Arizona.

4. Environmental Quality

a. Water

With few exceptions, most surface water and ground-water supplies throughout the Yuma area have concentrations exceeding 500 p/m TDS and many exceed 1,000 p/m TDS. The quality of the native ground water in the southern part of Yuma Mesa ranges from 1,000 to 1,100 p/m TDS and has sodium and chloride as the principal ions. Yuma Valley ground water concentrations along the limitrophe section are 1,000 to 1,500 p/m TDS. Irrigation drainage waters in Yuma Valley which are delivered to Mexico at the Southerly International Boundary via the Yuma Valley Main Drain have concentrations of 1,400 to 1,600 p/m TDS. Irrigation and domestic water diverted at Imperial Dam may range from 780 to 1,100 p/m TDS; the 1973 mean was approximately 850 p/m TDS. The principal ion in Colorado River water is sulfate. Monitoring of water quality in the backwater ponds at Hunter's Hole from October 1971 to present indicates that concentrations of total dissolved solids in these ponds range from about 1,850 p/m TDS to about 5,300 p/m. Dissolved oxygen in the water at Hunter's Hole ranges from approximately 2 to 11 p/m.

b. Esthetics

Although there are no designated scenic or esthetic sites in the project area, there are contrasts in land use and vegetation which create picturesque settings in the surrounding area. The citrus groves on the desert of the Yuma Mesa appear as patches of emerald green on a background of light brown sand splotched with creosote bush greenery. Thickets of mesquite form a bank of green shrubbery along the mesa escarpment separating the mesa from the Yuma Valley with its patchwork of cultivated fields and citrus groves outlined by section roads and irrigation conveyance channels. The West Main Canal and the Yuma Valley Levee form a line of demarcation between the valley and the adjacent vegetated riparian community of the Colorado River to the west.

E. Ecological Interrelationships

1. Yuma Valley

The wildlife habitat of the Yuma Valley and the adjacent riparian community are dependent on the hydrology of the area. Ground-water flows and water table levels directly affect the stability of the aquatic, semiaquatic, and riparian communities and their established ecosystems.

The drainage system in the Yuma Valley consists of approximately 80 miles of major open agricultural drains (see Plate 4). These drains carry drainage flows via the Yuma Valley Main Drain to the Arizona-Sonora Boundary at San Luis, Arizona, and San Luis, Sonora, Mexico, where the flows are pumped by the Boundary Pumping Plant into the Mexican conveyance channel. Part of the drainage water results from percolation of applied irrigation water intercepted in open agricultural drains, part is from drainage wells that discharge into the drains and a limited amount is from irrigation surface runoff that is collected by the drains.

Several small seepage ponds totaling about 3 acres of open water are located just south and west of Gadsden, Arizona, between the Yuma Valley levee and the Colorado River. These ponds are referred to on Plates 4 and 5 as Gadsden Ponds. They are primarily dependent on ground water; however, they do receive occasional runoff during irrigation of adjacent croplands.

About 2.5 miles southwest of Gadsden, Arizona, between the Yuma Valley levee and the Colorado River, are the five interconnected backwater ponds of Hunter's Hole which have a total of about 12 acres of water surface. These ponds are also dependent on ground water as well as backwater flow from the Colorado River and occasional small discharges from the West Main Canal through the 21-mile Wasteway. The Hunter's Hole ponds are shown in Photograph P998-300-01015 NA and on Plates 4 and 5. At present, the water level in the ponds is maintained by the backwater effects of flows in the river. These flows are currently remaining at about 300 ft³/s of brackish Wellton-Mohawk drainage water which is being discharged into the river immediately below Morelos Dam from the Main Outlet Drain Extension. The flows in the river channel are currently maintaining a water surface elevation of approximately 78 feet above mean sea level adjacent to Hunter's Hole. The channel into the Hunter's Hole ponds from the river has an average bottom elevation of approximately 75 feet above mean sea level. Therefore, when riverflows drop more than 3 feet from their present elevation, there is no longer surface flow into the ponds from the river. In periods when the river channel is dry, the Hunter's Hole ponds are primarily dependent on ground water from Yuma Valley and occasional small discharges through the 21-mile wasteway; however, the total flow discharged from the wasteway in 1973 was less than 10-acre feet.

2. Wellton-Mohawk Division and Painted Rock Reservoir

Portions of the agricultural lands in the Wellton-Mohawk Division are affected by high ground-water elevations. To reduce these high

ground-water tables, drainage pumps are used to pump the ground-water into drainage conveyance channels which convey and discharge annually about 220,000 acre-feet of drainage flows into the Colorado River channel below Morelos Dam. The ground-water has a high salinity content due to the past prolonged pumping of ground-water for irrigation and recent drainage pumping. High ground-water levels help sustain areas of riparian vegetation along the Gila River channel in the Division. Ground-water and some irrigation wasteway discharges also create various small ponds and marsh habitat in low-lying areas along the river channel. Occasional floodflows also help maintain and occasionally enhance the riparian communities along the river.

The impoundment of floodflows behind Painted Rock Dam has an effect on the areas along the Gila River upstream and downstream from the dam with respect to the amount of flows detained and the rate of releases from the reservoir. Rapid releases at the rate of 2,200 to 2,700 ft³/s, as experienced in 1966 and in 1973, result in downstream flooding and aquifer infiltration in the Wellton-Mohawk Division. This infiltration helps to sustain the riparian vegetation in the Division but also causes higher ground-water levels which in turn require increased ground-water pumping. Releases of this amount also result in the discharge of silt-laden flows into the Colorado River. To the extent possible these flows that reach the Colorado River are utilized beneficially in satisfying Treaty deliveries to Mexico, thereby leaving an equivalent quantity of water retained in storage reservoirs on the Colorado River. Releases at a higher rate also result in infiltration within the greenbelt area between Painted Rock Dam and the Wellton-Mohawk Division but not in as great a proportion as with slow releases. The infiltration in this area is a benefit to the vegetative habitat; however, the higher release rates from the 1966 and 1973 storms caused inundation of habitat to the extent that a substantial number of ironwood trees and possibly some mesquite were killed. The higher releases cause less period of inundation within the reservoir, where some of the lands are cultivated and others are riparian or desert habitat, thereby causing less damage to lands. There is also less time for evaporation to cause increases in the salinity of the detained water.

Sustained slow releases (200 to 400 ft³/s) from Painted Rock Reservoir result in greater infiltration of the greenbelt area upstream from Wellton-Mohawk Division and less infiltration within the Division. If releases are controlled so that the surface flows do not reach the Division there is no infiltration in the Division. This mode of operation greatly enhances the greenbelt of riparian vegetation and does not compound the drainage problems in the Division. On the other hand, the longer detention in the reservoir causes greater damage to reservoir lands and longer periods that they cannot be utilized. The period of recreation use of the reservoir is longer, however. After the 1973



Aerial view looking north showing the Hunter's Hole area in the center with the Colorado River channel in the upper left corner and in the foreground. The West Main Canal can be seen in the upper right portion of the photograph. Arizona--Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01015 NA.

releases were cut back to a slower rate ranging from 200 to 400 ft³/s and continued for about 18 months the rate of infiltration in the green-belt area was nearly 100 percent. As a result, vegetation density increased with a concurrent increase in utilization by a variety of wildlife species including upland game and big game populations.

3. Santa Clara Slough

The 75 acres of open water vegetation in the Santa Clara saltwater marsh and the 375 acres of spring-fed marsh habitat within the 103,000 acres of saltflats of the Santa Clara Slough are unique ecological components of this landscape. The Santa Clara salt marsh, sustained by irrigation drain water, is completely isolated from other areas of the slough and is not connected to the Gulf of California. The separation of the marsh and the low vulnerability to invasion by predatory or competitive species of fish has obviously contributed to the predominance of the existing population of desert pupfish in the salt marsh. The delicate environmental balance that appears to be necessary for the maintenance of the superiority of the population of desert pupfish appears to be directly related to habitat characteristics of the marsh, i.e., accumulated depth of organic substrate, shallow warm water, abundance of vegetative escape cover, high total dissolved solids level, absence of predators, and isolation. The disruption of one or several of these factors could directly affect this balance.

The 375 acres of disconnected freshwater marsh along the east escarpment of Santa Clara Slough have likely evolved since the discontinuance of extreme river floodflows over the delta to the Gulf of California and subsequent to the last major shift in the Colorado River channel. Habitat conditions and resultant wildlife populations are directly dependent upon the ground-water flow that surfaces at the base of the escarpment. This marsh is not affected by surface flow from the saltwater marsh, Colorado River, or tidewater from the gulf. The freshwater marsh could be affected by an extreme change in flow patterns from either of these areas, or a discontinuance of seepage from the escarpment.

Historically, the two marsh areas and the remaining saltflats have been affected by the vagaries of the gulf waters and the meandering patterns of the Colorado River channel throughout the lower delta. These two factors are not currently exerting an influence on Santa Clara Slough.

The consideration of the environmental future of the area is a concern in the development of the project; however, ultimate authority for action is the responsibility of Mexico.

4. Coachella Canal and Imperial East Mesa

Seepage from the Coachella Canal interfaced with that of the East Highline Canal, as they proceed northwesterly from the All-American Canal, has resulted in the unique evolution of plant and aquatic communities normally foreign to the desert environment of the Imperial East Mesa. In the area north of Glamis Road and south of Niland, California, these two canals converge while bisecting numerous natural washes that historically discharged surface flow into ancient Lake Coahuilla. The development of the approximately 4,100 acres of aquatic and plant communities more typical of humid climate have been concentrated within this area in response to a dramatic rise in the ground-water table.

Concurrent with the evolution of these communities, wildlife species infiltrated these prime areas and became established in relation to carrying capacity or availability of niches. The Salton Sea and its tributaries to the west, and the Finney-Ramer Unit of the Imperial Wildlife Area to the south, surrounded by agricultural lands interspersed with open desert, have served as sources of wildlife recruitment to this newly developed area. White-winged and mourning doves, waterfowl and other water-oriented species may have followed these watercourses and capitalized on the expanding habitat. Aquatic life had a natural entry into the area via the diversion from the Colorado River.

Both fish and wildlife have flourished in these habitats provided by these new communities. The viability of the vegetative and aquatic communities and their associated populations of fish and wildlife inhabitants are solely dependent upon the maintenance of the elevation of the ground-water table that has materialized as a direct result of seepage from the canals. Concurrently, the number of man-days of hunting and fishing associated with the canals is directly dependent upon the stability of the resultant habitat.

The visual quality and subsequent recreational use of a green belt in a desert area are also indirectly linked to the longevity of the abrupt divergence from the natural conditions of the area.

F. Potential Mitigation Features - Fish and Wildlife

There are several different mitigation sites being considered that fall within the parameters of the concepts recommended by the Ad Hoc Committees for Fish and Wildlife. These include onsite and offsite measures for in-kind and substitute mitigation. Habitat is the basic consideration used in developing mitigation values. Details of the replacement value and magnitude of final mitigation design are being

coordinated with the State game and fish agencies and the Fish and Wildlife Service through the Bureau of Reclamation and the Ad Hoc Committees. Funds for mitigation coordination are being provided by the Project as an objective of the Project under the Fish and Wildlife Coordination Act of 1958 and the National Environmental Policy Act.

1. Desalting Complex and Protective and Regulatory Ground-Water Pumping

a. Hunter's Hole Complex

The Hunter's Hole complex of ponds is located approximately 2 miles north of the International Boundary adjacent to the lower Colorado River below Morelos Dam. These consist of five interconnected ponds having a maximum depth of approximately 18 feet and a total of about 12 surface acres of water. These ponds were formed by flood conditions during the period of 1950 through 1953. At the time of formation they had a total surface area of approximately 30 acres. Since that time natural vegetative succession has reduced the size by the encroachment of vegetation and organic detritus. The ponds are bordered by a dense growth of cattail, bulrush, giant reed, and salt grass. Principal woody vegetation includes seepwillow, saltcedar, and screwbean mesquite. A 25- to 40-acre stand of medium density cottonwood trees are located to the north and east of the ponds. This area was burned during the summer of 1974.

Migratory waterfowl and wading birds use the area extensively. Approximately 8 to 15 acres of Yuma clapper rail habitat is located around the ponds. Cultivated lands border the ponds on the east and southeast. The river runs adjacent to the ponds to the west and at one point is interconnected with the lowermost pond. The river forms the International Boundary with Mexico. White-winged and mourning dove and Gambel's quail use the area surrounding the ponds extensively for nesting and cover. Beaver, muskrat and badger are common to the area. Coyotes, bobcat, skunk, cottontail rabbits, and jackrabbits can be found in abundance the adjacent fields and vegetative cover surrounding the ponds. There is a fair fishery in the ponds; however, primary use of the fishery is made from the Mexican side of the boundary. Principal game fish include largemouth bass, black crappie, channel catfish, bullhead catfish, bluegill, and tilapia. Mullett, Mugil cephalus, are present in abundance and the 10-pounder, Elops affinis has been previously observed in the ponds.

Big game hunting is nonexistent as deer do not frequent this area on a regular basis; however, there is extensive dove and quail hunting and some waterfowl hunting in the area during the regular hunting seasons.

The water source for the ponds is from the high ground-water table in the area. Since June 1972 the upper 2 to 3 foot level of water in the ponds has been maintained by the flow of the Wellton-Mohawk irrigation drain water which is discharged into the Colorado River below Morelos Dam. Access to the area is over the levee road and agricultural access roads. There is always considerable activity in this area as related to border patrol activities.

b. Gila River Wildlife Management Area and Fish Rearing Facility

The 900-acre area preferred for this development is in the lower portion of the Wellton-Mohawk Division, Gila Project. This site includes about 300 acres of developed farmland and 330 acres of Gila River riparian habitat including open water, riparian cover, and wetland habitat.

The principal vegetative cover in addition to cropped lands includes saltcedar, arrowweed, creosote bush, screwbean mesquite, seepwillow, and quailbrush. Limited cattails and bulrush can be found around the open water areas where the ground-water table is high and the areas receive some irrigation runoff and infrequent floodflows.

White-winged and mourning dove and Gambel's quail use the undeveloped area for cover and nesting and obtain food and water from agricultural lands in the immediate area. Skunks, beaver, fox, coyote, and cottontail and jackrabbits are common to the area. Big game can be found only in transient status. Fishing in the immediate vicinity is limited due to the lack of permanent deep water. A pair of Yuma clapper rails, an endangered species, was reported in the area during a 1974 survey. Archeological surveys will be made following a final delineation of the proposed wildlife management unit.

2. First 49 Miles of the Coachella Canal

a. Maintaining Select Riparian Habitat

This area is located primarily within the washes and low-lying areas between the Coachella and East Highline Canals north of Glamis Road and has been described earlier in this chapter. The vegetation is typed as mixed phreatophyte dominated by saltcedar, arrowweed, and screwbean mesquite with Goodding willow, coyote willow, cottonwood, honey mesquite and seepwillow found in localized areas. Hydrophytic or marsh vegetation in the area consists of cattails, common reed, sedges, rushes and some pampas grass.

Mosquitofish, yellow bullheads, and bullfrogs are found in some of the small seepage ponds and the seepage streams in the washes. White-winged and mourning dove and Gambel's quail use the area extensively for cover and nesting. The endangered Yuma clapper rail and the threatened California black rail have been recorded in the area but their numbers have not yet been quantified. Coyote, bobcat, kit fox, grayfox, badger, striped skunk and spotted skunk are known to be present in the area, along with black-tailed jackrabbits and Audubon cottontail. There is not a sizable population of desert mule deer in the area, less than six deer per square mile. The cactus mouse, desert pocket mouse, and the white-throated woodrat are the most prominent rodents in the wash habitat.

b. Lake Development

The 280 acres which will be leased on the northwest edge of the Salton Sea for development of a 10- to 20-acre lake and wildlife habitat is presently characterized by desert habitat. The vegetation is mainly comprised of sparse creosote bush and saltbush types. Wildlife inhabitants are few and consist mainly of desert rodents, rabbits, a few birds, lizards, and snakes. However, the surrounding area adjacent to the Salton Sea contains varied growths of mixed riparian vegetation. There are marsh areas and other wetland. Waterfowl, shorebirds, and wading birds frequent these areas. The general surrounding area also supports 800 to 900 acres of private duck hunting ponds.

The ground water in this area is only 1 to 3 feet below ground surface. Several agricultural drains discharge into the Salton Sea near the area. The 76th Avenue drain which passes through the area averages a monthly flow of 15 ft³/s and has an average TDS concentration of about 1700 p/m.

c. Finney-Ramer Unit

The Finney-Ramer Unit of the Imperial Wildlife Area is located along the Alamo River in Imperial Valley about 1 mile south of Calipatria, California. The area consists of ponded areas sustained by the Alamo River and agricultural drainage flows. Silt deposition has filled in about 200 acres of pond to a point that the marsh habitat is becoming choked with dense cattail growths, thus reducing to a minimum the amount of open water in the management unit. Waterfowl and wading bird use of this area is being reduced and wildlife food production is limited. Deep, open water areas for fish are almost nonexistent. The management unit is a typical example of marsh habitat evolving through natural succession to phreatophyte-xeric conditions. Physical management of the area will be necessary to restore it to its original condition and to maintain it as a productive fish and wildlife area.

d. Salton Sea National Wildlife Refuge

The lands which will be acquired (up to 364 acres) for inclusion in the Salton Sea National Wildlife Refuge are located adjacent to the refuge boundaries at the southeasterly edge of the Salton Sea near the New and Alamo River deltas. These lands are farmlands which are developed for irrigated agriculture. The lands contain irrigation and drainage channels. Irrigation water is supplied to these lands under contract by the Imperial Irrigation District.

The Salton Sea Wildlife refuge is managed primarily for migratory waterfowl and other aquatic and semiaquatic wildlife. Refuge lands contain ponded and marsh areas as well as lands which are farmed to produce wildlife feed crops. The refuge is considered a key management unit in the Pacific Flyway. Endangered Yuma clapper rail have been recorded on the refuge for several years. Hunting and fishing are important recreational activities on the refuge.

**III. ENVIRONMENTAL
IMPACTS OF ACTION**

III. ENVIRONMENTAL IMPACTS OF ACTION

A. Introduction

Environmental impacts will result directly and indirectly from the project and will affect both human and natural communities. In general, social and economic aspects of the human environment will be enhanced, while certain aspects of the natural environment will be enhanced and others impaired.

A given impact may be both beneficial and adverse in varying respects. The relationship between direct and indirect impacts is complex, and rarely will a direct impact occur without an indirect impact also occurring.

B. Desalting Complex

The Desalting Complex will be comprised of three major structural measures: (1) the desalting plant, (2) the replacement of the metal flume, and (3) the bypass drain.

1. Desalting Plant

a. Physical Environment

(1) Colorado River Water Quality and Quantity

The quality of Colorado River flows between the desalting plant site and Morelos Dam, a distance of about 2 miles, will be improved by the construction and operation of this project. It is estimated that the average salinity of water released at Imperial Dam by 1978 will be 910 p/m. If all drain flows including Wellton-Mohawk Division flows were returned to the river above Morelos Dam, the salinity at the Northerly International Boundary might reach 1,355 p/m by 1978. The provisions of Minute No. 242, however, require that all Wellton-Mohawk Division drainage flow be discharged to the river below the dam until works are constructed to remove the increased salinity effect of these waters. The bypassed Wellton-Mohawk Division drainage flow is not chargeable as Treaty flow. Therefore, the construction and operation of the project will result in salvage of approximately 132,000 acre-feet annually of this flow and the retention in storage reservoirs for use elsewhere in the Colorado River system of a like quantity of water. The construction and operation of the desalting complex will allow the United States to comply with the provision of Minute No. 242 for delivering water at Morelos Dam that has a salinity of no greater on an annual average than 115 p/m + 30 p/m higher than the annual average salinity of the waters arriving at Imperial Dam.

The construction and operation of this project will provide salvage of drain water but will have no effect on the quantity of water diverted at Morelos Dam. By agreement with Mexico, the United States is obligated to deliver 1,500,000 acre-feet of water pursuant to a schedule submitted by Mexico. Of this total about 1,360,000 acre-feet are delivered at the Northerly International Boundary.

The flow in the limitrophe section of the river below Morelos Dam which has been maintained since June 1972 by the 300 ft³/s of drain water that is being released from the Wellton-Mohawk Main Outlet Drain Extension below the dam will no longer pass through the river channel. The only other flow that contributes to the volume of the river in this reach results from infrequent floodflows and canal wasteway discharges. Consequently, sustained riverflows in this reach will essentially be lost. This will result in the loss of fish and wildlife habitat along this section of the river (quantitative impacts are discussed in this chapter under Bypass Drain).

(2) Energy

The impacts of providing 372,000,000 kWh per year of electrical energy for the desalting plant are far-reaching. Impacts regarding transmission line rights-of-way are discussed in this section under land use, vegetation, and esthetics. Regardless of the source of power, ultimately there will be an irreversible and irretrievable commitment of natural resources such as fossil fuels, nuclear fuel, or geothermal energy.

Supplying power to the project from the Navajo Project powerplant on an interim basis (as discussed in Chapter I) until other power sources can be derived will have certain adverse impacts. The Navajo Project powerplant uses about 8,395,000 tons of coal per year to generate about 20,148,000,000 kWh per year of electrical energy and requires a consumptive use of 34,100 acre-feet of Colorado River water per year for use in its cooling towers. The desalting plant will use about 2.07 percent of the annual energy produced by the powerplant and will, therefore, account for an annual consumptive use of about 173,630 tons of coal and 705 acre-feet of cooling tower water. In addition to the consumptive use of natural resources, production of the required electrical energy for the project will result in approximately 5.6 tons of smokestack emissions and fly ash per day at the powerplant site as follows:

SO ₂	- 1.2 tons/day
NO _x	- 4.2 tons/day
Flyash	- 0.2 tons/day
Total	<u>5.6 tons/day</u>

The use of Navajo Project power will not diminish the supply available to preference customers from Federal power systems operated by the Secretary of Interior.

Recalcing all of the sludge from the desalting process will require 8,500,000 BTU of energy per ton of lime and about 66,000 tons per year of lime could be produced. About 41,000 tons of lime per year are required in the pretreatment process leaving 25,000 tons per year for sale. The energy for recalcing would probably be supplied from fuel oil and would require about 22,000 tons or 157,000 barrels per year. Partial recalcing would require 9,900 tons or 70,400 barrels per year of fuel oil. A study will be undertaken to determine the feasibility of the recalcing process.

b. Biological Environment

(1) Vegetation

Use of the plant site will remove about 64 acres of land from agricultural production. There will be a loss of sparse creosote bush/bur-sage plant growth which predominates at the location of the disposal sites and is characteristic of the extensive desert areas within this region. Use of the alternate desalting plant site at the Gila River narrows would require at least 60 acres of land within the 300-acre area. Depending on which location were used, either very sparse desert vegetation could be lost or some open to dense riparian vegetation. If the Prison Hill site were used about 60 acres of sparse weeds and open growths of quailbush and arrowweed would be lost. This site has previously been cleared. Construction of an additional 6 to 18 miles of new bypass drain as a result of using one or the other of the alternate sites would not cause a discernible impact on vegetation since vegetation is absent to sparse along the M.O.D. and M.O.D.E. alignments.

(2) Fish

The desalting plant will have an adverse impact on the sport fishery in the 2 miles of drain below the plant. The gate structures required at the desalting plant site will prevent the movement of fish past that point. However, normal flows below the plant will be limited to the reject stream of 60 ft³/s at 8,416 p/m TDS with an average depth of about 2 feet. There is little possibility of a sustained, viable fishery developing within the drain under these conditions. Development of small and perhaps temporary fish populations in the bypass drain will be possibly limited to tilapia, carp, mosquito fish, and perhaps some catfish.

The 1973 edition of the Fish and Wildlife Service's Threatened Wildlife of the United States lists no fish which are found in the Main Outlet Drain Extension.

As mentioned, chlorine will be the only algacide employed, and its long-term effect on the environmental will be insignificant since the level of residual chlorine that the membrane systems can tolerate is restricted. Each membrane manufacturer specifies the upper limit of residual chlorine that is permissible for its particular membrane assembly. Most manufacturers specify up to about 0.5 parts per million of residual chlorine as an upper limit. Lime, sulfuric acid and detergents will be used in the desalting process and filter backwash procedures. The addition of sulfuric acid and lime will tend to offset significant pH changes. Refer to Table 1, following page 22, for breakdown of chemical constituents of the reject water. As previously mentioned there will be no significant pesticide nor herbicide residue levels in the reject stream.

One or more water outages will be required when connecting the plant's intake and outlet facilities into the Main Outlet Drain Extension. This will have a temporary adverse impact on the fish populations in the drain. A portion of the fish population in the M.O.D.E. will be lost during the outage and fishing in that area will be limited during that time. However, as in the past, the particular species respond rapidly to recruitment and will repopulate the area in the upstream portion of the drain.

There will be an increase in fishing potential where the product water from the plant discharges through M.O.D.E. No. 2 to the Colorado River channel 2 miles above Morelos Dam.

The only significant impact caused by locating the desalting plant on one of the alternate sites would be the impact on the fishery which now exists in those portions of the M.O.D. and/or M.O.D.E. which would be downstream from the alternate desalting plant site. The Wellton-Mohawk drainage flows with salinities over 3,000 p/m TDS would no longer flow in the M.O.D. or M.O.D.E. downstream from the desalting plant but instead the desalted product water, about 502 p/m TDS, would be conveyed 6 to 18 miles by these conveyance channels and discharged into the Colorado River at M.O.D.E. No. 2. This change in water quality may be of benefit by producing more desirable physiological conditions for some species. However, there is the possibility that certain fish parasites and perhaps even some fish diseases, which have thus far been excluded from the M.O.D. and M.O.D.E. because of the higher salt concentrations, will find their way into or be transmitted by a carrier into

the freshened waters of the drains. These organisms would reduce the biotic potential and vigor of the fish populations in the drain to some degree. If the alternate desalting plant site at the Gila River narrows were to be used these same impacts relating to change in water quality would be felt in the three tilapia spawning ponds adjacent to the M.O.D. which were constructed as a mitigation measure for lining the M.O.D. These ponds have been retained under Federal ownership and are being managed by Arizona Game and Fish Department cooperatively with the Bureau of Reclamation. Changes in water quality or quantity would significantly change the management criteria for the ponds. If for any reason the product water flow were stopped for a prolonged period due to plant shutdown some alternate means of obtaining a water source for these ponds would be essential. Prolonged water outages would also affect the fishery in those portions of the M.O.D. and M.O.D.E. downstream from the alternate plant site.

(3) Wildlife

Due to the virtually nonexistent populations of big game species in the area of the desalting plant site, there will be no impact on these animals. Impacts on white-winged and mourning doves will be limited to the loss of the food producing and nesting areas that are retired from cultivation. If one of the alternate desalting plant sites is used there will be disturbance and loss of about 60 acres of mostly poor, disturbed wildlife habitat. The numbers of animals lost would be small. Wildlife would be temporarily disturbed in the vicinity of the M.O.D. and M.O.D.E. if additional reaches of the bypass drain are constructed.

c. Cultural Environment

(1) Land Use

Approximately 60 acres of land will be required for the desalting plant and 4 acres for an access road and a railroad spur right-of-way. These lands are presently under irrigation and are presently cropped in sudan grass and wheat. This 64 acres of land amounts to less than .04 percent of the total irrigated acreage in the Yuma area. Loss of agricultural production on these lands will amount to a gross economic loss of about \$38,400 per year.

Depending on which 60-acre plot the desalting plant would be placed on, use of the alternate desalting plant site at the Gila River narrows could have some impact on land use. The sand and gravel operations of Arizona State Highway Department and Yuma County

Highway Department would be affected if the plant were placed on all or a portion of the 70 acres of land that is presently under materials permits. Although there is only little use of the private and state lands at the site, placement of the desalting plant on a portion of these lands would preclude their potential development. Use of the private lands at the Prison Hill site for the desalting plant would have no effect on land use since the 45 acres of fallow land and 65 acres of vacated lands are under no present use and have not been used for some time.

Construction of 6 to 18 miles of additional bypass drain would probably not have impacts on land use since existing Federal rights-of-way would be used for the alinement of the drain.

The proposed landfill for disposal of the desalting plant waste material will require a minimum of about 72 and a maximum of 600 acres of land during the life of the project depending on the extent of sludge recalcining. Three potential sites are under consideration. Access will be over existing roads in the area. The disposal area will be slowly utilized over the life of the project and will not result in the immediate removal of the entire desert habitat. There will be no impact on existing land use.

Approximately 50 acres of right-of-way will be required for the construction of about 5 miles of transmission lines. These acreages presently consist of undeveloped desertshrub habitat and some fallow lands. There should be no major impact on these land-use patterns, although the transmission line towers will adversely affect the esthetics of the area. The new transmission facilities will be at least 4 miles west of the city of Yuma.

(2) Recreation

The impact of the desalting plant and the disposal site on recreation will be minimal. There is little or no recreational use at their location. There may be a slight increase in fishing where the blended water will be discharged into the Colorado River.

Since recreational potential and use of the alternate desalting plant sites is very minimal there should be no effect on recreational activities by using either of the two alternate sites. Fishing activities in the nearby canals would not be substantially affected. Since there is not a significant amount of fishing in the lined M.O.D. and M.O.D.E., there would be no noticeable effect on fishing activities along these drains as a result of utilizing one or the other alternate sites.

(3) Archeological and Historical

There are no known archeological or historical sites at the proposed locations of the plant and the disposal area. See Chapter II. In accordance with the National Historic Preservation Act, the State Liaison Officer for Historic Preservation has been consulted and it has been determined that there are no potential historical sites at the proposed locations. There will be no impact on archeological or historical resources due to the use of one of the other alternate desalting plant sites.

d. Environmental Quality

(1) Noise Levels

Noise levels from the plant will not adversely affect the surrounding environment. In designing the plant, particular attention will be paid to baffling areas where noise levels may be critical. The use of electrical powered motors will insure relatively low sound levels at the plant site located about 4 miles from Yuma, Arizona, and about 400 feet south of a Cocopah Indian community of less than 100 people, or at one of the alternate sites under consideration. A September 5, 1973, survey of the general sound levels in the area is included in Chapter II, Table 4. As the survey indicates, sound levels within the area are presently within acceptable tolerance limits for normal habitation. This survey will be used for comparison and as a basis for maintaining an acceptable sound level for the project.

(2) Visual Quality

The low profile desalting plant, which will be located on flat terrain, will be a new structure in the area. The visual effect will be limited to the vicinity of the feature. Other visual structures in the area include the Yuma-Axis (Yucca) Powerplant, which is located about 800 feet south of the desalting plant site. Photograph P998-300-01018NA is an aerial view of the powerplant. At the Gila River alternate plant site there are no noticeable visible structures but at the Prison Hill site there are the many houses and buildings of the nearby city of Yuma.

2. M.O.D.E. Metal Flume

An existing metal flume on the Main Outlet Drain Extension (see Photographs P998-300-01012NA and P998-300-01011NA) will be removed and replaced with a single-barrel 120-inch-diameter inverted siphon. The siphon will be constructed adjacent to the flume and buried with about

3 feet of earth cover. A minimum of two short water outages involving shutdown of the wells in the Wellton-Mohawk Division will be required to connect the siphon to the concrete-lined M.O.D.E.

a. Physical Environment

Concern has been expressed over the consequences of the physical destruction of all or part of the metal flume section by vandalism or floods. The metal flume stands an average of about 4 feet above the ground surface, while the top of the buried siphon will be an average of 3 feet below the ground level. The embankment slope will be protected with rock riprap covered with soil. Burying the siphon and the rock protection to be provided will reduce the chances of flood damage to this section of the Main Outlet Drain Extension and the possibility of the saline Wellton-Mohawk drainage water mixing with Colorado River water. The physical safety hazard of the flume will also be eliminated.

b. Biological Environment

(1) Vegetation

There is a narrow strip of sparse vegetation on the proposed alignment, consisting primarily of saltcedar. This growth will be uprooted during construction activities. The total loss of vegetation will be less than 1 acre, and the total area to be temporarily disrupted will be less than 5 acres. As the area is located adjacent to the river natural revegetation will occur over the siphon alignment and over the present alignment of the metal flume in a short period of time.

(2) Fish

The existing metal flume will be kept in service during the construction of the new buried siphon. During the construction, it is anticipated that there will be two water outages at the construction site. The duration for each of these outages is expected to be 2 weeks or less. The water in the drain upstream of the metal flume will be checked up at structures and its level maintained. It is anticipated that there will be no loss of fish population in the drainage channel upstream of the existing metal flume. The water in the metal flume will be allowed to drain by gravity into the drain extension between the flume and M.O.D.E. No. 3 outlet below Morelos Dam; however, the water will be checked up at structures downstream to the extent possible. This will minimize



Aerial view looking north showing the Yuma-Axis (Yucca) Powerplant in the foreground and the proposed site for the desalting plant just beyond. The M.O.D.E. 2 diversion channel of the Wellton-Mohawk Main Outlet Drain Extension can be seen leading to the Colorado River in the upper left portion of the photograph. Colorado River Basin Salinity Control Projects, Title I. Bureau of Reclamation Photo No. P998-300-01018 NA.

fish losses downstream of the flume.

The 300-foot siphon located about 3,400 feet below the existing metal flume will provide a refuge for a residual population of the M.O.D.E. fishery during the water outages.

Fish salvage operations in the vicinity of the flume will be conducted as outlined in Chapter IV, and as have occurred on an annual basis in the past when water outages in the M.O.D.E. were necessary for scheduled drain maintenance. Future water outages as required for maintenance of the M.O.D.E. will also include, when possible, the checking up of water levels and appropriate salvage operation.

(3) Wildlife

Due to the intense human activity in the area, practically no use is made of this site by species of game birds or mammals.

c. Cultural Environment

(1) Land Use

Land over the alignment can be used for any purpose not detrimental to the siphon and which is not contrary to river management policy. Burying the siphon will be an important step in the eventual restoration of the historic Yuma Crossing, and Yuma County's planned development of a park in the area.

(2) Recreation

Replacement of the metal flume will not adversely affect any type of recreation. The removal of the flume will make available to the citizen and visitor to Yuma an area which may eventually be a part of the proposed restoration of the historic Yuma Crossing. Restoration is not a part of this proposed project.

(3) Archeological and Historical

There are no known archeological sites which the alignment of this project feature crosses and no impact is consequently anticipated. The National Park Service has granted clearance for construction. An archeological survey has been performed in this area.

The facility passes through the Yuma Crossing, which is recognized as a historical landmark in the National Register of Historic Places. This landmark is associated with the discovery of the Colorado River in 1540 by Hernando de Alarcon, an associate of Francisco Vasquez de Coronado in his expedition in search of the fabled Seven Golden Cities of Cibola. Removal of the metal flume will greatly enhance the movement now underway to eventually restore the site.

In compliance with Section 106 of the National Historic Preservation Act of 1966 and in the interest of preserving and enhancing a historical site, there has been completed, consultation with the California and Arizona State Liaison Officers for Historic Places and the Advisory Council on Historic Preservation. Reclamation submitted for their review and comment a report on the action with the determination that the action will not adversely effect the registered property but will constitute a beneficial change both esthetically and physically. In response to the consultation, both States and the Advisory Council concurred in Reclamation's determination.^{1/} In accordance with the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties," Reclamation was granted clearance to proceed with the undertaking by the Council.

(4) Human Safety

On occasion recreationists have been known to swim in the flume section at great danger to their lives. Although no drownings have been reported, the hazard does exist. Replacement of the flume with a properly screened siphon will eliminate that jeopardy. The siphon will have a sloping safety rack in the inlet end to reduce the water hazard.

d. Environmental Quality

Dismantling the metal flume and replacing it with a buried siphon will have no adverse impacts on environmental quality but will enhance the natural beauty of the area.

3. Bypass Drain

The reject stream from the desalting plant will be conveyed in a concrete-lined bypass drain to Santa Clara Slough upstream from the Gulf of California. This structure, which will begin at the existing terminus of M.O.D.E. No. 3 at Morelos Dam, will be 53 miles long,

^{1/} Letters dated May 1, June 4, and July 8, 1974, from California Department of Parks and Recreation, Arizona State Parks, and the Advisory Council on Historic Preservation, respectively, to Project Manager, Yuma Projects Office, Bureau of Reclamation, Yuma, Arizona.

16 miles in the United States and 37 miles in Mexico. Although the volume of flow in the reject stream will average $60 \text{ ft}^3/\text{s}$, the drain will be designed for a maximum flow of $353 \text{ ft}^3/\text{s}$ in order to bypass, if necessary, the entire Wellton-Mohawk drainage flow including any additional pumping which may occasionally be required when floodflows in the Gila River infiltrate into the Wellton-Mohawk aquifer. The feature is described in detail in Chapter I.

a. General Method of Bypass Drain Operation

A description of the possible options for operating the bypass drain is discussed in Chapter I and includes: (1) bypassing approximately 180,000 acre-feet annually of 3,100 to 3,400 p/m TDS water into Santa Clara Slough during an interim period following completion of the drain and prior to completion of the desalting plant; (2) bypassing the water to the Colorado River channel through a wasteway either in Mexico or the United States; (3) bypassing the water to the Colorado River at the Arizona-Sonora border wasteway if the United States completes its section of the drain prior to the completion of the Mexican section; (4) operating conditions or emergency situations when all of the Wellton-Mohawk drain water is bypassed for short periods of time; and (5) during infrequent hydrologic conditions when flood control releases from storage reservoirs on the Colorado River may become necessary.

All of the above options will be directly or indirectly dependent upon the desires of Mexico and will primarily affect the Colorado River channel below the Arizona-Sonora border and Santa Clara Slough.

(1) Interim Construction Period Bypass

If the bypass drain outfall is located in the north-east section of Santa Clara Slough as now planned the impacts of the $60 \text{ ft}^3/\text{s}$ reject stream will be as described under Santa Clara Slough impacts. The interim bypass of approximately 180,000 acre-feet per year of Wellton-Mohawk drain water for approximately 3 years after completion of the bypass drain and before completion of the desalting plant will result in different impacts on Santa Clara Slough. Impacts in the United States will be the same as described under b.(1) of this section.

Spreading rate of the 180,000 acre-feet of drain water per year over the 103,000 acres of salt flat in Santa Clara Slough will be dependent upon evaporation and infiltration rates, elevation, contours within the Slough and the potential for flow to the Gulf of

California. If the water should spread evenly over the Slough the 8-foot per year evaporation rate would account for the inflow; however, with the various elevation differences this is not likely. Infiltration will be at a minimum as most of the salt flat is already saturated just below ground surface. The most probable result will be ponding of water in the area of the salt marsh at the outfall of the drain and flow of the drain water down the old river channel to the Gulf of California east of Gore Island at the southeast section of the Slough. The area where the flow will most likely enter the Gulf is at a point near the Santa Clara Canal where the tidal flats are totally barren for several miles in both directions. This area is now being utilized as a storage for seasonal shrimp fishing fleets. The area has only minimal service facilities for the shrimp boats. The eastern fringe of the shrimp beds are located approximately 3-8 miles south-southwest of Montague Island at a point where the combined flows of the Colorado and Rio Hardy Rivers historically empty into the gulf. Dilution of imported water with the constantly changing gulf water should preclude any adverse impact on the remaining shrimp fishery.

The introduction of fish species into the Slough found in the Main Outlet Drain in Yuma Valley will occur. Principal species are tilapia, channel catfish, largemouth bass and other centrarchids. The development of a fishery to a level of providing protein to the local populace will be dependent upon the size and stability of the pool that develops in the Slough. The introduction of predators and competitive fish species into the salt marsh will likely result in a decrease of the desert pupfish population which is presently the dominant fish species in the 75 acres of open water. An increase in the size of the open water area will provide more resting and feeding areas and cover for waterfowl, wading and shore birds, and vegetated habitat for other marsh dwellers.

The volume of flow into the Slough for 3 years prior to operation of the desalting plant may result in a permanent connection to the gulf that would be maintained after the flow is decreased to 60 ft³/s of reject stream water. The inflow water during the interim period will have a higher quality than the 5,000 - 82,000 p/m TDS water now existing in the salt marsh that extends out onto the salt flats. The maintenance of water quality will be dependent upon evaporation rates and the potential for mixing with existing salt deposits. After the desalting plant begins operation the volume of water introduced into the Slough will decrease to approximately 40,000 acre-feet per year but the level of TDS of the inflow will rise to approximately 8,700 p/m. The increase in salinity levels will have a deteriorating effect on most species of freshwater fish populations that have developed in the Slough.

(2) Diverting the Colorado River through Wasteways

The Mexican Government will have the option of bypassing the Wellton-Mohawk drain water to the Colorado River at its wasteway structure which will be located approximately 14 miles south of San Luis, Mexico. The Colorado River from this point to approximately 5 miles below its junction with the Rio Hardy traverses cultivated lands. This option would most likely exist for the period prior to the operation of the desalting plant. The water discharged through the wasteway during the interim period would have the same quality as that now being bypassed below Morelos Dam. Following initial operation of the desalting plant the reject stream of 60 ft³/s would have a TDS of approximately 8,416 p/m. It is not likely that the reject stream would be discharged to the river channel at the wasteway after the plant is in operation.

Discharging the approximately 180,000 acre-feet per year of Wellton-Mohawk drain water to the Colorado River channel through the Mexican wasteway for a 3-year period would result in increased flow in the river channel for approximately 35 miles. The increased flow would likely breach the land plug that has formed across the historical outlet to the gulf approximately 7 miles southeast of the confluence with the Rio Hardy River.

Assuming the land plug would be breached and degradation of the river channel would occur, the river connection to the gulf would be reestablished. With the opening of the channel it is likely the marsh that has developed as a result of the trapped river water inundating riparian and agricultural lands in the area southwest of Los Carpilas will be drained. Loss of the marsh would result in a direct reduction of from 350 to 1,100 acres of habitat for waterfowl, shore birds, wading birds and other marsh inhabitants. Agricultural lands that have been flooded by the backwater could be reclaimed. Renewal of river flow to the Gulf would have positive benefits on the shrimp beds in the nearby area as the life cycle of this species requires a period associated with fresh water.

After the 3-year diversion period terminates, the flow from the Rio Hardy and irrigation drainage flows into the Colorado River channel may keep the channel to the Gulf of California open for a period of time. Without a significant flow, tidal action from the gulf would again eventually block the outlet.

Wasteway discharge into the river channel would preclude the introduction of 540,000 acre-feet of drain water into the salt marsh at the northeast side of Santa Clara Slough.

(3) Wasteway Discharge into the Colorado River Channel - Arizona-Sonora Border

An alternative to discharge of Wellton-Mohawk drainage flow in Mexico is to discharge the bypass water through the wasteway on the United States side of the Arizona-Sonora border. This could occur if requested by the Mexican Government or if the United States section of the bypass drain is completed prior to the Mexican section. Impacts of bypassing the 20 miles of river channel water from Morelos Dam to the Southerly International Boundary are described in this chapter under Section b.(1). Impacts from the Mexican Wasteway to the Gulf of California would be the same as described in previous paragraphs under Section (b). The impacts for the 19 miles of river channel from the Arizona-Sonora Boundary to the outfall of the Mexican Wasteway would parallel conditions that now exist. Flow in the 19 miles of river channel would be increased in proportion to the loss due to infiltration and evaporation that has occurred from Morelos Dam to the boundary. The period of discharge time of drain water to the river channel would be related to lag in construction time of the two segments of the bypass drain and the requirements of the Mexican Government. It is not expected that wasteway discharge would be made subsequent to operation of the desalting complex.

(4) Periodic Bypass of Wellton-Mohawk Drain Flows

After the desalting plant is operational there will be infrequent occurrences when the entire flow from the Wellton-Mohawk Division will be diverted through the bypass drain to Santa Clara Slough. This will occur in emergency situations such as during a power outage at the desalting plant, or when operating conditions occur, i.e., insufficient capacity of the desalting plant or additional Wellton-Mohawk Division pumping requirements resulting from the infiltration of Gila River floodflows. In any of these situations the quality of the reject stream will be enhanced in proportion to the volume of additional flow.

The increased flow in the bypass channel during these periods will result in a flushing effect in the channel and will temporarily add a greater discharge volume to Santa Clara Slough. Aquatic inhabitants of the drain will be transported to the outfall of the Santa Clara Slough in greater numbers than usual. Intermittent increased flows will clear silt deposits and provide moisture to the entire canal prism which normally will have a water depth of only 2 feet. A periodic increase in the rate of discharge to Santa Clara Slough will add a freshening effect to the ponded water and could temporarily add an increase in surface area. Safety hazards associated with the drain will rise during the periods of increased flow.

(5) Bypass During Floodflow Conditions

During certain hydrologic conditions it may become necessary to make flood control releases from storage reservoirs on the Colorado River. If flood control releases continue for an extended period of time and with sufficient flow to maintain treaty requirements, the desalting plant will be shut down and the Wellton-Mohawk Division drainage flows will be bypassed to Santa Clara Slough.

The increase in the volume of water in the bypass drain and consequently the volume discharged into Santa Clara Slough will have impacts similar to those described in the preceding Section (d), but with a greater magnitude. Water quality in the ponded area of the Slough will be improved during the bypass period and the surface water area will be expanded temporarily. If floodflows are of a magnitude to merit bypass to the Colorado River channel below Morelos Dam they will result in an overall enhancement to the riparian flora and fauna. Impacts on this area are described in this chapter under Section b.(1).

b. Morelos Dam to Southerly International Boundary

(1) General Impacts

The alignment of the bypass drain to the Southerly International Boundary will be adjacent to the Yuma Valley Levee. With the exception of two areas that will require installation of bench flumes or siphons where the river approaches the levee, it will have limited impact on areas of vegetation. Less than 3 acres of vegetation will be affected by the bench flumes or siphons. This will result in the loss of a small amount of habitat for doves, and a proportionate amount of habitat for other small animals. The 16 miles of this reach will add 32 surface acres of drain water at an average depth of about 2 feet. There is little possibility of a sustained, viable fishery developing within the drain.

There will be a reduction of aquatic and riparian habitats along the Colorado River below Morelos Dam as a result of eliminating the discharges of Wellton-Mohawk drainage water below the dam. There will be an overall reduction of river flows and acreages of surface water as well as an indirect impact on the ground-water level adjacent to the river. The surface area and water level of the approximately 23.8 acres of backwaters and off-river connectives including the Hunter's Hole area, will eventually be affected. The degree of impact on the vegetation along the river will be dependent upon the contribution the bypassing of the Wellton-Mohawk drainage has had on the ground-water level for the 10 years it has been discharged below Morelos Dam, the viability and stage of development

of the affected vegetation, the effects of the existing Mexican and U.S. well pumping in the vicinity, the frequency of floodflows, and the magnitude of surface runoff.

Subsequent to the completion of Morelos Dam in 1950, the river below Morelos Dam has not always been a continuously flowing stream. There have been periods since then when this section of the river was essentially dry. The discharge of Wellton-Mohawk drainage water below Morelos Dam, as required under Minutes Nos. 218, 241, and 242 of the International Boundary and Water Commission has been practically the only flow below Morelos Dam since the latter part of 1965.

The cessation of Wellton-Mohawk drainage discharges into the river channel will have a beneficial effect by eliminating the possibility of further infiltration of saline water into the ground-water aquifer, thus preventing this continued contamination of the ground-water aquifer underlying the Mexican well fields in the Mexicali Valley.

(2) Physical Environment

(a) Seismic Danger

Major faults in the project area are shown on Plate 6. In the deep wet area traversed by the bypass drain alignment, the occurrence of earthquakes on these faults in the vicinity of the drain could produce adverse effects on the drain not only by severe shaking, with local surface breakage along the active faults, but also by liquefaction and subsidence related to compaction or tectonic activity.

In the event of seismic damage to the bypass drain, reject and/or the bypassed drainage water would be shunted to the old Colorado River channel. Under the proposed plan, emergency evacuation points will be constructed at the Southerly International Boundary and halfway down the drain in Mexico, in addition to the existing M.O.D.E. No. 3 discharge facilities. The desalting plant would be shut down in case of drain damage downstream. The wells supplying the drain water could be shut down in a short period of time; however, it is also possible that this water would be bypassed around the desalting plant and discharged into the Colorado River below Morelos Dam. Emergency evacuation of the reject water from the bypass drain or diversion of the Wellton-Mohawk drainage flows into the river channel below Morelos Dam will result in temporary infiltration of these waters into the ground-water aquifer and temporary degradation of aquifer water quality.

(b) Ground-water Quality and Quantity

The discharges of Wellton-Mohawk drain water into the Colorado River channel below Morelos Dam will be terminated, thus eliminating the intrusion of the saline drainage water into the ground-water aquifer below Morelos Dam. The concrete-lined bypass drain will prevent all but minor infiltration, less than 1 percent, of the saline drainage water to the ground water.

(3) Biological Environment

(a) Vegetation

The 260 acres of Federally owned lands within the existing levee right-of-way, which will be required for the bypass drain, plus a portion of the 70 acres of additional rights-of-way, support vegetation which is similar to but less dense than that of the Colorado River reach below Imperial Dam. This growth consists primarily of salt-cedar, mesquite, willow, arrowweed, seepwillow, quailbrush, and cottonwood. A portion of the lands included in the additional rights-of-way consist of recently planted citrus orchards and irrigated grasslands.

With the exception of the land required for the rights-of-way, the bypass drain will not have a direct impact on the vegetation along the river; however, there will be a loss of riparian habitat downstream from Morelos Dam as a result of bypassing water to Santa Clara Slough by concrete-lined conveyance in lieu of discharging drainage flows into the Colorado River.

Lack of sustained flows in the limitrophe section of the Colorado River, along with lowering of ground-water levels due to ongoing pumping in the existing Mexican and U.S. well fields, will result in the loss of about 95 percent or 134 acres of surface water along this reach of the river in 10 years and 100 percent or 141 acres of surface water in 50 years. There will be a corresponding loss of riparian habitat amounting to an estimated maximum loss of about 420 acres (about 13 percent of the total 3,190 acres along the limitrophe section on the Arizona sides of the river) in ten years and 851 acres (about 27 percent of the total) in 50 years. Further breakdown of the habitat types which are expected to be lost is shown in Table 29.

(b) Fish

The eventual elimination of the aquatic habitat in the Colorado River mainstream and its associated backwaters below

Morelos Dam will result in the loss of the fish population and other aquatic organisms in those areas. The 141 surface acres of water which will be lost from the dam to the Southerly International Boundary comprises some of the best fish habitat and approximately 41 percent of the water surface acreage in Yuma Valley, excluding the river above Morelos Dam. Fish species which will be lost include the threadfin shad, red shiner, carp, goldfish, flathead catfish, yellow bullhead, channel catfish, striped mullet, redear sunfish, bluegill, green sunfish, warmouth, black crappie, largemouth bass, tilapia, mosquito fish, and mollies.

There will be no impact on any endangered species of fish. None of the fish species listed in the 1973 edition of the Fish and Wildlife Service's Threatened Wildlife of the United States, are found in this area.

(c) Wildlife

The requirement for utilization of 260 acres of existing levee rights-of-way and 70 acres of additional Federal and private land for the bypass drain alignment will eliminate a like amount of wildlife habitat consisting of some agricultural lands, riparian vegetation, and desert mesquite. Small animal species such as rodents, rabbits, lizards, quail and roadrunners will be lost from the lands along the proposed alignment. A limited amount of dove nesting habitat will also be lost. The drain will act as a barrier to some of the small animal species and may affect larger animals to some degree if the drain flows at capacity.

The potential long-term loss of 851 acres of riparian vegetation and 141 acres of surface water (as shown in Table 29) due to cessation of sustained flows below Morelos Dam will result in the respective loss of some wildlife populations of the area. Generally, there will be a change in animal species composition, diversity and density from the more hydric- and mesic-loving species to those preferring, or adaptable to, a more xeric state. Those wildlife species such as beaver, muskrats, and aquatic and semiaquatic birds and amphibians dependent upon the 63 acres of saltgrass and emergent vegetation and 141 acres of aquatic habitat (which is expected to be lost) will be lost. There will be about 7 acres of marsh type habitat which will be maintained just below the dam where semiaquatic wildlife species will be able to survive. With the estimated loss of 136 acres of mature saltcedar, 96 acres of open saltcedar, 24 acres of mature mesquite and 141 acres of open water, there will be a substantial change in the existing bird, reptile and mammal populations. There will be a potential annual loss of about 10 percent, or 1,274 white-winged dove nests and about 10 percent or 544 mourning dove

Table 29

PREDICTED MAXIMUM LOSSES OF HABITAT TYPES ALONG COLORADO RIVER MAINSTREAM
 DUE TO CESSATION OF WELLTON-MOHAWK DRAINAGE
 FLOWS BELOW MORELOS DAM^{1/}

Habitat Type	10 years		50 years	
	% Loss	Acres Lost	% Loss	Acres Lost
Mature Saltcedar	0	0	10	136
Open Saltcedar with Arrowweed	0	0	10	96
Mature Mesquite	0	0	10	24
Emergents and Saltgrass	0 ^{2/}	0	90	63
Artificial-Periodically cleared areas	75	420	95	532
Total Vegetative Habitat Losses	13	420	27	851
Openwater	95	134	100	141
Total Losses	17	554	30	992

^{1/} Included also are effects of existing Mexican and U.S. well fields drawdown of ground-water levels along the river.

^{2/} Losses will be compensated by expected encroachment of emergents into low-lying areas which presently contain surface water.

nests. Due to their virtual absence in the area, big game species will not be affected. Rodent populations will decline by about 50 percent in the affected areas from about 18 to 23 individuals per acre to 10 to 12 individuals per acre. This will be followed by a proportionate loss in mammalian predators such as skunks, coyotes, foxes, raccoons, bobcats, and badgers, in avian predators such as hawks and owls, and in the various reptilian predator species.

The U.S. Fish and Wildlife Service's publication, United States List of Endangered Fauna, May 1974, does not list any endangered mammals, reptiles, or amphibians which are found in the area of the bypass drain. However, they do list three species of endangered birds which have been recorded in the project area. These are: Yuma clapper rail, Southern bald eagle, and American peregrine falcon. The California black rail, a threatened species, is known to be in the project area but has not been observed or recorded south of Morelos Dam and is expected to be unaffected by the project.

The Yuma clapper rail is the only one of the three endangered bird species which is common in the area (see Chapter II) and which will be affected by the project. The construction and operation of the bypass drain will not have any direct effect on the Yuma clapper rail; however, cessation of drainage flows below Morelos Dam, along with reduced ground-water levels in the area caused by existing Mexican and U.S. pumping, will result in the eventual elimination of all but about 7 acres of the 30 to 40 acres of suitable clapper rail habitat along the limitrophe section of the river. This is an estimated loss of about one percent of the suitable clapper rail habitat which exists along the lower Colorado River between Davis Dam and the Arizona-Sonora Boundary. Loss of this amount of habitat will not be critical to the survival of the species, nor jeopardize the existence of the rails along the lower Colorado River. The 7 acres of marsh habitat just below Morelos Dam will not be affected by this project since they will continue to receive seepage from the dam and the Alamo Canal. This area appears to be the most preferred habitat by the clapper rail along the limitrophe section of the river. This area below Morelos Dam accounted for 5 of the 8 birds recorded during the 1973 multiagency inventory of Yuma clapper rail along the limitrophe section of the Colorado River and at least half of the 7 to 11 birds recorded during the 1974 inventory. Therefore, there will be an estimated loss of 3 to 5 birds due to implementation of the project. This is less than one percent of the clapper rail population along the lower Colorado River.

Every possible effort is being made to comply with Section 7 of the Endangered Species Act (P.L. 93-205) which states:

"The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary after consultation as appropriate with the affected states, to be critical."

Further, the Secretary's memorandum of October 16, 1974, designates the U.S. Fish and Wildlife Service as the agency responsible for implementing and coordinating the Act. In regard to the portion of Section 7 dealing with the modification of possible critical habitat, the Bureau of Reclamation is coordinating efforts with the U.S. Fish and Wildlife Service as outlined below.

Reclamation developed and submitted status reports of endangered species habitat area to the Fish and Wildlife Service at the field level for comment and recommendations.

The reports include an analysis of population density, quantification of existing habitat, impact of the project on habitat, mitigation measures, and resulting net change in habitat. The reports conclude that impacts stemming from the project will not result in habitat loss that would jeopardize the continued existence of the Yuma clapper rail. The Fish and Wildlife Service was requested to consult with the affected states in concurring with the recommendations. Following the receipt of comments from the Fish and Wildlife Service, the reports will be revised to include these comments and forwarded from the Commissioner, Bureau of Reclamation, to the Director, Fish and Wildlife Service, for formal recognition of compliance with Section 7 of the Endangered Species Act of 1973.

(4) Cultural Environment

(a) Land Use

The only impact on land use caused by the bypass drain will be within the drain rights-of-way. The use of 260 acres of existing

Yuma Valley Levee rights-of-way will eliminate its present limited use as wildlife habitat. The 50 acres of undeveloped land and 80 acres of developed farmland required for bypass drain rights-of-way will preclude the continued use of these lands for agricultural purposes. Considering the 195,543 acres of producing agricultural lands with a gross crop value of over \$99,000,000 in the Yuma area, the lost potential of agricultural products from these lands is minimal.

(b) Recreation

Construction and operation of the bypass drain will have little direct effect on recreation in the area from Morelos Dam to the Southerly International Boundary. Bridges will be placed over the drain to allow recreationists use of the public lands between the drain and the river and local residents access to private or leased lands on the west side of the drain.

Cessation of drainage flows below Morelos Dam will result in a reduction of the recreational activities of the area. Fishing, which is the dominant recreational activity engaged in along this section of the river, will be virtually eliminated. At the present rate of use it is estimated that this will mean an annual loss of perhaps 6,000 to 7,000 man-use days of fishing activity. This will result in increased fishing pressure on the river above Morelos Dam and along Yuma Valley irrigation canals. Most of the waterfowl hunting will also be lost along the affected section of river due to elimination of aquatic habitat required by the sought after species. Upland game hunting will be reduced by perhaps 10 percent which will be the proportionate loss of habitat presently being used by the corresponding upland game species such as cottontail, quail and dove. Total loss of hunter-use in this area is estimated to be about 1,200 use-days.

Other recreational activities of lesser importance such as swimming, picnic-camping, and interest visitation will also be reduced. It is estimated that less than 50 percent of the recreational potential of the riverine community below Morelos Dam is at present being utilized. This perhaps is due to lack of facilities and the significance of the river being the International Boundary and the border security restrictions and activities. The project will reduce the potential recreational value of the area which is at present only partially utilized.

(c) Archeological and Historical

An archeological survey covering the rights-of-way for the bypass drain has been conducted and no resources were found.

Archeological clearance has been granted by the National Park Service for the drain alignment. Consultation with the State Liaison Officer for Historic Preservation confirms that there are no known historical sites located in the area (see Chapter II, Section B.3.a.(3)(b)).

c. Southerly International Boundary to Santa Clara Slough

(1) General Impacts

The bypass drain from the Southerly International Boundary to Santa Clara Slough will be similar in size and construction to the reach in the United States. The structure will be an open drain except for siphons and will be approximately 37 miles long from the Boundary to the Slough, upstream from the Gulf of California. Bridges will be required for road crossings.

The direct adverse impact caused by this reach of the bypass drain will be the infringement of a concrete-lined drain on the terrain, the retirement of approximately 370 acres of agricultural land, and the commitment of approximately 380 acres of desert terrain to the drain right-of-way. There will be some loss of small game species to drowning. It is unlikely that a sustained viable fish population can be established in the drain.

For a period of about 3 years after construction of the bypass drain and prior to completion of the desalting plant, the full flow of the Wellton-Mohawk drainage channel will be bypassed to the Santa Clara Slough. During this time it is anticipated that the flows will be reducing from the present flow to about 175,000 acre-feet per year. After completion of the desalting plant, the reject flow amounting to about 43,000 acre-feet per year will discharge to the Slough. This discharge will cause the marsh and open water areas of Santa Clara Slough to increase in size. Fishing potential may be expanded and wildlife habitat increased and stabilized. The cessation of Wellton-Mohawk drainage flows in the Colorado River below Morelos Dam will cause the essential dry up of the river channel in Mexico except for agricultural drainage flows and occasional storm runoff and sporadic floodflows. This will result in the loss of some riverine-associated fish and wildlife habitat along the river. The river at present carries only small flows and does not flow to the Gulf of California, but is restricted by an earthen plug located south of the confluence of the Colorado River and the Rio Hardy and about 14 miles upstream from the Gulf of California.

(2) Physical Environment

The concrete-lined bypass drain will transport all of the reject water from the Mexican Border to Santa Clara Slough. There will

be a small quantity of seepage and evaporation loss in the bypass drain. Ground water from the boundary to the slough will not be affected. In the rare event of a break in the drain, emergency precautions discussed in B.3.a.(2)(a), Seismic Danger, of this chapter will be affected. Periodic cleaning and maintenance of the drain will be required and this will be done by Mexico.

(3) Biological Environment

(a) Vegetation

This reach of the alignment will traverse approximately 18 miles of agricultural land and approximately 19 miles of fallow and desert shrub land, requiring approximately 370 and 380 acres of right-of-way, respectively. The agricultural lands, which consist primarily of alfalfa, small grains, and cotton, will be retired from cultivation. The loss of 380 acres of typical Sonoran Desert vegetation on the fallow and desertland will result in the loss of habitat for wildlife such as small game and doves. Careful selection of the final route will reduce these impacts.

(b) Fish and Wildlife

Dove, quail, and rabbits are common to the area. Fish and wildlife species are generally similar to those along the alignment in the United States. The impact of the bypass drain upon these species will also be similar. The introduction of a new water source into the area may enhance avian and small game populations depending on the water quality, but may result in some losses of the latter species by drowning.

Although a major portion of the fish population in the river will probably be lost due to loss of aquatic habitat, there will most likely be localized low areas of the riverbed in which drainage waters will pool and maintain viable fish habitat at least for small species such as mosquito fish, mollies, and shiners. Losses of wildlife will be minimal since retention of a major portion of the riparian habitat along this reach of the river is expected due to sustained ground-water levels. If the low drainage flows in the river do create additional marsh vegetation this may evolve into additional wintering habitat for the endangered Yuma clapper rail.

(4) Cultural Environment

(a) Land Use

Approximately 750 acres of rights-of-way will be required for the bypass drain. The rights-of-way for the drain in

Mexico will be 37 miles long and an average of 165 feet wide. Approximately 550 acres are privately owned and the remaining 200 acres belong to the Mexican government. All of the Government land and 180 acres of the private land are presently uncultivated desert habitat, and use of the land for right-of-way will not have a significant effect on land use. Three hundred and seventy acres of the private land are cultivated for agricultural purposes, and use of this land for right-of-way purposes will mean a long-term loss of this acreage from agricultural production.

(b) Recreation

There should be no adverse impact on recreation as a result of the drain, although the drain will create a safety hazard to humans, especially when flowing at full capacity.

Cessation of sustained riverflows will have a significant adverse impact on recreation or recreational type activities in Mexico. The river is currently utilized by the Mexican people for swimming, bathing, and netfishing. The proposed project will result in the loss of a major portion of these activities.

(c) Archeological and Historical

Archeological and historical surveys for this reach have not been conducted, but coordination will be maintained with the Mexican government in regard to archeological aspects and concerns for historical significance along the proposed route prior to final selection. Recognition of and compliance with requirements of the Mexican government will be adhered to at all times.

d. Santa Clara Slough

Several field reconnaissances of the fish and wildlife habitat and vegetative types within and adjacent to the slough have been made. The overall effect of introducing the 8,416 p/m reject stream into Santa Clara Slough depends on the mode of operation as discussed earlier in this section. This water could enhance the area by supporting additional and stable wildlife habitat. In view of the adjacent salt flats and the continuous evaporation in the area, it is not anticipated that an additional salt load of this level will have a detrimental effect. The volume of the increased flow into the upper portion of the slough may cause scouring and deterioration of the 75 acres of stable marsh area, while at the same time enhancing the overall fish and wildlife habitat conditions of the area by creating additional water surface.

The introduction of a large volume of water may enhance the potential for certain fish species by providing additional habitat while at the same time adversely affecting the dense population of desert pupfish that are so abundant in the small open water area of the marsh. The impacts will be related to the ability of the pupfish to withstand change of environmental conditions including competition with other species and increased predation. The changes that occur will be dependent upon the site location of the outfall of the bypass drain by the Mexican government.

If a dissipation of velocity could be accomplished, the evolutionary life of the marsh could be sustained and its area expanded. The frequency of flooding of the area by tidal action and floodflows down the drain is the most important consideration in a complete assessment of impacts. Historical indications are that the slough is infrequently flooded during extreme tides resulting from hurricane conditions.

With an average flow rate of 60 ft³/s in the drain, there will be an annual average contribution of about 43,000 acre-feet of water to the slough, less 800 acre-feet of surface evaporation plus minor seepage losses from the drain. Depending on the location of the outfall, the topography, and rates of evaporation and percolation, the slough could expand to the point where it would again be connected to the Gulf of California. There is also a possibility that the increased volume of flow into the slough may reestablish a channel through the upper portion of the slough and drain or flush out some of the existing marshland.

Further study of basic contours and elevations of the slough and salt flats will be essential to determine whether to discharge directly into the existing marsh area or bypass around the vegetated area and discharge on the salt flats to the south. There is also the alternative of utilizing a combination of the two, i.e., using some of the flow for expansion of the slough and discharging the remainder on the salt flats to the south or west of the area for evaporation. Implementation of these and other potentials is dependent upon the wishes of the Mexican government.

4. Other Components

a. Wellton-Mohawk Division Acreage Reduction

The retirement from the Wellton-Mohawk Irrigation and Drainage District of approximately 4,200 acres of land that is now

in crop production (specific identification of the lands to be retired has not been completed), and approximately 5,800 acres that are not currently under irrigation will have both adverse and beneficial impacts on the natural and human environment. The beneficial impact on the natural environment will be the reversion of agricultural lands to a natural condition. The reversion of some of these lands may be similar to the existing natural area adjacent to the Gila River. If so, there will be a potential expansion of habitat for dove nesting, rabbit, and other small animal species. The estimated nest density for white-winged dove in the dense riparian habitat along this section of the Gila River is 274 per 100 acres. 1/ Densities for mourning dove nesting are slightly higher. There will be a loss of 4,200 acres of food producing potential for wildlife if the land selected for retirement is currently planted in crops suitable for wildlife use. This acreage constitutes about 2.5 percent of the 168,839 acres currently irrigated in the Yuma area. The inclusion of 5,800 irrigable acres not now being irrigated will remain in its national status and will be a long-term contribution to the stability of the existing wildlife populations.

Based on 1973 values, there will be a loss of economic returns, estimated at \$2,100,000 annually, to farmers now cultivating the 4,200 acres that are to be retired. The potential for economic benefits, estimated at \$2,900,000 annually, will be lost from the 5,800 acres that are not now in production, but will be retired. A proportionate amount of food production and potential food production will be forgone. Taxes derived from those lands to be taken out of production will be lost.

The implementation of the irrigation management program will progressively reduce the amount of water required for crop production. This will result in a proportionate decrease in irrigation drain water that will have to be pumped. As a result, the net consumptive use of the Colorado River water by the District will remain at approximately 300,000 acre-feet per year. However, surface water that normally results from flood irrigation will be reduced where pressure irrigation systems are installed. With improved irrigation efficiency, the salinity level of drain water will be greater than without improved efficiency.

b. Painted Rock Reservoir

A change in the management of floodflow releases from Painted Rock Reservoir will have beneficial impacts on the Wellton-Mohawk Irrigation and Drainage District. Drainage conditions will be improved since the flows will be controlled and infiltration will occur mostly

1/ Dennis D. Wigal, A Survey of the Nesting Habitats of the White-Winged Dove in Arizona: Special Report No. 2 (Arizona Game and Fish Department: Phoenix, Arizona, June 1973).

upstream from the District, except for large streamflows which will still have to be passed through the District. This will result in economic benefits through improved crop production and by eliminating the necessity of additional pumping in the District.

There will be an increased salinity of impounded waters due to increased evaporation because of longer periods of impoundment behind Painted Rock Dam. If the released water infiltrates above the Wellton-Mohawk Irrigation and Drainage District, the increased salinity will have no effect upon the District. If additional floodwaters enter the reservoir that would require larger releases, it is contemplated that the increased releases would not take place until there is sufficient inflow to dilute the salinity of the water remaining in the reservoir. Slower and more continual releases of floodwaters below Painted Rock Dam will enhance the green belt immediately below the dam. Slower water releases by the Corps of Engineers during 1974 have already resulted in increased wildlife habitat and wildlife population along the Gila River below the dam.

There are two possible methods of utilizing land within the reservoir, each of which will have a particular set of impacts.

(1) The lands may be operated essentially as they have been in the past. After the 8,800 acres of private land are acquired, the 4,000 acres presently under cultivation could be leased back for the same purpose. The Fish and Wildlife Service could continue to lease the presently irrigated 2,600 acres of Federal land for agricultural and wildlife benefits. There would thus be no change in land use under this approach.

At this writing, the actual anticipated operating criteria of Painted Rock Reservoir under the expanded Federal ownership described above have not been defined. It is conceivable that flood studies will show a pool of water standing on these newly acquired lands for a period of time that will make leasing the lands for agricultural purposes infeasible, or the lands may only be available for short duration crops on a 6-month basis which might change the present cropping patterns. Prolonged inundation of these lands will increase the salinity of the water and the lands due to increased evaporation. In any event, additional studies will be necessary to determine the feasibility of leasing back the lands to be acquired for agricultural purposes.

(2) Following the purchase of the private land, the area could be allowed to return to a natural condition. If this were done, there would be a loss of agricultural food products for wildlife and economic losses to the farmers. There would, however, depending upon the frequency of flooding,

overall increase in riparian habitat on a portion of the 6,600 acres now under cultivation. This increase in riparian habitat would have the potential for producing additional nesting habitat for white-winged and mourning doves. There would also be a proportionate increase in habitat for smaller animals, such as Gambel's quail, raccoon, fox and others, assuming that the lands would not be inundated to the extent that the riparian habitat would not develop.

The decision by the Corps of Engineers for the necessity of purchasing the additional lands will not be made until a court of competent jurisdiction decides that the existing flowage easements are inadequate to meet the requirements of a change in operating criteria.

c. Transmission System

The principal impact of construction of the transmission lines will be visual in nature. Approximately five miles of wood-pole 161-kV transmission lines will be constructed, all of which will parallel an existing wood-pole 161-kV transmission line. Construction will generally be contained within an approximately 85-foot right-of-way for 4.8 miles. Structure heights will range from 60 feet to 70 feet with intervals of 700 to 800 feet between structures.

The crossing of the Colorado River will be adjacent to an existing transmission line in an established transmission line river crossing.

The transmission line will cross over U.S. Interstate 8 and the Southern Pacific Railroad. At these locations, no change in the use of roadways will be made except for some unforeseen minor delays to the highway users during the time of the crossing construction. After the lines are in service, a motorist may experience low level electrical interference with radio reception. This annoyance is generally limited to the immediate area surrounding the conductors.

Structure site clearing will not be necessary except in the immediate vicinity of the wood poles. Temporary loss of desert vegetation may occur due to the crossing of machinery over plants which may only damage them. The regrowth of these plants may resume almost immediately after the crossing of the equipment. Less than 0.1 acre of vegetation will be lost due to structure site preparation.

Maintenance inspection of the transmission lines will generally be performed by monthly helicopter fly-bys. Emergency

services of electrical crews for the transmission line may be required during and immediately after severe area storms. Impacts of these activities will be similar to those expected during construction of the transmission lines.

C. First 49 Miles of the Coachella Canal

1. General Impacts

The total length of the Coachella Canal is 123 miles, the first 86 miles of which are unlined. Over the 16-year period from 1955 through 1970, conveyance losses from the unlined reach averaged 160,460 acre-feet per year, or about one-third of all water turned into the canal. The most significant overall impact will be the savings of 132,000 acre-feet of water per year by lining the first 49 miles with concrete. The water quality will be the same as that of the Colorado River at Imperial Dam. The salvaged water will be credited to the United States for the purpose of delivery of water to Mexico as a replacement for the bypassed Wellton-Mohawk drain water on an interim basis until such time as the Secretary of the Interior does not meet all the water delivery requests of the California agencies holding Colorado River water rights up to a total of 4.4 million acre-feet per year. After the desalting plant is in operation, any credits from the savings due to Coachella Canal lining would be used to offset past debits, credit against brine discharge from the desalting plant and accumulate credits to offset future brine discharges. Public Law 93-320 provides that credits of the water saved by the lining of the first 49 miles of the Coachella Canal will commence upon completion of the lining and will terminate the first year that the Secretary of the Interior delivers mainstream Colorado River water to California in an amount less than the sum of the quantities requested by (1) the California agencies under contracts made pursuant to Section 5 of the Boulder Canyon Project Act (45 Stat., 1057) and (2) Federal establishments to meet their water rights acquired in California in accordance with the Supreme Court decree in Arizona vs. California.

The utilization of additional desertshrub habitat along the proposed route will result in losses of the existing wildlife populations on the affected lands. The abandonment of the lands along the old canal alignment will partially offset these losses. Some riparian vegetation and all open water areas that have developed adjacent to the existing canal alignment will eventually be lost. In turn there will be a loss of fish and wildlife habitat in these areas and a reduction in quality of fish habitat that has developed within that portion of the canal that is to be replaced by the concrete lined section. Some loss of animal species will occur as a result of drowning. The silt and

algae load of water in the canal will be reduced. However, there will be an increase in filamentous algae attached to the canal lining and also an increase in planktonic organisms as a result of increased light penetration into the less turbid waters of the canal. There will also be an increase in planktonic feeding organisms with the increase in algae.

The ultimate decision on whether to continue serving the presently irrigated citrus land, amounting to about 500 acres; whether to allow these operators to expand the citrus acreage in accordance with their scheduled development plans to about 1,300 acres; or whether to eliminate the irrigation of this land entirely will have an effect on land use, economic returns, and available nesting habitat for doves and other nongame species of birds.

The new canal alignment will have no impact on mineral resources of the area. Commercial operations for sand and gravel are present in the area, but are limited to the beach line of the ancient Lake Coahuilla, which lies to the west of the canal.

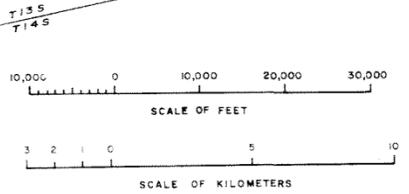
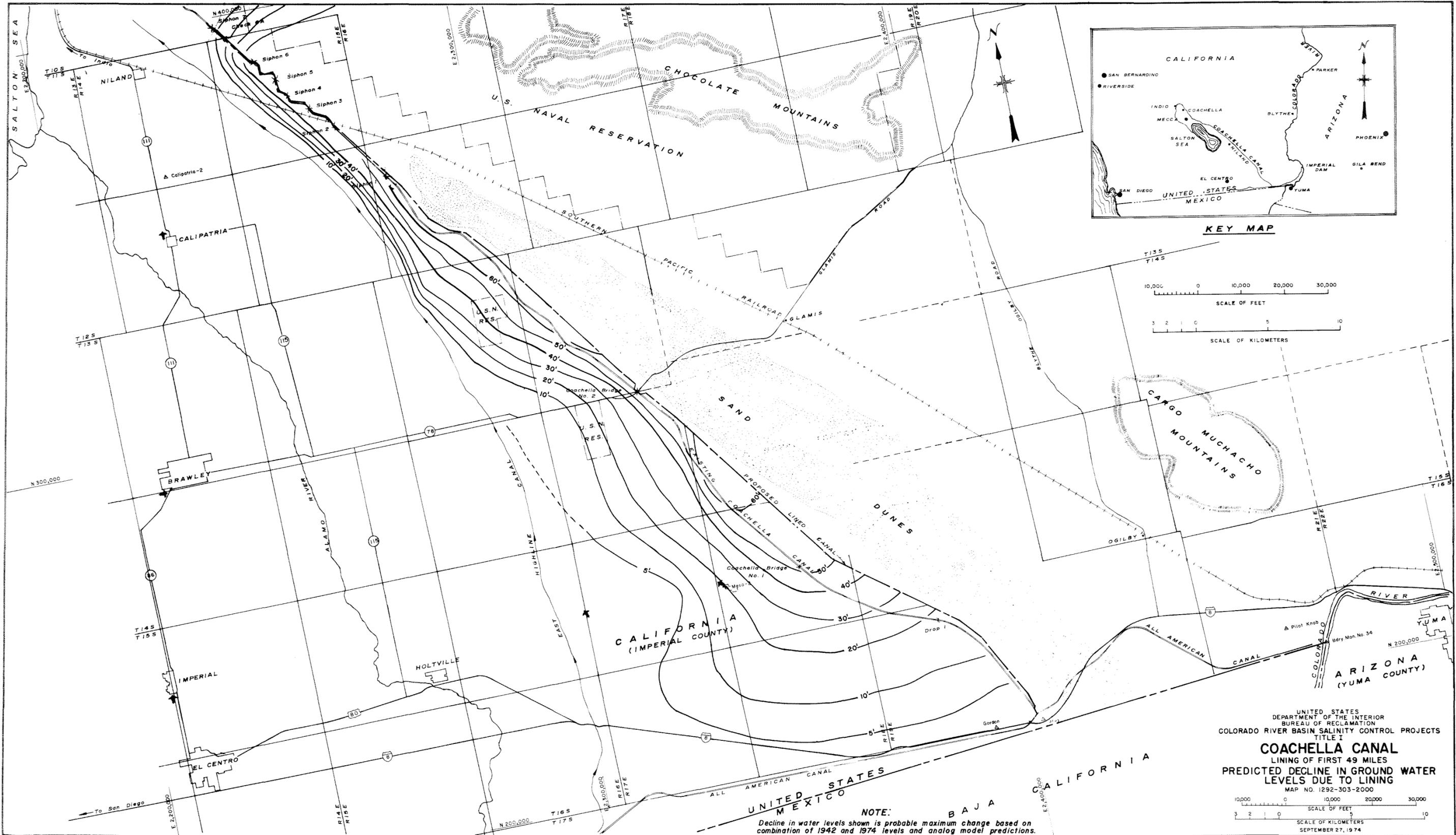
There will be no impact on the geothermal resources now being explored on the Imperial East Mesa near the canal alignment. The planned alignment passes just to the west of one capped test hole that was drilled in 1972. Due to the great depths of most geothermal drilling in the area (4,000-8,000 feet) slant drilling could be employed if it became necessary to drill under the canal.

2. Physical Environment^{1/}

The predicted maximum decline in the water table as a result of the 49 miles of lining is shown on Plate 14. The map is based partly upon the results obtained from a conductive sheet electric analog model and partly on the difference between the 1942 and 1974 ground-water levels. Predictions based on the difference in the ground-water levels alone would be inaccurate because of the following reasons:

1. A section of the canal beyond mile 49 will not be lined and will continue to leak as before.
2. The 1942 water table had not reached its equilibrium level.
3. The lined section of the canal will seep some 5 percent to 10 percent of the present rates.

^{1/} Information for this section was obtained from Preliminary Report on Ground-water Hydrology of Coachella Canal Area for Fish and Wildlife Ad Hoc Committee for Coachella Canal Unit, Colorado River Basin Salinity Control Projects, Title I, prepared by U.S. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada, Yuma Projects Office, Yuma, Arizona, November 1974.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
TITLE I
COACHELLA CANAL
LINING OF FIRST 49 MILES
PREDICTED DECLINE IN GROUND WATER
LEVELS DUE TO LINING
MAP NO. 1292-303-2000

10,000 0 10,000 20,000 30,000
SCALE OF FEET
3 2 1 0 5 10
SCALE OF KILOMETERS
SEPTEMBER 27, 1974

NOTE:
Decline in water levels shown is probable maximum change based on combination of 1942 and 1974 levels and analog model predictions.

4. Recharge from about 800 acres of irrigated land developed on Imperial East Mesa since Coachella Canal went into operation.

The relative rate of decline in the water table after the canal is lined will probably be similar to the rates of rise when the canal went into service. Those rates were as high as 19 feet per year. The decline rate could be faster than the rise rate because part of the water will be retained in the soil. During initial fill-up, the soil was practically dry and more water was required per unit volume of soil to change the water table a given amount than for a similar change when the water table falls. This will be partly offset because the lining will leak some; however, it is believed that the water table beneath and near some sections of the canal may drop as much as 20 feet in the first year. Farther from the canal the rate of change will be less.

The water table decline in the major wildlife area will eventually be as much as 60 feet but little change will occur to the west near the East Highline Canal. Plate 15 shows estimated maximum depths to ground water after lining and the water table reaches its new equilibrium condition.

Lining the Coachella Canal will greatly reduce the hazard of the rising ground-water levels in the Imperial East Mesa area. However, there should be no discernable impacts on the water quality and quantity of the Salton Sea as a result of the cessation of seepage water from the first 49 miles of the Coachella Canal.

As shown in Table 30, the total 36 acres of open ponded water which currently exists due to high ground-water levels resulting from seepage from the Coachella Canal will be lost in a period of about 4 to 6 years after the transfer of canal flows into the new concrete lined section has been accomplished. In addition to these losses, the small seep streams and surface water in the washes and low-lying marshes along the canal will also dry up once the ground-water levels drop.

The existing floodflow protective works which channel precipitation runoff from the Chocolate Mountains across the canal at the various siphons will be retained with only minor modifications.

3. Biological Environment

a. Vegetation

The major impact on vegetation will be caused by the declining ground-water levels due to elimination of seepage waters

from the canal. Table 30 shows the maximum expected long-term losses of the various riparian habitat types in the affected area. Losses are determined by correlating estimated ground-water drawdown contours with the existing riparian habitat locations. The rate of ground-water withdrawal was also taken into consideration as were the general environmental factors of the project area.

As stated previously, all of the open water areas and the 496 acres of hydrophytic growth (marshes) will be lost. The remaining riparian growth of 3,560 acres which is a mixture of different phreatophytic species is expected to be reduced by about 66 percent (loss of 2,351 acres). Individual phreatophytic plant species which do survive will have to respond to the drop in water tables by sending their root systems deeper. During this time the plants will be under stress and will be more susceptible to disease, pest infestations, and other harsh environmental pressures of the hot, arid desert environment. The ability of the plants to survive will depend on the location and maturity of each plant, the amount of competition exerted by surrounding plants, and on the plants inherent adaptability to the changing conditions. If a substantial number of the larger phreatophytic plant species survive, they will be significantly less vigorous and will suffer some decadence. The plant species most likely to survive will be the facultative phreatophytes such as saltcedar and mesquite. Some of the presently existing obligative phreatophytes such as cottonwood and willow trees may also survive if water tables do not drop too far too rapidly at their respective locations. It is doubtful that there will be any new reproduction of cottonwood and willow trees. The chances for reproduction of saltcedar and mesquite will also be substantially reduced.

The major portion of the 1,209 acres of riparian habitat, consisting mainly of saltcedar and mesquite, which is expected to survive, will be located in deeply incised washes or below the shoreline of ancient Lake Coahuilla and adjacent to the East Highline Canal where ground-water levels are expected to drop only 0 to 15 feet.

b. Fish

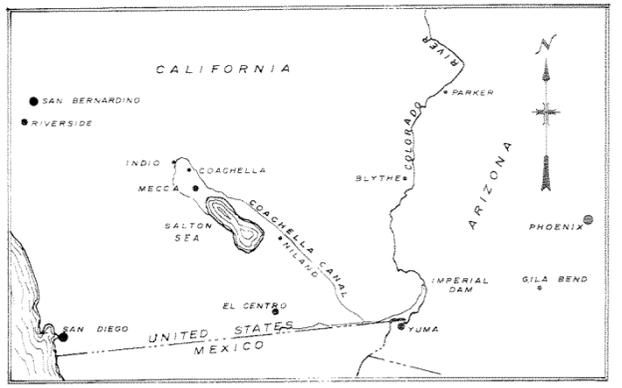
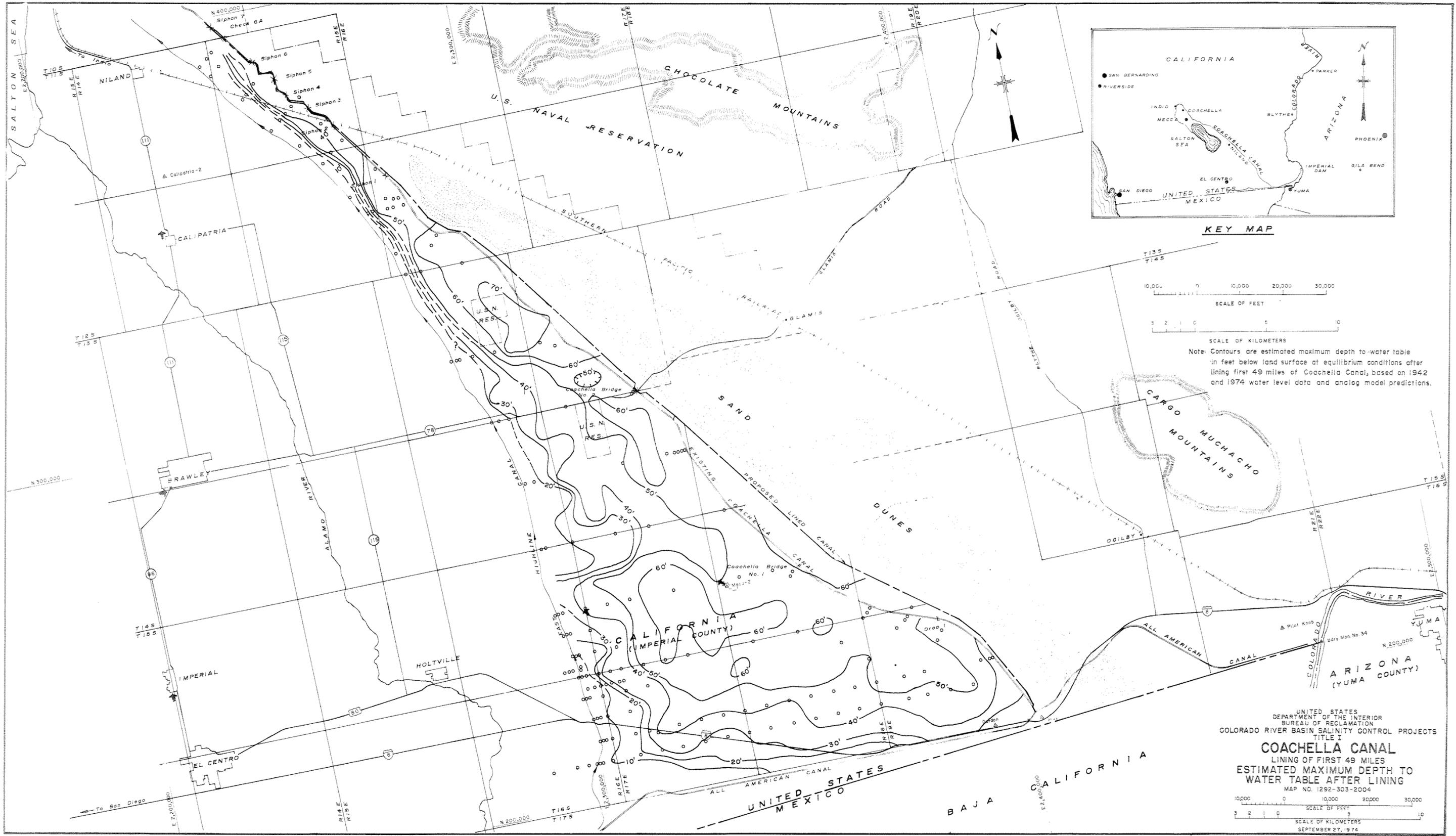
The construction of a new concrete-lined canal by reaches will prevent fish migration from the existing unlined reaches to the newly constructed lined reaches. Immediate fish losses will occur during the short water outages which will be scheduled to connect each reach of the existing unlined canal with the newly constructed reaches.

Natural reproduction of warm water game fish in the new canal will be substantially less than in the existing unlined canal.

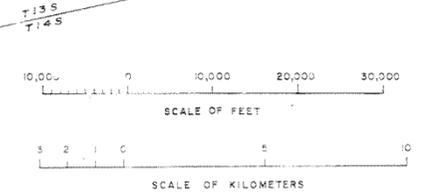
TABLE 30

TYPE OF EXISTING HABITAT, ACREAGE, AND ANTICIPATED MAXIMUM LONG-TERM
LOSS ALONG THE COACHELLA CANAL ASSOCIATED WITH A
DECLINE IN THE GROUND-WATER TABLE
OVER A PERIOD OF SIX YEARS

Habitat Type	Currently Existing Acres	Anticipated Loss Acres	Anticipated Loss Percent
Ponded Water (Open)	36	36	100%
Marsh	496	496	100%
Mixed Phreatophytes	3,560	2,351	66%
Total Riparian Habitat	4,092	2,883	70%



KEY MAP



Note: Contours are estimated maximum depth to water table in feet below land surface at equilibrium conditions after lining first 49 miles of Coachella Canal, based on 1942 and 1974 water level data and analog model predictions.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLORADO RIVER BASIN SALINITY CONTROL PROJECTS
TITLE I
COACHELLA CANAL
LINING OF FIRST 49 MILES
ESTIMATED MAXIMUM DEPTH TO
WATER TABLE AFTER LINING
MAP NO. 1292-303-2004
SCALE OF FEET
0 10,000 20,000 30,000
SCALE OF KILOMETERS
0 5 10
SEPTEMBER 27, 1974

Spawning and rearing habitat for warm water game fish, as well as for aquatic and semiaquatic fish foods, will be reduced. The most significant loss of game fish spawning will occur in the reproduction of channel catfish and especially largemouth bass. The lining will preclude the burrows, caves, and overhanging banks preferred by the catfish for spawning. It will also eliminate the sand and gravel substrates preferred by largemouth bass, bluegill, and black crappie for spawning. The vegetation needed for cover and feeding areas for the fry and fingerling of all of these species will be absent.

The present fish numbers of all species of fish in the canal are estimated at about 3,000 per mile of canal. The high water velocities and general lack of protective cover in the new lined canal section will result in a reduction of approximately 60 percent of the overall fish population in the canal. The principal reduction will occur in channel catfish, largemouth bass, bluegill, and crappie populations. There are no known Federally endangered species of fish that will be affected by the project.

The limited numbers of game and forage fish species (as described in Chapter II) which currently exist in the 36 acres of seepage ponds adjacent to the canal will be lost when these ponds dry up. There will also be a loss of the mosquito fish and yellow bullheads as the small seepage streams, which flow along some of the washes on the west side of the canal, dry up.

c. Wildlife

The new lined canal will constitute a hazard to larger animal species and even more so to small animals as they attempt to cross or drink from the canal. Considerable numbers of rodents, rabbits, and small reptiles will be lost by drowning in the new canal. The safety hazard to larger animals such as mule deer, feral burros, and bighorn sheep should be minimal in light of the fact that these species are relatively few in number in the affected area and considering the fact that the canal siphon sites provide substantial canal crossing locations in the areas which are most frequented by these animals.

Elimination of the narrow band of canal bankline vegetation will result in the loss of habitat and cover for invertebrates, small birds, and some waterfowl. It will also result in the loss of protective cover for small animals while they attempt to drink from the canal.

The major adverse impact on wildlife populations will be caused by the deterioration and eventual elimination of about 70 percent

of the riparian habitat which has been created by and is being supported by seepage water from the unlined canal. The predicted impacts on wildlife species are represented in Table 31. Loss of 100 percent of the ponded waters and marsh areas in the affected area will result in a total loss of all aquatic and semiaquatic animal species which are strictly dependent on these areas. Animal species which will be totally lost or nearly so from the affected area are the muskrat, large wading birds such as herons, egrets, and bitterns; shore birds such as rails, sandpipers, avocets, stilts, and willets; small birds such as pipits and marsh wrens; aquatic birds such as coots, ducks, cormorants, and grebes; and amphibians such as bullfrogs, leopard frogs, salamanders, turtles, and certain toads. Although these species will be eliminated from the immediate project area, they will still survive in habitat along the East Highline Canal, the canals and drains of the agricultural lands in Imperial Valley, and in the wildlife areas associated with the New and Alamo Rivers and the Salton Sea.

The loss of surface water, marsh, and a greater part of the mixed phreatophyte vegetation will result in a significant reduction of terrestrial animal species. Generally, there will be a change in animal species composition, diversity, and density from the more hydric- and mesic-loving species to those preferring, or adaptable to a more xeric state. Substantial reduction of perhaps 50 percent will occur in upland game species such as mourning and white-winged doves, Gambel's quail, and cottontails. These species will tend to concentrate (as carrying capacity allows) close to the East Highline Canal where there will still be a retention of about 1,209 acres of mixed phreatophytic growth which will provide cover, nesting habitat, and some food for these species.

The small populations of mule deer and feral burros which use the affected riparian areas will probably suffer very few losses, and will remain in the general area but will have to change locations for feeding and cover. There may be a limited amount of emigration of these species from the area. Due to the virtual absence of bighorn sheep in the project area, there will be no impact on this species.

There will be about a 30 to 50 percent reduction in rodent densities as the affected riparian habitat reverts back to precanal desertshrub conditions. This will be followed by corresponding reduction in predators such as coyotes, foxes, skunks, snakes, hawks, and owls.

The U.S. Fish and Wildlife Service's publication United States List of Endangered Fauna, May 1974, does not list any endangered mammals,

TABLE 31

PREDICTED IMPACTS ON WILDLIFE AS A RESULT OF
70 PERCENT RIPARIAN HABITAT LOSS ^{1/}
ALONG THE COACHELLA CANAL

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}		
	Adverse	Beneficial	None	Total	Substantial	Mod. Slight
<u>Mammals:</u>						
Burro Deer	X					
Bighorn Sheep			X			
Feral Burro			X			
Coyote	X					X
Gray Fox	X					X
Kit Fox		X	o r	X		
Raccoon	X				X	
Bobcat	X					X
Feral Cat	X					X
Striped Skunk	X					X
Cottontail	X				X	o r X
Blacktailed Jackrabbit	X					X
Kangaroo Rats		X	o r	X		
Muskrat	X				X	
Woodrats	X					X
Bats	X					X

^{1/} Losses include 100 percent loss of marsh and open water and 66 percent loss of mixed phreatophytes.

^{2/} Degree of impact refers to the expected degree of reduction of a species in and along the Coachella Canal and the riparian areas which are supported by seepage water from the canal. Data from wildlife inventory was used in predicting these impacts.

TABLE 31
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}			
	Adverse	Beneficial	None	Total	Substantial	Mod.	Slight
<u>Mammals (cont.):</u>							
Hispid Cottonrat	X						X
Pocket Mice	X						X
Cactus Mouse	X						X
Deer Mouse	X						X
House Mouse	X						X
Norway Rat	X						X
Round-Tailed Ground Squirrel		X	o r	X			
<u>Birds:</u>							
Heron, Egrets, Bitterns	X			X			
Raptors	X						X
Quail	X				X	o r	X
Rails (includes Yuma clapper & California black rails)	X			X			
Shorebirds	X			X			
Doves	X				X	o r	X
Roadrunners							X
Hummingbirds	X						X
Kingfisher	X				X		

TABLE 31
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}			
	Adverse	Beneficial	None	Total	Substantial	Mod.	Slight
<u>Birds (cont.):</u>							
Woodpeckers	X				X		
Flycatchers	X						X
Larks	X						X
Swallows	X				X		
Verdins	X				X		
Wrens	X				X		
Mockingbirds & Thrushes	X						X
Thrushes	X						X
Pipits	X			X			
Gnatcatchers & Kinglets	X						X
Shrikes	X						X
Vireos	X						X
Warblers	X						X
Blackbirds, Orioles, & Meadowlarks	X				X		
Tanagers	X						X
Finches & Sparrows	X						X
Coots	X			X			

TABLE 31
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}			
	Adverse	Beneficial	None	Total	Substantial	Mod.	Slight
<u>Birds (cont.):</u>							
Ducks	X				X		
Cormorants & Grebes	X				X		
<u>Reptiles & Amphibians:</u>							
Bullfrogs	X				X		
Leopard Frogs	X				X		
Turtles	X				X		
Salamanders	X				X		
Most Lizards		X	o r	X			
Tree Lizard	X						X
Desert Tortoise		X	o r	X			
Western Leaf-Nosed Snake				X			
Desert Patch-Nosed Snake				X			
Desert Glossy Snake				X			
Western Long-Nosed Snake				X			
Colorado Desert Shovel-Nosed Snake				X			

TABLE 31
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}			
	Adverse	Beneficial	None	Total	Substantial	Mod.	Slight
<u>Reptiles & Amphibians (cont.):</u>							
Western Diamond-back			X				
Mojave Desert Sidewinder			X				
Mojave Rattlesnake			X				
All other snakes	X						X or X
Most toads	X			X	o	r	X

reptiles, or amphibians which are found in the area of the Coachella Canal. However, they do list three species of endangered birds which have been recorded in the project area. These are the Yuma clapper rail, Southern bald eagle, and American peregrine falcon.

The Yuma clapper rail is the only one of the three which has recently taken up residence in the riparian areas adjacent to the canal. This species will be affected by the project. The California black rail, a threatened species, will also be affected by the project. The loss of 36 acres of open ponded water and 496 acres of marsh will result in the elimination of the clapper rail and black rail from these areas. However, these losses do not appear to be critical to the survival of these species since there are sizable populations of both species along the lower Colorado River and there are other areas of appropriate marsh habitat in the vicinity of the Coachella Canal, such as those near the southern end of the Salton Sea, which do have sizable populations of Yuma clapper rail and some California black rail. Similar procedures as explained in Section B.3.b.(3)(c) of this chapter for compliance with Section 7 of the 1973 Endangered Species Act regarding modification of critical habitat is being accomplished through the U. S. Fish and Wildlife Service.

4. Cultural Environment

a. Land Use

The rights-of-way for the existing canal will be utilized whenever possible by keeping the proposed canal close to the existing alignment. For approximately the first 37 miles, lying along the eastern edge of the Imperial East Mesa adjacent to the sand hills, the proposed canal alignment will not diverge from the existing unlined canal by more than 2 miles (see Frontispiece). About 1,020 acres of additional rights-of-way will be required for the new canal, including approximately 100 acres of patented land, and 920 acres of withdrawn public lands. The majority of the withdrawn Federal land consists of desertshrub habitat. Of the 100 acres of patented land, there are approximately 36 acres of cultivated citrus with the remaining 64 acres primarily desertshrub habitat.

The commitment of land for new rights-of-way will be partially offset by the land to be abandoned in the existing rights-of-way. For a certain time the wildlife habitat of the abandoned land will be superior to the surrounding desertland, but it will ultimately deteriorate as the ground-water levels decline. The abandoned canal could eventually become sandfilled in some reaches, while in others the vegetation could be increased due to the concentration of precipitation runoff from the embankments.

The 3,800 acres of private undeveloped lands on the Imperial East Mesa that are to be acquired by the United States and returned to public domain are primarily desertshrub habitat and will remain so throughout the life of the project.

A decision has not yet been made whether or not the 500 acres of cultivated citrus in the project area along the Coachella Canal will be purchased and irrigation service to these lands curtailed. At present it appears that purchase of these lands would be too costly. If the lands are not bought, citrus production will continue and the value of the groves as wildlife habitat, especially dove nesting habitat, will increase as the citrus trees mature. If the citrus lands are bought by the project, the lands will be allowed to revert back to natural desert vegetation.

b. Recreation

As fish and wildlife populations decrease, a corresponding reduction in recreational hunting and fishing activities can be expected. These activities when engaged within the Coachella Canal right-of-way are considered as trespass by the Coachella Valley County Water District. The California Department of Fish and Game estimates the current annual fishing pressure along the first 49-mile reach of the Coachella Canal to be 6,100 angler-days. There will be an estimated loss of about 50 percent of these angler-days due to the project. This means a reduction of about 3,000 angler-days. If trespass fishing is unrestricted, the annual sport angler-use of the fishery in the lined canal will remain at about 3,100 angler-days; however, general angling sources will be decreased. There will be a total loss of angling in the seepage ponds adjacent to the canal.

The California Department of Fish and Game estimates the hunting activities on the Imperial East Mesa to be about 50,000 man-days. Possibly less than one-third of the activity is close enough to the project site to be impacted by it. However, it is recognized that there will be a substantial loss in hunting opportunities and a reduction of hunting success as a result of the reduction of the respective wildlife populations due to the effects of the project. Total hunting loss is estimated to be over 7,000 hunter-use days.

There will not be a significant reduction in big game hunting. Waterfowl hunting will be reduced by less than 250 man-days per year. There will be slight reduction in the hunting of coyotes, bobcats and other predators. The most significant adverse impacts will be on dove and quail hunting in the affected riparian areas. Man-days of hunting for these species may be reduced by as much as 50 percent.

As stated in Chapter II, the predominant recreational activity in the vicinity of the first 49-mile reach of the Coachella Canal is the use of off road vehicles (ORV). Most of this activity is in the sand hills and lands to the east of the canal; however, ORV enthusiasts trespass along the canal by using canal operating roads and bridges as access to these recreational areas and by camping along the rights-of-way and swimming and bathing in the canal.

The trespass of dune buggies and motorcycles along the existing canal causes some damage to banks and roadways and presents hazard to the vehicle operators and passengers. Off road vehicle problems and needs in the general areas traversed by the Coachella Canal are being studied by other Federal and State agencies.

The new concrete-lined canal will have restricted public access. The only public crossing will be near the beginning of the canal, at the siphon locations, and at California State Highway 78. This will limit the access points to the sand hills and other areas frequented by ORV users. However, the total ORV use of the area will not be reduced by the project.

The higher water velocities and the smooth concrete sides of the new canal will present a higher safety risk than does the existing unlined canal. Those people who attempt to swim or bathe in the canal will do so in risk of their lives.

c. Archeological and Historical

The National Park Service has completed an archeological survey (see Chapter II) covering the entire rights-of-way area and has granted archeological clearance for the project. Plans for the preservation or protection of any historical or archeological values found during construction will be developed in cooperation with appropriate agencies and civil organizations. Close coordination will be maintained with the State Liaison Officer for Historic Preservation to assure protection of possible historic sites.

5. Environmental Quality

Some improvement in water quality in the Coachella Canal will occur, but the total dissolved solid load is not expected to change. Quantities of floating material in the new canal should decrease because of the reduction in plant detritus from plant growth in and along the canal banks. However, there will be a continual cleaning problem as filamentous algae attaches to the lining of the new canal and continues

to grow. Overall canal maintenance and the amount of screening necessary before routing water into the distribution system will be reduced. Flows in the proposed concrete-lined canal will also contain less silt than in the existing canal due to elimination of bank erosion. Sand blown into the canal will continue to be a minor quality problem after construction.

Several methods of weed control are currently used along the unlined canal reach, including chemical weed sprays and burning. The project will greatly reduce the amount of weed control necessary, resulting in continuous, although minor, long-term benefits to air and water quality, fish and wildlife, and agricultural productivity. Current canal maintenance also includes occasional excavation operations to repair and reshape the canal sideslopes and bottom. The concrete-lined canal will eliminate this activity and its associated air and noise pollution with minor beneficial effect.

With construction of the new canal, the following existing structures will be abandoned and may be a long-term visual intrusion in the area:

- Coachella Canal Drop No. 1
- Five diversion turnouts
- Five storm water drainage inlets
- Two single-lane operating bridges
- Forty-nine miles of dry, unlined canal

There are no present plans to remove these structures.

D. Protective and Regulatory Ground-water Pumping

1. Physical Environment

a. Hydrology

The construction and operation of the well fields will involve a commitment of ground-water resources which have accumulated over a long period of time. Although the quantity of water in storage will support the pumping for many decades, it is anticipated that because of economic considerations the quantity of water pumped may have to be reduced some time in the future to correspond to the quantity of ground-water recharge. Analog model studies indicate that pumping both existing and proposed wells can continue for 50 years and probably longer.

A lowering of ground-water elevations in the Yuma Valley has already commenced as a result of concurrent, ongoing pumping in the

Mexicali Valley to the west and on the Sonoran Mesa to the south and by the United States on the Yuma Mesa to the east.

Analog model runs have been made to estimate the water table decline with Mexico's pumping and pumping of the existing Yuma Mesa wells and the additional water table decline which is expected with operation of the protective and regulatory pumping wells. Plates 7 and 8 show the estimated water table decline with Mexico's pumping and pumping of the existing Yuma Mesa wells for 10 and 50 years, respectively. Plate 9 is a revision of Plate 4 in the supplement to the draft statement and shows water table declines after 10 years associated with more accurate estimates of pumping quantities and startup operations of the proposed Yuma Mesa boundary and Yuma Valley boundary well fields. Plate 10 is likewise a revision of Plate 5 in the supplement to the draft statement and shows water table declines after 50 years of combined pumping. Table 32 presents the estimated water table decline at various locations and the difference in the estimated water table decline that would be associated with protective and regulatory pumping. In the event that a protective and regulatory pumping program were not implemented but private development proceeded in the restricted pumping zone to where the private pumping approached 160,000 acre-feet per year, the water table decline would be similar to that caused by protective and regulatory pumping.

The long-term results of declining ground-water levels caused by the ongoing Mexican and U.S. pumping alone will result in eventual dry ups of about 15 acres of surface water in the Hunter's Hole and Gadsden Pond areas as well as about 80 miles of major agricultural drainage channels in Yuma Valley.

Table 32 shows that without protective pumping the Mexican and U.S. pumping alone will draw the water level at Hunter's Hole down about 7 feet in 10 years and 19 feet in 50 years. With protective pumping, the water level at Hunter's Hole will drop about 16 feet in 10 years and 51 feet in 50 years. Either with or without protective and regulatory pumping the Hunter's Hole pond complex will essentially dry up in 10 to 15 years. Due to the fact that cattail and bulrush encroachment will be accelerated as the water levels in Hunter's Hole drop due to ongoing Mexican and U.S. pumping, the actual life expectancy of the Hunter's Hole ponds, with or without the project, is less than 20 years.

Comparison of analog model data indicates that dry up of the Yuma Valley agricultural drains will occur at about the same rate with or without protective and regulatory pumping (see Table 33). There will be about a 60 percent dry up in 10 years and a 100 percent dry up in

50 years. Drainage flows from the Yuma Valley drains are presently delivered to Mexico as part of the 1944 United States-Mexico Water Treaty. Under the protective and regulatory pumping plan, 125,000 acre-feet per year of water pumped from the ground-water reservoir will be delivered to Mexico at the Southerly International Boundary, along with the 15,000 acre-feet per year of existing canal wasteway flows, to maintain water deliveries to Mexico. This will preserve a corresponding amount of Colorado River water for use in the United States.

b. Geology

Land subsidence has been a problem in some areas where pumping has lowered ground-water levels significantly. The controlling factors appear to be the distribution and thickness of fine-grained sediments, particularly clay, and the depletion of artesian pressure or lowering of the water table. Significant occurrences of clay beds at shallow depths are found along the east side of the Yuma Valley and beneath the Yuma Mesa near the apex of the ground-water mound. Occurrences of clay layers seem sparse along the Arizona-Sonora Boundary east of San Luis where the top 500 feet of alluvium is predominantly sand with some coarse gravel beds. Deep test wells drilled on the Yuma Mesa near San Luis indicate very little clay to a depth of 2,300 feet, moderate clay beds to 4,000 feet, and a large thickness of clay below the 4,000-foot depth. On the east side of Yuma Valley where the hydraulic head in the coarse gravel zone aquifer will be lowered by some 40 feet, there is insufficient weight of overburden to completely dewater the shallow clay lenses and trigger subsidence. On Yuma Mesa within the 100-foot ground-water decline contour, the texture of the sediments within the upper 100 feet is predominantly sand and, therefore, it is expected that there will be only a few tenths of a foot subsidence within the 100-foot contour. The effect on other areas of the Yuma Mesa and of Yuma Valley will be even less.

c. Energy

The impacts of providing 52,000,000 kWh per year of electrical energy for the Yuma Mesa and Yuma Valley boundary well fields are far-reaching. Impacts regarding transmission line rights-of-way are discussed in this section under land use, vegetation, and esthetics. Regardless of the source of power, ultimately there will be an irreversible and irretrievable commitment of natural resources such as fossil fuels, nuclear fuel, or geothermal energy.

Supplying power to the project from the Navajo Project powerplant on an interim basis (as discussed in Chapter I) until other

TABLE 32

ESTIMATED WATER TABLE DRAWDOWN DUE TO PUMPING FROM
YUMA GROUND-WATER RESERVOIR

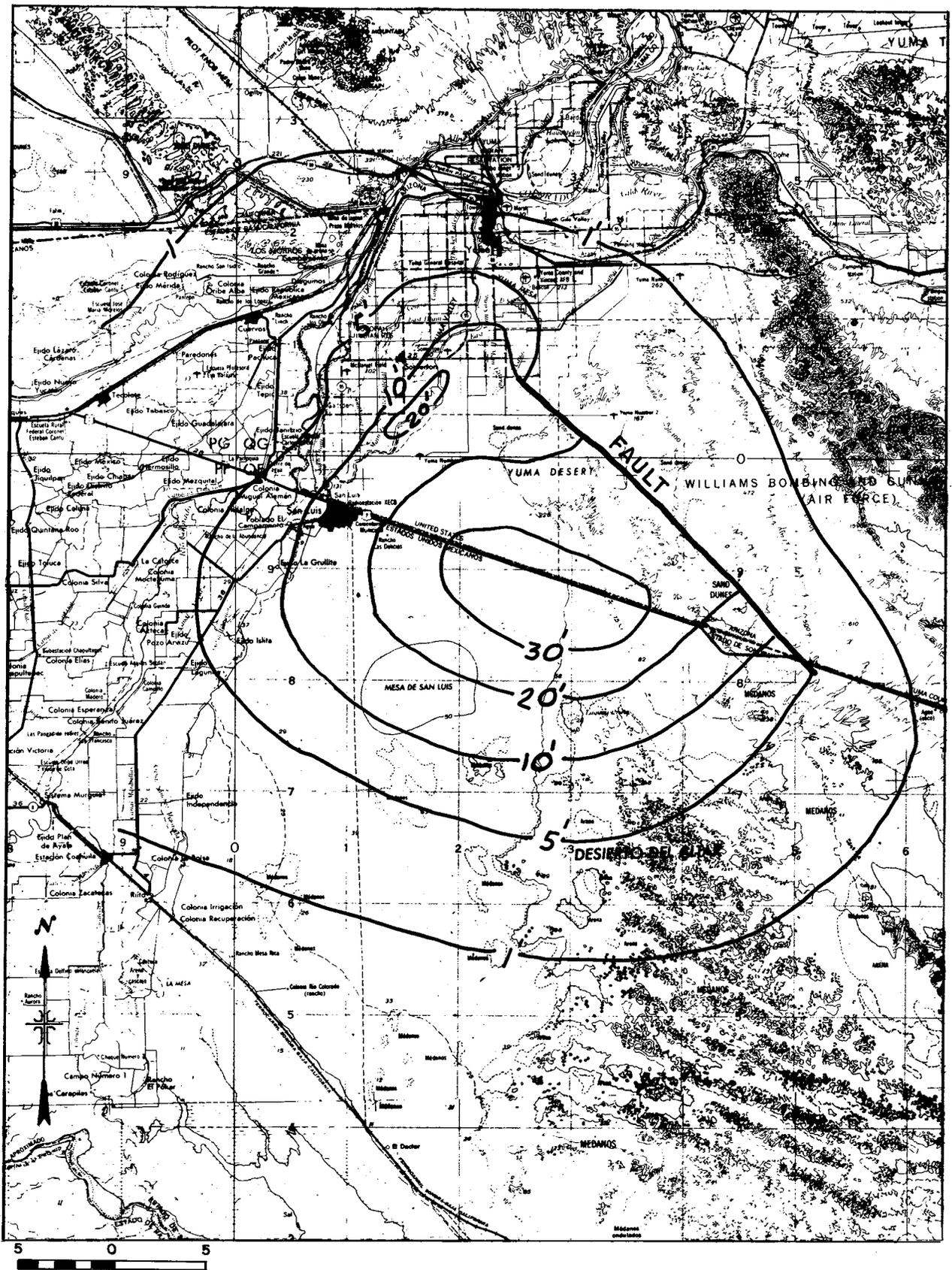
Location	10-years Pumping			50-years Pumping			Depth to Ground Water September 1974 (feet)
	Combined U.S. and Mexico Pumping (feet)	Yuma Mesa Well Field and Mexico Pumping Only (feet)	Difference (feet)	Combined U.S. and Mexico Pumping (feet)	Yuma Mesa Well Field and Mexico Pumping Only (feet)	Difference (feet)	
Somerton, Arizona	8	8	0	29	23	6	10
San Luis, Arizona	22	12	10	59	26	33	73
Arizona-Sonora Boundary 10 miles east of San Luis, AZ	55	33	22	110	60	50	94
Hunter's Hole	16	7	9	51	19	32	0

TABLE 33

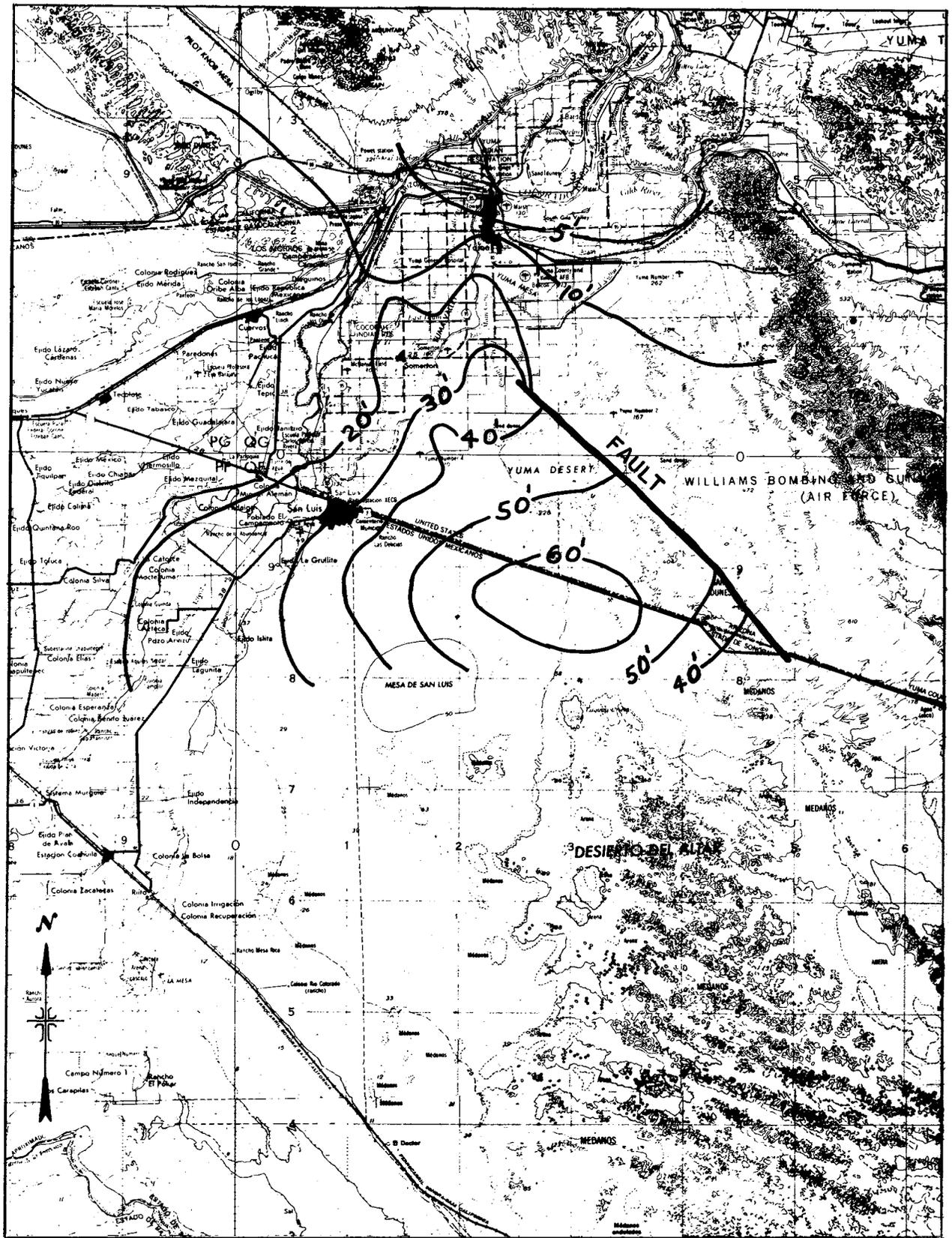
PREDICTED LOSS OF HABITAT TYPES ALONG YUMA VALLEY DRAINS
 DUE TO DECLINE OF GROUND-WATER LEVELS CAUSED
 BY GROUND-WATER PUMPING

Habitat Type	Project Without Protective Pumping				Project With Protective Pumping			
	10 years		50 years		10 years		50 years	
	% Loss	Acres Lost	% Loss	Acres Lost	% Loss	Acres Lost	% Loss	Acres Lost
Emergents and Saltgrass	67 ^{1/}	20	100 ^{1/}	30	87 ^{1/}	26	100 ^{1/}	30
Openwater	60 ^{1/}	72	100 ^{1/}	120	60 ^{1/}	72	100 ^{1/}	120

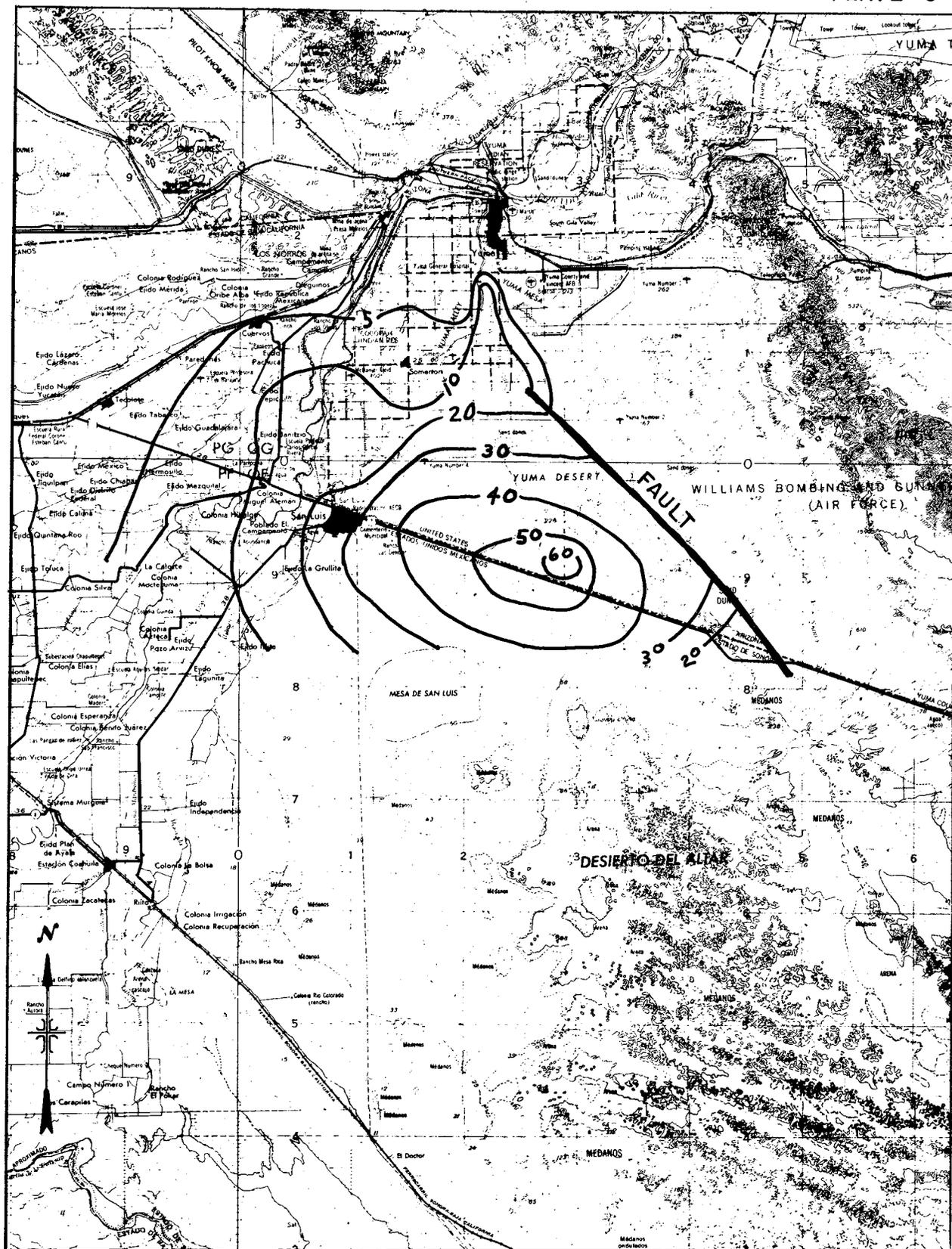
^{1/} Excludes changes due to natural succession, fire, or other unpredictable disturbance factors.



Computed decline in water levels after 10 years pumping 60,000 AF/yr from 12 Yuma Mesa wells and 160,000 AF/yr from Sonora, Mexico well field.--U.S. Geological Survey Analog Model Laboratory Analysis Run No. 102

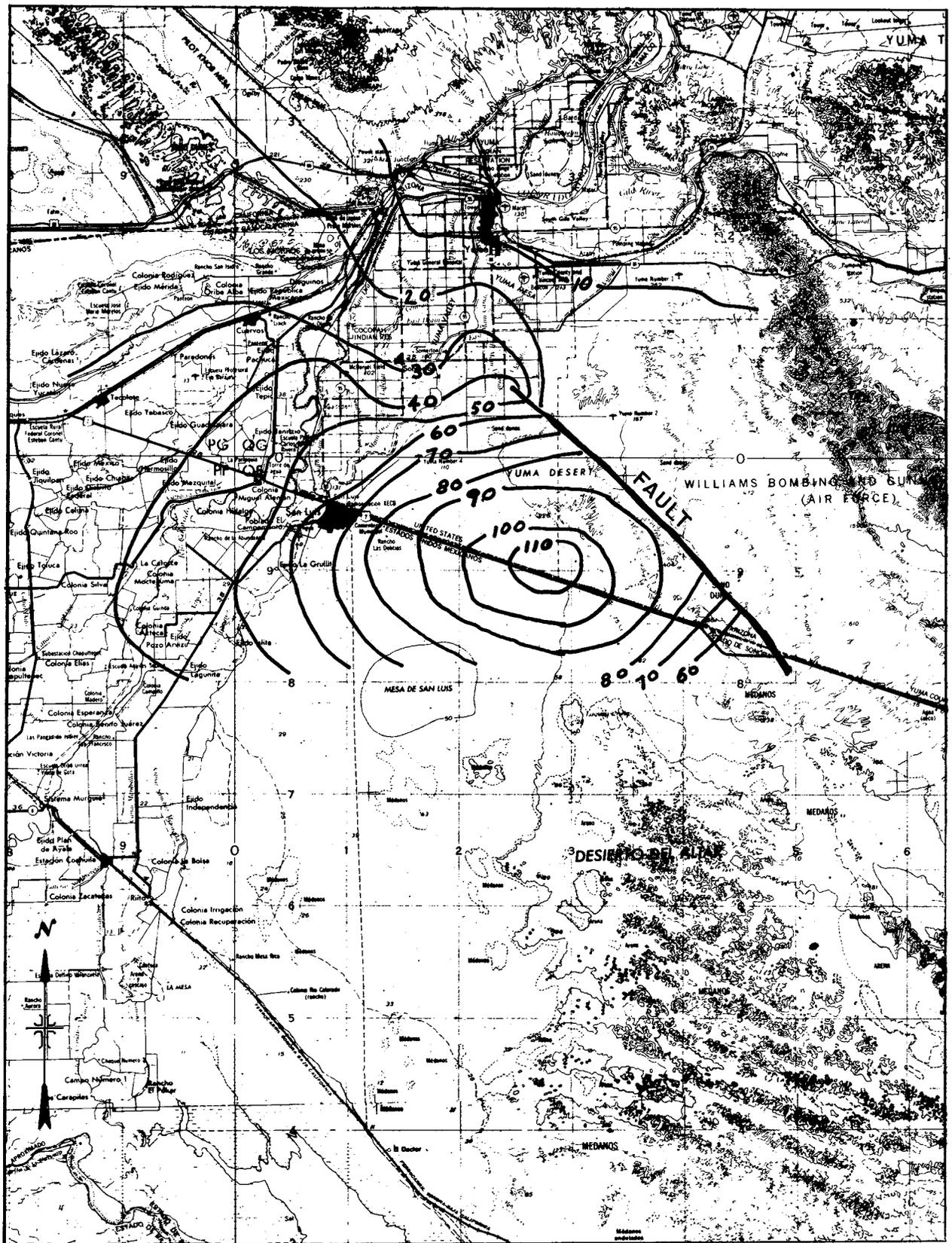


Computed decline in water levels after 50 years pumping 60,000 AF/yr from 12 Yuma Mesa wells and 160,000 AF/yr from Sonora Mexico well field.-- U.S. Geological Survey Analog Model Laboratory Analysis Run No. 108



5 0 5
SCALE OF MILES

Computed decline in water levels after 10 years pumping 12 Yuma Mesa wells at 60,000 AF/yr, Sonora Mexico wells at 160,000 AF/yr, and after 5 years pumping 25 proposed Yuma Mesa Boundary wells at 115,000 AF/yr, 10 proposed valley wells at 45,000 AF/yr; reduction in existing Yuma Valley wells of 50,000 AF/yr,--U.S. Geological Survey Analog Model Laboratory analysis, Run No. 135



SCALE OF MILES

Computed decline in water levels after 50 years pumping 12 Yuma Mesa wells at 60,000 AF/yr, Sonora, Mexico wells at 160,000 AF/yr, and after 45 years pumping 25 proposed Yuma Mesa Boundary wells at 115,000 AF/yr, 10 proposed valley wells at 45,000 AF/yr; reduction in existing Yuma Valley wells of 50,000 AF/yr first 15 years, 65,000 AF/yr thereafter--U.S. Geological Survey Analog Model Laboratory analysis, Run No. 135

power sources can be derived will have the following impacts. The Navajo Project powerplant uses about 8,395,000 tons of coal per year to generate about 20,148,000,000 kWh per year of electrical energy and requires a consumptive use of 34,100 acre-feet of Colorado River water per year for use in its cooling towers. The well fields will use about 0.31 percent of the annual energy produced by the powerplant and will, therefore, account for an annual consumptive use of about 26,000 tons of coal and 106 acre-feet of cooling tower water. In addition to the consumptive use of natural resources, production of the required electrical energy for the project will result in about 1.26 tons of smokestack emissions and fly ash per day at the powerplant site, as follows:

SO₂ - 0.63 tons/day
NO_x - 0.61 tons/day
Flyash - .02 tons/day
Total = 1.26 tons/day

The use of Navajo Project power will not diminish the supply available to preference customers from Federal power systems operated by the Secretary of Interior.

2. Biological Environment

a. Vegetation

Approximately 105 acres of land will be required for rights-of-way for the project. Vegetation will be permanently removed on 6 acres required for the well plots. Vegetation on the remaining 99 acres will be removed during construction of buried pipelines. Upon completion of the project, pipeline rights-of-way not required for access roads (approximately 64 acres) will be returned to their present use through natural revegetation or by restored agricultural practices.

As the Yuma Valley agricultural drains dry up, there will be a long-term loss of the 30 acres of intermittent emergent vegetation, consisting primarily of cattails and some saltgrass (see Table 33). The long-term losses will be the same with or without the proposed protective pumping project; however, there will be a slightly increased rate of loss with protective pumping due to increased rate of ground-water drawdown in some areas.

The increased rate of ground-water drawdown caused by protective and regulatory pumping will also result in the loss of about 1,500 acres of riparian vegetation located along the Arizona side of the Colorado River below Morelos Dam. These losses will be in addition to

those resulting from ongoing pumping and cessation of riverflows. Impacts on riverine vegetation will depend upon the ability of the species to adapt their root systems to the receding ground-water level. The small quantities of hydrophytic vegetation such as cattails, bulrushes, and reeds will be lost due to cessation of riverflows and subsequent successional changes. This will happen without protective pumping. The species which will be affected by ground-water drawdown associated with protective pumping will be the phreatophytes. Obligative phreatophytes such as cottonwoods, willows, and seepwillow will be mostly lost. Facultative phreatophytes, such as saltcedar and mesquite, which are more readily adaptable to receding ground-water levels will be the species most likely to survive. However, these species will be more susceptible to disease, pest infestations, and other harsh environmental pressures of the hot, arid desert environment.

Sustained growth and vigor of phreatophytic vegetation will depend upon the location of such vegetation, the competition exerted by surrounding plants, the ability of the species to adapt, and its state of maturity. Even if some of the more hardy species do survive, they will suffer some decadence and loss of vigor. The reproductive potential of these species will also be seriously curtailed.

b. Fish

The impacts due to the loss of fish habitat along the Colorado River, the ponds of the Hunter's Hole area, and in the drainage channels of Yuma Valley will occur with or without the protective and regulatory ground-water pumping as described earlier in this section under water resources. However, the protective pumping project will hasten these impacts as previously described. Refer to Section B.3.b.(3)(b) of this chapter for a description of fish losses in the river and associated backwater ponds.

The 120 acres of surface water which will be lost in the open subsurface drains in Yuma Valley comprise about 35 percent of the existing surface water in Yuma Valley, excluding the Colorado River above Morelos Dam. Fish species which will be lost include the threadfin shad, red shiner, carp, yellow bullhead, channel catfish, flathead catfish, bluegill, redear sunfish, largemouth bass, tilapia, mosquito fish, and mollies. Other aquatic organisms will also be lost.

There will be no impact on any endangered species of fish as a result of the project. None of the fish species listed in the 1973 edition of the Fish and Wildlife Service's Threatened Wildlife of the United States, are located in this area.

c. Wildlife

The requirement for 105 acres of land for the proposed protective and regulatory pumping rights-of-way will permanently eliminate approximately 70 acres of desert habitat available to wildlife and temporarily affect the remaining 35 acres of habitat. Wildlife species which will be lost or temporarily displaced from these respective acreages will be primarily small animals such as rodents, rabbits, and lizards.

Loss of the 120 acres of surface water and about 30 acres of saltgrass and emergent vegetation along the Yuma Valley drains will have an impact on the animal species which inhabit or frequent the drains. Large wading birds such as herons, egrets, and bitterns and some small song birds will be lost when the drains dry up. A very small number of quail and cottontails will be affected since their population numbers are low along the drains and since they are not solely dependent on the drains for food and cover.

There will be a loss of the bullfrogs which are associated with the drains. It should again be emphasized that the above-described impacts on the drain will occur at about the same rate of time either with or without the proposed project because of the ongoing Mexican and U.S. well fields already in operation.

The potential long-term loss of an additional 1,500 acres of riparian vegetation along the Colorado River, which will result from the increased rate of ground-water drawdown due to the protective pumping project, will affect the wildlife population along the Colorado River below Morelos Dam. As this riparian vegetation is lost there will generally be a change in animal species composition, diversity, and density from the more hydric- and mesic-loving species to those preferring, or adaptable to, a more xeric state. There will be a substantial change in the existing bird, reptile, and mammal populations. There will be a potential loss of about 53 percent or 6,796 white-winged dove nests and about 50 percent or 2,720 mourning dove nests. Moderate to substantial reduction of perhaps 50 percent will occur in roadrunner, quail, and cottontail populations which inhabit the affected areas. There will still be adequate food and water available to these species on the adjacent agricultural lands of Yuma Valley. The only limiting factor will be the amount of nesting and escape cover available to these species along the periphery of the agricultural complex.

Due to their virtual absence in the area, it is expected that big game species will not be affected. Rodent populations will decline

by about 50 percent in the affected areas from about 18 to 23 individuals to about 10 to 12 individuals per acre. This will be followed by a proportionate loss in predators such as skunks, coyotes, foxes, bobcats, badgers, hawks, owls, and snakes.

The U.S. Fish and Wildlife Service's publication United States List of Endangered Fauna, May 1974, does not list any endangered mammals, reptiles, or amphibians which are found in the area of the protective pumping project. However, three species of endangered birds have been recorded in the project area. These are the Yuma clapper rail, Southern bald eagle, and American peregrine falcon.

The Yuma clapper rail is the only one of the three which is common in the area (see Chapter II) and which will be affected by the project. The eventual elimination of all but about 7 acres of the 30 to 40 acres of suitable clapper rail habitat along the limitrophe section of the river will occur regardless of the protective and regulatory ground-water pumping due to the ongoing Mexican and U.S. pumping and to cessation of sustained riverflows. Protective pumping will merely hasten these impacts by about 10 years. This is an estimated loss of about one percent of the suitable clapper rail habitat along the lower Colorado River below Davis Dam. Loss of this amount of habitat will not be critical to the survival of the species nor jeopardize the existence of the rail along the lower Colorado River. The 7 acres of marsh habitat just below Morelos Dam which will not be affected by the project since it will continue to receive seepage from the dam and the Alamo Canal, currently appears to be the most preferred habitat by the clapper rail along the limitrophe section of the river. This area below Morelos Dam accounted for 5 of the 8 birds recorded during the 1973 multiagency inventory of Yuma clapper rail along the limitrophe section of the Colorado River and at least half of the 7 to 11 birds recorded during the 1974 inventory. Therefore, there will be an estimated loss of 3 to 5 birds due to implementation of the project. This is a loss of less than one percent of rail population along the lower Colorado River.

As previously stated, compliance with Section 7 of the 1973 Endangered Species Act regarding modification of critical habitat is being accomplished through the U.S. Fish and Wildlife Service prior to implementation of the project.

The California black rail, a threatened species, has not been reported nor observed south of Morelos and is expected to be unaffected by the project.

3. Cultural Environment

a. Land Use

The acquisition of right-of-way for the Yuma Mesa boundary well field will have little direct impact on land use. Acreage requirements for rights-of-way for the well sites were presented in Chapter I, Section H.3.f. Rights-of-way for the well sites and pipeline on the developed agricultural lands, which are almost exclusively used for citrus farming, will require 11 acres. Due to the fact that new wells will be placed adjacent to existing wells and that existing access roads through the citrus groves are sufficiently wide enough to allow the pipeline construction, no removal of trees is anticipated. Rights-of-way required for new well sites, access roads, and the pipeline on undeveloped Yuma Mesa desertland will be 67 acres.

The buried pipeline of the Yuma Mesa boundary well field will be 15.3 miles long and have a minimum of 2 feet of earth cover. It will have a temporary impact on the area during construction, but will not permanently affect farming operations in the developed mesa lands. Except where the pipeline rights-of-way are needed for access roads (approximately 35 acres), no permanent change of land use on undeveloped desertlands will occur. The pipeline will cross under U.S. Highway 95 in San Luis, Arizona.

The acquisition of right-of-way for the Yuma Valley boundary well field will have some impacts on land use in the Yuma Valley. Rights-of-way for the well sites and pipeline in the valley will require 27 acres. These 27 acres are presently under irrigated croplands none of which, however, are citrus. The well plots will require a permanent land use of only 2 acres. Although the 5.3-mile-long pipeline of the valley well field will require rights-of-way of 25 acres, it will be buried with a minimum of 4 feet of earth cover and farming will be allowed on the rights-of-way over the pipeline. In addition, there are no plans to use the pipeline rights-of-way in the Yuma Valley for access roads as the existing roads are adequate.

b. Recreation

Recreational activities in the southern portion of Yuma Mesa are very minimal, and therefore will not be affected by the protective and regulatory pumping project. As a result of the effect of groundwater drawdown on the aquatic and vegetative communities along the Colorado River, around Hunter's Hole, and along the Yuma Valley drains, which will occur at a faster rate with protective pumping, the recreational activities in the Yuma Valley, such as hunting, fishing, and frog gigging, will be greatly reduced because of the loss of wildlife populations, fish, and other aquatic organisms.

Impacts on recreational activities along the Colorado River below Morelos Dam due to cessation of sustained riverflows were discussed previously in this chapter under B.3.b.(4)(b). In addition to the loss in fishing and hunting opportunities due to these impacts, the impacts on the riparian habitat due to protective pumping will reduce the upland game hunting by about 2,000 hunter-use days. Other recreational activities such as picnic-camping and interest visitation will also be reduced about 50 percent.

Dry up of the Yuma Valley drains which will occur at about the same rate with or without protective pumping, will mean a significant reduction in frog gigging and fishing in Yuma Valley. There will be a probable loss of 2,000 to 3,000 man-use days of fishing activity due to dry up of the drains. This will result in increased fishing pressure along Yuma Valley irrigation canals and other areas of Yuma Valley.

The Yuma Mesa boundary well field pipeline will be located near Friendship Park, which was developed by Yuma County in San Luis, Arizona. The pipeline is parallel to and south of the south fence of the park. Construction of the pipeline will not infringe on the park, although noise will be created while work is in progress. Highway traffic will be temporarily affected as the pipeline from the Yuma Mesa boundary well field is constructed across U.S. Highway 95, east of the park. Construction of the pipeline across U.S. Highway 95 will be coordinated with the Arizona Highways Division's District I Engineer.

c. Archeological and Historical

There are no known archeological or historical sites in the area of the well fields and conduits (see Chapter II). An archeological survey has been conducted and archeological clearance has been granted by the National Park Service for all sites of project features. There will be no impacts by the project on any historic or potential historic site.

d. Economic and Social

The provision for limitation of pumping of ground water within 5 miles of either side of the Arizona-Sonora land boundary near San Luis was incorporated into Minute No. 242 to preserve to the extent possible the ground-water resource in the United States. Over 13,000 acres of approximately 23,500 acres of state of Arizona land on the Yuma Mesa within the 5-mile distance is already subject to leases for agricultural development. The project will restrict such development on the 23,500 acres of state and the 10,900 acres of Federal land located within the 5-mile restricted ground-water pumping area.

Under the project, whatever water is not required for preserving the historic surface deliveries across the land boundary near San Luis will be available for limited use on existing developed areas or possibly for some new agricultural, municipal, or industrial development. Although ground-water pumping will be restricted within 5 miles of the Southerly International Boundary, additional lands might be developed under certain conditions with pumped ground water from beyond the 5-mile distance where there are no restrictions imposed by international agreement.

Delivering ground water across the land boundary near San Luis to preserve historic treaty deliveries at that point results in preserving diversion entitlements from the Colorado River for delivery elsewhere in the state of Arizona. If surface flows decreased across the land boundary area, return flow credit accountable under the Supreme Court Decree in Arizona vs. California would decrease, and this would require corresponding decrease in diversions to other uses within the state at such time as Arizona is using its full entitlement of Colorado River water.

Construction and land acquisition costs for the protective and regulatory pumping project are estimated to be \$34 million of which about \$16 million are the estimated acquisition costs for 23,500 acres of state of Arizona lands on the Yuma Mesa. Efforts will be made to negotiate the acquisition of state lands by means of exchange for Federal lands elsewhere. Acquisition costs can be cut to the extent this is successful. The acquisition of Federal exchange lands and subsequent development of those lands under the auspices of the State Land Commission could have a beneficial economic and social impact.

The decrease in ground-water levels, as projected by the analog models due to pumping in both the United States and Mexico, has already been initiated through pumping of boundary well fields in Mexico. The ongoing pumping operations as well as protective pumping will improve drainage in the agriculture areas in the Yuma Valley which have high water tables. Presently, there are about 500 acres of land where the depth to ground water is 4 feet or less. It is estimated that with 5 to 10 years of pumping operations under the plan, there will be no drainage problem areas in the Yuma Valley. Pumping the existing Yuma Mesa wells is already providing drainage benefits to the Yuma Valley.

Private irrigation and domestic wells in the Yuma Mesa and Yuma Valley areas located near the international border will be affected by the lowering of ground-water levels. Wells that penetrate the gravel aquifer will not be affected other than increasing the pumping head.

Shallow wells, however, particularly in the southern portion of Yuma Valley will be affected. As the water table drops more than about 20 feet below the ground surface, suction lift pumps will no longer be effective and will have to be replaced with submersible pumps. Some of the present domestic wells, undoubtedly, are not large enough in diameter for the installation of this type of pump. Also, as the water table drops below the bottom of shallow wells, they will have to be replaced with deeper wells. The ground-water elevations will lower with present pumping but at a slower rate than with the additional protective pumping in the United States. The increased number of wells and pumps that will have to be replaced before the end of their useful lives resulting from the accelerated rate of ground-water lowering cannot be determined. The total number of small-diameter domestic and stock-watering wells in the Yuma Valley within 5 miles of the International Boundary was determined by the U.S. Geological Survey to be 109 wells. It is not known how many of these wells are shallow and how many are deep enough to penetrate the gravel aquifer. The costs involved for drilling new wells and increases in power demands will be an economic impact on private well owners.

4. Environmental Quality

a. Noise

Temporary disturbances associated with construction activities will occur at the sites of all features during their construction. During the operation of the facilities, low level noises attributable to electric motors and pumping will be discernible in the immediate vicinity of the well plots.

b. Visual Quality

A degradation of visual quality will occur during the construction of the facilities as soil and vegetation are disturbed. These, however, will not be generally located in populated areas. The impact will gradually disappear as revegetation occurs along the alignment of the buried pipeline, and only the individual well sites, access roads, and power transmission facilities will have a permanent visual effect.

E. Cumulative Summary of Impacts

1. Physical Environment

a. Water Resources

The construction and operation of the desalting complex will result in the delivery of a higher quality of water to Mexico and will

also conserve up to 132,000 acre-feet per year of stored water in the United States. The releases of blended water into the Colorado River above Morelos Dam will improve the quality of the river water for 2 miles above the dam.

The desalting complex will also allow the United States to comply with the provisions of Minute No. 242 for delivering water at Morelos Dam that has a salinity no greater than 115 p/m + p/m TDS higher, on an annual average, than the annual average salinity of the waters arriving at Imperial Dam.

The lining of the Coachella Canal will save an additional 132,000 acre-feet of water which can be delivered to Mexico on a temporary basis. This supply will be of the same quality as the waters diverted at Imperial Dam. The 132,000 acre-feet saved on the Coachella Canal will be a direct saving in the total Colorado River water allocation to the state of California.

The protective and regulatory ground-water well fields will provide a means of utilizing 160,000 acre-feet of water from the underground reservoir to the advantage of United States water delivery obligations. Delivery of 125,000 acre-feet of this water to Mexico, in addition to 15,000 acre-feet of canal wasteway flows across the Southerly International Boundary will insure water deliveries at that location in accordance with Minute No. 242. The project will also provide 35,000 acre-feet of water for use in the United States.

There will be an eventual cumulative loss of 297 acres of ponded and surface water due to construction and operation of the project. These losses include 36 acres adjacent to the Coachella Canal in California, 141 acres in Arizona along the mainstream of the Colorado River between Morelos Dam and the Southerly International Boundary, and 120 acres associated with the Yuma Valley drains.

The cessation of Wellton-Mohawk drainage flows in the Colorado River below Morelos Dam will cause the essential loss of the surface water in the river channel in Mexico except for agricultural drainage flows and occasional storm runoff and sporadic floodflows. However, with the added discharge of the bypass drain (amounting to about 43,000 acre-feet per year) it is probable that the open water areas of the Santa Clara Slough will increase in size.

The construction of bench flumes or siphons for the bypass drain in the two areas where the Colorado River approaches the levee,

between Morelos Dam and the Southerly International Boundary will create temporary turbidity in the area.

Supplying water for use in construction of project features will be the contractor's responsibility. Existing canals or the river will probably be used and no impact on the overall environment of the project area is anticipated. Environmental guidelines included in contract specifications assure compliance by the contractor.

A change in the management of floodflow releases from Painted Rock Reservoir will have a beneficial impact on the Wellton-Mohawk Irrigation and Drainage District. Drainage conditions will be improved since the flows will be controlled and infiltration to underground aquifers will occur mostly upstream from the District.

There will be an increased salinity of stored waters in Painted Rock Reservoir due to longer periods of impoundment and increased evaporation.

b. Energy

The impacts of providing 424,000,000 kWh per year of electrical energy for the desalting plant and well fields are far-reaching. Impacts regarding transmission line rights-of-way are discussed in this section under land use, vegetation, and esthetics. Regardless of the source of power, ultimately there will be an irreversible and irretrievable commitment of natural resources such as fossil fuels, nuclear fuel, or geothermal energy.

Supplying power to the project from the Navajo Project powerplant on an interim basis (as discussed in Chapter I) until other power sources can be derived will have certain adverse impacts. The Navajo Project powerplant uses about 8,395,000 tons of coal per year to generate about 20,148,000,000 kWh per year of electrical energy and requires a consumptive use of 34,100 acre-feet of Colorado River water per year for use in its cooling towers. The desalting plant and well fields will use about 2.38 percent of the annual energy produced by the powerplant and will, therefore, account for an annual consumptive use of 199,630 tons of coal and 811 acre-feet of cooling tower water. In addition to the consumptive use of natural resources, production of the required electrical energy for the project will result in about 6.86 tons of smokestack emissions and fly ash per day at the powerplant site, as follows:

SO₂ - 1.83 tons/day
NO_x - 4.81 tons/day
Flyash - .22 tons/day
Total - 6.86 tons/day

The use of Navajo Project power will not diminish the supply available to preference customers from Federal power systems operated by the Secretary of the Interior. Additional sources of energy will be consumed during construction of the project.

If all or a portion of the sludge derived from the desalting process is recalcined there will also be additional sources of energy consumed by the project. Partial recalcining would require about 70,400 barrels of fuel oil per year whereas total recalcining would require about 157,000 barrels per year.

c. Mineral Resources

Sand, gravel and rock will be used in construction of project features but there will be no other impact on mineral resources within the project area. It is anticipated that these materials will be obtained primarily from excavation of structure sites and from new and existing borrow and quarry sites in the area. Other fabricated or refined minerals and chemicals required for construction or operation of the project will be obtained from commercial sources.

Normally, all excavated material will be used for embankment construction within the project. Areas required for disposal of excess material will be evaluated along with the potential borrow areas to lessen impacts. Disposal of solid waste material will be accomplished with and under approval of the appropriate county authorities in Arizona and California.

Lining of the Coachella Canal will have no effect on geothermal resources in the Imperial Valley.

d. Erosion

Due to the limited slope of the lands and the small amount of rainfall in the project area, erosion from surface runoff is not expected to increase materially from the added disturbance to the land. Wind erosion during extremely dry seasons can be serious and may result in the loss of disturbed topsoil by blowouts, cause drifting, and contribute to a dust and air pollution problem.

Due to carefully planned landfill operations which will be used in disposing of the sludge from the desalting operation, there will be no erosion from the disposal sites caused by winds or precipitation runoff. Due to the very low amounts of annual precipitation in the project area, there will be no leaching of toxic substances from the sludge disposal into the ground-water aquifer.

2. Biological Environment

a. Vegetation

Disturbance of vegetation during construction will be kept to a minimum. There will be a loss of vegetation on portions of

up to 2,131 acres of desert habitat, 260 acres of mixed riparian and desert mesquite habitat and 588 acres of cropland required for rights-of-way. Storage of construction equipment and materials will cause temporary losses of vegetation. Natural revegetation of desert areas will occur slowly.

Approximately 4,200 acres of irrigated cropland will be retired from agricultural production in the Wellton-Mohawk Division. These lands will revert back to native vegetation or be used for other purposes. Approximately 6,600 acres of irrigated cropland behind Painted Rock Reservoir will also be affected by the project if and when they are inundated by impounded storm waters.

The 3,800 acres of private land on the Imperial East Mesa, 500 acres of state land at Painted Rock Reservoir, 23,500 acres of state land on Yuma Mesa, and the greater portion of all Federal lands affected by the project are characterized by sparse desert habitat. The vegetation on these lands will remain essentially unchanged.

Cessation of Wellton-Mohawk drainage flows below Morelos Dam in addition to ground-water drawdown will adversely affect the riparian community along the Colorado River. Table 34 shows the predicted maximum losses related to no project, project without protective pumping, and project with protective pumping. In 10 years without the project there will be essentially no expected loss of riparian habitat. The project without protective pumping will result in the loss of about 420 acres, and with protective pumping the loss will be about 722 acres of riparian vegetation. In 50 years without the project there will still be no expected loss of riparian vegetation; the project without protective pumping will result in the loss of 851 acres and the project with protective pumping will result in the cumulative loss of about 2,323 acres. The only marsh type vegetation which will remain after 10 years of project operation will be about 7 acres of cattails in the river channel immediately below Morelos Dam where seepage from the dam and the adjacent Alamo Canal will still occur.

Approximately 30 acres of saltgrass and emergent vegetation along Yuma Valley drainage channels will be lost at about the same rate with or without the project (see Table 33).

About 496 acres of marsh habitat, 36 acres of open ponded water and 2,351 acres of mixed phreatophytes will be lost along the Coachella Canal as a result of ground-water withdrawal due to the virtual elimination of seepage losses from the unlined 49-mile reach. A breakdown of these losses was shown in Table 30.

TABLE 34

PREDICTED MAXIMUM LOSSES OF HABITAT TYPES IN ARIZONA ALONG THE COLORADO RIVER MAINSTREAM WITH NO PROJECT, PROJECT WITHOUT PROTECTIVE PUMPING, AND PROJECT WITH PROTECTIVE PUMPING, RESPECTIVELY.
LOSSES WERE DETERMINED FROM ANALOG MODEL DATA ON GROUND-WATER WITHDRAWAL RATES.

Habitat Type	Effects of Ongoing Mexican & U.S. Pumping without the Project				Effects of Ongoing Pumping & Cessation of River Flows below Morelos Dam				Effects of Ongoing Pumping; Cessation of River Flows; & Protective and Regulatory Pumping			
	10 years		50 years		10 years		50 years		10 years		50 years	
	% Loss	Acres Lost	% Loss	Acres Lost	% Loss	Acres Lost	% Loss	Acres Lost	% Loss	Acres Lost	% Loss	Acres Lost
Mature Saltcedar	0	0	0 ^{1/}	0	0	0	10	136	5	68	60	816
Open Saltcedar with Arrowweed	0	0	0 ^{1/}	0	0	0	10	96	10	96	75	718
Mature Mesquite	0	0	0 ^{1/}	0	0	0	10	24	5	12	80	194
Emergents and Saltgrass	0 ^{1/}	0	0 ^{1/}	0	0 ^{2/}	0	90	63	60	42	90	63
Artificial - Periodically Cleared Areas	0	0	0	0	75	420	95	532	90	504	95	532
Total Vegetative Habitat Losses	0	0	0	0	13	420	27	851	23	722	73	2,323
Openwater Losses	0 ^{1/}	0	20 ^{1/}	30	95	134	100	141	100	141	100	141
Total Losses	0	0	1	30	17	554	30	992	26	863	74	2,464

^{1/} Excludes changes due to natural succession, fire, or other unpredictable disturbance factors.

^{2/} Losses will be compensated by expected encroachment of emergents into low-lying areas which presently contain surface water.

Overall, the project will have an adverse impact on a small portion of the cultivated land and a large portion of desert habitat in the project areas. The effect will not be significant with respect to the total amount of those habitats in the general vicinity.

A portion of the 370 acres of agricultural vegetation in Mexico and 380 acres of sparse Sonoran desert vegetation affected by rights-of-way will be lost. The loss of agricultural vegetation will amount to less than .1 percent of the 430,000 acres of farmland in the Mexicali-San Luis Valley. Loss of the desert vegetation will be even less significant due to the extensive desert habitat in the general area.

b. Fish

Approximately 412 acres of fish habitat will be lost due to project implementation. The most abundant fish species which will be affected will be catfishes, largemouth bass, bluegill, other sunfishes, mollies, shiners, and mosquito fish. Fish reproduction and carrying capacity will be less in the lined Coachella Canal than in the current unlined section, and availability of fish food and adequate cover will be severely reduced. The sustained streamflow in the Colorado River below Morelos Dam will be lost, and fish populations in this area will be lost. In addition, fish populations in the Main Outlet Drain Extension below the desalting plant will be adversely affected by the reduction in flow and increased salinity of the bypass drain. It is expected that fishing activities at the discharge point of the product water above Morelos Dam will be enhanced. Fish will be lost as the agricultural drains of Yuma Valley dry up. This will happen at about the same rate with or without the project.

The discharge of brackish drain flows into Santa Clara Slough will increase the overall value of the aquatic habitat for a variety of fish species, but may be detrimental to the desert pupfish in that other fish species may be introduced which could result in increased competition pressures and predation. Depending on the point of discharge of the bypass drain into the slough, there may be some deterioration and scouring of the habitat preferred by the pupfish.

c. Wildlife

Construction activities related to borrowing, disposal of waste material, traffic pattern, night lighting, and temporary storage of construction equipment will cause temporary disturbances to and some loss of wildlife species. Wildlife will generally be lost from within the project rights-of-way in proportion to the amount of habitat which is lost in the construction of the facilities.

There will also be a slow reduction of wildlife species as 2,847 acres of vegetation dependent upon seepage from the unlined Coachella Canal are lost as a result of concrete lining the canal. The estimated effects on wildlife were shown in Table 31. There will be a similar reduction of wildlife species occurring as the 2,323 acres of riparian habitat along the Colorado River below Morelos Dam, and 30 acres in the Yuma Valley drains are lost, due to ground-water withdrawal. The predicted cumulative impacts on wildlife species along the limitrophe section of the Colorado River due to cessation of riverflows and ground-water drawdown are shown on Table 35. Generally, wildlife species which will be affected the most will be those which are solely or partially dependent on the aquatic and semiaquatic habitats which will be lost due to project implementation.

The Yuma clapper rail is the only endangered species which will be affected by the project. Cessation of sustained Colorado River flows below Morelos Dam and ground-water drawdown will affect less than 1 percent (30 to 40 acres) of the suitable rail habitat and less than 1 percent (1 to 4 individuals) of the rails known to be along the lower Colorado River. Ground-water withdrawal as a result of lining the first 49-mile reach of the Coachella Canal will result in the loss of small percentages of suitable rail habitat and a number of rails. Considering the available habitat and number of rails which exist in the nearby state and Federal wildlife management areas of Imperial Valley and the habitat and rails which exist along the lower Colorado River, the losses will be small.

A small percentage of wildlife food sources in the Wellton-Mohawk and Painted Rock areas will be lost when agricultural lands are taken out of production. However, with the expected increase and stabilization of riparian habitat at Painted Rock Reservoir and in the Wellton-Mohawk Division, wildlife populations will be sustained. New nesting areas may even be created for white-winged and mourning doves, as well as habitat for a variety of small animals. There may also be an increase in wildlife as a result of habitat expansion due to the flow of the reject stream into the Santa Clara Slough.

3. Cultural Environment

a. Land Use

The proposed project will require a total of 750 acres of land in Mexico and up to about 1,969 acres in the United States for

TABLE 35

CUMULATIVE PREDICTED IMPACTS ON WILDLIFE AS A RESULT OF
73 PERCENT RIPARIAN HABITAT LOSS^{1/} ALONG THE
COLORADO RIVER BELOW MORELOS DAM DUE PRIMARILY TO THE
CESSATION OF SUSTAINED RIVER FLOWS AND PROTECTIVE
AND REGULATORY GROUND-WATER PUMPING

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}			
	Adverse	Beneficial	None	Total	Substantial	Mod.	Slight
Mammals:							
Mule Deer			X				
Feral Burrow			X				
Coyote	X						X
Gray Fox	X						X
Kit Fox		X	o r	X			
Raccoon	X						X
Bobcat	X						X
Feral Cat	X						X
Striped Skunk	X						X
Cottontail	X						X
Blacktailed Jackrabbit	X						X
Kangaroo Rats		X	o r	X			
Muskrat	X				X o r	X	
Woodrats	X						X
Bats	X						X
Hispid Cottonrat	X						X
Pocket Mice	X						X

1/ In addition to 73 percent vegetative habitat loss, this table also considers substantial loss of aquatic & semiaquatic habitat in the river channel and associated backwaters and ponds.

2/ Degree of impact refers to the expected degree of reduction of a species in and along the Colorado River. Data from wildlife inventory was used in predicting these impacts.

TABLE 35
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}		
	Adverse	Beneficial	None	Total	Substantial	Mod. Slight
Mammals (cont.):						
Cactus Mouse	X					X
Deer Mouse	X					X
House Mouse	X					X
Norway Rat	X					X
Round-Tailed Ground Squirrel		X	o r X			
Birds:						
Herons, Egrets, Bitterns	X			X o r	X	
Raptors	X					X
Quail	X					X
Rails	X			X o r	X	
Shorebirds	X			X o r	X	
Doves	X				X o r	X
Roadrunners			X			
Hummingbirds	X					X
Kingfisher	X				X	
Woodpeckers	X				X	
Flycatchers	X					X
Larks	X					X
Swallows	X				X	

TABLE 35
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}			
	Adverse	Beneficial	None	Total	Substantial	Mod.	Slight
<u>Reptiles & Amphibians</u>							
(cont.):							
Most Lizards		X o r	X				
Tree Lizard	X						X
Desert Tortoise		X o r	X				
Western Leaf-Nosed Snake							X
Desert Patch-Nosed Snake							X
Desert Glossy Snake							X
Western Long-Nosed Snake							X
Colorado Desert Shovel-Nosed Snake							X
Western Diamondback							X
Mojave Desert Sidewinder							X
Mojave Rattlesnake							X
All other snakes	X						X o r X
Most Toads	X			X o r	X		

TABLE 35
(continued)

Animal Species	Type of Impact			Degree of Adverse Impact ^{2/}		
	Adverse	Beneficial	None	Total	Substantial	Mod. Slight
<u>Birds (cont.):</u>						
Verdins	X				X	
Wrens	X				X	
Mockingbirds & Thrushes	X					X
Thrushes	X					X
Pipits	X			X o r	X	
Gnatcatchers & Kinglets	X					X
Shrikes	X					X
Vireos	X					X
Warblers	X					X
Blackbirds, Orioles, Meadowlarks	X				X	
Tanagers	X					X
Finches & Sparrows	X					X
Coots	X			X		
Ducks	X			X		
Cormorants & Grebes	X			X		
<u>Reptiles & Amphibians:</u>						
Bullfrogs	X			X o r	X	
Turtles	X			X		

new rights-of-way. Table 36 lists the acreage by ownership, present use, and proposed use. The land in Mexico will consist of 200 acres of land belonging to the Mexican government and 550 acres of private land. In the United States, 1,595 acres of Federal land, 332 acres of private land and 42 acres of state land will be required. In addition, project features will utilize acres of existing right-of-way.

In addition, the proposal will involve the acquisition of 6,200 irrigable acres of private land and withdrawal of 3,800 acres of irrigable Federal land in the Wellton-Mohawk Division of the Gila Project. It may also be necessary at a later date to preclude from irrigation up to 5,000 additional acres, but this possibility is not included in the initial plan.

A total of 3,800 acres of private land in the Imperial East Mesa will also be required as a part of the project. Although the existing Coachella Canal contains the capacity and turnouts to serve this land, the acreage has not been developed because of soil deficiencies.

Lands in Painted Rock Reservoir will be utilized in order to reduce the infiltration of floodflows on the Gila River into the Wellton-Mohawk aquifer. The proposal is to withdraw 22,100 acres, including 12,800 acres of Federal land, 500 acres of Arizona state land, and 8,800 acres of private land which will be acquired. At the present time, 2,600 acres of the Federal land are under lease from the Fish and Wildlife Service to Arizona Game and Fish Department who sublease to farmers for agricultural purposes which benefit wildlife.

The proposed protective and regulatory ground-water pumping project will acquire the 23,500 acres of state of Arizona lands on the south Yuma Mesa within 5 miles of the Southerly International Boundary. The provisions for limiting the pumping of 160,000 acre-feet per year of ground water within this 5-mile limit will restrict the development on these lands and on an additional 10,900 acres of undeveloped Federal lands. Efforts will be made to negotiate the acquisition of state lands by means of exchange for Federal lands elsewhere.

Overall, the project will thus involve approximately 62,379 acres. This will be comprised of 200 acres of Mexican government land and 550 acres of private land in Mexico; 18,455 acres of Federal land and 24,042 acres of Arizona state land; and 19,132 acres of private land in the United States. Only a small portion of this land (less than 2,000 acres) will be actually utilized as the sites of physical structures.

Since construction equipment will require a certain amount of periodic maintenance and repair, some land use will be required for

service areas. These areas will probably be centrally located near major facility sites, with the location controlled by access from existing roads, field conditions, and proximity to the construction work. Temporary buildings will generally be used for service facilities. The duration of the facilities at each location will probably be one to two years. Depending upon the location, service areas will generally disrupt the tranquility of the environment because of the continual activity, noise, and problems associated with the repair and maintenance of heavy-duty equipment. The activities will be of such a nature that oil, diesel fuel, grease, and solvents may be spilled on the ground; however, the contractor will be responsible for conducting spill prevention methods of operation and for any cleanup of such spills.

The environmental impacts of facilities required for construction will be temporary. Upon completion of construction, all equipment, supplies, buildings, and personal property will be dismantled and/or removed from the construction area and disposed of in an acceptable manner and in conformance with current policy. Disturbed areas will be dressed and leveled and allowed to revegetate under natural conditions.

b. Recreation

Due to degradation and loss of aquatic and riparian habitat resulting from cessation of sustained river flows below Morelos Dam and dry up of Yuma Valley agricultural drains, it is estimated that there will be an annual loss of about 10,000 man-days of fishing activity and over 3,000 man-days of hunting in the Yuma Valley area. Other recreational activities such as picnic-camping and interest visitation will also be reduced by perhaps 50 percent.

Lining the first 49-mile reach of the Coachella Canal will result in reduced fish populations and will mean an annual loss of about 3,000 man-days of fishing activity. Loss of riparian habitat along the canal due to ground-water withdrawal will result in the annual loss of over 7,000 man-days of hunting activity.

c. Archeological and Historical

In compliance with the directive set forth in Section 106 of the National Historic Preservation Act of October 1966 (Public Law 89-655) and Section 101(b)(4) of the National Environmental Policy Act of 1969 (Public Law 91-190), the proposed project has been fully evaluated relative to the impacts it may have on historical and archeological resources and action will be taken to preserve them.

Only one registered historical site will be affected by construction of the project. The Yuma Crossing and Associated Sites,

TABLE 36
PRESENT AND PROPOSED LAND USE

Proposed Measures	Present Ownership					Present Use	Proposed Use
	United States Federal	Private	Arizona State	Mexico Govt.	Private		
I. Structural Measures							
Desalting Plant Facilities	up to 600	--	--	--	--	Undeveloped	Landfill disposal site & right-of- way
	--	64	--	--	--	Irrigated agri- culture	Plant facilities site & right-of- way
	--	50	--	--	--	Undeveloped or fallow	Transmission line & right-of-way
M.O.D.E. Siphon	--	--	--	--	--	M.O.D.E. right- of-way	M.O.D.E. right- of-way
Bypass Drain	260	--	--	--	--	Levee right-of- way	Right-of-way
	--	80 ^{1/}	--	--	370	Irrigated agri- culture	Right-of-way
	50	--	--	200	180	Undeveloped	Right-of-way
Coachella Canal	920	64	--	--	--	Undeveloped	Right-of-way
	--	36	--	--	--	Irrigated agri- culture	Right-of-way
Protective Pumping	--	3	--	--	--	Irrigated agri- culture	Well plots and right-of-way
	1	--	2	--	--	Undeveloped	Well plots and right-of-way
	--	35	--	--	--	Irrigated agri- culture	Pipeline, trans- mission line, & access road rights of-way

^{1/} U.S. permit and private.

TABLE-36
(continued)

Proposed Measures	Present Ownership					Present Use	Proposed Use
	United States Federal	Private	Arizona State	Mexico Govt.	Private		
Protective Pumping (cont.)	24	--	40	--	--	Undeveloped	Pipeline, transmission line, access road right-of-way
Subtotal	1,855	332	42	200	550		
II. <u>Nonstructural Measures</u>							
Reduction in Wellton-Mohawk Division	3,400	--	--	--	--	Undeveloped	Remain undeveloped
	400	2,000	--	--	--	Undeveloped	Remain undeveloped
	--	4,200	--	--	--	Irrigated agriculture	Remove from development
Gila River Control - Painted Rock Dam	10,200	4,800	500	--	--	Undeveloped	Flood Control
	--	4,000	--	--	--	Irrigated agriculture	Flood Control
	2,600	--	--	--	--	Leased for irrigated agriculture	Flood Control
Acquisition of Imperial East Mesa Lands	--	3,800	--	--	--	Undeveloped	Remain undeveloped
Acquisition of Arizona State Lands on the South Yuma Mesa	--	--	23,500	--	--	Undeveloped	Remain undeveloped
Subtotal	<u>16,600</u>	<u>18,800</u>	<u>24,000</u>	<u>--</u>	<u>--</u>		
Total	18,455	19,132	24,042	200	550		

which are described in Chapter II, are located in the area of the proposed concrete siphon replacement for the existing metal flume. This is already a modified and congested area, and no direct adverse impact will result through construction activities. However, there will be an immediate beneficial impact on esthetic values as a consequence of the replacement of the existing flume. Removing the existing above-ground structure will be conducive to the possible restoration of the Yuma Crossing. The extent of the impact on the Yuma Crossing has been assessed in cooperation with the Advisory Council on Historic Preservation and clearance for the replacement of the metal flume has been granted.

At the present time, there are no known archeological sites that will be affected by the proposed project. Archeological surveys have been conducted at all project facility sites under the auspices of the National Park Service and archeological clearance has been granted for all sites. The Bureau of Reclamation proposes to mitigate the impact of the undertaking on any archeological or historical resources located during construction activities. Any properties located will be evaluated by an appropriate professional who will make a determination in consultation with the State Historic Preservation Officer as to the properties' significance. Should the property be determined eligible for nomination to the National Register of Historic Places, the Bureau of Reclamation will follow the procedure outlined in 36 CFR Part 800. Should it then be determined that extensive recovery and study were required, such activities would be both beneficial and adverse. The beneficial impacts will include the actual location and documentation of the site, the information gained through excavation, and the preservation of artifacts found. The adverse impacts will involve the physical loss of the site, which will preclude any future evaluation at some later date when newer technology might allow for more detailed findings.

In addition to the archeological surveys by the National Park Service, the State Liaison Officer for Historic Preservation and the State Archeologists in Arizona and California have been consulted relative to the proposed location of project facilities.

Where proposed project facilities involve lands in Mexico, coordination will be maintained with the Mexican government in regard to an archeological survey and other concerns for sites of historical interest. Compliance with the requirements of the National Environmental Policy Act will be encouraged where they are not contrary to policies of the Mexican government.

d. Social and Economic

Historically, as increasing quantities of Colorado River water have been used, partially returned to the river, and reused further downstream, the overall salinity of the water has progressively increased.

This constant recycling represents an optimal development of the resource but has resulted in rising salinity levels in the lower Colorado River Basin in both the United States and Mexico. Correlated with the salinity control proposals embodied in the Colorado River Water Quality Improvement Program, this project will be a partial solution to the problem.

The Colorado River Basin Salinity Control Project, Title I, will control the quality of water deliveries to Mexico, thus constituting a positive step in improving the social and economic well-being of the users in Mexico. In addition, the utilization of Wellton-Mohawk drainage flows which are normally released below Morelos Dam, will prevent intrusion of these flows into the aquifer to the lower Yuma Valley and the Mexicali-San Luis Valley, thus preventing further degradation of the water quality in the aquifer from this source.

The Irrigation Efficiency Improvement Program and the acquisition of lands in Painted Rock Reservoir for additional flood control will improve drainage conditions on irrigated lands in the Gila Project. This will create indirect economic benefits in the area. However, there will also be some economic losses to particular farmers in the United States as a result of the land acquisition in the Wellton-Mohawk Division and Painted Rock Reservoir. There will be economic losses to farmers in both the United States and Mexico as a result of the loss of cropland required for project rights-of-way.

Lining of the first 49-mile reach of the Coachella Canal will result in the savings of 132,000 acre-feet of Colorado River water annually which will be a direct economic benefit to Colorado River water users and especially to the Coachella Valley County Water District. Eliminating seepage water from the canal will reduce the high ground-water levels underlying the Imperial East Mesa agricultural complex.

The provisions for limiting pumping of ground water within 5 miles of either side of the Arizona-Sonora land boundary near San Luis will restrict the economic development of 23,500 acres of state of Arizona land and 10,900 acres of Federal land. Delivering ground water across the land boundary at San Luis to preserve historic treaty deliveries at that point will result in preserving diversion entitlements from the Colorado River for delivery elsewhere in the state of Arizona. The protective pumping operations will have a beneficial impact on agriculture in Yuma Valley by improving drainage in areas with a high water table; however, private irrigation and domestic wells in the Yuma Mesa and Yuma Valley areas located near the Arizona-Sonora Boundary

will be affected by the lowering of ground-water levels. There are 109 domestic and stock watering wells within 5 miles of the boundary. These wells and others may eventually go dry, depending on their depth and location. The shallower wells will have to be replaced with deeper wells and pump lifts will be increased on all wells in the area. The costs involved for drilling new wells and increases in power demand will be an economic impact on private well owners.

Construction of this project, which has an estimated total cost of approximately \$155,500,000 will have social and economic impacts in the United States and Mexico. Employment opportunities will be available to many people directly and to many more indirectly, and the need for special equipment will create employment in specialized industries beyond the local and State boundaries. It is estimated that approximately 50 percent of the construction cost will be used for employment in the project area. The Bureau of Reclamation has made estimates of the employee requirements for the construction and operation of the three major features as presented in Table 37.

The desalting plant site is about 4 miles west of Yuma, Arizona, and it is assumed that essentially all of the individuals associated with the work force, amounting to a maximum of about 163 in 1980, would reside with their families in and around the city of Yuma, Arizona along with about 101 additional Federal employees and their families.

The proposed protective and regulatory pumping plant, located in Yuma County, includes installation of wells and pipelines on the South Yuma Mesa and western portion of the Yuma Valley within 5 miles of the southern boundary between the United States and Mexico. The individuals of the work force related to this scheme, amounting to a maximum of about 25 in 1977-1979, may reside with their families in the nearby towns of Gadsden, San Luis, and Somerton, Arizona. However, it is anticipated that many may choose their residence a few miles further away in Yuma because of its abundant services and conveniences.

The State of Arizona, Office of Economic Planning and Development (OEPD) has prepared a report on a study of the economic and demographic impacts that may be generated in the southwest portion of Yuma County by installation of a desalting complex. The report entitled "An Arizona Trade-Off Model Analysis of A Proposed Desalting Complex in Yuma County, Arizona" was distributed in November 1974 as the first phase of a study analysis by the State. The report presents estimates of overall increases in the labor force and demands for public services based on Bureau estimates of labor force requirements directly related to the construction and operation of the desalting complex.

The following discussion presents some of the basic conclusions of the OEPD Report:

The construction and operation of a desalting complex in Yuma County is expected to generate a peak increase in jobs of 468 by 1979. However, after completion of construction, the impact of the complex will be far less dramatic with only 75 additional jobs expected by 1990.

Yuma County population is expected to grow by 963 by 1981 as the result of the desalting complex. However, after construction is completed and temporary residents leave, the permanent population impact is expected to be approximately 200 additional residents by 1985 and 1990. With population growth there will be increased demands for housing in Yuma County. Housing demands are expected to rise to 378 units by 1981 but additional demand is expected to fall to 78 units by 1985 as temporary residents move out of the county by completion of plant construction. The pattern of construction related housing demands (197 in 1980, falling to 14 in 1985) dramatically illustrates that a good portion of total increased housing demand may be for temporary quarters; mobile homes may provide adequate interim shelter for most transitory residents.

The projected population increases will generate an estimated additional 269 aged 5-10 school enrollees by 1981. But by 1985 the permanent impact on school enrollments should only be 26 additional students; therefore, it may not be necessary to add to the permanent school plan.

These demographic and economic impacts as predicted by the OEPD Report will be centered in the cities of Yuma, Somerton, Gadsden, and San Luis, Arizona.

Construction related to the Coachella Canal will be located entirely within Imperial County, California. The work will begin at the Coachella Canal Turnout, about 25 miles west of Yuma, Arizona, and will continue along the canal in a northwesterly direction for 49 miles to a point about 5 miles east of the town of Niland, California. As shown in Table 37, the majority of the individuals of the work force, amounting to a maximum of about 250 in 1977, will probably reside with

TABLE 37

ESTIMATE OF EMPLOYEE REQUIREMENTS

Fiscal Year	Construction Employees			Additional Federal Employees in Yuma	Additional Federal Employees in Imperial Co. for Coachella Canal Lining
	Desalting Complex	Coachella Canal	Protective and Regulatory Pumping		
1975	11	3	2	74	11
1976	13	147	7	86	24
1977	0	250	25	93	25
1978	52	188	25	93	25
1979	112		25	101	
1980	163			101	
1981	50			45	
1982				40*	
1983				40*	

* Represents permanent Federal Government Employees required for operation and maintenance of the desalting complex facilities.

their families in Imperial County, California, in the towns of Brawley, Holtville, El Centro, and Calipatria, California, along with about 25 Federal employees and their families. There may be some individuals that will choose to reside in Yuma, Arizona.

Economic and demographic impacts in Imperial County associated with an increased work force will be similar to those predicted for Yuma County. However, it is anticipated that the impacts related to increased demands for public services will be less pronounced since the work force in Imperial County, California, will be more widely scattered throughout the towns of El Centro, Brawley, Holtville, Calipatria, and Niland, California; whereas the work force in Yuma County, Arizona, will be mainly concentrated in the city of Yuma. The Bureau of Reclamation feels that both Yuma and Imperial Counties are in an excellent position as far as public services are concerned because of the very nature of their tourist-oriented economies. The seasonal variations in population associated with winter visitors in each of the two counties are estimated to be at least 10,000 persons. Therefore, the impact of temporary population increases of less than 1,000 persons due to construction and operation of the project features should not be significant as far as most public services are concerned.

The presence of construction camps in the project area will have some social impacts relating to disturbance and sanitation. The only construction camps anticipated will be temporary construction field office areas and may include temporary or mobile structures, maintenance facilities, and security guard quarters. Water and sewage facilities at the project site are nonexistent requiring temporary facilities that meet requirements of Federal and Arizona and California State health laws.

Construction workers will occasionally utilize camp trailers or pickup-type campers for a short duration of time in the vicinity of construction. Control of this aspect will be difficult and will be the primary responsibility of the landowner. Contractor's employees may be discouraged from this practice by the work schedule, contractual relationships, and the establishment of adequate facilities within the right-of-way boundaries, in nearby communities, or on private lands. Due to the large number of winter visitors in the area utilizing similar camping equipment it will be difficult to distinguish between construction workers and visitors during the winter season.

Access roads will be necessary to facilitate construction work and allow safe travel for personnel. Existing roads in the project area will be used for this purpose whenever possible and will be improved

where required to handle construction traffic. Those which are already in good condition and capable of handling the increased load will be maintained in their present condition. New roads which will be required will be located within the project rights-of-way whenever possible. Public safety will be provided for on all roads utilized for construction activities. Existing operation and maintenance roads closed during construction work will cause an inconvenience to the general public. However, the upgrading of the road system will be a long-term advantage to travelers in the area.

Vehicular and pedestrian accidents may be greater than normal during the construction period due to the increased traffic. Off-highway travel and extensive traveling to and from the construction area during all hours of the day may present a potentially hazardous traffic situation. Local residents will not be allowed on the closed access roads, thereby eliminating a major safety concern but restricting access. Construction personnel traveling through the local area will be controlled by State and local traffic regulations. Detours or other appropriate measures will be provided to allow private citizens access to private or leased lands along project rights-of-way.

4. Environmental Quality

a. Noise

During construction of project facilities, large earthmoving equipment and heavy construction activities will produce a high level of noise, which is highly objectionable in confined areas or near developments. Utilization of equipment on a round-the-clock basis will be common in the construction areas and the greatest relative increase in noise levels will occur during the nighttime. However, the construction areas are generally remote, and there should be no great disturbance of the populace. Wildlife will be disturbed by the noise, but should repopulate the area after construction is completed.

The use of electric motors in operation of the desalting plant will insure relatively low sound levels at the plant site. Particular attention will be paid in designing the plant to baffle areas where noise levels may occur. During the operation of the protective and regulatory well fields, low level noises attributable to electric motors and pumping will be discernible in the immediate vicinity of the well plots.

b. Air Quality

Inherent with thunderstorms, windstorms, construction, travel, and other activity in desert regions is an ever-present dust problem.

The amount of ambient (air) particulate matter in the project area exceeds the Federal and State standards about 98 percent of the time. Additional temporary discomfort to people and wildlife may occur from the construction of the various project features. Dust problems will normally be localized during construction, however, and this discomfort will not exceed that experienced during periods of high winds or duststorms in the area. Removal of vegetation and disturbance of soils along rights-of-way and at borrow and excavation sites will create additional dust sources until revegetation occurs on those areas which are not permanent features of the project. Active dust abatement procedures by the contractor will reduce the dust hazard created by movement of heavy construction equipment along access roads and at construction sites.

Operation of the desalting plant and well fields will create essentially no bothersome aerial emissions. There will be some dust created during the landfill operations at the sludge disposal sites, but this should be minimal. Periodic travel by maintenance crews along the unpaved roads connecting the well plots will create some dust, but this will be only minor compared to the total dust generated by vehicular travel on all of the unpaved roads in the area.

c. Visual Quality

No special scenic sites will be affected by the project; although, loss of riparian communities along the Colorado River and the Coachella Canal will change the visual quality of those areas. Permanent structural features of the project such as the desalting plant, well plots, power transmission facilities, the lined Coachella Canal, and the bypass drain and their associated structures will have a permanent effect on the visual quality at their respective locations.

F. Impacts of Fish and Wildlife Mitigation

As discussed in Chapter I and Chapter II, mitigation was not included with original authorization of Public Law 93-320. Mitigation concepts have been studied, analyzed and recommended by the Ad Hoc Committees for Fish and Wildlife. Refinement of the concepts and the development of details and preconstruction design are being prepared by fulltime coordinator from the Arizona Game and Fish Department. Continued coordination will be maintained with the Fish and Wildlife Service and the California Department of Fish and Game through the Ad Hoc Committees. Impact of the mitigation concepts discussed in the following paragraphs is related to the analysis of environmental inventories and coordination and recommendations from the Ad Hoc Committees.

1. Desalting Complex and Protective and Regulatory Ground-Water Pumping

a. Hunter's Hole Complex

Maintaining water elevation in the 12 acres of water surface in Hunter's Hole with some overflow capacity to the surrounding vegetative areas will result in the continued existence of from 8 to 15 acres of suitable Yuma clapper rail habitat. White-winged and mourning dove, and Gambel's quail, plus shore birds, wading birds and waterfowl will also benefit from retention of the surface water resulting from the mitigation plan for Hunter's Hole. The potential for approximately 1,000 man-days of fishing, 350 man-days of hunting, and 250 man-days of general recreation use can result from maintaining the pond water elevation and the surrounding vegetation. The quality of the water within Hunter's Hole will be improved by pumping the higher quality ground water as a source of supply for the ponds.

b. Gila River Wildlife Management Area and Fish Rearing Facility

The approximately 900 acres that will be designated as a wildlife management area will result in a permanent status of this designation. Since the 300 acres of developed farmland will be exchanged with irrigable lands elsewhere there will be no net effect on land use caused by using this area. Ponds, dikes, and marshes that are created in the undeveloped and developed areas will be beneficial to the local fish, waterfowl, wading bird and other wildlife populations. If farming for wildlife is undertaken this effort will not only provide selective food for wildlife but will relieve some of the depredation on the adjacent farm community. White-winged and mourning doves and Gambel's quail will benefit from a permanent area for nesting and cover. Other animals such as beaver, muskrat, coyote, fox, cottontail rabbits, and jackrabbits will benefit as this area is managed for fish and wildlife. Proper management and development of the area will provide additional habitat for the endangered Yuma clapper rail.

It is tentatively anticipated that the proposed warm water fish rearing facility will produce warm water game species of fish for the annual stocking of approximately 200 to 300 surface acres of local waters that will result in approximately 50,000 angler-days of fishing activity per year. The facility will allow the upgrading of the stocking program in the area and will present the Arizona Game and Fish Department with the option of rearing and stocking fish that are more suitable to this area of southwestern Arizona. Ground water that is pumped for hatchery use after passing through the hatchery ponds will be used in the

development of a marsh area or allowed to infiltrate the local ground-water aquifer. A survey of archeological resources will be conducted immediately following the exact site selection.

2. First 49 Miles of the Coachella Canal

a. Maintaining Select Riparian Habitat

The designation of several hundred acres of existing riparian habitat as a wildlife management area will result in the better management and protection of the area for wildlife benefit. The inclusion of about 10 watering devices within the selected area will add to the permanent value of this select habitat. Maintenance of a portion of the habitat will be aimed at retention of habitat for doves, quail, cottontails, and the endangered Yuma clapper rail. California black rail habitat will also be a consideration in selection of the location of watering devices. The watering devices will furnish drinking water to wildlife away from the canal and will, therefore, minimize drownings of animals in the canal and will maintain wildlife utilization of these selected areas.

Recreational hunting for white-winged and mourning doves, Gambel's quail, and cottontails will continue but to a lesser degree. Off-road vehicle use of the area may eventually increase due to the reduction in size of the area containing a dense volume of riparian vegetative growth.

b. Lake Development

The development of a 10- to 20-acre fishing and recreational lake in the southern end of the Coachella Valley will add to the surface water available for public recreational use and will provide a source of fresh water for upland game, small mammals, and rodents. Management of the lake as a warm water fishery will provide more than 3,000 man-days of fishing per year. Day-use recreational facilities will provide a potential for an additional 3,000 man-days of nonfishing recreational use. Due to the expected fishing activity, use of the lake as a resting area for waterfowl will be limited and will not likely contribute to waterfowl hunting in the area. In addition to the Salton Sea, there are approximately 800 to 900 acres of private duck hunting ponds in the area.

If additional wetland habitat is developed in the 280-acre area which will be under lease, this will provide niches for aquatic and semiaquatic wildlife.

c. Finney-Ramer Unit

Dredging of a 2-mile-long, 70-foot-wide, irregular channel in the cattail choked wildlife management unit will contribute to recreational use, fishing, hunting access, and to migratory waterfowl, shore bird and wading bird habitat. Development of sloping dikes, minimum slope islands and edge effect will add considerably to the potential for suitable Yuma clapper rail and black rail habitat. The utilization of spoil from the dredging operation to build low dikes and sloping banks will add to the diversity of the marsh area which will be an asset to all marsh associated wildlife. Deepening of the 2 miles of dredged channel to a minimum of 8 feet will provide 17 acres of new productive fish habitat and will have the potential for over an additional 2,000 fisherman-use days on the refuge. The dredging work will restore a significant area of the marsh that has deteriorated to a point where it is no longer optimum for wildlife management. Construction of a silt catchment basin at the inflow to Finney Lake will reduce silt buildup in the lake and will provide better circulation and cleaner water for the lake.

d. Salton Sea National Wildlife Refuge

The purchase of up to 364 acres of previously selected lands will add to the overall integrity of management of wildlife on the Salton Sea National Wildlife Refuge. The purchase of the land itself will not add materially to the existing marsh and open water habitat; however, plans by U.S. Fish and Wildlife for future development will result in the creation of additional open water ponds and marsh habitat. The marsh will be developed in consideration of Yuma clapper rail habitat and habitat suitable to the overall continuity of the refuge. Use of the purchased land for other than crop production will constitute a change in land use. Considering the approximately 530,000 acres of agricultural lands in Imperial Valley with a gross crop value of \$317,538,831, loss of 364 acres would result in a loss of about 0.07 percent of the agricultural lands and a loss of less than \$222,280 in economic returns.

**IV. MITIGATION AND
ENHANCEMENT MEASURES**

IV. MITIGATION AND ENHANCEMENT MEASURES

A. Introduction

This chapter describes the measures which will be taken to mitigate the overall impacts described in Chapter III. These factors are classified under two broad categories: (1) standard criteria for design and construction and (2) mitigating measures for which funding authorization will be sought and which will be included as a project cost.

Standard criteria for improving the appearance of all structures and preserving the landscape at all installations will be implemented. These are applicable in the planning, design, and construction of all facilities in order to minimize adverse environmental impacts of a project. They apply to general impacts which may result from any proposal and are an integral part of any action for which authorization is sought.

Additional measures are included to mitigate the impacts of a specific feature in a particular area. Such features may be designed either to mitigate an anticipated adverse effect or to enhance the environmental quality of an area, including vegetative habitat, fish and wildlife, recreation, esthetic values and other factors. Basically, there are two methods of alleviating the environmental ramifications of a proposed action. Wherever possible, measures will be taken to minimize the extent of an impact at a particular site. In addition to this, features will be included as substitutions for losses, thus mitigating the overall impact of the project and preserving environmental quality in the general area. Mitigating measures are being designed and undertaken in coordination with appropriate agencies.

From the time the President of the United States appointed as his special Representative former Attorney General Herbert Brownell, Jr., on August 16, 1972, to serve as Special Representative to develop a solution to the salinity problem with Mexico until Minute No. 242 was signed and approved on August 30, 1973, negotiations between the two countries were of a confidential nature. The first widespread knowledge of the details of the proposal came with the introduction into Congress of the recommended bill in early 1974. The draft environmental impact statement on the project as prepared by the Administration was distributed on April 1, 1974. (For more detail see Chapter I, Sections A. through F. of this statement.)

Due to the nature of the negotiations and the demand for expediency in getting the proposal before Congress for authorization and funding, there was not included with the legislation a fish and wildlife plan or other detailed consideration for environmental mitigation.

Upon passage of the legislation into law as Public Law 93-320 on June 24, 1974, immediate steps were taken to comply with the Fish and Wildlife Coordination Act (of 1958), the National Environmental Policy Act of 1969 and other existing laws and guidelines regarding impacts of a Federal project on the natural resources of the nation.

A supplement to the draft statement was distributed for public comment on August 27, 1974, covering the additional feature of protective and regulatory ground-water pumping included in Title I of the law that was not included in the Administration's bill as introduced into Congress. This was followed by a public hearing on the draft and supplemental statements in Yuma, Arizona on October 5, 1974.

Concurrent with these actions, detailed but short-term environmental inventories were initiated in the areas that would be affected by the project. Fieldwork on all of the studies was completed by November 15, 1974, and the reports were submitted, reviewed and accepted by the Ad Hoc Committee and the Bureau of Reclamation.

In order to guide and participate in the studies, environmental analyses and development of mitigation concepts, two Ad Hoc Committees for Fish and Wildlife were organized, one for the Coachella Canal and another for the features located in the vicinity of Yuma, Arizona. The two separate committees were charged with the responsibility of assisting the Bureau of Reclamation in developing plans for mitigation of fish and wildlife and recreation resources that may be necessary as a result of the impacts of Title I, Colorado River Basin Salinity Control Project, and to assist the Bureau in carrying through with agreed-upon mitigation measures. Agency representation on these separate committees are listed below:

Committee: Ad Hoc Committee for Fish and Wildlife
on the Desalting Complex and Protective and
Regulatory Ground-Water Pumping

U. S. Bureau of Reclamation
U. S. Fish and Wildlife Service
U. S. Bureau of Land Management
Arizona Water Commission
Arizona Game and Fish Department
Wellton-Mohawk Irrigation and Drainage District
International Boundary and Water Commission -
United States Section
Yuma County Water Users' Association
Yuma County Board of Supervisors

Committee: Ad Hoc Committee for Fish and Wildlife
on the Coachella Canal

U. S. Bureau of Reclamation
U. S. Fish and Wildlife Service

California Department of Fish and Game
Colorado River Board of California
Coachella Valley County Water District
Imperial Irrigation District

The respective committees have worked cooperatively with the Bureau of Reclamation in developing mitigation concepts which have been agreed upon by the separate committees. The committees will continue in effect until the details of the mitigation concepts have been thoroughly planned, designed and implemented.

A secondary consideration of the Ad Hoc Committees has been guidance in compliance with Section 7 of the December 28, 1973 Endangered Species Act. The principal concern has been with the impacts on the endangered Yuma clapper rail in respect to the destruction or modification of habitat of this species.

Section 7 of the Endangered Species Act (P.L. 93-205) states:

"The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical."

Further the Secretary's memorandum of October 16, 1974 designates the U.S. Fish and Wildlife Service as the agency responsible for implementing and coordinating the Act. In regard to the portion of Section 7 dealing with the modification of possible critical habitat, the Bureau of Reclamation is coordinating efforts with the U.S. Fish and Wildlife Service as outlined below.

Reclamation developed and submitted status reports of endangered species habitat area to the Fish and Wildlife Service at the field level for comment and recommendations.

The reports include an analysis of population density, quantification of existing habitat, impact of the project on habitat, mitigation measures,

and resulting net change in habitat. The reports conclude that impacts stemming from the project will not result in habitat loss that would jeopardize the continued existence of the Yuma clapper rail. The Fish and Wildlife Service was requested to consult with the affected states in concurring with the recommendations. Following the receipt of comments from the Fish and Wildlife Service, the reports will be revised to include these comments and forwarded from the Commissioner, Bureau of Reclamation to the Director, Fish and Wildlife Service for formal recognition of compliance with Section 7 of the Endangered Species Act of 1973.

1. Desalting Complex and Protective and Regulatory Ground-Water Pumping Ad Hoc Committee

The Ad Hoc Committee for fish and wildlife and recreation for the desalting complex and protective and regulatory pumping plan located in Arizona is similar in structure and has the same charge for developing mitigation concepts as does the Coachella Ad Hoc Committee in California. The committee is active in the review and analysis of final reports of inventory studies that were financed by the project and conducted in the project area. The separate studies conducted to gain inventory data for the area of impact are listed below:

<u>Study Title</u>	<u>Agency</u>
1. Inventory of Aquatic Habitats and Fishes of the Yuma Valley, Arizona.	Arizona State University
2. Wildlife Use and Density Inventory and Vegetation Types Along the Colorado River from Morelos Dam to the Southerly International Boundary.	Arizona State University
3. A Special Report on: The Recreational Use of Areas Along the Lower Colorado River, Limitrophe & Neighboring Areas.	Arizona State University
4. Fishes of Hunter's Hole, Yuma County, Arizona	Arizona State University
5. Analog Model of: Protective and Regulatory Ground-Water Pumping	U.S. Geological Survey ^{1/}
6. Cost and Effects of Federal Buy-out of Wellton-Mohawk District.	Bureau of Reclamation

^{1/} Yuma area ground-water model was structured and constructed in 1966 with funds provided by the Geological Survey, Bureau of Reclamation, and the United States Section of the International Boundary and Water Commission. Data input was furnished by all three agencies. Model runs applicable to the protective and regulatory ground-water pumping plan and alternates were run in 1974 and were financed by the project.

In addition to the formal studies listed above, numerous lesser studies of specific items have been undertaken by project personnel. Preliminary feasibility reports and analysis of all of the original mitigation concepts were developed for use of the Ad Hoc Committee by study teams on the committee. The results of the studies and inventories have been utilized by the Ad Hoc Committee in preparing mitigation proposals. The data from these reports will be used in resolving the final details of the mitigation concepts recommended to and accepted as project objectives. Mitigation measures which have been proposed include providing Hunter's Hole with a water supply and the development of a Wildlife Management Area and Fish Rearing Facility along the Gila River. These concepts are discussed in more detail later in this chapter.

2. Coachella Canal Ad Hoc Committee

The Ad Hoc Committee for fish and wildlife on the Coachella Canal was active in the development and participation of field inventory studies of the resources of the area. The inventories were financed by the project and were completed by November 15, 1974, and subsequently submitted to and approved by the Ad Hoc Committee. These separate studies included analysis of the following:

<u>Study Title</u>	<u>Agency</u>
1. Recreation Use	San Diego State University, Calexico
2. Water Availability and Service	Colorado River Board of California and Coachella Valley County Water District
3. Fish and Fisherman Use	California Department of Fish and Game
4. Game and Hunter Use	California Department of Fish and Game
5. Hydrology	Bureau of Reclamation
6. Vegetation	Bureau of Reclamation
7. Small Mammals, Reptiles and Amphibians	California Department of Fish and Game
8. Legal Opinion Regarding Mitigation Responsi- bilities	Field Solicitor, Department of the Interior, Riverside, California

Results of these studies were utilized by the study teams and the Ad Hoc Committee in formulating mitigation recommendations. Copies of the reports are on file with individual agencies represented on the Ad Hoc Committee.

In a 1971 evaluation of the fish and wildlife habitat within and along the Coachella Canal, the Fish and Wildlife Service and the

California Department of Fish and Game recommended that a portion of the water to be salvaged from the lining of the canal be allocated for fish and wildlife mitigation along the canal and for the Salton Sea National Wildlife Refuge.^{1/} The Secretary of the Interior can make such an allocation with due consideration to the priority of such an allocation with respect to the priority considerations of the State of California. During the review period of the draft environmental impact statement, The Resources Agency of California expressed the following opinion on the availability of Colorado River water from the Coachella Canal for mitigation of wildlife.^{2/}

"...all Colorado River water in California is apportioned and there is no water available for consumptive use for new purposes on a permanent basis. The relative priority of such allocation would be so low that the water right would be realized only on a short-run basis. Moreover, the United States is prohibited, by the Supreme Court decree in Arizona v. California, from releasing Colorado River water except in accordance with the allocations made within that decree. If further reservations of mainstream water are made by the United States, these reservations would be subject to present perfected rights and to rights under contracts made under Section 5 of the Boulder Canyon Project Act. The practical result of this would be that, after the Central Arizona Project is in operation when California is likely to be cut back in its Colorado River diversions, there would be no water available from such an allocation."

"...allocation or nonallocation of a specific amount of water for consumptive use for the Salton Sea National Wildlife Refuge is not applicable to this project..."

"...priorities of water already have been set by the State and the agencies holding water rights under the California Seven-Party Water Agreement. These priorities were incorporated into and confirmed by contracts between the United States and California water agencies. Present perfected rights will be determined by the Supreme Court in accordance with Article VI of the decree in Arizona v. California."

On October 31, 1974, in a report to the Ad Hoc Committee for fish and wildlife on the Coachella Canal,^{3/} the Colorado River Board of California reemphasized the position stated in the earlier

- 1/ Memorandum from the Regional Director, Bureau of Sport Fisheries and Wildlife (Fish and Wildlife Service), "Coachella Division--All-American Canal System Water Salvage--Boulder Canyon Project, California"(December 15, 1971)
- 2/ The Resources Agency of California--letter of July 2, 1974
- 3/ California's Colorado River Water Rights Situation and Possible Sources of Water for Fish and Wildlife Purposes--Coachella Canal Relocation Project--Mimeotyped October 31, 1974

letter from The Resources Agency of California as follows: "...it is apparent that the reconstruction of 49 miles of the Coachella Canal will not make available any additional quantities of water that may be used for fish and wildlife purposes."

This position was made known to the members of the Ad Hoc Committee and the study teams of the committee. The study teams were charged by the committee to analyze mitigation concepts with the full consideration of the inability to utilize Colorado River water as a part of the proposed mitigation measures.

As a result of study team indepth analysis which included numerous alternatives for onsite and offsite mitigation, the Ad Hoc Committee agreed upon and recommended mitigation concepts which are primarily offsite. Onsite mitigation measures are related to standard construction design and maintaining select habitat with pumped ground water by using windmills. Major mitigation includes offsite rehabilitation measures at the Finney-Ramer unit of the Imperial Wildlife Area, fish pond and habitat development in the Coachella Valley, and purchase of additional lands to be included in the Salton Sea National Wildlife Refuge.

The mitigation concepts were agreed upon by the Ad Hoc Committee and recommended to the Bureau of Reclamation by the committee. Reclamation has agreed to these concepts subject to the allocation of funds. A general outline of the accepted mitigation concepts is presented in more detail later in this chapter.

The Ad Hoc Committee is charged with the development of details of the concepts for inclusion of the final design. The committee will remain active until the agreed-upon measures are implemented.

B. Measures Included as Part of the Standard Criteria for Design and Construction

The implementation of environmental considerations and commitments made in the environmental statement is of major concern and will be actively followed during the design, construction and postconstruction periods. The measures to be followed during these periods are as follows:

Design concepts will be shaped to minimize the adverse effects of manmade structures on the natural environment.

Systematic reviews of construction work will be performed with particular emphasis on the environmental concerns. This will insure full awareness of environmental matters during the construction phase.

Maintenance review of the project after construction will be performed as appropriate. This will enable evaluation of the effectiveness of environmental monitoring programs, and will allow for the refinement of monitoring programs as needed.

An "Environmental Guidebook for Construction" has been published by the Bureau of Reclamation for its use during construction. The guidebook is also made available to contractor personnel. This 61-page pocket-size book generally delineates the aspects discussed in this environmental statement. The booklet represents a standard for the construction industry applicable to Bureau of Reclamation construction.

In addition to the guidebook, orientation sessions will be provided to employees in positions of responsibility and key inspection positions to heighten their awareness and sensitivity to environmental requirements identified in both the environmental impact statement and contract specifications. Of particular concern in the orientation sessions, will be the need to recognize possible scientific, prehistorical, historical, and archeological materials should they be uncovered during excavations for structures.

This environmental statement recognizes that there may be potentials for mitigating impacts related to those facilities to be constructed by responsible entities of the Government of Mexico. If Mexico desires further environmental studies to evaluate these impacts, these will be undertaken in cooperation with the Mexican Government.

1. Specific Design Considerations

Specific requirements which apply to this project are as follows:

- a. The Structures of the project will be located to take advantage of the natural topography.
- b. Aqueducts will be designed to minimize cuts and fills.
- c. The structures will be designed to be compatible with the surrounding area.
- d. The external appearances of the structures will be considered during the design stage so that they will be environmentally compatible with the surroundings.
- e. Cut-and-fill slopes will be selected to blend into the natural terrain.
- f. Borrow and disposal areas will be located to the extent possible in generally concealed areas.

Possible impacts on vegetation, wildlife, and esthetic values will be considered in choosing their location, size, and configuration. Borrow pits will be shaped to blend with the surrounding terrain and sloped to prevent erosion and undesirable ponding of water. Native vegetation will be protected in accordance with procedures developed by the Arizona Commission of Agriculture and Horticulture under the Arizona Native Plant Law (Arizona Revised Statutes, Sec. 3-901, et seq. - 1972 Supp.) for work in Arizona and appropriate statute or agency requirements for similar work in California.

Excavated material will normally be used for embankment within the project. Where spoil disposal areas are required, they will be located in low-profile areas insofar as practicable.

g. Access roads will be located along the alignments of the features where possible and will be utilized for operation and maintenance access roads. Existing roads will be used as much as possible in order to minimize new construction.

h. Pumps and motors will be designed to prevent harmful and bothersome noise levels.

i. Adequate lighting facilities will be provided in the structures to accommodate safe working conditions.

2. Construction Specification Considerations

Construction contractors will be required by specifications provisions to reduce or avoid adverse impacts by the following methods:

a. Controlling operations so as to disturb the minimum amount of rights-of-way. Only the necessary amounts of vegetation will be cleared within the rights-of-way.

b. Restoring the areas that are disturbed by construction to as natural a condition as possible, e.g., temporary access roads, construction camps, equipment storage and service, and materials storage.

c. Closing access roads to the general public during construction and providing detours for private access to owned or leased lands should limit the contractor's liability, promote public safety, and prevent unnecessary disturbances of undeveloped surrounding areas. Upon completion of construction, temporarily disturbed areas will be restored as nearly as practicable to their original condition to complement the natural surroundings.

d. Maintaining heavy equipment to eliminate excessive air pollution.

e. Providing construction equipment with features to minimize noise pollution.

f. Providing efficient measures, including watering devices, to reduce the dust nuisance on access roads and in work areas.

g. Maintaining efforts to keep waste water returns to a minimum.

h. Collecting and disposing of the waste products from equipment service areas in an acceptable manner to avoid any form of pollution. Waste products may include oil, diesel fuel, grease, and solvents.

i. Implementing provisions for minimizing safety hazards involved with heavy construction equipment traffic.

j. Adhering to State and local safety standards.

k. Adhering to local public health standards in regard to sanitary and water supply facilities.

3. Debris and Fire Control

Special guidelines for disposal of materials will be incorporated into construction specifications. The contractor will be required to have suitable equipment and means to prevent and suppress damaging fires.

4. Transmission Systems

Transmission lines, substations, and other related facilities will be designed and constructed in accordance with the Department of the Interior's "Environmental Criteria for Electric Transmission Systems." The structures will be located to make maximum use of existing topography for screening and will be designed to blend with the natural surroundings. Insulators, hardware, and related materials will be designed to reduce electronic interference to a minimum.

5. Archeological and Historical

Pursuant to the National Historic Preservation Act of 1966, P.L. 89-665 (80 Stat. 915), the Advisory Council on Historic Preservation and the National Park Service, Department of the Interior, have adopted procedures and criteria to further the Nation's historic preservation program. The National Register of Historic Places and the National Registry of Natural Landmarks, identified in the Federal Register through March 4, 1975, have been checked and only one historical site exists in the project area. This is the Yuma Crossing and Associated Sites located along the banks of the Colorado River on the north edge of

Yuma, Arizona. The only construction in this area will be replacement of the M.O.D.E. metal flume with a buried siphon. Removal of the flume and smoothing of the landscape of the area will actually enhance any movement to restore this historical landmark. Clearance has been granted by the Advisory Council for replacement of the flume.

Lands required for project purposes have also undergone archeological reviews. No archeological sites were found in the vicinity of project features. The National Park Service has granted archeological clearance for construction of the project.

As mentioned earlier, construction personnel will be charged with the responsibility of observing and reporting to higher authority any evidence of possible archeological materials among other data that may be uncovered during excavation work. Should archeological finds be discovered, the work will be temporarily restricted until the appropriate officials, including the State Historic Preservation Officer, have had the opportunity to evaluate the site. Based on the recommendations of the professional reviewer, a decision will be made either to alter the construction, to avoid the finds where practical, or to undertake excavation and recording of the finds. This procedure will minimize the loss of any cultural or archeological artifacts that may be encountered unexpectedly,

C. Measures Included as Part of the Project

1. Desalting Complex

a. Desalting Plant

The number of new features required as a part of the plant will be reduced as a result of the features already existing at the proposed site. The Main Outlet Drain Extension is in close proximity and will be used to supply feed water and to convey product water to the Colorado River. Consequently, the pipelines required to feed the desalting plant will be short and will have no impact on vegetation in the area. Existing structures on the drain will be utilized whenever possible and modified if required. Since the site is located near existing roads and a spur of the Southern Pacific Railroad, only approximately 1/4 mile of new access roads and approximately 800 feet of new railroad tracks will be required to provide access to the desalting plant. In conveying the reject stream from the plant, the existing Main Outlet Drain Extension which now discharges immediately below Morelos Dam will be utilized as a part of the proposed bypass drain to the Santa Clara Slough. The M.O.D.E. presently extends for a distance of 2 miles south of the proposed site for the desalting plant. Screens will be installed on the feed water intake structure which will minimize fish losses.

An extensive archeological study has been conducted under contract with the National Park Service. There were no sites located within the rights-of-way of any phase of the desalting complex. Archeological clearance has been obtained. Contact is being maintained with the Arizona and California State Liaison Officers in compliance with the mandates of the National Historic Preservation Act. There are no sites included on, or proposed for inclusion on, the National Register for Historic Places that will be affected by the desalting plant.

Special foundation treatment consisting of excavation and compacted refill may be required for the desalting plant features as a matter of seismic design to compensate for the remote possibility that severe earthquakes would cause liquefaction.

b. M.O.D.E. Metal Flume

(1) Fish

Fish losses during the two water outages required to connect the siphon to the Main Outlet Drain Extension will be minimized by a concurrent fish salvage program which will be coordinated with the Arizona Game and Fish Department. During the two short water outages required to disconnect the existing metal flume and to begin operations with the new buried siphon, existing check structures will be used to maintain the water level in the drain above the flume. In the event that seepage losses are in excess of those anticipated, a selected number of wells within the Wellton-Mohawk Division can be pumped to insure that the water level is maintained at an acceptable level. To the extent possible without retaining standing water in the construction area, the gates in existing check structures downstream of the site will be lowered to store water in the existing drain channel. A short siphon just downstream of the metal flume will also retain water during the outages.

A fish salvage operation at the short siphon will be planned in cooperation with the Arizona Game and Fish Department to restock the upper section of the drain where sufficient check structures will not allow ponding of water in order to maintain the fish population in the drain after the connection is made. Fish can also be utilized to stock other drains in the area. It is expected that fish existing in the drain will replenish themselves in a short period of time following completion of construction.

(2) Archeological and Historical

The replacement of the metal flume with a buried siphon will generally have beneficial impacts on environmental quality

of the immediate area. The removal of the existing surface structure will enhance esthetic values, improve physical safety, and contribute towards the eventual restoration of the original Yuma Crossing historical landmark. The impacts of the project on Yuma Crossing were determined by the Advisory Council on Historic Preservation to be insignificant following the procedures outlined in Section 106 of the National Historic Preservation Act. Clearance has been granted for replacement of the flume. Study results revealed there would be no archeological sites affected by replacement of the metal flume. Archeological clearance has been obtained from the National Park Service.

c. Bypass Drain

(1) Humans and Wildlife

A minimum of six bridges will be constructed for access over the 16 miles of bypass drain to be constructed in the United States. Three of these bridges will be located within the boundaries of the Cocopah Indian Reservation. The bridges will provide crossings for both humans and wildlife. Before designing the bypass drain, consultations will be held with the Bureau of Land Management, Yuma County Highway Department, Bureau of Indian Affairs, Cocopah Tribe, and landowners to determine the number and location of bridges required.

Escape ladders will be provided at intervals along the drain and above all check structures for human extrication. Under normal operating conditions the depth in the drain of the 60 ft³/s byproduct water will be less than 2 feet and should not be a hazard to humans nor to an occasional migratory big game animal that may fall into the drain. In the event they fall into the drain, most coyotes, foxes, badgers, bobcats, and other animals in this size range will be able to escape by scrambling up the dry concrete sidewall.

(2) Archeological and Historical

Archeological studies for the 16 miles of the bypass drain in the United States have been completed. No significant sites were located and clearance has been granted by the National Park Service.

2. First 49 Miles of the Coachella Canal

a. Fish

Provisions for salvaging stranded fish during the dewatering of the existing canal are being planned. These measures will be developed in cooperation with the California Department of Fish and Game and the Fish and Wildlife Service. The provisions may include netting and hauling fish to appropriate new locations. There is a

possibility that Colorado River squawfish, an endangered species, are being diverted from the river into the All-American Canal. Recent and intensive sampling of the fish population in the first 49 miles of the Coachella Canal did not result in the observation of any endangered fish.

b. Humans and Wildlife

Structural features designed to alleviate adverse environmental effects will include installation of escape ladders at regular intervals, and in particular, near siphons and check structures to allow humans to extricate themselves if they fall into the concrete-lined canal. Since small animals such as rodents, birds, and lizards will be able to obtain water from the lined canal with very minor losses and since the few burros, deer and other animals, which do frequent the riparian areas along the canal, have adequate and safe crossing points at the canal siphons, no special structural features such as escape ramps, footbridges or fencing will be provided for wildlife.

c. Archeological and Historical

Working through the National Park Service, Reclamation contracted for archeological surveys along the Coachella Canal alignment.

One significant archeological site (CC4) was located on privately patented land approximately 1/8 mile from the new canal alignment. The site will not be affected by the project construction. In response to the intent of the 1966 National Historic Preservation Act, the site was reported to the National Park Service.

Two sites, CC2 and CC2A, considered worthy of further study were located within potential canal right-of-way. Detailed field mapping and evaluation of these sites were completed in January 1975. Evaluation revealed that Site CC2 appeared to have been the remains of a moderately large animal kill, probably natural in origin and not necessarily the result of human activity. The site consisted of surface scatter of fragmentary bone spread over an area about 150 feet in diameter. Site CC2A, apparently a campsite, consisted of a limited surface scatter of ceramic, lithic, and bone debris, on the gently sloping side of a depressed area. Results of the evaluations were forwarded to the National Park Service for their analysis and advice on the custodial responsibilities for physical remains found during the site evaluations. By letter of April 1, 1975, the National Park Service granted archeological clearance for the area.

3. Protective and Regulatory Gound-Water Pumping

When the protective and regulatory ground-water pumping plan is initiated, care will be taken to protect the cultural well-being of the project area. Archeological investigations have been conducted on the area of the proposed plan and there were no significant finds at the site of any project features. In the event that construction activity does not uncover unknown archeological sites, these will be protected until investigations can be completed by the proper authorities. Disturbance caused by pipeline construction near Friendship Park and across U.S. Highway 95 at San Luis, Arizona, will be closely monitored and kept to a minimum so as not to unduly affect use of the park and hinder traffic on the highway. Construction of the pipeline across the highway will be coordinated with the Arizona Highway Department.

Power transmission facilities, access roads, pumping plants, and pipelines will be designed and placed where practicable to have the least possible effect on the natural and esthetic appearance of their surroundings. Placement of power transmission lines will be along existing and acquired pipeline rights-of-way, thus requiring no additional rights-of-way. Access roads will follow existing routes where possible and will be within the common right-of-way of the transmission line and pipeline corridor. Pipelines will be buried, and the fill smoothed over. Well plots will be fenced to eliminate hazardous conditions and pumps and motors maintained to prevent bothersome noise levels.

D. Measures for Which Funding Authorization Will Be Sought and Included as a Project Cost and Objective

As outlined earlier in this chapter, due to the nature of the negotiations with Mexico and the demand for expediency in getting the proposal before Congress for authorization and funding, a detailed fish, wildlife and overall environmental mitigation plan was not included for legislative consideration. Following authorization of the project, immediate progressive steps were taken to develop a plan for environmental mitigation. These included the organization of two Ad Hoc Committees for fish and wildlife; environmental inventory studies to identify existing resources; analysis to determine losses of resources to be incurred; formulation and recommendations by the Committees of mitigation measures concepts to replace those losses; and approval and adoption of concepts of mitigation measures to become a part of the project.

Mitigation measures concepts as adopted will be refined and authorization for funding and implementation will be sought. The following discussions are on those concepts.

1. Desalting Complex and Protective and Regulatory Ground-Water Pumping

Fish and wildlife mitigation measures for impacts to be incurred by the desalting complex and protective and regulatory ground-water pumping are primarily related to utilization of drainage flows from the Wellton-Mohawk Division in the desalting process and to the accelerated drawdown of ground-water levels through well field pumping. Utilization of the drainage flows will essentially result in the termination of flow in the 21 miles of Colorado River channel below Morelos Dam to the Southerly International Boundary and will reduce streamflow for several miles in Mexico, south of the boundary. Drawdown of ground-water levels will dry up 15 acres of backwater ponds along the river and 80 miles of agricultural drains in Yuma Valley.

a. Hunter's Hole Pond Complex

Even though the Hunter's Hole ponds are now in existence, the water surface elevation will be reduced a minimum of 7 feet in 10 years. The ponds now have an average depth of approximately 6 feet with a maximum depth of 18 feet. They will essentially be lost as open water areas within 10-15 years as a result of existing pumping. The removal of the Wellton-Mohawk drainage flow from the river channel will only result in an immediate drop in surface elevation of 2-3 feet. Maintaining these ponds will be direct mitigation as their total demise is expected to occur from reasons that are not impacts or accountable to the project.

In order to maintain the water as long as feasible in Hunter's Hole, a well equipped with up to a 5 ft³/s capacity pump will be installed adjacent to the ponds to supply freshwater to the ponds on a demand basis. Due to unpredictable percolation rates, the pumped ground water may not maintain the water levels in perpetuity. The water surface elevation and water quality will be monitored to determine the efficiency of the measure. Use of the well water will not be an infringement on any water rights but accountable under the 160,000 acre-feet per year stipulated in Minute No. 242. A water level control structure will be installed on the pond outlet to the river to prevent excessive outflow of water and to assist in maintaining the upper 3-foot elevation of the pond's water surface. The introduction of pumped water having a TDS pf approximately 1,200 p/m as opposed to the existing pond water which now has a TDS level in excess of 4,000 p/m is expected to improve water quality in the pond. Seepage from the upper perimeter of the 12 acres of open water is expected to maintain approximately 8-12 acres of riparian vegetation around the pond complex. The vegetated area that will be sustained is existing suitable habitat for the endangered Yuma clapper rail and numerous other species of wildlife. A maximum of four clapper rails has been censused in the Hunter's Hole complex.

Throughout the feasible life of the mitigation measure, operation and maintenance costs of this feature will be the responsibility of the designated management agency as outlined in a cooperative agreement.

b. Gila River Wildlife Management Area and Fish Rearing Facility

The proposal for combining several recommended mitigation concepts into a wildlife management area concept on the Gila River was presented to the Ad Hoc Committee by memorandum of March 11, 1975. On March 18, 1975, the proposal for locating the wildlife management area concept on the Gila River was discussed with the Wellton-Mohawk Irrigation and Drainage District Board of Directors. A meeting was conducted with the Director of the Arizona Game and Fish Department and his staff to outline the proposal. The combination of the concepts into a management area concept was accepted in principal at that meeting. On March 21, 1975, the wildlife management area concept was presented and discussed in detail by the Ad Hoc Committee. At that meeting the wildlife management area concept was received favorably by the Committee members. The combining of concepts into a wildlife management area concept was recommended thereafter to the Regional Director, Lower Colorado Region, Bureau of Reclamation through a copy of the meeting notes.

By memorandum dated April 18, 1975, the Regional Director responded to the March 14 and March 21, 1975 Ad Hoc Committee recommendations for mitigation concepts. Therein, the wildlife management area as a mitigation concept was accepted.

If the detailed plans of the concept for a wildlife management area in the Dome Narrows on the Gila River are not resolved to the satisfaction of the Wellton-Mohawk Irrigation and Drainage District, Arizona Game and Fish Department and the Bureau of Reclamation, an alternative location for the concept will be identified. As a result of the Bureau of Reclamation's formal acceptance, the concept itself still remains valid. Therefore, the following is outlined as the concept for total fish and wildlife mitigation either in the Dome Narrows as described or another suitable location if required.

An adequate number of acres of lands will be acquired by Reclamation and assigned to the Arizona Game and Fish Department for designation as a wildlife and recreation management area. The preferred location is along the Gila River within the narrows created by the Laguna Mountains on the north and the Gila Mountains on the south. This area will support a dredged ponded area for fish, wildlife and recreational use, marsh and riparian wildlife habitat, wildlife crops, a pumped supply of ground water, and a site for a fish rearing facility.

Presently within the proposed Dome Narrows area there are developed farmlands, riparian habitat, including open water, marsh,

woody riparian (mixed phreatophytes), wetlands, and undisturbed desert habitat. Irrigation and drainage facilities, U.S. Highway 95, and various access roads also pass through this area. These lands are located adjacent to Yuma County's Adair Park, irrigated farmlands, the Wellton-Mohawk Main Conveyance Channel, the Wellton-Mohawk Canal, and the Southern Pacific Railroad.

After acquisition of lands is completed, they will be designated as a wildlife and recreation management area, but will not have rights to receive Colorado River water. Water will, however, be supplied by pumped ground water. Ground water in the surrounding area varies from 1,100 p/m TDS to 3,500 p/m TDS at depths from 8 to 120 feet below ground level.

Lands within the management area can be selectively utilized for producing wildlife feed crops and/or abandoned to revert to natural riparian growth. A low-lying area of 12 to 15 acres can be developed by a means of dredging an 8- to 12-acre pond to provide aquatic habitat and peripheral hydrophytic vegetation.

If the Dome Narrows site is the final selection, the Gila River riparian habitat presently consisting of marsh, mixed phreatophytes and some open water will be preserved and enhanced by selective channel dredging with consideration given to Gila River flood-flows. A slightly meandering channel, varying in width and depth, will be dredged to create additional aquatic habitat. This will greatly enhance the fishery in this area. Branches off the main channel will be provided to create secluded coves for aquatic and semiaquatic wildlife.

A fish rearing facility will be constructed to provide for the annual stocking of fishing waters in the Yuma area. Sizing of the facility will be determined through negotiations with the Arizona Game and Fish Department in coordination with the fish and wildlife Ad Hoc Committee. It is anticipated that the facility may provide enough fish for the annual stocking of 200 to 300 surface acres of fishing waters and for about 50,000 angler days of fishing activity per year. The facility located within a controlled management area will be afforded security, a suitable and ample water supply, some protection from herbicide and pesticide aerial drift, and a ready access to a main thoroughfare and power source.

Development of plans and designs for wildlife management area and fish rearing facility will be coordinated with the Arizona Game and Fish Department and the Ad Hoc Committee for fish and wildlife. Costs and designs will be relative to land exchange, sizing of the fish rearing facility, capacities of ground-water wells, dredged pond surface acres, and other appurtenant features such as power transmission lines, access roads, and protective works. Operation and maintenance of the wildlife management area and fish rearing facility will be the

responsibility of the designated management agency. The overall O&M responsibility for management of the area will be outlined in a cooperatively developed management agreement.

c. Summary of Expected Replacement Value of Planned Mitigation Concepts for the Desalting Complex and Protective and Regulatory Ground-Water Pumping

During the life of the project, as stated in Chapter III, approximately 2,353 acres of riparian habitat below Morelos Dam and in the Yuma Valley will be lost due to the cessation of Wellton-Mohawk drainage flows in the Colorado River below Morelos Dam and as a result of the combined ground-water pumping in the United States and Mexico. The loss of 117 surface acres of riverflow and 9 acres of off-river connective open water will be directly attributable to the project. The loss of approximately 15 surface acres of backwaters and ponds and 120 surface acres of open water in the Yuma Valley Drains will result from existing ground-water pumping. The protective and regulatory ground-water pumping feature of the project will increase the ground-water drawdown rate approximately 56 percent in the first 10 years.

Measures that are planned to maintain the water level in Hunter's Hole will retain 12 surface acres of the 15 acres of backwaters and ponds that will be lost with or without the project. Overflow and seepage from Hunter's Hole will retain approximately 8-12 acres of marsh habitat suitable for Yuma clapper rail.

Development of a fish and wildlife pond on the wildlife management area will replace 8-12 surface acres of water that will be lost in the Yuma Valley Drains. Selective dredging of the Gila River in the proposed Dome Narrows Wildlife Management Area concept will provide between 20-30 additional surface acres of aquatic habitat for mitigation.

The land to be acquired for a wildlife management area will include riparian habitat including marsh, woody riparian and wetland habitats. If the final site selected includes developed farmland, they can be utilized and managed for wildlife crops. Additional acres of land within the wildlife management area not utilized for a fish rearing facility and for access will provide a buffer zone, or can be used for future development of the management area.

The fish rearing facility will be sized in proportion to the detailed and final estimate of fish loss resulting from the project and to the stocking requirements of the newly developed mitigation features. It is now anticipated that the facility may provide enough fish for the annual stocking of 200 to 300 surface acres of fishing water and for about 50,000 angler days per year.

d. Environmental Gains -- Unquantified

In 1973 discharges at a low rate from Painted Rock Dam allowed most of the released storm water to infiltrate into the ground-water basin in the greenbelt area below the dam and above the Wellton-Mohawk Division thereby reducing infiltration within the Division. As reported to the fish and wildlife Ad Hoc Committee by the Arizona Game and Fish Department, the lower but consistent release of flow from Painted Rock Dam resulted in considerable enhancement within the greenbelt area. Vegetation along the Gila River course improved markedly, resulting in higher populations of quail, dove, and other avian species in the area. Small mammal populations also increased. Deer utilized the riparian habitat in larger numbers than in the past.

The retirement of 10,000 acres of irrigable land in the Wellton-Mohawk Division will have a long-term beneficial impact on wildlife in the area. In addition to the approximately 3,800 acres of Federal lands and 2,000 acres of private lands that are presently undeveloped, 4,200 acres of private lands under irrigated agriculture will be retired. Although the conditions of the land acquisitions will not be determined until negotiations are conducted with the individual landowners, land purchased in fee will normally be allowed to remain or return to native vegetation, whichever the case may be. In some instances, a portion of the land may be leased back to the present owners or sold back without the right to receive water through the Wellton-Mohawk Division irrigation system. Generally, the retention of approximately 5,800 acres of land as natural habitat and reversion of 4,200 acres to fallow land and/or eventually to natural habitat will ensure and/or enhance the wildlife carrying capacity of these lands especially for upland game species such as cottontails, doves, and quail.

Even with these obvious benefits, only general enhancement values can be assigned to the increase in wildlife habitat and density that will result from retirement from development of lands in the Wellton-Mohawk Irrigation and Drainage District and the proposed change in operating criteria of Painted Rock Dam. The exact location and types of land to be retired have not been specifically identified and the exact criteria for releases from Painted Rock Dam can not have been established nor can these flows be assured. Consequently, mitigation credit has not been claimed for benefit to the environment that will result from these enhancement measures.

2. First 49 Miles of the Coachella Canal

a. Maintain Select Riparian Habitat

The better quality wildlife habitat within the washes and low-lying areas adjacent to the Coachella Canal will be defined and designated as permanent wildlife management areas if the selected area

is under unencumbered Federal ownership. Within the selected acreage, the fish and wildlife agencies will designate sites for the placement of approximately 10 wildlife watering devices equipped with 1,200-gallon tanks with overflow spill blocks. Water for the tanks will be supplied by ground water pumped from wells equipped with mechanical windmills. No Colorado River water rights will be provided nor will any water rights be necessary. Following a specified period of time to assure the proper operation of the facilities a management agency will be designated in a cooperative agreement to assume responsibility for the periodic operation and maintenance of these facilities.

The watering devices will furnish drinking water to wildlife away from the canal and will therefore minimize drowning of animals in the canal and will maintain wildlife utilization of these selected areas. Overflow from the tanks will not be controlled and will result in the development and maintenance of small patches of riparian vegetation.

b. Lake Development

Approximately 280 acres of land at the northwest end of the Salton Sea in the E 1/2 Section 7, T. 8 S., R. 9 E., SBM, will be leased and designated as a wildlife management area. Within this area a 10- to 20-acre recreation and fishing lake will be constructed. Recreational use facilities and fish and wildlife improvements can be a part of the plan of development. Ground water of unsuitable TDS for other uses, and/or irrigation drainage water will be utilized as a water supply for the lake and whatever habitat development there might be. A water right is not stipulated. Ground water is only 1-3 feet below the ground surface in this area and irrigation drainage water can be supplied at a rate of about 15 ft³/s. At present, the drain water in this area has a TDS concentration of about 1,700 p/m.

The location, size, and configuration of the lake and development of wildlife habitat in the 280-acre area will be coordinated with the Ad Hoc Committee. Initial and periodic fish stocking, and fish and wildlife management will be the responsibility of the California Department of Fish and Game. The overall operation and maintenance responsibility for the management of the area will be outlined in a cooperatively developed management agreement. Responsibility for the separate or joint management of the fish and wildlife resources, recreational aspects and maintenance necessary to maintain the viability of the area will be defined in the management agreement.

c. Finney-Ramer Unit, Imperial Wildlife Area

Rehabilitation of about 200 acres of degrading marsh habitat in Finney Lake and Culver Pond of the Finney-Ramer Unit of the Imperial Wildlife Area, Imperial County, California, will be accomplished by

means of dredging. The work will contribute to recreational use and access of the area and to the creation and enhancement of habitat for fish and aquatic and semiaquatic wildlife. There will be better water circulation through the marsh areas and the water will be less turbid. The equivalent of, or approximately 2 miles of dredged channels and waterways will be constructed averaging 70 feet in width and 8 to 12 feet in depth. The total of about 17 surface acres of dredged area will be irregular in shape. Spoil will be beneficially used for the creation of sloping protective dikes and minimum slope islands for the enhancement and creation of habitat suitable to wading birds and shore birds, particularly the Yuma clapper rail. A deeper and wider section will be dredged at the inlet to Finney Lake to serve as a silt catchment basin with silt removal maintenance capabilities.

Plans for the rehabilitation work in the Finney-Ramer Unit will be developed by the California Department of Fish and Game in coordination with the Ad Hoc Committee. Operation, maintenance and management of the area will remain the responsibility of the California Department of Fish and Game.

d. Salton Sea National Wildlife Refuge

The project will acquire all or part of the 364 acres of land that has been identified and selected for expansion of the Salton Sea National Wildlife Refuge. The amount of lands acquired is dependent upon the extent of development of the other mitigation measures previously discussed.

All or a part of the acreage acquired can be developed into ponds and marsh habitat. Water for this purpose could be furnished by the purchase of water from the Imperial Irrigation District and/or by the use of irrigation drainage flows. This area would provide habitat for aquatic and semiaquatic wildlife, hunting and nonconsumptive recreation. With adequate planning additional habitat for Yuma clapper rail and California black rail can be an integral segment of the development.

e. Summary of Expected Replacement Value of Planned Mitigation Concepts for the Coachella Canal

Analog models of the expected drop in ground water over a 50-year period in the riparian areas along the Coachella Canal reveal that approximately 1,209 acres of the existing 4,092 acres of riparian habitat will not be affected by the cessation of seepage water from the Coachella Canal. These 1,209 acres are located at the lower elevations in the major washes and adjacent to the Imperial Irrigation District's East Highline Canal.

The incorporation of approximately 10 watering devices in selected areas of choice habitat can contribute significantly to the

maintenance of an additional number of acres of existing habitat. The flow of water from the windmill-powered pumps will not be checked, and the anticipated overflow from the reservoirs will retain and perhaps improve habitat quality in the selected sites. If a land exchange can be negotiated between private interest and the Federal government, it may be possible to block out an area of approximately 1,700 acres that can be designated as a wildlife management area. This proposal is being pursued under the onsite select habitat mitigation concept.

Approximately 240 acres of the 280 acres of land at the northwest end of the Salton Sea to be obtained by lease under the lake mitigation concept can be developed into wildlife habitat and controlled as a recreation and wildlife management unit. These 240 acres will be further replacement of the expected loss of 2,983 acres of habitat along the Coachella Canal. The remaining 40 acres of the 280 acres to be leased under the lake concept can be developed into an intensive use area including a 10- to 20-acre recreation and fishing lake, access and parking areas, and recreational sites and a buffer zone for wildlife. The lake development will serve to replace the estimated 6,100 man-days of fishing annually in the 49 miles of the existing unlined canal. Depending upon the size of the lake, as determined by the California Department of Fish and Game, the permanent lake will replace an additional 5-15 acres of open ponded water that will be lost along the canal. Recreation within the intensive use area will contribute to balancing recreational losses that are expected to occur as a result of lining the first 49 miles of the Coachella Canal.

Dredging of approximately 2 miles of channel in the Finney-Ramer Unit of the Imperial Wildlife Area will replace approximately 17 acres of the 36 acres of open ponded water that will be lost along the Coachella Canal. The open water resulting from the dredging will be permanent and superior in some respects to the seasonally fluctuating open water acreage along the Coachella Canal and will greatly increase the fish habitat and fishing recreation in the management unit. The dredging will rehabilitate approximately 200 acres of the degrading marsh habitat in Finney Lake and Culver Pond on the Finney-Ramer Unit of the Imperial Wildlife Area. This will both directly and indirectly contribute to replacement of the anticipated loss of approximately 496 acres of marsh habitat along the Coachella Canal.

The acquisition of part or all of the 364 acres of land that has been identified and selected for expansion of the Salton Sea National Wildlife Refuge will further defray the anticipated loss of 2,983 acres of wildlife habitat along the Coachella Canal. The development of the newly acquired lands will be dependent upon the execution of the Refuge Master Plan by the Fish and Wildlife Service. The lands have potential for marsh and pond development and enhancement and protection of terrestrial wildlife habitat. The acquisition

of additional lands for the refuge will have a real but undetermined tangible value toward the Fish and Wildlife Service achieving the goal of expansion of the Salton Sea National Wildlife Refuge. Most of the original refuge area established in 1930 is now inundated by increases in the surface level of the Salton Sea since that time. The expansion will be permanent and will contribute to the more effective management of the refuge as a unit.

**V. UNAVOIDABLE
ADVERSE EFFECTS**

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A. Introduction

1. General

The overall effects of the project, whether they are beneficial or adverse, were described in Chapter III. In Chapter IV, the mitigation measures which are designed to fully or partially offset adverse impacts are identified. By balancing the adverse and beneficial impacts of both chapters, the net positive or net negative change is determined. This process of balancing is simplified if the proposed mitigation is onsite replacement in kind, i.e., replacement of Yuma clapper rail habitat for like habitat. For this project, however, the mitigation proposed is often times not replacement in kind. Consequently, trade offs are being accomplished between one fish species vs. another or hunting for fishing. An understanding of this balancing process and a determination of the net effect of the proposed project (with mitigation) is further complicated by the fact that some mitigation measures are in so-called "offsite" areas.

In this chapter, an attempt is made to define the unavoidable adverse impacts which result from the balancing process. It should be kept in mind that this chapter provides only for those unavoidable impacts which are not mitigated. Since the positive benefits of the project are not emphasized here, this chapter if taken out of context could overmagnify the negative aspects of the project.

2. Adverse Impacts Related to Construction Activities

The construction of the project will entail new roads, some of which will be located on undeveloped land, which will disturb existing wildlife and vegetative patterns. Approximately 4 acres of irrigated farmland will be utilized for the permanent access road for operation and maintenance of the desalting plant. Permanent access roads required for the Coachella Canal and the bypass drain will be constructed adjacent to those features. The protective pumping well fields will require 35 acres of new permanent access roads. Existing levee roads will also be utilized. There will be an impact related to the frequency and type of use of the new access routes. Roads used only during construction will be scarified and allowed to return to a natural condition when no longer required, and will have only a temporary adverse effect.

Borrow and waste disposal areas may be required for project construction, resulting in a removal of vegetative cover and a change in existing topography. These areas have not been fully identified nor quantified.

Construction will involve a few small areas for materials storage, increased levels of airborne dust, noise, nighttime lighting, heavy equipment traffic and increased erosion in the project area, affecting both wildlife and people. These impacts will generally be of a temporary nature. Water supplies, electric power, and fuels will be consumed in increased levels.

B. Desalting Complex

1. Desalting Plant

a. Physical Environment

Providing 372,000,000 kWh/year of electric power to the desalting plant will involve adverse environmental impacts extending beyond this area. Regardless of the source of supply, the result will be a general increase in power needs in the area. Ultimately, there will be a commitment of about 173,630 tons of coal per year or an equal energy source from other fossil fuels, nuclear fuel, or geothermal energy.

b. Biological Environment

Agricultural vegetation will be permanently removed from the 64 acres required by the desalting plant and access roads. Loss of this vegetation will mean a loss of feeding and nesting area for a limited number of small game and nongame animals. There may also be a loss of up to 600 acres of desert vegetation at the sludge disposal site depending on the amount of recalcining. Considering the expansive desert habitat of the area, the removal of this amount of habitat acres will not significantly affect the wildlife of the area. The reduction of drainage flows and increased total dissolved solid concentrations in the reject stream discharged from the desalting plant into the M.O.D.E. will have an adverse impact on the fish populations in the 2 miles of the M.O.D.E. below the plant.

c. Cultural Environment

The proposed desalting plant site will permanently remove approximately 64 acres of irrigated farmland from crop production. This will only be a small impact considering the fact that there are 168,839 acres of irrigated agricultural lands in the Yuma area. The desalting plant will not have an effect on recreational activities.

There are no anticipated adverse effects on archeological or historical resources. If, during the course of construction, any

archeological or historical resources are located, an appropriate professional, in consultation with the State Historic Preservation Officer, will evaluate the resource and make a determination on a course of mitigative action. If it is determined that extensive recovery and study are required, the impact will be both adverse and beneficial. That is, the site will be developed but the artifacts will have been discovered and professionally investigated and preserved.

d. Environmental Quality

The desalting plant will have an impact on the visual quality and esthetics of the area, but these impacts will be limited to the vicinity of the feature. Additional impacts on the visual quality of the area will be caused by electrical transmission lines.

Noise levels caused by the operation of the plant will not have a significant effect on the surrounding area. Impacts on air quality will also be very minor.

2. M.O.D.E. Metal Flume

With the exception of short-term construction activities, the replacement siphon for this structure will have no anticipated adverse effects.

3. Bypass Drain

a. Morelos Dam to Southerly International Boundary

(1) Physical Environment

Utilization of the bypass drain to carry Wellton-Mohawk drainage flows to Santa Clara Slough will have an adverse effect on over 21 miles of Colorado River channel below Morelos Dam, in that sustained riverflows will be eliminated.

(2) Biological Environment

(a) Vegetation

The construction of this reach of the bypass drain, about 16 miles long, will utilize approximately 260 acres of existing rights-of-way and will require approximately 130 acres of new rights-of-way in Arizona. This includes about 80 acres of irrigated crops within the flood plain of the Colorado River. This adverse impact will be permanent in

terms of the life of the drain. Federally owned lands along the alignment support riparian vegetation typical of the area, but only approximately 3 acres of this growth will be lost where bench flumes or siphons are constructed.

About 851 acres of riparian vegetation and 141 acres of open water areas along the river below Morelos Dam will eventually be lost due to cessation of sustained riverflows and decline in the groundwater levels due to ongoing U.S. and Mexican ground-water pumping.

Mitigation measures will partially compensate for these losses by maintaining 12 surface acres of water in the Hunter's Hole ponds along with from 8 to 12 acres of peripheral riparian vegetation, and by the enhancement of riparian habitat and creation of more open water and marsh habitat within the 900 acres which will be acquired along the Gila River and designated as a wildlife management area.

(b) Fish

The fish and other aquatic organism habitat of the 21 miles of Colorado River downstream from Morelos Dam will be lost as a result of no sustained flows in this reach. Mitigation measures will fully compensate for fish losses by the construction of a fish rearing facility which is anticipated to provide on an annual basis enough fish to stock an estimated 200 to 300 surface acres of other local fishing waters.

(c) Wildlife

Wildlife inhabiting the proposed alignment will be displaced by the removal of vegetation for the bypass drain, and some will fail to survive. This effect should be slight because of the sparse habitat the bypass drain will traverse. Abundant species in this area include white-winged and mourning doves, Gambel's quail, desert cottontail, and roadrunners.

The reduction of riparian habitat along the Colorado River will result in a significant loss of aquatic and semiaquatic wildlife species and a lesser loss of upland game species and other terrestrial wildlife. These losses will be partially compensated for by the enhancement of existing riparian vegetation and creation of new marsh and open water habitat in the proposed 900-acre wildlife management area. It is anticipated that all losses of suitable Yuma clapper rail habitat along the river (amounting to about 20 to 30 acres) will be compensated for by appropriate habitat retention at Hunter's Hole and habitat creation and improvement at the Gila River mitigation site.

(3) Cultural Environment

There will be a loss of about 6,000 to 7,000 man-days of fishing along the river below Morelos Dam as sustained flows are eliminated. Loss of 851 acres of riparian habitat will result in losses of about 1,000 hunter-use days and a 50 percent reduction of other recreational activities along this reach of the river. Construction of a fish rearing facility may create an estimated 50,000 angler-days per year and will more than compensate for the fishing recreation lost along the river. Maintaining water levels at Hunter's Hole and creation and enhancement of habitat on the Gila River will most likely compensate for over half of the hunting and nonconsumptive recreation losses due to cessation of riverflows. The remaining losses will be compensated for as a trade-off by the extra fishing recreation provided for by the fish rearing facility.

There are no anticipated adverse effects on archeological or historical resources. If, during the course of construction, resources are encountered and extensive evaluation and study are required, the impact will be both adverse and beneficial. The sites will be developed but the artifacts will have been discovered and professionally investigated and preserved in consultation with the State Historic Preservation Officer.

(4) Environmental Quality

The structure will have an effect on the esthetic quality in the area, particularly in stretches of heavy riparian vegetation.

b. Southerly International Boundary to Santa Clara Slough

(1) Physical Environment

Utilization of the bypass drain to carry Wellton-Mohawk drainage flows to Santa Clara Slough will have an adverse effect on the Colorado River in Mexico in that sustained riverflows will be essentially eliminated.

(2) Biological Environment

(a) Vegetation

This 37-mile-long reach of the drain will permanently remove from production 370 acres of irrigated farmland and 380 acres of sparse desert habitat.

(b) Fish

There should be no impact on fish in this reach of the drain. There may be some adverse effect on the desert pupfish in Santa Clara Slough depending on the point and amount of discharge of the bypass drain into the slough and the introduction of competitive or predacious fishes. With only irrigation return flows to maintain fish habitat, there will be a significant effect on the fish of the Colorado River in Mexico as sustained riverflows are curtailed.

(c) Wildlife

Wildlife in this reach, though sparse, consists mainly of white-winged and mourning doves, Gambel's quail, cottontail rabbits, roadrunners and other birds, small mammals, reptiles, and amphibians common to the southern Sonoran desert. There should be only a slight impact, if any, on the species in this area.

(3) Cultural Environment

Loss of sustained riverflows will significantly curtail recreational and other river-associated activities in Mexico. Removal of 370 acres of productive farmland will cause a minor impact to the agricultural economy of the area.

c. Santa Clara Slough

Unavoidable adverse effects on Santa Clara Slough will be negligible or minimal depending on the point of discharge of the bypass drain. If the drain discharges directly into the small marsh area at its upper end of the slough, there may be some flushing out of the marsh and deterioration of desert pupfish habitat.

4. Other Components

a. Wellton-Mohawk Division Acreage Reduction

The retirement of 4,200 acres of land which are now in agricultural production will be a loss of economic returns estimated at about \$2,100,000 annually. The potential for economical benefits of an estimated \$2,900,000 will be foregone due to retirement of the 5,800 acres of irrigable lands which have not been developed for agriculture.

b. Gila River Control Measures--Painted Rock Dam

Retention of floodwaters behind Painted Rock Dam will raise the salinity of the impounded storm water and may have an adverse impact on land use and economics if there is prolonged inundation of the 6,600 acres of agricultural lands.

c. Transmission System

The most obvious unavoidable impact is the contrast between manmade structures and the natural desert setting. The visual effect will be minimized, however, by aligning the 4.8 miles of additional electric transmission system adjacent to an existing high-voltage transmission line.

Some noise, dust, odors, and smoke attendant to construction activity and the relevant movement of traffic on desert roads will be unavoidable. The use of necessary safety precautions will cause occasional delays to the highway traveler.

C. First 49 Miles of the Coachella Canal

1. Physical Environment

Eliminating seepage from the existing unlined canal will result in lower ground-water levels on the Imperial East Mesa which will result in the loss of the 36 acres of open ponded water and other surface water which supports marsh vegetation. Dredging of about 17 acres of waterways in the Finney-Ramer Unit, development of a 10- to 20-acre lake in Coachella Valley, and future development of ponds on the up to 364 acres which will be acquired for the Salton Sea National Wildlife Refuge will more than compensate for the 36 acres of open ponded water which will be lost.

2. Biological Environment

a. Vegetation

Construction of a concrete-lined canal will remove an additional 1,020 acres of desert habitat for canal rights-of-way. Elimination of excessive seepage from the Coachella Canal will have an adverse effect on a total of approximately 2,847 acres of vegetation which depends upon this source of water. As the level of the ground water declines, riparian vegetation not adaptable to natural desert conditions or in areas of substantial ground-water decline will be lost. Adjacent to the canal there will be an eventual loss of approximately 496 acres of marsh that have developed as a result of seepage from the unlined canal. In addition, approximately 2,351 acres of mixed phreatophytic vegetation will eventually be lost as ground-water levels recede.

With the proposed rehabilitation of 200 acres of marsh habitat at the Finney-Ramer Unit of the Imperial Wildlife Area and purchase of up

to 364 acres of lands for the Salton Sea National Wildlife Refuge and with measures maintaining select habitat with watering devices along the Coachella Canal, it is expected that losses of the 496 acres of marsh habitat will be fully compensated for. The above mitigation measures along with lake development and possible habitat creation on the 280-acre area in the Coachella Valley will compensate for only a small portion of the losses of mixed riparian (phreatophytes) vegetation.

Vegetation along the alignment of the canal that will be lost consists primarily of creosote bush/bursage, jointfur, some galleta grass, and low-growing annuals. Rooted aquatic vegetation within the canal will also be lost.

b. Fish

Since the construction of the canal by reaches will generally prevent the migration of fish from existing unlined reaches to constructed lined reaches, immediate fish losses will occur during the dewatering of each existing reach, even with a fish salvaging operation. Lining the canal will result in the loss of aquatic vegetation, increased water velocities and loss of appropriate spawning substrates, thus the habitat value for warm water game fish will be reduced. Development of 17 acres of deepwater channels in the Finney-Ramer Unit of the Imperial Wildlife Area, future pond development on the 364 acres to be acquired for the Salton Sea National Wildlife Refuge, and development of a 10- to 20-acre fishing and recreational lake in Coachella Valley will provide for over 5,000 angler-days per year and will more than compensate for fish losses due to lining the first 49 miles of the Coachella Canal.

c. Wildlife

The reduced vegetative cover along the alignment will adversely affect wildlife populations that have built up in the area. The magnitude of the impact is substantial. The ability of the natural habitat in the general vicinity to accommodate displaced wildlife species will be minimal. There will also be some loss of wildlife to drowning in the lined structure.

Marsh rehabilitation in 200 acres of the Finney-Ramer Unit of the Imperial Wildlife Area, future creation of marsh areas on a portion of the up to 364 acres which will be acquired for addition to the Salton Sea National Wildlife Refuge, possible development of marsh or wetland areas on the 280-acre area in Coachella Valley, and maintenance of select habitat with watering devices along the canal is expected to fully compensate for all aquatic and semiaquatic wildlife losses. Losses of the Yuma clapper rail and the California black rail will be fully compensated for

by appropriate offsite habitat creation at these mitigation sites. Any suitable habitat created for these two species due to maintaining select habitat with watering devices will be a plus. Maintaining select habitat with off-canal watering devices will help minimize drownings of animals and will help maintain the wildlife carrying capacity of the selected areas; however, there will still be a significant reduction in terrestrial animal populations which have built up due to creation of the mixed riparian community by seepage from the canal. This includes a reduction in quail, doves, cottontail, and predators such as coyotes, foxes, bobcats, and skunks.

3. Cultural Environment

a. Land Use

Use of the additional 1,020 acres of rights-of-way for the new lined canal will not have significant impact on land use since most of these lands are Federally owned and consist of sparse desert habitat.

b. Recreation

With the reduction of fish and wildlife habitat, hunting will be reduced by over 7,000 man-days annually and fishing will be reduced by about 3,000 angler-days. It is estimated that the creation of about 17 acres of deep waterways at Finney-Ramer Unit of Imperial Wildlife Area, development of a 10- to 20-acre fishing and recreation lake in Coachella Valley, and future pond development on the lands to be acquired for the Salton Sea National Wildlife Refuge will create over 5,000 angler-days per year and will more than compensate for losses of recreational fishing along the 49-mile reach of the Coachella Canal. Rehabilitation of 200 acres of marsh habitat at Finney-Ramer Unit, possible habitat development in the 280 acres in Coachella Valley, future habitat development of acquired lands at the Salton Sea National Wildlife Refuge, and maintaining select habitat with watering devices along the Coachella Canal will more than compensate for the approximately 250 hunter-days of waterfowl hunting which will be lost and will compensate for perhaps one-fourth of the hunting recreation lost due to reduction in quail, dove, rabbit, deer, and predator species.

Because of damage to the canal banks and hazards to drivers and passengers, the canal alignment will be closed to the use of off-road recreation vehicles. Unauthorized activities within the canal rights-of-way will be trespassing.

c. Archeological and Historical

There are no anticipated adverse effects on archeological or historical resources. If, during the course of construction the

archeological or historical sites are encountered, the impact will be both adverse and beneficial. The sites will be developed but the artifacts will have been discovered and professionally investigated and preserved in consultation with the State Historic Preservation Officer.

4. Environmental Quality

Construction of the lined canal, with access roads, fences, and bridges, will impair the esthetic quality of the area, although there is an existing structure paralleling the proposed alignment. Reduced vegetative cover will also detract from the oasis aspect of the area.

D. Protective and Regulatory Ground-water Pumping

1. Physical Environment

a. Hydrology

The proposed plan will contribute to the reduction of the quantity of the ground-water resource that has accumulated over a period of time. This would occur over a longer period of time without the project as a result of ongoing U.S. and Mexican pumping. Ground-water levels will recede and will cause the dry up of 80 miles (120 surface acres) of drainage channels in the Yuma Valley. Mitigation measures will not replace the loss of these surface waters but will compensate for the loss of the fishery in the waters.

b. Geology

A substantial decline in ground-water levels may cause some localized subsidence in the project area. This could be an adverse impact, particularly if it affects irrigation systems, roads and buildings in this area. However, neither widespread nor significant levels of subsidence are anticipated.

c. Energy

Providing 52,000,000 kWh/year of electric power to the well fields will involve adverse environmental impacts extending beyond those areas. Regardless of the source of supply, the result will be a general increase in power needs in the area. Ultimately, there will be a commitment of about 26,000 tons of coal per year or an equal source of energy from other fossil fuels, nuclear fuel, or geothermal energy.

2. Biological Environment

a. Vegetation

Construction of the well fields and associated facilities will require approximately 105 acres of rights-of-way, of which approximately 6 acres for well sites will be permanently removed from any type of vegetative recovery or use. In addition, sparse desert vegetation will be permanently removed on approximately 35 acres of pipeline rights-of-way which will be required for access roads on the Yuma Mesa.

The increased rate of ground-water drawdown due to pumping in the well fields will result in an additional loss of about 1,500 acres of riparian vegetation along the Colorado River as well as about 30 acres of intermittent emergent vegetation along the drainage channels in the Yuma Valley. This impact would occur over a longer period of time without the project as a result of ongoing U.S. and Mexican pumping. The acquisition and designation of about 900 acres of land along the Gila River as a wild-life management area and creation of and enhancement of riparian habitat thereon will compensate for only a small portion of the above habitat losses.

b. Fish

Fish in the 80 miles (120 surface acres) of major drainage channels in Yuma Valley will be eliminated as the ground-water table declines. Bullfrogs will likewise be affected. The most abundant game fish species which will be lost are catfish, largemouth bass, tilapia, bluegill, and striped mullet. These fish losses will be more than compensated for by the construction of a fish rearing facility which is tentatively anticipated to provide enough fish for the annual stocking of from 200 to 300 surface acres of fishing waters in the Yuma area.

c. Wildlife

With the loss of an additional 1,500 acres of excellent aquatic, marsh, and riparian habitats in the riverine community, and about 30 acres of emergent vegetation in the Yuma Valley drains, wildlife species will be significantly affected. It is unlikely that any other areas in the vicinity will be able to accommodate the wildlife populations which will be displaced. The most abundant species adversely affected will be waterfowl, wading birds, doves, Gambel's quail, desert cottontail, and roadrunners. The endangered Yuma clapper rail will also be slightly affected. These impacts would occur over a longer period of time without the project as a result of ongoing U.S. and Mexican pumping.

The above wildlife losses will be partially compensated for by the enhancement of existing riparian habitat and creation of new marsh and aquatic habitat in the 900-acre Gila River Wildlife Management Area. These measures plus the potential of producing wildlife feed on these lands will create additional niches for expansion of wildlife populations in the management area. As stated previously in this chapter, it is anticipated that all losses of suitable Yuma clapper rail habitat along the Colorado River, due to project implementation, will be fully compensated for by appropriate habitat retention at Hunter's Hole and habitat creation are the Gila River mitigation site.

3. Cultural Environment

a. Land Use

Approximately 105 acres of land will be committed to well sites and pipeline rights-of-way. Construction of the buried pipeline along the rights-of-way will temporarily curtail farming operations on approximately 25 acres of farmland in the Yuma Valley, and there will be some minimal interference with road traffic in the San Luis area. Once the project is completed, the only adverse change in land use by project features will be the 6 acres used for well plots and the 35 acres of access roads to the Yuma Mesa wells. The use of land by power transmission facilities will be noticeable but will not cause a change in land use practices.

b. Recreation

Drying up of drainage channels in Yuma Valley as an indirect result of ground-water drawdown will result in the loss of 2,000 to 3,000 angler-days of fishing activity per year. Reductions of wildlife along the drains and along the Colorado River will reduce hunting potential in the Yuma Valley area by about 2,000 man-days per year in addition to those effects caused by cessation of riverflows. This would occur over a longer period of time without the project as a result of ongoing U.S. and Mexican pumping.

Construction of the fish rearing facility may create an estimated 50,000 angler-days per year and will more than compensate for the fishing recreation losses in the Yuma Valley drains in addition to compensation for losses in the Colorado River as described earlier in this chapter. The losses of hunting activity will not be compensated for in kind, but will be compensated for as a tradeoff by the extra fishing recreation which will be created by construction of the fish rearing facility.

c. Archeological and Historical

There are no anticipated adverse effects on archeological or historical resources. If, through project excavation, archeological or historical resources are encountered, the impact will be both adverse and beneficial. The sites will be developed, but the artifacts will have been discovered and professionally investigated and preserved in consultation with the State Historic Preservation Officer.

d. Economic and Social

The limitation on unrestricted agricultural development within a 5-mile distance of the Arizona-Sonora land boundary imposed by the requirement of Minute No. 242 to limit pumping of ground water to 160,000 acre-feet per year is effective with or without the protective and regulatory pumping project. Exporting more of the available pumped water for delivery across the land boundary to preserve historic deliveries of treaty water at that location places considerable restriction on land development on the Yuma Mesa within 5 miles of the border. Water will be available, however, to supply the agricultural needs on already developed private and state land and some water may be available for limited additional agricultural, municipal and industrial use. Depending on their depth and location, private wells near the Arizona-Sonora boundary may go dry as ground-water levels decline. This will result in increased pumping costs for private well owners in the affected area.

4. Environmental Quality

The esthetic quality of the area will be impaired to a slight degree by construction of an additional 35 miles of power transmission facilities, access roads, and visible structures at the well sites, but to a much larger degree by the drying up of drainage channels and the subsequent loss of riparian vegetation. The most significant impact will occur along the Colorado River below Morelos Dam. Except for the effects of the constructed facilities, the impacts would occur over a larger period of time without the protective and regulatory pumping project due to ongoing U.S. and Mexican pumping.

The sound quality of the project area will be affected only temporarily during construction activities. Noise from pumping operations after construction will affect only that area in the immediate vicinity of the well plots.

Impacts to air quality due to the project will be minor.

**VI. SHORT-AND LONG-TERM
ENVIRONMENTAL USES**

VI. SHORT- AND LONG-TERM ENVIRONMENTAL USES

Short-term disturbances of the environment will occur during the construction of project facilities, as discussed in Chapter III. Changing the appearance of the natural setting by the construction of the project will have a long-term effect on esthetic values. Adverse effects will be minimized by clearing only those areas necessary for constructing the project facilities and taking only the irrigated acreage necessary for construction of the desalting complex, well fields, and pipelines. The new facilities will be designed with low profiles to blend with the natural setting.

Despite the long-term losses of up to 5,200 acres of riparian habitat in the project area, mitigation measures will create new habitat and enhance existing habitat to a point that most aquatic or semiaquatic wildlife populations will be maintained. However, there will be a redistribution of these populations. Terrestrial wildlife species in the affected areas will experience long-term population reductions. Loss of up to 297 acres of open aquatic habitat will be a long-term effect on the area; however, with the proposed mitigation measures fish losses will be more than compensated for by increased stocking of other waters.

Construction and operation of the desalting complex will have the long-range effect of providing 132,000 acre-feet of better quality water to the lower Colorado River system in lieu of saline drainage water. These waters of higher quality will be available to about 430,000 acres presently irrigated in Mexicali-San Luis Valley.

The 132,000 acre-feet of water salvaged from the Coachella Canal will lower the water table in the area, thus reducing the threat to the productivity of certain lands in Imperial Valley, but ultimately decreasing the vegetation adjacent to the canal that has developed as a result of the seepage loss. Land required for the Coachella Canal right-of-way will be increased by 1,020 acres over the present requirement.

Replacement of the metal flume with a buried siphon will provide a long-term esthetic enhancement of the historic Yuma Crossing and make available right-of-way lands of significant historical value for dedication to history and/or recreation.

Protective and regulatory ground-water pumping will lower the water table in a large area of Yuma Valley, thus improving the long-term agricultural productivity of the Yuma Valley soils that now have drainage problems. The well fields will also provide the United States with a method of protecting and recovering a very valuable water resource which in turn

can be used to meet treaty commitments to Mexico and provide water to existing and future water users in the project area. However, fish and other aquatic wildlife populations in the drains and in the Colorado River will be virtually eliminated due to dewatering by groundwater pumping.

Long-term electrical energy requirements for the desalting plant and well fields will amount to 424,000,000 kWh annually, thus requiring an annual energy source equivalent to about 199,630 tons of coal.

Project features will provide for long-term needs by conserving and/or reclaiming valuable water resources, curtailing the infiltration of Wellton-Mohawk drainage water into the ground water below Morelos Dam, maintaining the production potential of agricultural lands in both the United States and Mexico and greatly enhancing the natural value of the Santa Clara Slough.

The project will be consistent with the long-term needs of delivering to Mexico 1.5 million acre-feet of water as guaranteed in the 1944 treaty. This water will meet the salinity differential of $115 \text{ p/m} \pm 30 \text{ p/m}$ stipulated in Minute No. 242. The conditions will be met with a minimum loss of water resource.

The retirement of 10,000 acres of land from the Wellton-Mohawk Irrigation and Drainage District, 3,800 acres on the Imperial East Mesa, and development restrictions on 34,400 acres of land on Yuma Mesa will preclude their future use for agricultural production. Longer periods of intermittent inundation of 6,600 acres of irrigated land in Painted Rock Reservoir may affect their agricultural production. However, the retention of some of these lands as native wildlife habitat and the reversion of some to wildlife habitat will be a long-term benefit to wildlife in the area.

**VII. IRREVERSIBLE AND IRRETRIEVABLE
COMMITMENTS OF RESOURCES**

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

For the purposes of consideration, irreversible and irretrievable commitments of resources are those which will extend at least throughout the life of the proposed project. The resources involved are discussed under three categories: physical environment, biological environment, and cultural environment.

A. Physical Environment

A large portion of the water resources affected by the proposed action have already been legally and physically committed, a condition which the project will not significantly alter. The treaty of 1944 with the Republic of Mexico guarantees the delivery to Mexico of 1,500,000 acre-feet per year of Colorado River water, from any source, including return flows from irrigation in the United States below Imperial Dam. Wellton-Mohawk drainage flows have been included in the allocation, but at present are bypassed because of their salinity characteristics and are now being replaced with stored Colorado River water or other waters. Desalting these Wellton-Mohawk return flows will allow them to be used in meeting treaty deliveries to Mexico, thus conserving the supplies of Colorado River water which have been used to replace them. Consequently, the adverse commitment will in this situation be limited to the 60 ft³/s reject stream, which will be conveyed to the Santa Clara Slough.

The water saved by constructing a concrete-lined canal for the first 49 miles of the Coachella Canal, estimated at 132,000 acre-feet per year, may constitute a temporary commitment of that resource to the project objectives. Under existing conditions, the water has served to charge the ground-water basin underlying the East Mesa area of Imperial Valley. However, by utilizing the water as a part of Mexico's annual delivery on an interim basis, an equal amount of Colorado River storage water now delivered to Morelos Dam will be conserved for use in the United States.

The protective and regulatory pumping plan will involve a commitment of up to 160,000 acre-feet of ground water per year, but it will also constitute a conservation measure. The existing Yuma Mesa well field is currently pumping 60,000 acre-feet of ground-water per year. Because of an existing well field in Mexico, ground water underlying the project area moves across the border and is pumped for agricultural use in Mexico. Consequently, this resource is being gradually consumed by Mexico. While the proposed action will hasten the depletion of the ground-water reservoir, it will allow the resource to be beneficially used to meet the treaty commitments and result in a conservation of Colorado River water in the United States. In this sense, the project represents not a commitment of an unused resource, but a commitment to a type of use.

The energy resources committed to construction and operation of the proposal will be irretrievably lost. This includes electric generating capacity and energy requirements of approximately 45 MW and 372,000,000 kWh per year for the desalting complex, and 7 MW and 52,000,000 kWh per year for the well fields. Regardless of the source of supply, ultimately there will be irreversible and irretrievable commitments of about 199,630 tons of coal per year or an equal energy source from other fossil fuels, nuclear fuel, or geothermal energy.

Additional sources of energy will be consumed during construction of the project.

B. Biological Environment

Right-of-way for project construction and operation will affect a portion of up to 2,979 acres of agricultural and natural vegetation now growing on the proposed sites of surface structures and along proposed right-of-way alignments. Initial right-of-way involvement includes 588 acres of irrigated farmland, 260 acres of riparian vegetation, and 2,131 acres of undeveloped desert habitat. There will be a loss of about 2,847 acres of seep-supported vegetation along the alignment of the Coachella Canal. Mitigation measures will offset less than 50 percent of these losses. However, there will be full replacement of the 496 acres of marsh habitat as a result of these measures. About 30 acres of riparian vegetation will be gradually lost along drainage channels in Yuma Valley as ground-water levels in the area south of Yuma decline as a result of ground-water pumping. There will also be a loss of about 2,323 acres of vegetative growth along the Colorado River downstream from Morelos Dam as ground-water levels recede, since large quantities of Wellton-Mohawk drainage flows will no longer be discharged into this reach of the river. Mitigation measures will offset less than 50 percent of these losses. However, there will be full replacement of the loss of between 20 and 30 acres of suitable clapper rail habitat as a result of these measures.

The fish and other aquatic populations in the 49 miles of the Coachella Canal will be reduced, and those in the 21 miles of Colorado River and some associated backwaters below Morelos Dam and in the 80 miles of Yuma Valley drains will be lost. These represent commitments of a recreation resource in the project area. However, mitigation measures will more than replace the fisheries lost in the Coachella Canal, Colorado River, and Yuma Valley drains. This will be done by creating new fishing water and by more heavily stocking other waters in the area.

Wildlife will be lost or displaced in proportion to the loss of vegetation and aquatic habitat resulting from project operations. This will occur primarily in the limitrophe section of the Colorado River along

Yuma Valley drainage channels, along the alignment of the Coachella Canal and within the flood pool of Painted Rock Reservoir in relation to the frequency and volume of flooding. Included among the affected species are waterfowl, wading and shore birds, amphibians, doves, Gambel's quail, and desert cottontail, which constitute a significant recreation resource in the form of hunting. Mitigation measures will mostly offset losses of aquatic and semiaquatic wildlife populations and will partially offset reductions in terrestrial populations.

It is expected that mitigation measures will fully replace any suitable habitat losses of the endangered Yuma clapper rail. As a result, rail populations will be only temporarily lost or displaced. The end result will probably be an increase in this species.

C. Cultural Environment

In terms of the expected life of the project, the lands required for rights-of-way by surface structures and consequently limited in use will represent irreversible commitments of a natural source. This will pertain to a total of about 2,979 acres, including up to 714 acres for the desalting plant, disposal site, transmission lines, and access roads; 1,140 acres for the bypass drain; 6 acres for well sites; 35 acres for pipelines and access roads; and 1,020 acres for the concrete-lined Coachella Canal. This also includes 750 acres of land in Mexico. A portion of these lands that are used for actual construction will be cleared of vegetation and, in some cases, topographically modified to accommodate the physical structures.

In addition to the commitment of land to rights-of-way, other lands will be utilized for the project in varying degrees. This will include a reduction in the size of the Wellton-Mohawk Division by 10,000 acres. The 4,200 acres of irrigated land in the Wellton-Mohawk Irrigation and Drainage District that will be retired from cultivation, and the 5,800 acres of undeveloped land represent a permanent loss of agricultural production potential for the life of the project. The land commitments will also include 22,100 acres of land to be set aside for a flood pool in Painted Rock Reservoir. This will represent a periodic loss for the duration of the project. The magnitude of the commitment will be in direct proportion to the frequency and volume of flooding on the Gila River system. This could include an economic loss in the form of foregone agricultural production on 6,600 acres now irrigated in the 22,100-acre flood pool area and the potential for loss of wildlife habitat. The project will also involve the acquisition of 3,800 acres of undeveloped private land on the Imperial East Mesa. Limitation on pumping of ground water to 160,000 acre-feet annually, as provided in Minute No. 242, is effective pending conclusion by the governments of

the United States and Mexico of a comprehensive agreement on ground water in the border areas. Until such a comprehensive agreement is consummated, there is no knowledge as to how its terms might alter these pumping provisions. The pumped ground water might in the future be used in this area, or water from other sources be provided. Therefore, restrictions on development on the Yuma Mesa within 5 miles of the border are not necessarily an irreversible commitment. This includes restrictions on 23,500 acres of state of Arizona lands and 10,900 acres of Federal lands. Yuma Mesa lands could be developed in the future if an adequate water supply became available. Table 36, in Chapter III, lists by acreage the lands involved, their present status, and the expected impacts.

Construction and operation of the proposed features will require an irreversible and irretrievable commitment of economic resources. Installation costs for the entire project are estimated at \$155,500,000. Savings amounting to 424,000 acre-feet per year of Colorado River water will result from project facilities. In addition, unquantified irretrievable economic resources will be lost as long as there are limitations on agricultural development of 34,400 acres of lands on the Yuma Mesa, 10,000 acres in the Wellton-Mohawk area, and 3,800 on Imperial East Mesa. On the other hand, maintaining treaty deliveries to Mexico across the land boundary with pumped and salvaged water will have an indirect economic benefit elsewhere in the United States.

**VIII. ALTERNATIVES
TO THE PROPOSED ACTION**

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A. Introduction

The alternatives for complying with the requirements of Minute No. 242 consist of measures to eliminate the effect of the Wellton-Mohawk Division drainage flows by treating the flows to reduce their salinity to that of waters arriving at Imperial Dam by eliminating the flows altogether or by bypassing the flows and replacing them with water from other sources. The plan of development authorized by Public Law 93-320 involves the treatment and beneficial utilization of waters available. Three alternatives to the measures authorized by the legislation that involve the elimination or bypass of the Wellton-Mohawk drainage waters that were considered are presented in this chapter. They are:

- (1) A total shutdown of the Wellton-Mohawk Division.
- (2) An augmentation of Colorado River flows
 - (a) An exchange agreement for substitution of water from the California State Water Project
 - (b) Weather modification
- (3) A moratorium on future Federal development in the Colorado River Basin

The alternative of no action is also discussed. Alternatives to specific features and eight alternatives to the project were presented in the Brownell report to the President and in the Final Environmental Impact Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico, which was filed with the Council on Environmental Quality by the Department of State. The eight project alternatives from these statements are listed at the end of the chapter.

B. Total Shutdown of the Wellton-Mohawk Division

1. Description of the Action

This alternative would involve the Federal purchase of the entire Wellton-Mohawk Division of the Gila Project, including all land, buildings, equipment, utilities and other services, and District-owned capital. Payments would be made for district-supported investments and interests

and for any other damages assessed, and the Federal investment in the area would be written off. Under Federal ownership, regulations would restrict land use to a natural environment of desert and riparian habitats. The Wellton-Mohawk drainage flows of 220,000 acre-feet per year at 3,700 p/m TDS water would be eliminated and would be replaced by Colorado River water, which would reduce the salinity at the Northerly International Boundary to an increase of $115 \text{ p/m} \pm 30 \text{ p/m}$ over the waters arriving at Imperial Dam. The direct costs of such a measure are estimated at between \$125 and \$150 million.

2. Description of the Environment

The project area would encompass the Gila River Valley from Dome, Arizona, upstream to Texas Hill. The elevation of the irrigable land ranges from 150 to 340 feet above mean sea level, with low mountains bordering the valley on both sides. The land is comprised primarily of 75,000 irrigable acres, of which 63,973 were being irrigated in 1973.

a. Vegetation and Wildlife

The vegetation and wildlife are very similar to those described in Chapter II. Vegetation consists of cultivated crops on the irrigated land; arrowweed, seepwillow, saltcedar, mesquite, willow, and cottonwood along canals and streams; and creosote bush/bursage plant growth outside the valley. The most important game birds in the area are white-winged and mourning doves and Gambel's quail, all of which have large populations and are hunted extensively. The nest density of white-winged dove in the area along the Gila River from Texas Hill to the Colorado River is approximately 2.74 nests per acre within the riparian type of habitat. The nest density for mourning doves is expected to be slightly higher. Approximately 14 Yuma clapper rail, an endangered species, have recently been found inhabiting the marsh areas in the valley. A few mule deer visit the area during the winter months.

An excellent tilapia fishery exists in the drainage flows from the Wellton-Mohawk District. Other fish species found in the drains, the lower Gila River, and several marsh type lakes adjacent to the Gila River include largemouth bass, channel catfish, flathead catfish, carp, crappie, and various species of minnows.

b. Land Use Patterns

The present use of lands in the Wellton-Mohawk Division is principally agricultural. There are 75,000 irrigable acres in the

1/ Dennis D. Wigal, A Survey of the Nesting Habitats of the White-Winged Dove in Arizona, Special Report No. 2 (Arizona Game and Fish Department: Phoenix, Arizona; June 1973).

area, of which 63,973 were irrigated as of 1973. Gross crop value as of 1973 average \$499.69 per irrigated acre, for a total of \$31,966,811. The major crops grown are listed in the following 1973 tabulation:

<u>Gross Crop Value (1973)*</u>				
<u>Crop</u>	<u>Acres</u>	<u>Per Acre</u>	<u>Total</u>	<u>Percent of W-M Total Value</u>
Alfalfa Hay	22,164	\$ 292	\$6,473,100	20
Wheat	14,957	187	2,800,446	9
Oranges and Tangerines	5,388	175	945,279	3
Cotton	8,365	525	4,394,640	14
Sorghum	3,678	172	634,400	2
Lemons and Limes	1,119	711	191,208	1
Seed (Bermuda Grass)	6,370	685	4,365,040	14
Lettuce	8,653	1,006	8,709,503	27
Cantaloupes	1,302	533	694,856	2

* Excludes 4,650 acres of miscellaneous crops.

The Wellton-Mohawk Division has an allocation for the beneficial consumptive use of no more than 300,000 acre-feet of water of the Colorado River. Water deliveries to the Wellton-Mohawk Division in 1973 were as follows:

<u>Use</u>	<u>Acre-Feet</u>	<u>Percent of Net Supply</u>
Net Supply*	508,469	100.00
Operation/Transportation Losses	68,374	13.45
Municipal and Industrial	627	0.12
Total Delivered to Farms	439,468	86.43
Per Irrigated Acre	6.87	

*Diversions at Station 790+00 on the Gila Gravity Main Canal (487,470 acre-feet) plus flow from tile drains and drainage wells (20,999 acre-feet).

c. Population Development

The population of the Wellton-Mohawk area is estimated to be over 4,000 people. Rural communities have steadily grown, and the population of Wellton, Arizona, has reached 1,000. Other communities include Tacna, Antelope Heights, and Roll, Arizona. Farm supply businesses, services, and urban and suburban residential areas are found in all communities. Elementary schools are located in Wellton

and in the valley east of Roll, and Antelope High School is located near Antelope Heights in the center of the project area. Arizona Western College, located about 20 miles west of Wellton, is a part of the state system of junior colleges. Churches of many denominations are found in all four communities.

The Wellton-Mohawk Irrigation and Drainage District contains no Indian reservations and appears to contain no formal organizational structure for Indians. There are no available statistics concerning the number of Indians living in the area. To the southwest, are two Indian reservations, the Yuma Indian Reservation and the Cocopah Indian Reservation, located in the Reservation Division and Valley Division, respectively, of the Yuma Project.

d. Economic Contributions

The Wellton-Mohawk District's total annual economic impact in 1973 from \$36.5 million annual crop income on the business community, on industry, on income from taxes, and on all areas affected by this flow of income is estimated by the University of Arizona to represent \$5 for every dollar of agricultural income, providing a total annual impact of \$182,500,000 from crop income.

Based on an earlier study by the Bureau of Reclamation, updated with the help of the University of Arizona, the annual contribution to Federal taxes is estimated at \$24 million. Contribution to State income is estimated at \$2.4 million, State sales tax at \$4.4 million. Yuma County receives \$1.2 million from this area annually in property taxes. The total estimated contribution to taxes by the Wellton-Mohawk District farm economy was \$32,000,000 in 1973.

3. Environmental Impacts

a. Land and Vegetation

This alternative would return the 75,000 acres of irrigable land to some limited riparian habitat and to a sparsely vegetated desert environment consisting largely of the creosote bush/bursage plant community. Large amounts of cultivated crops and riparian type vegetation would be eliminated, with the exception of natural vegetation along the Gila River channel. Land now occupied by communities would also eventually return to the desert environment.

b. Fish and Wildlife

With the shutdown of the Wellton-Mohawk Division, flows in the Main Outlet Drain would cease, and the existing fishery in the drains would be eliminated.

The return of the area to native desert vegetation would provide an additional habitat for indigenous wildlife in the area, consisting primarily of such species as lizards, snakes, rodents, black-tail jackrabbits, and coyotes. However, the loss of cropland and sections of riparian growth would greatly reduce or eliminate the populations of upland game species, such as mourning and white-winged dove, Gambel's quail, and cottontail rabbits, which rely upon this type for food supplies and shelter. Insect patterns could also be significantly affected by the change in available water and vegetative growth.

c. Air and Water Quality

Air quality in the immediate area would be improved only slightly, if at all. The population of 4,000 in the Wellton-Mohawk Division is only a small percentage of the 61,000 people living in the general Yuma vicinity. Any significant change would result from a decrease in dust and a reduction in the burning of agricultural waste products.

The elimination of the Wellton-Mohawk drainage flows would permit the United States to fulfill its commitment under Minute No. 242. The 220,000 acre-feet of drainage water would be replaced by Colorado River water. The salinity of Colorado River water available to users in the United States would remain unchanged. Since the Wellton-Mohawk Division presently diverts an average of 513,000 acre-feet, and 220,000 acre-feet would be delivered to Mexico to replace return flows, an average of 293,000 acre-feet would be available for use in Arizona. In the long-term the Division's maximum allocated beneficial use of 300,000 acre-feet per year would be available to other users in the State.

d. Noise and Visual

Noise levels in the area would be reduced by the cessation of agricultural activities and by the probable elimination of the communities which depend upon the agricultural base.

The visual impact of the alternative would be significant. Agricultural crops and riparian vegetation would be replaced by sparse desert growth, and the human communities would probably gradually disappear.

e. Social and Economic

The adverse social and economic impacts of the alternative would be very extensive. Individual farm incomes would be lost, resulting in economic and social hardships on each family directly involved

in farming practices. Secondary economic and social impacts would be felt by the support facilities throughout the communities that had been providing goods and services to the farm families. Overall, the farms, businesses, and social relationships which have been developed over a period of years would be disrupted as families were forced to relocate. It could prove difficult for them to find similar conditions in other areas, and some would probably have to travel great distances to establish themselves in comparable modes of life. With the elimination of farms, the communities in the area would probably disappear over a period of time. The loss of 75,000 irrigable acres would be about 44 percent of the 168,839 acres irrigated in the Yuma area in 1973.

The direct one-time costs of inactivating the project are estimated to be from \$125 to \$150 million. These costs are exclusive of the indirect economic losses which would result in the city of Yuma, Yuma County, and the state of Arizona. Indirect economic losses are conservatively estimated to double those of direct losses and would persist for an indefinite period of time. Strong opposition to the measure would probably occur throughout the basin.

f. Archeological and Historical

The current National Register of Historic Places lists only one historic site in the vicinity. This is the Yuma Crossing of the Colorado River which was used by Alarcon during his discovery and exploration of the river in 1540. The landmark would not be affected by the alternative. Since the project area would return to a desert environment, there should be no additional impact on any undiscovered archeological or historical sites. Without the project there would be no pressing initiative to undertake archeological studies which would advance the state of knowledge of the subject.

g. Energy

The 18,291,000 kWh now used for drainage pumps and additional energy utilized for other purposes in the division could be utilized in other areas, thus reducing the amount of energy required from thermal generating resources. This would be a beneficial environmental impact.

C. Augmentation of the Flow of the Colorado River

The possible augmentation of the Colorado River could provide sufficient additional water to replace the bypassed Wellton-Mohawk drainage flows. This discussion concerns two possibilities for such an action: (1) an exchange agreement for substitution of water from the

California State Water Project, and (2) augmentation of weather modification. Other alternatives concerning augmentation are discussed in the Department of State's Final Environmental Impact Statement.

1. Exchange Agreement for Substitution of Water from the California State Water Project

a. Description of the Action

A short-term agreement might possibly be negotiated whereby Colorado River water presently being diverted to southern California could be withheld, and the diversions replaced by water from northern California delivered by the State Water Project. This Colorado River water would then be used to replace bypassed Wellton-Mohawk drainage flows. Unused capacities in the State Water Project conveyance system would be utilized in an interim period until additional demands develop in southern California, which are projected to occur by 1985, thus eliminating the need for constructing any new facilities. Water would be available during the near future to provide the required 220,000 acre-feet per year of replacement water and to provide additional supplies as well. However, these surpluses are dwindling, and the substitution water would probably be needed in California by 1985. Consequently, this alternative would be a temporary solution to the salinity problem and would be in violation of the agreement with Mexico for a permanent and definitive solution. In addition, it is doubtful that the state of California would be interested in such an agreement. The annual cost for the 220,000 acre-feet of water is estimated at \$23 million per year. Construction of the bypass drain (a project feature) would probably still be required for disposal of the 220,000 acre-feet from the Wellton-Mohawk Main Outlet Drain.

b. Description of the Environment

The environment is the same as that described in Chapter II for the main plan of development.

c. Environmental Impacts

(1) Land and Vegetation

This alternative would have no impact on land and vegetation in the project area other than that associated with construction of a bypass drain that would still be required for disposal of the 220,000 acre-feet of Wellton-Mohawk drain water. Assuming that such a drain would still carry the Wellton-Mohawk drainage flows to Santa Clara Slough in Mexico, the impacts of the 53-mile drain would

be very similar to those described in this statement. The impacts of the increased flow into Santa Clara Slough would be greater and probably more beneficial in respect to the increased volume of water and a lesser salinity than would be obtained via the reject stream from the proposed desalting plant.

(2) Fish and Wildlife

The biota in the Colorado River would benefit from the slightly increased flow below Parker Dam, but the long travel route would also result in a slight increase in evaporation and transpiration. There would be no effect on wildlife in the project area other than from the construction of a drain capable of carrying Wellton-Mohawk drainage flows to Santa Clara Slough in Mexico. The increased volume of flow into the Slough would eventually broaden the habitat base for both fish and wildlife. Depending upon spreading potential of the water over the Slough and salt flats, and evaporation and percolation rates, the inflow of Wellton-Mohawk drain water may, in time, rejoin the Slough with the Gulf of California. With the addition of a 53-mile conveyance system to Santa Clara Slough the fishery potential for tilapia and channel catfish would be greatly enhanced. Other fish and wildlife impacts would be similar to those described in Chapter III.

(3) Air and Water Quality

No change in air quality would occur as a result of the water substitution. The exchange would provide sufficient Colorado River water to replace the bypassed Wellton-Mohawk flows and meet the salinity differential stipulated in Minute No. 242. Riverflows at the Northerly International Boundary would be improved by about 347 p/m in 1978.

The salinity of ground water in the United States south of Yuma and in Mexico would probably increase, unless the Wellton-Mohawk return flows were conveyed to the Santa Clara Slough in a concrete-lined drain. If flows were not bypassed, this water would percolate into the ground-water table below Morelos Dam, from which it is pumped for irrigation.

(4) Noise and Visual

There would be no noise or visual impacts related to the alternative other than those that would be associated with a bypass drain if it were constructed.

(5) Social and Economic

The control of the quality of water delivered to Mexico could be a positive step in an eventual improvement in the social and economic conditions of the people dependent upon the river.

2. Flow Augmentation by Weather Modification

a. Description of the Action

This measure, which would be long-term in character and contingent upon further research and experimentation, would use cloud seeding techniques in an effort to increase winter snowfall in high mountainous areas by an estimated average of 15 percent. During winter months, supercooled clouds form over the higher elevations as moist air is forced by strong winds over the major mountain masses in the Upper Colorado River Basin. Under certain favorable conditions, the precipitation from these clouds can be increased by seeding with silver iodide. If successful, this would produce an additional 2.0 million acre-feet per year of streamflow in the Upper Colorado River Basin, and would help reverse the general downward trend of Colorado River flows at Lee Ferry, Arizona. The average annual direct cost for such a measure is estimated at about \$5.4 million.

The addition of 2.0 million acre-feet to the Upper Basin streamflow would reduce the salinity at the Northerly International Boundary by 70 p/m if the additional water were not put to use in the Upper Basin. It is conceivable that if additional lands were put into production or if new industrial development occurred, the salinity of water in the Lower Basin would continue to increase. A portion of the 2.0 million acre-feet would be used to replace the bypassed Wellton-Mohawk drainage flows, thus achieving the salinity differential of 115 p/m \pm 30 p/m agreed to in Minute No. 242.

Construction of the bypass drain to Santa Clara Slough would probably still be required to dispose of the Wellton-Mohawk drainage flows. The impacts of this are discussed under the previous alternative.

The Bureau of Reclamation is conducting an investigation program in southwestern Colorado which covers a portion of the Upper Colorado River Basin. This study, which is only half completed, is discussed in a Final Environmental Statement filed with the Council on Environmental Quality on July 16, 1971. Briefly, this Colorado River Basin Pilot Project is a 4-year weather modification experiment in southwestern Colorado for augmenting water supplies. Winter snowfall is expected to be increased by an average of 16 percent by cloud seeding. This relatively slight increase will be imposed upon the already highly variable extremes of seasonal snowfall. About 250 kilograms of silver iodide will be burned during a typical winter season for a 1,300-square-mile target area.

The present evidence from this investigation does not suggest dramatic direct ecological consequences from such a program. However, at this time we are not able to accurately predict those changes which would result from the interaction and propagation through the ecological system of many minor indirect effects. The relationship of some of these changes to human activities and values is not fully understood. Environmental monitoring studies are therefore an important part of the current investigative program, and should be continued as part of any new program.

Cloud seeding, if further perfected, could be an economic alternative or a viable supplement to water resource development. Large field experiments, such as the Colorado River Basin Pilot Project, are needed to provide increased knowledge and experience. Such practical, large-scale information can be used in determining how the integrated role of cloud seeding and its comparative environmental impact can be appropriately considered in future development of conservation projects.

D. Moratorium on Future Federal Development in the Colorado River Basin

1. Description of the Action

This alternative, which could well go beyond political credibility, would involve the postponement of all future Federal actions that would lead to additional development in the Colorado River Basin. Proposed irrigation projects, transmountain diversions, and the construction of additional powerplants in the area are only a few of the activities that would be adversely affected. Major new legislation would be required to put such a scheme into effect, and the proposal would undoubtedly prove to be highly controversial.

To give significant effect to this alternative, it would be necessary also to prohibit or restrict development of each states' Colorado River water apportionment by the state or by private enterprise; however, it is unlikely that the Federal government has the power to legislate such a prohibition. Even so, adoption of such a prohibitive development policy would deprive the United States of vital food, fiber, mineral, and energy resources that would otherwise be available from the upper basin states.

It should be remembered that although the present salinity level at Imperial Dam is about 850 p/m, it is expected to rise as the Basin continues to develop its compact-apportioned waters unless control measures are made effective. A moratorium on future Federal development

in the Colorado River Basin would not necessarily decrease the salinity, but would prevent the anticipated gradual increase.

The Colorado River waters which would otherwise be used for the future developments would be available to replace the bypassed Wellton-Mohawk drainage flows. This would achieve the salinity differential of Minute No. 242, requiring that the salinity differential between Imperial Dam and the Northerly International Boundary be no more than 115 p/m \pm 30 p/m.

Construction of the bypass drain to Santa Clara Slough (a proposed project feature) would probably still be required for disposal of the Wellton-Mohawk drainage flows. The impacts of this are discussed in Section C, "Augmentation of the Flow of the Colorado River."

2. Description of the Environment^{1/}

a. Topography

The Colorado River Basin includes 254,633 square miles of drainage of the Colorado River. It is divided into two regions, the upper and lower subbasins which are separated at Lee Ferry on the river. Elevations in the basin range from plus 14,000 feet above sea level in the high Rocky Mountains to about 100 feet above sea level at the Southerly International Boundary.

b. Climate

Climate in the basin varies widely due to the changes in elevation. The Upper Basin is generally arid to semiarid and consists of four seasons. In the Lower Basin milder temperatures prevail in the predominant desert areas.

c. Vegetation

The basin supports a wide variety of vegetation ranging from forests to desert. Localized vegetation is generally dependent upon the climate, topography, and soil condition of a given area.

d. Fish and Wildlife

There are approximately 25 species of game fish and 60 species of nongame fish existing in the basin.

^{1/} Bureau of Reclamation, Initial Environmental Analysis of the Colorado River Water Quality Improvement Program (Engineering and Research Center: Denver, Colorado, June 1973).

In addition, there is a wide variety of big game and smaller mammals inhabiting the basin. There are about 26 species of endangered and threatened fish and wildlife.

e. Archeological and Historical

The Colorado River Basin is highly significant to the understanding of the prehistory of the great Southwestern United States. Literally thousands of sites of historical or archeological significance exist in the basin.

3. Environmental Impacts

Most of the effects would be felt in the Upper Basin. By 1965, 1.6 million acres were under irrigation in the Upper Basin, with many new projects still unbuilt.

In order to address the question of the environmental impact of a major measure of this character in any meaningful manner, it is necessary to define what the proposal would mean in terms of its scope or the probable extent of the effective application of such a limitation. The most significant parameter that may be assumed for this discussion is that such a moratorium would apply to Federal development only and would not directly prohibit non-Federal or private development. To be fully meaningful, however, such a measure would have to preclude all direct and indirect Federal assistance which would contribute to further development. This would include any program which has a direct influence on the ability of non-Federal entities to develop and utilize Colorado River water within the basin. Obviously, the impacts of such a sweeping measure would depend upon the nature and intent of its provisions, the legality of these as determined through challenges in the courts, and the successful imposition of any court-sustained provisions over time. Assuming a successful moratorium on Federal development such as described above, it would be reasonable to expect a reduced rate of development in the basin in the near term and, therefore, a reduced rate of adverse environmental effects.

However, in evaluating the trade off between the adverse environmental effects which might be attributable to Federal development as against those that could arise from non-Federal and private development, it is by no means certain that, in the long term, adverse environmental effects would, on balance, be reduced under a Federal moratorium. For example, if potential Federally sponsored developments were effectively prevented, many of the water rights now held for anticipated water development would likely become available for industrial

use both in and out of the basin. It should be noted that at present most, if not all, of the basin state water rights laws recognize the industrial use of water as third in priority following domestic and agricultural use. The environmental implications of this shift in priority could be very adverse. Moreover, it appears that while the full development and utilization of the water resources of the Colorado River could be delayed somewhat by a Federal moratorium, further development sponsored by other sources could reasonably be expected to occur at some time. Also, the loss relating to facilities which were designed and constructed to complement future developments would amount to hundreds of millions of dollars. In addition to the loss of Federal investment, there would be a loss of benefits to the basin associated with the failure to utilize the water that was to be developed by that investment.

As just one example of a possible serious adverse effect on the human environment, a moratorium would adversely affect the economy and development of Indian tribes within the basin area. The Navajo Indian Irrigation Project and various coal gasification plants are presently under construction on Indian land and require water from the Colorado River and its tributaries. Other development plans are predicted on the availability of this water source. More broadly, a Federal moratorium on development would, in effect, restrict development on Indian lands. Since this land is in trust status, the Secretary of the Interior must approve all leases, permits, etc. This constitutes a Federal action, even if Federal funds are not involved.

Finally, with regard to the practicability of such a scheme, one can only speculate about the possibilities for action and counter-action by all affected parties. In the first instance, as a minimum, there would probably be substantial controversy, debate, and delay in Congress before any kind of moratorium could realistically be enacted; and a series of court cases would probably ensue relating to the legal and institutional arrangements which are presently operative on the Colorado River and within the basin. The Upper Basin States could contend that an abrogation of the Colorado River Compact of 1922, which apportions consumptive use of water between the Upper and Lower Basin States, would be the de facto result of imposing a moratorium. They might further contend a legal right to the consumptive use of water originating in the Upper Basin and would most likely take steps to put it to use in due time irrespective of presently effective legal and institutional arrangements. The inevitable result would be litigation, disorganized operation of the river system, and disorientation among the Basin States and other political entities involved in utilization of the Colorado River Water resources.

E. No Action

Title I of Public Law 93-320 was enacted on June 24, 1974, for the purpose of controlling the salinity of the Colorado River water delivered to Mexico. The principle impacts of the project in the U.S. will be in the Imperial Valley of California, the Colorado River below Morelos Dam, Wellton-Mohawk District, Yuma Mesa, and the Yuma Valley. The areas affected in Mexico will be the San Luis and Mexicali Valleys and the Santa Clara Slough.

This final environmental statement is a detailed evaluation and discussion of the impacts on these areas with the project. The future of the area with no action was the principle concern in the negotiations, planning and authorization of the project. Although thorough consideration was given to the future of the area without the project, the following salient topics are reviewed in order for the reader to better understand the consequences that may be in evidence under the condition of no action.

1. Salinity Levels of Colorado River Water in Mexico

Without the proposed action, there would be no permanent and definitive solution to the international problem of the salinity of the Colorado River, as proposed in Minute 242 and in the Joint Communique of June 17, 1972. The United States would be confronted with the uncertainties of international adjudication and the risks of placing in jeopardy a part of the water supply of the Colorado River Basin States.

2. Ground-water Levels in Yuma Valley and on Imperial East Mesa

Regardless of the project the Mexican ground-water pumping immediately south of the Arizona-Sonora Boundary and the existing U.S. pumping will affect the irrigation drainage flows in the Yuma area. The existing pumping is already lowering the ground-water levels in the Yuma Valley. Water collected in the drains has been delivered to Mexico as a part of the United States obligation under the 1944 treaty. A reduction of these flows will require additional water from storage above Imperial Dam or from some other source to be delivered at Morelos Dam, Mexico's diversion structure on the Colorado River, or at the Southerly International Boundary. The overall effect of no action will be a decrease in water supplies in the Lower Colorado River Basin in the United States.

The gradual lowering of water levels in the Yuma Valley drains and the overall lowering of the ground-water level in the Yuma Valley will cause a reduction in fish and wildlife habitat and recreation activities. The riparian vegetation now found along the drains will

slowly decrease as will the wildlife concentrations which inhabit this growth. This will affect both fishing and hunting patterns in the area. A drop in ground-water levels will also have a similar impact on Hunter's Hole and on the Gadsden ponds. A decrease in the ground-water level will result in a higher cost of recovery of ground-water for domestic, agricultural and municipal use.

The discharging of the saline Wellton-Mohawk drainage flow into the river channel below Morelos Dam will result in a salt intrusion into the underground aquifer and will sustain the riparian vegetation along the river channel and backwaters.

Without the project, seepage losses along the Coachella Canal on Imperial East Mesa will continue at their present rate. Ground-water levels will continue to increase under the agricultural lands of Imperial Valley causing drainage problems. With continued seepage from the canal, wildlife habitat within the 4,092 acres of vegetation that has developed as a result of the seepage would remain intact.

3. Water Deliveries to California and Arizona

The Colorado River is the most highly regulated river system in the United States and has been intensively developed to support approximately 14 million people in the many communities, industries, and agricultural areas in the southwest. The available surface water supplies have already been severely taxed by expanding agricultural demands and by an expanding population which is using water at an increasing per capita rate. Major projects such as Hoover Dam, the Colorado River Aqueduct, the All-American Canal System, the Salt River Project, and large ground-water developments have so far satisfied essentially all of the requirements in this large arid region. However, such future developments as the Central Arizona Project and similar projects in the Upper Basin are underway as each state continues to develop its apportioned quantity of Colorado River water. The world crisis in lagging food and energy production is already taxing existing developments and resulting in pressures for full development and maximization of all food and energy production potential. Since 1963, the lower Colorado River has been operated so that the only water released from upstream reservoirs has been the amount required for irrigation and municipal and industrial uses in the United States and for deliveries to Mexico in accordance with the 1944 treaty.

In view of this situation under a no action plan, the necessity of bypassing about 220,000 acre-feet per year of saline drainage flows below Morelos Dam and replacing with other waters in order to maintain the

quality of Colorado River water at the Northerly International Boundary and continued large-scale seepage losses of 141,000 acre-feet per year from the Coachella Canal constitute serious losses of a valuable resource.

Without the proposed measures at Painted Rock Reservoir storm waters will continue to be released at a higher rate of between 2,200 to 2,700 ft³/s. Thus, these stormflows will continue to reach the Wellton-Mohawk area and infiltrate the ground-water aquifer. The results will be the continued drainage and salinity problems in the Wellton-Mohawk Division which will necessitate increased ground-water pumping and result in increased drainage flows with higher salinities to be discharged into the Colorado River below Morelos Dam.

Failure to implement the protective and regulatory pumping project would necessitate release of additional Colorado River waters to Mexico, which in turn would be economically detrimental to the state of Arizona. In addition, no action would be taken to reduce the underflow across the Arizona-Sonora Boundary caused by Mexican pumping, thereby causing a loss of a United States ground-water resource. Without the pumping project, some of the available ground water under the Yuma Mesa could possibly be used to develop a limited amount of currently owned state and Federal desertlands into agricultural production. This would enhance the economic development of the area and would create employment opportunities.

4. Land Use and Demography

Land use patterns in the project area would continue basically as in relation to the population demands. There would be no acquisition of lands in the Wellton-Mohawk Division nor on the Imperial East Mesa. State and Federal lands on the Yuma Mesa within 5 miles of the Arizona-Sonora Boundary would still be encumbered by the limitation of 160,000 acre-feet of ground water which may be pumped under international agreement within the 5-mile distance. Development on these and other lands in the project area would be contingent upon economic conditions and the availability of water for agricultural, municipal, and domestic use. Changes in land value would be gaged by these demands. Tax rates and tax structures would follow the patterns of land use and population demands. Without the project, international relations between the two countries may become strained and may deteriorate seriously in the areas in Mexico that would be most affected without the project.

F. Other Alternatives

More detail on alternatives to the project and alternatives to the features is contained in the environmental impact statement prepared

by the Interagency Task Force which worked with Mr. Brownell in preparing his report to the President, and in the Department of State's Final Environmental Impact Statement that was filed with the Council on Environmental Quality in 1973. Other alternatives for partial or total solution to the problem considered during preparation of the project plan of development include those listed below. All of these plans involve an augmentation of the river to replace bypassed Wellton-Mohawk drainage flows.

1. Constructing a 300-Mgal/d seawater distillation plant near Yuma, Arizona, with the installation of a nuclear powerplant as the energy source;
2. Constructing a seawater distillation plant of 300-Mgal/d capacity located in the metropolitan Los Angeles area;
3. Constructing a large-scale ion-exchange plant to desalt the entire flow of the Colorado River;
4. Constructing a reverse osmosis desalting plant designed to desalt about 450,000 acre-feet of water and remove 1,200,000 tons of salt annually from the return flows of the Palo Verde Irrigation District.
5. Desalting geothermal brine in the Imperial Valley;
6. Substituting Colorado River water from above Imperial Dam;
7. Adopting more efficient irrigation practices throughout the irrigated area in the basin;
8. Increasing Colorado River flow by vegetative management.

In addition, consideration was given to other desalting schemes for desalting the Wellton-Mohawk drainage flows. Plants of varying sizes and at several different locations within the Yuma-Wellton area were considered. With enactment of Public Law 93-320 wherein specific provisions were authorized to meet the objectives of the project, those alternatives mentioned above were precluded from further consideration.

IX. CONSULTATION AND COORDINATION

IX. CONSULTATION AND COORDINATION

A. Consultation and Coordination During Development of the Proposal and During the Preparation of the Draft Environmental Statement

Minute No. 242 of the International Boundary and Water Commission, United States and Mexico, was the result of extensive negotiations between the governments of Mexico and the United States to arrive at a permanent and definitive solution to the problem of the salinity of waters delivered to Mexico pursuant to the 1944 Water Treaty.

On August 16, 1972, President Nixon appointed Herbert Brownell, Jr., as his Special Representative to work with an Interagency Task Force to consider alternatives and to make recommendations for a solution to salinity problems. Subsequently, he was appointed Special Ambassador to negotiate with Mexico for a permanent and definitive solution.

The seven-state Committee of Fourteen also met and consulted with Mr. Brownell and advised him during the studies and the negotiations.

The Task Force studies were evaluated in an environmental statement entitled Final Environmental Impact Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico which was filed with the Council on Environmental Quality by the U.S. Department of State. The statement was generally broad in its coverage and assumptions with the understanding that the project would be further described as better information became available.

The Draft Environmental Statement entitled Colorado River International Salinity Control Project (predecessor to this final statement) was prepared concurrently with the negotiations between the two countries and represented an analysis of the project based on the best information available at that time. Certain parameters were still being discussed and due to the delicate position of each government's negotiating team, the preparation of the draft statement was accomplished within the Departments of Interior and State on a confidential basis. Coordination and consultation with other Federal agencies and State and local entities were also kept confidential to avoid premature disclosure of sensitive negotiating points. Written or verbal comments on the project or the working draft environmental statement were obtained from the following agencies:

Department of the Interior

Bureau of Mines
Fish and Wildlife Service

National Park Service
Geological Survey
Bureau of Land Management

Department of State
Department of the Army - Corps of Engineers
United States Section, International Boundary and Water Commission
Environmental Protection Agency
Council on Environmental Quality

Arizona Public Service Company
Fluor Corporation
Imperial Irrigation District
Wellton-Mohawk Irrigation and Drainage District
Coachella Valley County Water District

B. Coordination and Distribution of the Draft Environmental Statement
for Review Purposes

The draft environmental statement was distributed to the Federal agencies that have expertise or authority in subject areas covered by the statement. Additional distribution was made to the State and local entities shown on the distribution list at the front of this statement. Additional requests for copies of the statement were filled as received after the notice of availability appeared in the Federal Register.

The bill, H.R. 12165, that was passed into law as Public Law 93-320, included the additional feature of protective and regulatory ground-water pumping which was not included in the original Draft Environmental Statement. To be consistent with Public Law 93-320 and the requirements of the National Environmental Policy Act, Council on Environmental Quality and Reclamation Guidelines, a Supplement to the Draft Environmental Statement was filed with the Council on Environmental Quality and distributed for review and comment on August 27, 1974. A total of 30 letters were received commenting on the draft statement, and 37 on the supplement to the draft statement.

On October 5, 1974, a public hearing on all features of Title I, Public Law 93-320, was conducted in Yuma, Arizona.

All written substantive comments received on the draft environmental statement and the supplement to the draft environmental statement are included as Appendices A and B, respectively, in this final environmental statement. Comments received at the public hearing and those received in writing as a result of the public hearing have been abstracted and are included in Appendix C. The complete public hearing comments are included

in the public hearing record which is available at the Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada. A total of 17 individuals appeared and made statements to the hearing board. In addition, 2 letters were submitted to the Regional Director for inclusion in the public hearing record. Some of those presenting statements at the hearing supplemented their statements or made written comments on the draft environmental statement.

C. Recent Studies Reflected in the Final Environmental Statement

Additional environmental, hydrological, economic, and legal studies were conducted subsequent to the draft statement and are reflected in this statement. A listing of these studies is included in Chapter IV.

D. Disposition of Comments Received on the Draft Environmental Statement and at the Public Hearing

Letters of comment with appropriate replies have been included in Appendix A and Appendix B. Abstract of the public hearing comments with appropriate replies have been included in Appendix C.

E. Interagency Coordinating Committees

Following the issuance of the draft environmental statement, two separate Ad-Hoc Committees were organized to coordinate the evaluation of impacts of the project on fish, wildlife and recreation, and to develop mitigation concepts for those impacts. These two committees are considering the Coachella Canal feature in California and the desalting complex and the protective and regulatory ground-water pumping well fields in Arizona as two separate units. These two multi-agency committees meet on a frequent basis and have been instrumental in developing mitigation concepts recommended to the Bureau of Reclamation. The committees will remain active until the details of the mitigation concepts have been developed and mitigation measures implemented. A listing of the participating agencies is included in Chapter IV.

Close coordination with the Fish and Wildlife Service, the Arizona Game and Fish Department and the California Department of Fish and Game continued in the development of the final environmental statement up to the time the document was printed for filing with CEQ. The Fish and Wildlife Service provided informal review and comments on two separate occasions. The Arizona Game and Fish Department reviewed and commented on the responses to their formal letter of comment on the Supplement to the Draft Environmental Statement. The California Department of Fish and Game and the above-listed agencies were provided for review and comment copies of the section in Chapter IV dealing with

fish and wildlife mitigation. Fish and Wildlife Service representatives from the separate field offices of River Basin Studies in Arizona and California participated in an informal review with Reclamation personnel in Boulder City, Nevada of Chapter III (environmental impacts) and the section in Chapter IV concerned with mitigation for fish and wildlife. Comments and suggestions received from these agencies in writing and during the informal reviews have been used extensively in the development of the final environmental statement. The cooperation and assistance received from these agencies have been helpful in resolving concerns with fish and wildlife impacts and mitigation. It is expected that the close coordination will continue as the project develops.

F. Public Meetings

Subsequent to the public hearing on the draft and supplemental environmental statements, numerous public information meetings have been conducted in the Yuma area. These meetings have consisted of detailed descriptions of the project impacts and benefits, and a question and answer discussion period. This type of informational meeting will continue as the development of the project progresses.

APPENDIX A

DEPARTMENT OF PARKS AND RECREATION

P.O. BOX 2390
SACRAMENTO 95811April 24 1974
Action Taken

Mr. E. A. Lundberg, Regional Director
Lower Colorado Region
Bureau of Reclamation
Post Office Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have received your letter of April 8, 1974 transmitting the Draft Environmental Impact Statement on the proposed Colorado River International Salinity Control Project in Imperial and Riverside Counties in California and in Yuma County in Arizona.

As staff for the State Historic Preservation Officer, we have determined that three State Historical Landmarks are in the vicinity of the proposed Main Outlet Drain Extension at Yuma Crossing, Imperial County: Fort Yuma, site of Mission Purisima Concepcion, and the Hernando De Alarcon Expedition.

As the Yuma Crossing and Associated Sites are included on the National Register of Historic Places, they are afforded full protection under Section 106 of the National Historic Preservation Act of 1966.

We are pleased to know of your intention to maintain close coordination with the State Historic Preservation Officer to assure protection of these historic sites. We are also pleased that the National Park Service is conducting an archeological survey along the entire right of way.

If we may be of further assistance, please feel free to contact us.

Sincerely,

A handwritten signature in cursive script that reads "Russell W. Porter".

Russell W. Porter, Chief
Grants and Statewide Studies Division

F-3/7

Reply to Comment Made by the
California Department of Parks and Recreation
(Letter of April 24, 1974)

1. Comment: As staff for the State Historic Preservation Officer, we have determined that three State Historical Landmarks are in the vicinity of the proposed Main Outlet Drain Extension at Yuma Crossing, Imperial County: Fort Yuma, site of Mission Purisima Concepcion and the Hernando De Alarcon Expedition.

As the Yuma Crossing and Associated Sites are included on the National Register of Historic Places, they are afforded full protection under Section 106 of the National Historic Preservation Act of 1966.

Reply: Notation is made in the draft environmental statement concerning the Yuma Crossing and Associated Sites, pages 69 and 70. Also included were notations of the Hernando De Alarcon Expedition, Fort Yuma, Arizona Territorial Prison, and the U.S. Army Quartermaster Depot. All of these sites are in close proximity to the metal flume which will be replaced on the Main Outlet Drain Extension. Special notation has been made in the final environmental statement to the effect that Fort Yuma, site of Mission Purisima Concepcion, and the site of the Hernando De Alarcon Expedition are California State Historical Landmarks. Procedures for clearance under Section 106 of the National Historic Preservation Act have been accomplished. Official clearance was issued on July 8, 1974 by the Advisory Council on Historic Preservation.

DISTRICT #4, COUNCIL OF GOVERNMENTS

377 MAIN STREET, ROOM 202

YUMA, ARIZONA 85364

(602) 782-1886

April 25, 1974

13011

Mr. E. A. Lundberg
Regional Director
P.O. Box 427
Boulder, Nevada

Dear Mr. Lundberg:

This office has just received a draft of the Enviornmental Statement dated April 1, 1974, for the proposed Colorado River International Salinity Control Project (INT DES 74-39) from the Arizona State Clearinghouse for review.

The first page of this report lists agencies, Federal, State, local and private, which have been asked to comment on this proposal. Eliminated from this list of local agencies are the City of Yuma and the towns of Wellton and Somerton. It is admirable that you feel responses are required from such groups as the Yuma Valley Rod and Gun Club and the Yuma County Chamber of Commerce who have an interest in such projects, but the total disregard you show for the comments of the locally elected officials is unforgivable. The size of this document makes it impracticle for us to send a review copy to the elected officials within District IV.

The elected officials that represent the cities and towns of this region are necessary for review of this project because they represent the majority of the citizens of this region. Your list of review agents seems to stress land that is involved and neglects people in incorporated areas. These people also have a vested interest in all projects that effect this region.

Therefore, I strongly recommend that you send a copy of the above mentioned proposal to all cities and towns within the affected area and that these cities and towns be placed on your lists for projects in the future.

A-3

Mr. A. E. Lundberg
April 25, 1974
Page two

If there is any further information you may need in this regard, please contact me.

Sincerely,

DISTRICT #4, COUNCIL OF GOVERNMENTS

Brian H. Babiars

Brian H. Babiars, Director
Physical and Natural Resources

cc: Mayor Ersel Byrd, City of Yuma
Mayor Herman Magana, Town of Somerton
Mayor Doug Morris, Town of Wellton
Mrs. Constance LaMonica, Arizona State Clearinghouse
Mr. J. W. O'Meara, Director, Office of Saline Water
Mr. J. R. Fiedkin, Commissioner, International Boundry & Water Comm.
Mr. Ted Moser, Project Manager, Bureau of Reclamation

BHB/rp

Replies to Comments Made by
Mr. Brian H. Babiars
District #4, Council of Governments
Yuma, Arizona
(Letter of April 25, 1974)

1. Comment: This office has just received a draft of the Environmental Statement dated April 1, 1974, for the proposed Colorado River International Salinity Control Project (INT DES 74-39) from the Arizona State Clearinghouse for review.

* * * *

Therefore, I strongly recommend that you send a copy of the above mentioned proposal to all cities and towns within the affected area and that these cities and towns be placed on your lists for projects in the future.

Reply: It is regreted that the city of Yuma and the towns of Wellton and Somerton were not sent copies of the statement in the initial mailing. In an area such as Yuma, Arizona, with so many diverse interests present, it is difficult to assemble an all-encompassing distribution list. However, an attempt is made in our initial distribution to gather comments from a broad spectrum of the populace rather than from special interest groups. The initial distribution list included locally elected officials such as the Yuma County Board of Supervisors, Highway Department, Public Works Department, Parks and Recreation Department, and Imperial County, to name a few. It is also pointed out that, in the interim between printing of the statement and distribution, our list is often expanded to include recipients who do not necessarily appear on the list in the front of the statement but are in fact initial recipients.

Additionally, notices of availability in the form of news releases were sent to local news media so those entities not included in the original distribution could request copies. As a result of this, the City of Yuma did request copies of the statement which were provided immediately. As requested, copies were provided to Mayor Magana and Mayor Morris of Somerton and Wellton, Arizona, respectively. Their names have been placed on the mailing list to receive future statements for projects in their areas of concern.



WYOMING
EXECUTIVE DEPARTMENT
CHEYENNE

STANLEY K. HATHAWAY
GOVERNOR

May 9, 1974

Mr. E. A. Lundberg
Regional Director
U. S. Bureau of Reclamation
Post Office Box 427
Boulder City, Nevada

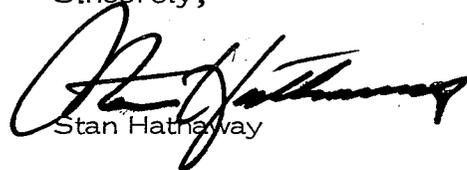
Dear Mr. Lundberg:

Thank you for the opportunity to comment on the Draft Environmental Statement for the Colorado River International Salinity Control Project (INT DES 74-39).

While Wyoming generally supports the concept of good relations between the United States and Mexico on the Colorado River, we do feel that certain aspects of this project, and Minute 242 in general, could result in the imposition of obligations beyond the scope or intent of the 1944 Treaty with the Republic of Mexico. The ultimate effect of this project and Minute 242 is yet to be ascertained, but Wyoming would certainly expect that the Colorado River International Salinity Control Project would, in no way, inhibit future development of our full allocation under the Colorado River and Upper Colorado River Basin Compacts, or result in any more expanded obligation to the Republic of Mexico under the 1944 Treaty.

Again, thank you for the opportunity to comment.

Sincerely,



Stan Hathaway

SH:bbv

Reply to Comment Made by the
Wyoming Executive Department
(Letter of May 9, 1974)

1. Comment: The ultimate effect of this project and Minute No. 242 is yet to be ascertained, but Wyoming would certainly expect that the Colorado River International Salinity Control Project, would, in no way, inhibit future development of our full allocation under the Colorado River and Upper Colorado River Basin Compacts, or result in any more expanded obligation to the Republic of Mexico under the 1944 Treaty.

Reply: Title II of the Colorado River Basin Salinity Control Project provides for salinity improvement measures upstream from Imperial Dam. This should enhance the opportunities for future development in the United States as well as preclude future salinity problems with Mexico.



United States Department of the Interior

BUREAU OF OUTDOOR RECREATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

D6427-LCO

MAY 6 - 1974

Memorandum

To: Commissioner of Reclamation

From: *Assistant* Director, Bureau of Outdoor Recreation

Subject: Draft Environmental Statement - Colorado River
International Salinity Control Project

We have reviewed the subject Draft enclosed with your memorandum of April 11, 1974 in terms of its impact on recreation and the related environment. We have no significant comments to offer at this time.

Thank you for giving us the opportunity to review the Environmental Statement.

Les Jones



ARIZONA CONSERVATION COUNCIL

P. O. Box 11312 Phoenix, Arizona 85061

May 10, 1974

Mr. E. A. Lundberg
United States Department of Interior
Bureau of Reclamation
P. O. Box 427
Boulder, Nevada 89005

Dear Mr. Lundberg;

The Arizona Conservation Council is pleased to respond to the draft environmental statement of the proposed Colorado River International Salinity Control Project, control number DES 74-39. At the request of the membership organizations of the Council, I would like to offer the following comments.

a. We support the purchase of the lands in the flood area behind the Painted Rock Dam. As recent history proved, the flowage requirements in the present flood easements have resulted in a great deal of conflicts. It would be our hope that these lands, if purchased, might be made available for management by the Arizona Game and Fish Department. We were also pleased with the suggestions that greenbelts might be used downstream of the Painted Rock Dam to absorb most of the runoff that would be released.

b. We feel that the cost figures should include the price of the 276.1 million kilowatts of electricity annually required and an estimate of the operating and maintenance of the desalting plant and other units of this project.

c. What is to be the source of electricity for this plant? Will this require transmission lines to be run from a distant generator?

d. There is concern about paragraph 1.b of minute 242 which appears to seek a guarantee that salinity levels delivered to Mexico stay at levels of under 1240 ppm of TDS. In view of the rising salinity of the Colorado River and proposed projects such as the additional Dams which will cause the salinity to increase at even a greater rate to a higher value, what steps are being taken to guarantee that this portion of the minute 242 can be honored even with the implementation of this project?

please continue on next page.

A-9

AMERICAN CAMPING ASSN • AMERICAN INSTITUTE OF PLANNERS • ARIZONA WILDLIFE SOCIETY • ARIZONA ASSN OF LANDSCAPE ARCHITECTS
ARIZONA EDUCATION ASSN • ARIZONA FEDERATION OF GARDEN CLUBS • ARIZONA FEDERATION OF WOMENS CLUBS • AMERICAN YOUTH HOSTELS
ARIZONA RIFLE & PISTOL ASSN • ARIZONA STATE HORSEMENS ASSN • ARIZONA OUTDOOR WRITERS ASSN • ARIZONA ROADSIDE COUNCIL
ARIZONA PARKS & RECREATION ASSN • ARIZONA VARMINT CALLERS ASSN • AUDUBON SOCIETY • SIERRA CLUB • ENVIRONMENTAL CONSCIENCE
UNIVERSITY OF ARIZONA WILDLIFE SOCIETY • ARIZONANS IN DEFENSE OF THE ENVIRONMENT



ARIZONA CONSERVATION COUNCIL

Page 2 of response to draft statement DES 74-39

e. As has been noted one politically unacceptable solution would be to bypass all of the approximately 200,000 acre feet from the Wellton-Mohawk discharge. Yet it appears that even with this project 50,000 acre feet will be bypassed. We are concerned for what the taxpayer is paying for the 150,000 acre feet of water which is essentially what this project accomplishes. If one excludes \$18.5 million for the outlet and bypass drains there is an argument that the American public is paying roughly \$700 in initial costs per acre foot to preserve this water allotment exclusive of the ongoing costs of this project. We feel that this form of cost evaluation should be pursued further.

We thank you for this opportunity to comment and we hope that we have been of some assistance to you in evaluating this matter.

Yours truly,

Lyndon Keefer
Chairman

Arizona Conservation Council

A-10

Replies to Comments Made by the
Arizona Conservation Council
(Letter of May 10, 1974)

1. Comment: We support the purchase of the lands in the flood area behind the Painted Rock Dam. As recent history proved, the flowage requirements in the present flood easements have resulted in a great deal of conflicts. It would be our hope that these lands, if purchased, might be made available for management by the Arizona Game and Fish Department. We were also pleased with the suggestions that greenbelts might be used downstream of the Painted Rock Dam to absorb most of the runoff that would be released.

Reply: Purchase of additional lands for flood water storage behind Painted Rock Dam would not necessarily change land-use patterns, since management of the reservoir could allow present uses to continue except in periods of inundation. Jurisdiction over the acquired lands will have to be maintained by the Federal Government (Army Corps of Engineers). However, management and protection of fish and wildlife on these lands would naturally fall under the jurisdiction of the state.

2. Comment: We feel that the cost figures should include the price of 276.1 million kilowatts of electricity annually required and an estimate of the operating and maintenance of the desalting plant and other units of this project.

Reply: A discussion of the estimated operation, maintenance and power costs of the desalting plant, and other features of the project are included in Chapter I.

3. Comment: What is to be the source of electricity for this plant? Will this require transmission lines to be run from a distant generator?

Reply: Chapter I of the final statement has been expanded to include further discussion on source and transmission of power.

4. Comment: There is concern about paragraph 1.b. of Minute No. 242 which appears to seek a guarantee that salinity levels delivered to Mexico stay at levels of under 1,240 p/m of TDS. In view of the rising salinity of the Colorado River and proposed projects such as the additional dams which will cause the salinity to increase at even a greater rate to a higher value, what steps are being taken to guarantee that this portion of the Minute No. 242 can be honored even with the implementation of this project?

Reply: Paragraph 1.b. of Minute No. 242 has no reference to Colorado River water delivered to Mexico at the northerly international boundary. It is specifically referring to water deliveries to Mexico at "...the land boundary at San Luis and in the Limitrophe section of the Colorado River downstream from Morelos Dam..." Water delivered to Mexico across the land boundary at San Luis, Sonora, Mexico, and San Luis, Arizona, is primarily drainage flows with some irrigation canal wasteway discharge from the Yuma Valley. These deliveries have been averaging approximately 140,000 acre-feet annually with an average salinity of about 1,400 to 1,600 p/m.

5. Comment: As has been noted, one politically unacceptable solution would be to bypass all of the approximately 200,000 acre-feet from the Wellton-Mohawk discharge. Yet it appears that even with this project, 50,000 acre-feet will be bypassed. We are concerned for what the taxpayer is paying for the 150,000 acre-feet of water which is essentially what this project accomplishes. If one excludes \$18.5 million for the outlet and bypass drains there is an argument that the American public is paying roughly \$700 in initial costs per acre-foot to preserve this water allotment exclusive of the ongoing costs of this project. We feel that this form of cost evaluation should be pursued further.

Reply: Estimates of installation and operating costs of a project are based on April 1973 price index levels and are analyzed over a time period equivalent to the estimated useful life of the project facilities. Because the useful life of most of the desalting complex facilities is estimated to be at least 50 years, costs have been analyzed over this period.

As authorized, the desalting plant would produce about 101,000 acre-feet of product water annually, or about 90 Mgal/d. The unit cost of 240 p/m product water at the desalting plant boundary would be about \$136 per acre-foot, or about 42 cents per 1,000 gallons. The total water savings resulting from blending the desalting plant product water with the remaining Wellton-Mohawk drain flows would amount to about 132,000 acre-feet annually, or about 117 Mgal/d. The unit cost of blended 910 p/m water is estimated at \$125 per acre-foot or about 39 cents per 1,000 gallons.

Studies are in progress to identify the desalting process to be used and an updated estimate of capital and operating costs for the plant will not be available until the design of the plant is more firmly established.

JACK WILLIAMS
GOVERNOR

WALTER W. SURRETT
CHAIRMAN

WALTER A. NELSON
VICE CHAIRMAN

LEN W. MATTICE
MEMBER

BILL ERDMANN
MEMBER

FRANCIS N. CONNOLLY
MEMBER



W. A. ORDWAY
ACTING STATE HIGHWAY DIRECTOR

WM. N. PRICE
STATE HIGHWAY ENGINEER

ARIZONA HIGHWAY DEPARTMENT

Environmental Planning Division
205 South 17th Avenue
Room 240
Phoenix, Arizona 85007

May 13, 1974

452-101
Mr. E. A. Lundberg
Bureau of Reclamation
Lower Colorado Regional Office
U.S. Department of the Interior
Post Office Box 427
Boulder City, NV 89005

Re: Draft Environmental Statement
Colorado River International
Salinity Control Project

Dear Mr. Lundberg

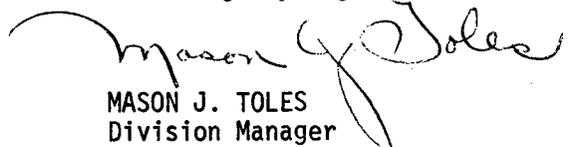
The Arizona Highway Department's Environmental Planning Division has reviewed the Draft Environmental Statement for the Proposed Colorado River International Salinity Control Project.

There appear to be no conflicts with present or five-year programmed Arizona State Highway projects as the proposal is outlined at this time with the desalting plant located as described on page 32 and outlined on photograph PX303-2521.

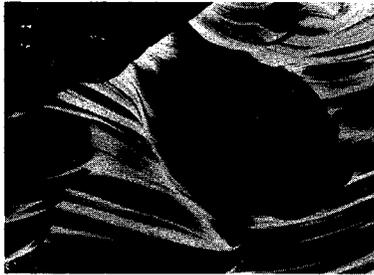
We appreciate the opportunity to review the plan and make comment.

Yours very truly

WM. N. PRICE
State Highway Engineer


MASON J. TOLES
Division Manager

MJT:ADG:as



Sandstone Sculpture, Peach Wash, Arizona

SIERRA CLUB ~~Southwest Office~~

2014 East Broadway, Room 212, Tucson, Arizona 85719

452.1-1
May 13, 1974

E.A. Lundberg, Regional Director
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 427
Boulder City, Nevada 89005

Re: Draft Environmental Impact Statement - Colorado River International Salinity Control Project

Dear Mr. Lundberg:

Thank you for sending me a copy of the draft environmental statement on the proposed Colorado River International Salinity Control Project. This letter contains the Sierra Club's comments on this proposal and draft environmental statement.

The draft statement does not adequately describe the sequence of events that led to the present situation. An understanding of the history of irrigation in the Wellton-Mohawk area and the repeated attempts by the federal government and others to correct or control problems arising from this irrigation would be most helpful to those persons who are now seeking a solution to the present problem. Irrigated agriculture in the Wellton-Mohawk area has been plagued with problems from its very inception, the response to which has been uniformly to seek a technological fix generally at the expense of the federal taxpayer.

First there was not enough water, which in turn prompted the construction of the Wellton-Mohawk Division of the Gila Project. Then there was too much water which led to the construction of the Wellton-Mohawk Drain. Then it was learned that the drainage waters were causing a salinity problem in Mexico. This led to the installation of more drainage wells so that they might be selectively pumped. It also was a major impetus for the proposal to channelize the lower Gila River. Now we are told that only another massive federal investment, another structural solution, is needed to correct the problems arising from the irrigation of lands in the Wellton-Mohawk area.

This history is filled with evidence of the lack of any systematic planning, the lack of any attempts to look ahead. It is a history of patchwork solutions to emergency situations. It is a history of failing to consider non-structural solutions to these problems. We think it is about time for a change.

The draft environmental statement is strongly biased in favor of a large desalting plant. Completely inadequate consideration is given to alternatives which might reduce or eliminate the saline drainage waters which the plant would treat. The only such

E.A. Lundberg
page two
May 13, 1974

alternative discussed is total shutdown of the Wellton-Mohawk Division by federal acquisition of the project. This is dismissed largely out of hand because of the adverse social and economic impacts. The implication being that the entire economy of the area, now largely based on irrigation agriculture, would disappear overnight.

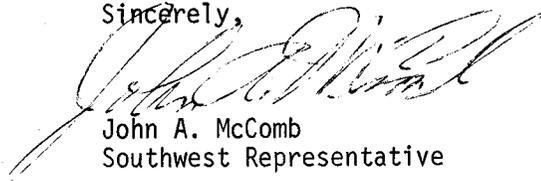
We think the alternative of total shutdown deserves much more consideration than it has received. It need not take place overnight. It could be done through a system of financial incentives rather than by federal acquisition. It would free some 300,000 acre-feet of water per year to be used in other locations in Arizona that would not cause salinity problems. Clearly we would be talking about a shift in economic activity from one location to another, probably with a net economic benefit to the State of Arizona and possibly even to Yuma County. It would eliminate the need for the massive resource investment needed to construct and operate the desalting plant. Many of the resources needed for this plant are of an irreplaceable nature and either are or can reasonably be expected to be in short supply. The analysis of options prepared for the Department of State indicates that total shutdown would achieve the same end in terms of salinity control at a cost equal to or below the desalting plant solution. Admittedly the impact on the local human environment in the Wellton-Mohawk area would be high. However, similar impacts are taking place all over Arizona as water use shifts to municipal and industrial uses, generally in a manner beneficial to the entire State. We believe that this alternative is much more attractive than the statement indicates.

Partial shutdown of the Wellton-Mohawk Division is not even discussed beyond the acquisition of some 4,200 acres of irrigated land which is part of the proposal. What about shutdown of all of the mesa acreage where most of the saline drainage problem originates? Cannot irrigation efficiencies be improved even beyond the modest increase (from 58% to 63%) that is a part of the proposal?

Doubtless there are many other non-structural solutions to the Mexican salinity problem if we took the broader view.

I hope that you find these comments of value in your preparation of the final statement. I would appreciate receiving a copy of the final statement when it becomes available.

Sincerely,



John A. McComb
Southwest Representative

cc: Michael McCloskey
Henry Zeller
Les Albee
Jerry Lobel
Brent Blackwelder.

Replies to Comments Made by the
Sierra Club, Tucson, Arizona
(Letter of May 13, 1973)

1. Comment: The draft statement does not adequately describe the sequence of events that led to the present situation. An understanding of the history of irrigation in the Wellton-Mohawk area and repeated attempts by the Federal Government and others to correct or control problems arising from this irrigation would be most helpful to those persons who are now seeking a solution to the present problem.

Reply: This type of information is available and can be obtained from the Bureau of Reclamation project histories and other publications at either the Yuma Projects Office or the Regional Office in Boulder City, Nevada. Project personnel are aware of the irrigation and drainage history of the area and are now concerning themselves with the current problems and facts at hand to relieve the salinity problem caused by the discharge of Wellton-Mohawk drainage flow into the Colorado River within the authority of Public Law 93-320.

2. Comment: The draft environmental statement is strongly biased in favor of a large desalting plant. Completely inadequate consideration is given to alternatives which might reduce or eliminate the saline drainage waters which the plant would treat. The only such alternative discussed is total shutdown of the Wellton-Mohawk Division by Federal acquisition of the project. This is dismissed largely out of hand because of the adverse social and economic impacts. The implication being that the entire economy of the area, now largely based on irrigation agriculture, would disappear overnight.

We think the alternative of total shutdown deserves much more consideration than it has received. It need not take place overnight. It could be done through a system of financial incentives rather than by Federal acquisition. It would free some 300,000 acre-feet of water per year to be used in other locations in Arizona

that would not cause salinity problems. Clearly we would be talking about a shift in economic activity from one location to another, probably with a net economic benefit to the State of Arizona and possibly even to Yuma County. Admittedly the impact on the local human environment in the Wellton-Mohawk area would be high. However, similar impacts are taking place over all Arizona as water use shifts to municipal and industrial uses, generally in a manner beneficial to the entire state. We believe that this alternative is much more attractive than the statement indicates.

Reply: The desalting complex is the focus of Public Law 93-320, which obviously did not favor the alternative of total shutdown of the Wellton-Mohawk Division. The desalting complex will alleviate the problem of eliminating the discharge of saline drainage flows into the Colorado River in the shortest time span possible as agreed with Mexico in Minute No. 242. Construction and operation of the desalting complex can be accomplished with the least amount of negative impacts on the human population in Yuma County and in Arizona. It will result in a significant salvage of water. Shutdown of the Division would result in a loss of thousands of acres of habitat for a variety of wildlife species that are dependent upon these cultivated area for water, food, and cover. The adverse impact on human life and the economy of the area would be traumatic since the district is responsible for about one-half of the agricultural commodities produced in Yuma County. Complete shutdown of the District would not be consistent with the national goals of food and fiber production. It should be noted that the purpose of the National Environmental Policy Act of 1969 is not only "...to promote efforts which will prevent or eliminate damage to the environment and biosphere..." but is also to "...stimulate the health and welfare of man...."

3. Comment: Partial shutdown of the Wellton-Mohawk Division is not even discussed beyond the acquisition of some 4,200 acres of irrigated land which is part of the proposal. What about shutdown of all the mesa acreage where most of the saline drainage problem originates? Cannot irrigation efficiencies be improved ever beyond the modest increase (from 58% to 63%) that is a part of the proposal?

Reply:

At this time there would be no immediate advantage to the partial shutdown of the Wellton-Mohawk Division beyond the shutdown of approximately 10,000 acres as planned. As long as any part of the District is still operating, the saline drainage flows will continue and would have to be dealt with. The reason for reducing the irrigated area and improving the irrigation efficiency in the project plan is to establish a base level drainage flow of 175,000 acre-feet per year which can be adequately handled by the proposed desalting facilities.

The largest portion of the saline drainage and that having the highest concentrations of salts are pumped from valley lands in the Wellton-Mohawk Division and not from the mesa acreage. The valley lands comprise about 80 percent of the irrigated acreage, while mesa lands comprise only about 20 percent. The mesa irrigated lands do have a lower irrigation efficiency than valley lands due to deeper percolation of irrigation waters. Shutdown of mesa lands as opposed to valley lands may result in a savings of water, but the total salinity of the drainage flows from the District would not be proportionately reduced.

Irrigation efficiencies in the range from 50 percent to 75 percent are high for the type of soils found in the Wellton-Mohawk area. If the increase in the average efficiency of the total District can be raised to 63 percent it would be a substantial contribution. As stated in the draft environmental statement, it may be possible to achieve average onfarm irrigation efficiencies of 50 percent on the mesa lands if substantial changes are made to irrigation system.

Department of Water and Power



the City of Los Angeles

TOM BRADLEY
Mayor

Commission
HENRY G. BODKIN, JR., *President*
KATHERINE B. DUNLAP
BURTON J. GINDLER
MICHAEL GLAZER
HERBERT C. WARD
MARY J. BORN, *Secretary*

ROBERT V. PHILLIPS, *General Manager and Chief Engineer*
PAUL H. LANE, *Chief Engineer of Water Works and Assistant Manager*
JAMES L. MULLOY, *Chief Electrical Engineer and Assistant Manager*
WILLIAM D. SACHAU, *Chief Financial Officer*

May 14, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

Draft Environmental Statement
Proposed Colorado River International
Salinity Control Project

This is in response to your April 8, 1974 invitation to review and comment on the subject Statement, assigned Control Number DES 74-39, on proposed projects to implement Minute 242 of the International Boundary and Water Commission.

The Los Angeles Department of Water and Power (Department) has closely followed the negotiations leading to the signing of Minute 242 and appreciates the opportunity to comment on the draft Statement.

Our comments cover those areas of the environmental statement which relate to: (1) the proposal's adequacy in providing a permanent and definitive solution to the international salinity problem; (2) salinity in the main stem of the Colorado River; and (3) groundwater pumping.

1. International Salinity Problem

The Statement indicates that a corollary objective of the proposal is the "...enhancement of the social and economic well being of the Mexican people (who are) dependent upon a stabilized Colorado River water supply." However, the proposed projects are designed to limit the average salinity of water delivered to Mexico to not more than 115 parts per million (ppm) (± 30 ppm) over that at Imperial Dam; they would not guarantee that the quality of water delivered to Mexico will be "stabilized" or never exceed an absolute limit.

A-20

May 14, 1974

The intent of the Minute is, of course, to furnish acceptable quality water to Mexico. It can be expected that Mexico would reopen the recent controversy with the United States if its water quality degraded substantially, even if the 115 ppm criterion was being met.

The Statement is, therefore, inadequate in that it does not propose projects designed to "stabilize" the salinity of the Colorado River. It does not provide a "permanent and definitive solution" to the international salinity problem as intended in Minute 242.

The program described in your Bureau's February 1972 report, entitled "Colorado River Water Quality Improvement Program," may provide the best prospect for an adequate solution to this serious problem.

2. Salinity in the Main Stem of the Colorado River

The Statement on page 101, which refers to control of salinity of water flowing to the Lower Basin, is incorrect. The proposal would have no beneficial effect on the salinity of the Main Stem of the Colorado River above Imperial Dam.

3. Groundwater Pumping

The Statement briefly discusses Mexico's groundwater pumping on the international boundary near San Luis and indicates that this pumping will decrease the water supplies of the Lower Basin states. Such pumping will reduce surface drainage delivered to Mexico as part of the United States' obligation under the 1944 Treaty. Because of this, annual releases of up to 160,000 acre feet will be required from stored water above Imperial Dam to replace these flows.

We note your Statement chooses to forego a similar pumping program by the United States to prevent such losses. Such a program would be permitted by Minute 242. These losses could significantly reduce the quantity of water available to users in the United States.

Therefore, we feel the Statement is inadequate in that it does not provide and evaluate any alternatives to the no-pumping policy, with the resultant loss of as much as 160,000 acre feet of water annually.

Mr. E. A. Lundberg

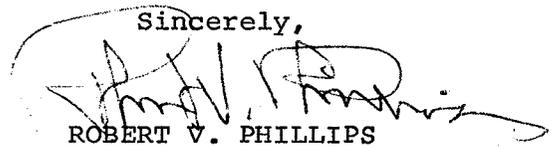
- 3 -

May 14, 1974

* * * * *

We appreciate the opportunity to review and comment on your Statement and trust that our remarks will receive appropriate attention.

Sincerely,



ROBERT V. PHILLIPS

General Manager and Chief Engineer

cc: Mr. Myron Holburt
Colorado River Board of California
302 California State Building
217 West First Street
Los Angeles, California 90012

Replies to Comments Made by the
City of Los Angeles Department of
Water and Power
(Letter of May 14, 1974)

1. Comment: The proposed projects are designed to limit the average salinity of water delivered to Mexico to not more than 115 parts per million (p/m) (± 30 p/m) over that at Imperial Dam; they would not guarantee that the quality of water delivered to Mexico will be "stabilized" or never exceed an absolute limit.

The Statement is, therefore, inadequate in that it does not propose projects designed to "stabilize" the salinity of the Colorado River. It does not provide a "permanent and definitive solution" to the international salinity problem as intended in Minute No. 242.

Reply: The project as outlined in the draft environmental statement, has been designed to alleviate the immediate salinity problems below Imperial Dam concerned with direct delivery of Colorado River water to Mexico at the Northerly International Boundary. Implementation of basin-wide projects and studies designed to stabilize the salinity of the Colorado River upstream from Imperial Dam has been provided for in Title II of the Colorado River Basin Salinity Control Act which was signed into law by President Nixon on June 24, 1974.

2. Comment: The Statement on page 101, which refers to control of salinity of water flowing to the Lower Basin, is incorrect. The proposal would have no beneficial effect on the salinity of the Main Stem of the Colorado River above Imperial Dam.

Reply: The statement referred to on page 101 concerns the projected future of the project area with or without the proposed action, and should not be construed as to mean that the proposed project facilities would control the quality of water flowing to the lower Basin. Similar comments were made in the letter by the Colorado River Board of California. This paragraph has been substantially changed in the final environmental statement in order to impart a clearer understanding of what the effects of the projected future of the area might be without the proposed project implementation.

3. Comment: The Statement briefly discusses Mexico's ground-water pumping on the international boundary near San Luis and indicates that this pumping will decrease the water supplies of the Lower Basin States. Such pumping will reduce surface drainage delivered to Mexico as part of the United States' obligation under the 1944 Treaty. Because of this, annual releases of up to 160,000 acre-feet will be required from stored water above Imperial Dam to replace these flows. We note your Statement chooses to forego a similar pumping program by the United States to prevent such losses. Such a program would be permitted by Minute No. 242. These losses could significantly reduce the quantity of water available to users in the United States.

Therefore, we feel the Statement is inadequate in that it does not provide and evaluate any alternatives to the no-pumping policy, with the resultant loss of as much as 160,000 acre-feet of water annually.

Reply: Title I of Public Law 93-320, does include a protective and regulatory pumping feature as part of the project. A supplement to the draft environmental statement, INT DES 74-39, Colorado River International Salinity Control Project was issued concerning a Protective and Regulatory Ground-Water Pumping Project. The supplement describes the feature and the environmental impacts of two U.S. well fields located along the International Boundary which are capable of pumping a combined total of 160,000 acre-feet of ground water per year. A description of this project and its environmental impacts are also included in the final statement.



STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

S. E. REYNOLDS
STATE ENGINEER

Bataan Memorial Building
STATE CAPITOL
SANTA FE, NEW MEXICO 87501

May 15, 1974

Mr. E. A. Lundberg
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

By notice dated April 8, 1974, you transmitted the Environmental Statement on the Colorado River International Salinity Control Project and invited comments on it.

The first sentence of the last paragraph on page 1 of the draft states: "Although the Treaty permits the United States to include drainage waters from irrigation projects below Imperial Dam as part of Mexico's allotment, it does not settle the question of the quality of Colorado River waters to be delivered." This statement conflicts with statements of State Department witnesses at the Senate hearings on the 1944 Treaty and could be prejudicial to the United States' position in the future. I recommend that the entire paragraph be deleted or substantially modified.

I suggest that the legal context of the problem could be made clearer by inserting a paragraph, perhaps on page 6, pointing out that water was bypassed without credit under Minute No. 218 and 241 after notice to and with the acquiescence of the Colorado River Basin States.

The following language appears on page 101 under the heading The Projected Future of the Area Without the Proposed Action:

1. Salinity levels of Colorado River water in Mexico. In the absence of the proposal or an equivalent alternative, there may be a continued increase in the salinity of the Colorado River water flowing to the lower basin as the upper basin states continue to develop their compact - apportioned water supply from the river. A deferral of a permanent solution would be in violation of the agreement reached with Mexico for a permanent and definitive solution.

Mr. E. A. Lundberg
May 15, 1974
Page 2

With respect to the first sentence quoted above, it does not appear that the presence or absence of the proposed action (construction of a desalting complex and lining of the first 49 miles of the Coachella Canal) has any bearing on whether there may be a continued increase in the salinity of the Colorado River water flowing to the lower basin as the upper basin states develop their compact apportioned waters.

The second sentence quoted above implies an interpretation of Minute No. 242 not in accord with the interpretation contained in the joint letter of February 7, 1974 from Assistant Secretary Stanton D. Anderson and Under Secretary John C. Whittaker to the President of the Senate. Attention is invited to the last paragraph on page 7 of that letter which states:

Under the agreement Mexico will not receive further improvement in its water till the Congress enacts enabling legislation.

In this connection, attention is also invited to the second complete paragraph on page 2 of the "Section-by-Section Analysis" forwarded by the joint letter. The interpretations given in the second paragraph on page 17 and the second paragraph on page 20 of the draft environmental statement are consonant with the interpretation of the joint letter. While it seems clear that deferral of the proposed action would have serious consequences for the United States' relations with Mexico, it does not seem correct to imply that failure to authorize the proposed action would be a violation of Minute No. 242. I am concerned that the second sentence of the first paragraph on page 101 of the environmental statement could mislead Mexico as to the United States' interpretation of Minute No. 242. I suggest that the sentence be deleted or substantially revised so that it is clearly consistent with the view set out in the joint letter mentioned above.

Paragraph numbered 2 on page 101 (Valley Drains) discusses the consequences of Mexican ground water pumping on the water resources of the United States. Since the proposed action includes nothing related to the international ground water pumping problem, the discussion under the heading Valley Drains should make it clear that the consequences described will be faced with or without the proposed action.

Beginning at the last line on page 131 the draft contains the following language:

The normally bypassed drain water will be treated to improve quality, and 132,000 acre-feet per year

Mr. E. A. Lundberg
May 15, 1974
Page 3

will be utilized in fulfilling the Treaty obligations to Mexico. The quality of water delivered to Mexico at the northerly international boundary will be stabilized at the stipulated salinity differential of Minute No. 242, which may be a positive step toward beneficial gains to the irrigation and M&I users in Mexico. It will also conserve about 132,000 acre-feet per year in the United States.

I assume that the word "It" in the last sentence quoted above refers to the proposed action. As I understand the matter, it would be necessary for the United States to continue to bypass, without credit, 118,000 acre-feet annually of the Wellton-Mohawk return flows if the proposed action is not authorized by the Congress. If the proposed action is authorized and carried out, the United States would bypass only the 43,000 acre-feet annually of brine reject from the desalt plant with a consequent saving of 75,000 acre-feet annually. Indulging the assumption that the lining of the first 49 miles of the Coachella Canal would not be undertaken in the absence of authorization of the proposed action, the salvage of 132,000 acre-feet by lining the canal could be credited to the proposed action, giving a total conservation of 207,000 acre-feet annually. The basis for the 132,000 acre-feet per year cited in the last sentence quoted above is not clear.

The first complete paragraph on page 132 states:

The bypass drain will prevent all but minor infiltration from the reject water to the ground water. Conversely, it will prevent large quantities of salt water from polluting the regional ground water.

It is suggested that the period at the end of the first sentence be deleted and the words "and thus" substituted for the word "Conversely" in the second sentence.

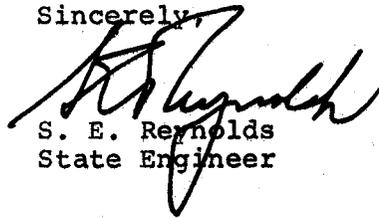
The discussion on page 204 under the heading Moratorium on Future Federal Development in the Colorado River Basin appropriately acknowledges that this alternative could well go beyond political credibility. The discussion also notes that "Major new legislation would be required to put such a scheme into effect, and the proposal would undoubtedly prove to be highly controversial." Perhaps it should be pointed out that to give effect to the alternative as described it would be necessary also to prohibit development of each state's apportionment by the state or by private enterprise; I am advised that it is unlikely that the federal government has the power to legislate such a prohibition. Discussion of

Mr. E. A. Lundberg
May 15, 1974
Page 4

this alternative should emphasize that its adoption would deprive the United States of vital food, fiber, mineral, and energy resources that would otherwise be available from the upper basin.

Thank you for the opportunity to review the environmental statement on the Colorado River Salinity Control Project.

Sincerely,



S. E. Reynolds
State Engineer

SER:re

cc: J. F. Friedkin
J. W. O'Meara

Replies to Comments Made by the
State of New Mexico
State Engineer Office, Santa Fe
(Letter of May 15, 1974)

1. Comment: The first sentence of the last paragraph on page 1 of the draft states: "Although the Treaty permits the United States to include drainage waters from irrigation projects below Imperial Dam as part of Mexico's allotment, it does not settle the question of the quality of Colorado River waters to be delivered." This statement conflicts with statements of State Department witnesses at the Senate hearings on the 1944 Treaty and could be prejudicial to the United States' position in the future. I recommend that the entire paragraph be deleted or substantially modified.

Reply: Modifications have been made within the final statement as suggested to state that although the 1944 Water Treaty does not contain specific provisions regarding the quality of water, the Treaty does provide for the settlement of differences with respect to the interpretation of application of the Treaty.

2. Comment: I suggest that the legal context of the problem could be made clearer by inserting a paragraph, perhaps on page 6, pointing out that water was bypassed without credit under Minute No. 218 and 241 after notice to and with the acquiescence of the Colorado River Basin States.

Reply: The change has been made in the final statement.

3. Comment: The following language appears on page 101 under the heading The Projected Future of the Area Without the Proposed Action:

1. Salinity levels of Colorado River water in Mexico. In the absence of the proposal or an equivalent alternative, there may be a continued increase in the salinity of the Colorado River water flowing to the lower basin as the upper basin states continue to develop their compact - apportioned water supply from the river. A deferral of a permanent solution would be in violation of the agreement reached with Mexico for a permanent and definitive solution.

With respect to the first sentence it does not appear that the presence or absence of the proposed action (construction of a desalting complex and lining of the first 49 miles of the Coachella Canal) has any bearing on whether there may be a continued increase in the salinity of the Colorado River water flowing to the lower basin as the upper basin states develop their compact apportioned waters.

The second sentence implies an interpretation of Minute No. 242 not in accord with the interpretation contained in the joint letter of February 7, 1974, from Assistant Secretary Stanton D. Anderson and Under Secretary John C. Whittaker to the President of the Senate. Attention is invited to the last paragraph of page 7 of that letter which states:

Under the agreement Mexico will not receive further improvement in its water till the Congress enacts enabling legislation.

While it seems clear that deferral of the proposed action would have serious consequences for the United States' relations with Mexico, it does not seem correct to imply that failure to authorize the proposed action would be a violation of Minute No. 242.

Reply: The final statement has been revised to reflect the changed condition, that is, authorization of Public Law 93-320. The topic "Salinity Levels of Colorado River Water in Mexico" has also been changed and may be found in Chapter VIII.E.1.

4. Comment: Paragraph numbered 2 on page 101 (Valley Drains) discussed the consequences of Mexican ground-water pumping on the water resources of the United States. Since the proposed action includes nothing related to the international ground-water pumping problem, the discussion under the heading Valley Drains should make it clear that the consequences described will be faced with or without the proposed action.

Reply: A supplement to the draft environmental statement was filed on August 27, 1974 which included the description of the protective pumping feature of the project which is proposed to help counteract the effect of Mexico's pumping along the International Boundary. Assessments were made of the effects both the Mexican and U.S. pumping will have

on the water resources of the United States with or without the project. A description of this project and its impacts are also included in this final statement.

5. Comment: Comment is to the effect that "the basis for the 132,000 acre-feet per year cited in the last sentence...." in the partial paragraph at the top of page 132 is not clear.

Reply: The discussion under "Ground-Water Quality and Quantity" has been revised to deal more directly with the impacts upon ground water.

6. Comment: It is suggested that the period to the first sentence of the first complete paragraph on page 132 be deleted and the words "and thus" substituted for the word "conversely" in the second sentence.

Reply: This section has been rewritten to include this comment.

7. Comment: The discussion on page 204 under the heading Moratorium on Future Federal Development in the Colorado River Basin appropriately acknowledges that this alternative could well go beyond political credibility. The discussion also notes that "Major new legislation would be required to put such a scheme into effect, and the proposal would undoubtedly prove to be highly controversial." Perhaps it should be pointed out that to give effect to the alternative as described it would be necessary also to prohibit development of each state's apportionment by the state or by private enterprise; I am advised that it is unlikely that the Federal Government has the power to legislate such a prohibition. Discussion of this alternative should emphasize that its adoption would deprive the United States of vital food, fiber, mineral, and energy resources that would otherwise be available from the upper basin.

Reply: An additional paragraph has been added in Chapter VIII.D.1. to expand the discussion as suggested.

Southern California Edison Company

P. O. BOX 800

2244 WALNUT GROVE AVENUE

ROSEMEAD, CALIFORNIA 91770

DAVID J. FOGARTY
VICE PRESIDENT

TELEPHONE 4
213-572-2796

May 15, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
Nevada Highway & Park Street
P. O. Box 427
Boulder City, Nevada 89055

Subject: Comments on the Draft Environmental Statement for
the Colorado International Salinity Control Project

Dear Mr. Lundberg:

The Southern California Edison Company appreciates the opportunity to comment on the Draft Environmental Statement for the subject project. It is our opinion that this Draft substantially meets all of the requirements of the National Environmental Policy Act except in the area of a description of the resources required for providing electrical power and energy as described on page 41.

The report notes that the desalting plant and associated facilities will have a peak demand of about 35 megawatts, an electrical energy requirement of about 276 million kilowatt hours per year. The desalination of water from the Wellton-Mohawk Canal is viewed as an environmental benefit which is attained at the expense of consumption of a considerable energy resource.

It is recommended that the environmental impact statement evaluate in general terms the impact of generating the required electrical energy and capacity. For example, it has been calculated that the annual energy requirement is roughly equivalent of the consumption of about 450,000 barrels of oil per year.

Mr. E. A. Lundberg
May 15, 1974
Page 2

It is recognized that the detailed evaluation of secondary impacts has not been required in environmental impact statements. However, the particular secondary impact of energy production is very significant for this project and should be addressed.

Very truly yours,

David J. Fogarty
David J. Fogarty

Reply to Comment Made by the
Southern California Edison Company
(Letter of May 15, 1974)

1. Comment: It is recommended that the environmental impact statement evaluate in general terms the impact of generating the required electrical energy and capacity. For example, it has been calculated that the annual energy requirement is roughly equivalent to the consumption of about 450,000 barrels of oil per year.

Reply: An evaluation of the environmental impacts of generating the required electrical energy has been included in Chapter III of this final environmental statement.

Hemet, California

May 17th 1974

Mr E.A. Lundberg
Regional Director
Bureau of Reclamation
P.O. Box 427
Houlder City NV

Dear Mr Lundberg

The "Draft Environmental Statement Colorado River International Salinity Control Project" Having been reviewed, and that I find the statement well prepared and, that all items adequately covered. I am pleased that at last the first 49 miles of the Coachella Canal is to be lined. Thanks for providing me with a copy of the statement.

Sincerely


John R Nicholson

P.O. Box 429

Hemet, Ca 92343



United States Department of the Interior

BUREAU OF MINES
WASHINGTON, D.C. 20240

May 20, 1974

DES 74-39

Memorandum

To: Commissioner of Reclamation
 Through: *Acting Deputy* Assistant Secretary--Energy and Minerals
 From: Director, Bureau of Mines
 Subject: Draft environmental statement for Colorado River International Salinity Control Project

J. Wells
MAY 24 1974

Our Intermountain Field Operation Center, Denver, reviewed the draft environmental statement for the Colorado River International Salinity Control Project, Yuma and Maricopa Counties, Arizona, Imperial County, California, and Sonora, Mexico.

The statement, dated April 1, 1974, and prepared jointly by agencies of the U.S. Departments of Interior and State, describes environmental effects associated with measures to improve the quality of water delivered to Mexico at Morelos Dam. Major project measures include construction and operation of a desalting plant, siphon, and bypass drain, replacement of the first 49-mile reach of the Coachella Canal with a new lined canal, and modification of existing control measures at Painted Rock Dam on the Gila River. A total of 17,820 acres of public domain land, 19,099 acres of private land, and 500 acres of State land will be involved in this undertaking.

The statement does not describe the impact on, and the commitment of, mineral resources of public domain land. Further, it does not specify what mineral rights will be purchased and what rights will be subordinated on the private and State lands required for the project.

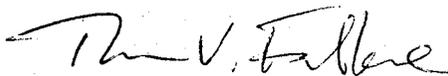
Today, sand and gravel is the most important mineral resource in the project area; in 1971 it was the most valuable mineral commodity produced in each of Maricopa, Yuma, and Imperial Counties. Under the Imperial East Mesa southeast of the Salton Sea, geothermal energy and associated brines are mineral resources with potential value. Other mineral commodities are produced in the three-county area, but these occur outside the project area.

Memo. to: Commissioner of Reclamation, Subj: Draft environmental statement
for Colorado River International Salinity Control Project

Our office review indicates that project facilities in Yuma County would have no significant adverse effect on known mineral resources or mineral-production facilities. Sand and gravel resources that might be lost under project measures would be insignificant. Sources of construction materials for the several project measures are mentioned in the statement. Additional energy requirements for the desalting plant, which would require fossil or other fuel, also are discussed.

Without a field investigation and a more precise description of land involved, however, we cannot properly assess possible mineral involvement in two areas of concern: Imperial East Mesa and Painted Rock Dam. Acquisition of 3,800 acres of private land is proposed, in addition to the 1,020 acres required for the Coachella Canal, on Imperial East Mesa; because of the potential for geothermal energy resources in this area, effect of the project on exploration and exploitation of geothermal resources should be described. Utilization of 22,100 acres of Federal and private land behind Painted Rock Dam is proposed for flood control; the effect of this proposal on mineral resources should be assessed also. Although we are not aware of any mineral resources that would be inundated, copper and molybdenum are reported in the adjacent Painted Rock Mountains. Disposition of mineral rights on these lands should be mentioned.

We suggest that mineral involvement be discussed more fully in the final environmental impact statement. Specifically, a section II. A. 3.b. (4) on mineral resources should be added. An assessment of the effect of the proposed project on (1) geothermal and associated resources under Imperial East Mesa and on (2) mineral resources at Painted Rock Dam should be made and included in the final statement.



Director

Thomas V. Falkie

Reply to Comment Made by the
Bureau of Mines, Washington, D.C.
(Memorandum of May 20, 1974)

1. Comment: We suggest that mineral involvement be discussed more fully in the final environmental impact statement. Specifically, a Section II.A.3.b., (4) on mineral resources should be added. An assessment of the effect of the proposed project on (1) geothermal and associated resources under Imperial East Mesa and (2) mineral resources at Painted Rock Dam should be made and included in the final statement.

Reply: A paragraph has been added to Chapter II of the final environmental statement to discuss the mineral and geothermal resources of the project area.

The effect of lining the first 49 miles of the Coachella Canal on geothermal resources has been assessed and included in Chapter III of the final environmental statement.

Construction of the new lined Coachella Canal will be located so that it will not interfere with previously explored geothermal sites and because of the narrow band of rights-of-way of approximately 400 feet wide, it will not preclude potential development of the geothermal resource.

Painted Rock Dam is an existing feature constructed and operated by the Corps of Engineers. The reservoir area is already subject to inundation and a change in operating criteria will not adversely affect mineral resources of the area.

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

May 21, 1974

Mr. E. A. Lundberg, Regional Dir.
Lower Colorado Regional Office
Bureau of Reclamation
Post Office Box 427
Boulder City, NV 89005

Re: Project Title: Colorado River International
Salinity Control Project
State Application Identifier: 74-80-0015

Dear Mr. Lundberg:

The Arizona State Clearinghouse has received and reviewed your notification of proposed action concerning the above project. The Clearinghouse review has generated several responses, copies of which are attached for your information.

In accordance with current requirements as set forth in the Office of Management and Budget Circular A-95, Revised, this letter will serve as the State Clearinghouse comment on the proposal.

Please include the above State Application Identifier in any future correspondence regarding this proposal. Thank you for providing Arizona with the opportunity to comment upon this proposal.

Sincerely yours,

Dennis A. Davis, Executive
Secretary for Federal Programs
DAD:CL:cr

encl:

A-39

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007
Date: April 19, 1974

TO: Office of Economic Planning
and Development, 3rd Floor
1624 West Adams Street
Phoenix, Arizona 85007

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

*Economic Sec
Civil Rights
Indian Affairs
Ag & Hort
Anthropology
Health*

*Bureau of Mines
Az Mining Ass'n
Arid Lands
Game & Fish
Highway
Land A-40*

*Water
Parks
AORCC
CEPAD*

Authorized Review
Agency Signature
Region IV Region III

ARIZONA

OFFICE OF THE GOVERNOR

OFFICE OF

ECONOMIC PLANNING AND DEVELOPMENT

APR 25 P.M.

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007 Date: April 19, 1974

TO: Mr. John P. Dickinson Dept. of Economic Security Post Office Box 6123 Phoenix, AZ 85005

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- [X] No comment on the above project. [] Proposal is supported as written. [] Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

Economic Sec
Civil Rights
Indian Affairs
Agr Hort
Anthropology
Health

Bureau of Mines
AZ Mining Ass'n
Arid Lands
Game & Fish
Highway Land A-41

Water
Parks
ACREC
CETAD

Authorized Review
Agency Signature

Region IV Region III

Handwritten signature of John P. Dickinson

ARIZONA

OFFICE
OF THE
GOVERNOR

OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 19, 1974

TO: Mr. William H. Dresher
Dean, College of Mines
Dir., Az. Bureau of Mines
The University of Arizona
Tucson, Arizona 85721

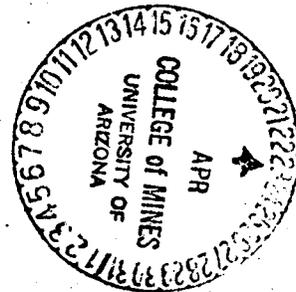
FROM: Clearinghouse Staff Contact: Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015



A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

We have received only a limited number of copies of this statement. We have Xeroxed several pages from the statement for your information and review. Should you desire a copy for review, contact the Bureau of Reclamation, Lower Colorado Regional Office, Post Office Box 427, Boulder City, Nevada 89005 and refer to their No. LC-150 120.1.

Review Agency Staff Contact:

Bureau of Mines
Az Mining Ass'n

[Handwritten Signature]
Authorized Review Agency Signature

A-42

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007
Date: April 19, 1974

TO: Mr. Clinton M. Pattea
Executive Secretary
Indian Affairs Commission
1623 West Adams St.
Phoenix, Arizona 85007

1645 W. Jefferson

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

Economic Sec	Bureau of Mines
Civil Rights	Az Mining Ass'n
Indian Affairs	Arid Lands
Ag & Hort	Game & Fish
Anthropology	Highway
Health	Land A-43

Clinton M. Pattea

ARIZONA COMMISSION OF INDIAN AFFAIRS

Water	Authorized Review	4-26-74
Parks	Agency Signature	
ADRC	Region IV	Region III
CEPAD		

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007
Date: April 19, 1974

TO: Mr. Ford Smith, Exec. Dir.
Civil Rights Div, Dept of Law
1645 W. Jefferson, Room 140
Phoenix, Arizona 85007

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

J. Ford Smith

Economic Sec
Civil Rights
Indian Affairs
Agr Hort
Anthropology
Health

Bureau of Mines
Az Mining Ass'n
Arid Lands
Game & Fish
Highway Land A-44

Water
Parks
NORCC
CEPAD

J. Ford Smith
Authorized Review Executive
Agency Signature Director
Region IV Region III

✓

District #4, Council of Governments
377 Main Street, Room 202
Yuma, Arizona 85364
(602) 782-1886

REGIONAL CLEARINGHOUSE

DISTRICT #4, COUNCIL OF GOVERNMENTS

PROJECT NOTIFICATION AND REVIEW SIGN-OFF

The application for federal financial assistance described below has been reviewed by the District #4, Regional Clearinghouse.

S.A.I. NUMBER 74-80-0015

PROJECT TITLE: Colorado River International Salinity Control Project

APPLICANT AGENCY: Bureau of Reclamation

FEDERAL PROGRAM TITLE:

CATALOG NO.:

FEDERAL FUNDS REQUESTED:

APPLICATION IS SUPPORTED AS WRITTEN

COMMENTS ATTACHED

DISTRICT #4, COUNCIL OF GOVERNMENTS

BY Brian H. Babiarz
BH

DATE 5-17-74

COPY TO OEPAD

COPY TO APPLICANT

✓

Comments on 74-80-0015

It is District #4's understanding that each local government in the area that may be affected by this project have received a copy of this statement and will respond individually.

District #4's response to this salinity proposal is that it is a sound statement in general. However, whether or not HR 12834, and S. 3094 will be successful in Congress or whether a similar proposal is enacted will not affect our positive response to this Environmental Statement as long as the final bill will not substantially change the basic elements of this statement.

Brian H. Babiars
by *gm*
Brian H. Babiars

APR 19 1974
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20250

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007
Date: April 19, 1974

TO: Mr. K. E. Foster, Ass't Dir.
College of Earth Sciences
Office of Arid Lands Studies
1201 East Speedway
Tucson, Arizona 85719

To:

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

*Economic Sec
Civil Rights
Indian Affairs
Agr Hort
Anthropology
Health*

*Bureau of Mines
Az Mining Ass'n
Arid Lands
Game & Fish
Highway
Land A-47*

*Water
Parks
ACRCC
CEPAD*

Authorized Review
Agency Signature
Region IV Region III



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007
Date: April 19, 1974

TO: Mr. Les Ormsby, Admin.
Arizona Power Authority
1810 West Adams Street
Phoenix, Arizona 85005

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

Economic Sec
Civil Rights
Indian Affairs
Ag & Hort
Anthropology
Health

Bureau of Mines
Az Mining Ass'n
Arid Lands
Game & Fish
Highway
Land A-48

Water
Parks
ACRCC
CEPAD

J. Ormsby
Authorized Review
Agency Signature
Region IV Region III

ARIZONA

OFFICE
OF THE
GOVERNOR

OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 19, 1974

TO: Mr. Wm. N. Price, State Hwy. Eng
Environmental Planning Division
Department of Highways
206 South 17th Avenue
Phoenix, Arizona 85007

RECEIVED

APR 29 1974

ARIZONA HIGHWAY DEPARTMENT
ENVIRONMENTAL PLANNING DIVISION

FROM: Clearinghouse Staff Contact: Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

It is our understanding that you have received a copy of a Draft Environmental Statement from the above Applicant for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact: Mason Joles

Game & Fish
Highway
Water
Land
Parks
AORCC

AZ Historical Society

Division Manager
Authorized Review
Agency Signature

A-49:

GOVERNOR

JOHN DAVIS
CHAIRMAN

ROY E. CAMPBELL
VICE CHAIRMAN

WALTER W. SURRETT
MEMBER

WALTER A. NELSON
MEMBER

LEN W. MATTICE
MEMBER



JUSTIN HERMAN
STATE HIGHWAY DIRECTOR

WM. N. PRICE
STATE HIGHWAY ENGINEER

ARIZONA HIGHWAY DEPARTMENT

Environmental Planning Division

205 South 17th Avenue

Room 240

Phoenix, Arizona 85007

74-80-0015

May 6, 1974

Mr. E. A. Lundberg
Bureau of Reclamation
Lower Colorado Regional Office
U.S. Department of the Interior
Post Office Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

Thank you for submitting the Draft Environmental Impact Statement for the Colorado River International Salinity Control Project for our review and comment.

We do desire to make comment but will be unable to do so within the 45-day deadline. We wish to request a two week extension of time for such review and comment.

Yours very truly,

WM. N. PRICE
State Highway Engineer

MASON J. TOLES
Division Manager

MJT/cm

ARIZONA

OFFICE OF THE GOVERNOR

OFFICE OF ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 19, 1974

TO: Mr. Wesley E. Steiner, Eng. State Water Commission 222 N. Central Ave., Suite 800 Phoenix, Arizona 85004

WES BGS
TCC JDV
DWS DRL
RCC PCB
DAG SGE
JGL JLB
MSA PSO
GDC PLM
File

FROM: Clearinghouse Staff Contact: Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International Salinity Control Project

State Application Identifier: 74-80-0015

It is our understanding that you have received a copy of a Draft Environmental Statement from the above Applicant for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
Proposal is supported as written.
Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact: [Signature]

Game & Fish
Highway
Water
Land
Parks
AORCC

RECEIVED
APR 23 1974
Arizona Water Commission

Authorized Review Agency Signature

A-51

GEORGE E. LEONARD
CHAIRMAN
JOHN S. HOOPES
VICE-CHAIRMAN
WESLEY E. STEINER
EXECUTIVE DIRECTOR
AND
STATE WATER ENGINEER



Arizona Water Commission

222 NORTH CENTRAL AVENUE, SUITE 800

Phoenix, Arizona 85004

TELEPHONE (602) 258-7561

May 9, 1974

MEMBERS
PETER BIANCO
LINTON CLARIDGE
DAVID R. GIPE
DOUGLAS J. WALL
WILLIAM H. WHEELER
EXOFFICIO MEMBERS
ANDREW L. BETTWEY
MARSHALL HUMPHREY

Mrs. Constance LaMonica
Clearinghouse Staff Contact
Office of Economic Planning and Development
1645 W. Jefferson, Room 428
Phoenix, Arizona 85007

Dear Mrs. LaMonica:

We have reviewed the Draft Environmental Statement on the Colorado River International Salinity Control Project (SAI 74-80-0015) and support the statement as written.

The environmental impacts of this proposed action are accurately defined as are the unavoidable adverse effects and the irretrievable commitments of resources.

While the statement was prepared in support of HR12834 and S3094 it would also serve in satisfaction of the same aspects of the more comprehensive Colorado River Basins alternative proposed federal measures of HB12165 and S2940.

Sincerely,

A handwritten signature in cursive script, appearing to read "Wesley E. Steiner".

Wesley E. Steiner
Executive Director

ARIZONA

OFFICE OF THE GOVERNOR

OFFICE OF ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 19, 1974

TO: Mr. Andrew L. Bettwy, Comm., Department of Land, 1624 W. Adams St., 4th Floor, Phoenix, Arizona 85007

SLC, C.A.R, Lease/R, C. & E, Loc. Prep, P. & R, Apprs'l, S. & Ex, Res. Mg't, Forestry, Mineral, Rge. & H, Water, NRCD, Prot., Adm. Ser.

FROM: Clearinghouse Staff Contact: Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International Salinity Control Project

State Application Identifier: 74-80-0015

Handwritten note: 4-23-74 to WE nothing cannot w/less get it and return it to A-53

It is our understanding that you have received a copy of a Draft Environmental Statement from the above Applicant for your review and comment in accordance with requirements of CMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
Proposal is supported as written.
[X] Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact:

Game & Fish, Highway, Water, Land, Parks, AORCC, Az Historical Society

Authorized Review Agency Signature (handwritten)



JACK WILLIAMS
GOVERNOR

Arizona
State Land Department

1624 WEST ADAMS
PHOENIX, ARIZONA 85007
602 - 271-4634



ANDREW L. BETTWY
STATE LAND COMMISSIONER

May 21, 1974

Constance LaMonica
Office of Economic Planning
and Development
1624 West Adams, Room 312
Phoenix, Arizona 85007

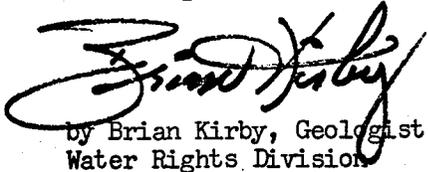
Dear Ms. LaMonica:

Enclosed please find a carbon copy of a letter to Mr. E. A.
Lundberg, and an OEPD form (filled out).

I hope this information will be beneficial.

Very truly yours,

Wm. Joe Melling, Director
Water Rights Division


by Brian Kirby, Geologist
Water Rights Division

BK:jag

Enclosure



BRUCE WILLIAMS
GOVERNOR

Arizona
State Land Department

1624 WEST ADAMS
PHOENIX, ARIZONA 85007
602 - 271-4634



ANDREW L. BETTBY
STATE LAND DEPARTMENT

May 21, 1974

E. A. Lundberg
Regional Director
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

RE: LC - 150 540.

Dear Mr. Lundberg:

This office has studied the Draft Environmental Statement concerning the "Colorado River International Salinity Control Project", and offers the following comments.

The draft Environmental Statement on the Colorado River International Salinity Control Project discusses the international treaty between the United States and Mexico (minute #242, paragraph 5) dealing with the pumping of groundwater within five miles of the Arizona-Sonora boundary near San Luis. However, the Environmental Impact Statement primarily covers only construction of a desalinization plant in Yuma, lining the by-pass drain to Santa Clara Slough in Mexico, and lining the Coachella Canal in California. Additional discussion concerning minute #242 and its affects would be desirable.

The projects to be constructed as stated in this Environmental Impact Statement do not appear from the report to have any adverse affects on the water rights laws administered by the State Land Department. However, minute #242, paragraph 5, if implemented, will have a great affect as to the present State law concerning groundwater and the large amount of State trust lands located in the restricted pumping area, especially as it affects future use and development thereof.

The State Land Department is also primarily concerned that according to the report, about 500 acres of State trust lands in the vicinity of Painted Rock Dam will be needed for the project. We presume provision will be made to recompense the trust for any lands used or lost as a result of the project. A withdrawal of the 22,000 acres of

E. A. Lundberg
May 21, 1974
Page Two

the Painted Rock Reservoir area could preclude the use of the State land to the detriment of the trust. A map of the reservoir area and land ownership would be helpful in the report.

We hope these comments will be beneficial to you in preparing the final Environmental Statement.

Very truly yours,

Wm. Joe Melling, Director
Water Rights Division

A handwritten signature in cursive script, appearing to read "Brian Kirby".

by Brian Kirby, Geologist
Water Rights Division

cc: Constance LaMonica
Office of Economic Planning & Development

MAILS TO GOFF THRU FOLLETT
5-15-73 ✓

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 19, 1974

TO: Dr. James L. Schamadan, Dir.
Department of Health Services
1740 West Adams Street
Phoenix, Arizona 85007



FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

William E. Johnson

Economic Sec *Bureau of Mines*
Civil Rights *Az Mining Ass'n*
Indian Affairs *Arid Lands*
Ag & Hort *Game & Fish*
Anthropology *Highway A-57*
Health *Wild*

*Water
Parks
ARCC
CEPAD*

Authorized Review
Agency Signature
Region IV Region III



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 22, 1974

MEMORANDUM

TO: Mr. Leon Berger, Exec. Dir.
Northern Az. Council of Govts.
P.O. Box 57
Flagstaff, AZ 86001

FROM: Arizona State Clearinghouse (A-95)
Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Project Notification

Applicant: Bureau of Reclamation

Project Title: Colorado River International Salinity
Control Project

State Application Identifier: 74-80-0015

- Respond Directly to Applicant
- Respond to the State Clearinghouse

A-58

NORTHERN ARIZONA COUNCIL OF GOVERNMENTS
P. O. BOX 57
FLAGSTAFF, ARIZONA 86001

May 9, 1974

State Clearinghouse
1645 West Jefferson, Room 428
Phoenix, Arizona 85007

Gentlemen:

We are pleased to acknowledge receipt of your Notice of Intent Form SCH-1 forwarded to us by the State Clearinghouse, initiating Project Notification and Review by the Regional Clearinghouse (A-95).

Please note that the Regional Clearinghouse uses the State Application Identifier number assigned for reference to this project.

The Regional Clearinghouse has begun the review process and you may expect notification of completion of the initial review within thirty days.

Sincerely,

Leon H. Berger
Leon H. Berger *by TL*
Executive Director

LHB:bn

Replies to Comments Made by the
Arizona State Land Department
(Letter of May 21, 1974)
(Submitted by the State of Arizona, Office of
Economical Planning and Development
by Letter of May 21, 1974)

1. Comment: However, Minute No. 242, Paragraph 5, if implemented, will have a great affect as to the present state law concerning ground water and the large amount of state trust land located in the restricted pumping area, especially as it affects future use and development thereof.

Reply: As a result of Mexico's pumping along the International Boundary and the agreement in paragraph 5 of Minute No. 242, Title I of Public Law 93-320 does include an authorization for a protective and regulatory ground-water pumping feature of the project. A supplement to the draft environmental statement describing this feature and its environmental impacts was prepared, filed and distributed, subsequent to the distribution of the original draft environmental statement. The final environmental statement contains a description of the protective pumping project and its environmental impacts. The impacts on future use and development of state lands on the south Yuma Mesa are also discussed.

2. Comment: The State Land Department is also primarily concerned that according to the report, about 500 acres of state trust lands in the vicinity of Painted Rock Dam will be needed for the project. We presume provision will be made to recompense the trust for any lands used or lost as a result of the project. A withdrawal of the 22,000 acres of the Painted Rock Reservoir area could preclude the use of the state land to the detriment of the trust. A map of the reservoir area and landownership would be helpful in the report.

Reply: The state trust lands as well as other lands below elevation 610 are presently encumbered with flowage easements. They are to be acquired in fee or other necessary interests only if a court of competent jurisdiction determines that the Corps of Engineers does not have sufficient title for the intended method of operation of the dam. In this case the state would be compensated.

Acquisition of additional lands for floodwater impoundment behind Painted Rock Dam will not necessarily mean

that land use practices in the affected lands will change. This includes state lands. In the draft environmental statement, page 118, it states that lands presently under agriculture and wildlife use may remain so under a leasing program dependent upon periods of flood inundation.

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

June 3, 1974

Mr. E. A. Lundberg, Regional Dir.
Lower Colorado Regional Office
Bureau of Reclamation
Post Office Box 427
Boulder City, NV 89005

Re: Project Title: Colorado River International
Salinity Control Project
State Application Identifier: 74-80-0015

Dear Mr. Lundberg:

Enclosed is a copy of responses received from the Department of Anthropology concerning the above project which was received by us after our letter to you on May 21, 1974, in which we enclosed comments.

Sincerely,

A handwritten signature in cursive script, appearing to read "Constance LaMonica".

Constance LaMonica
Arizona State Clearinghouse

CL:hh

Enc.

A-62

ARIZONA

OFFICE
OF THE
GOVERNOR



OFFICE OF
ECONOMIC PLANNING AND DEVELOPMENT

MAILING ADDRESS: 1645 West Jefferson • Room 428 • Phoenix, Arizona 85007

Date: April 19, 1974

TO: Dr. James Schoenwetter
Department of Anthropology
Arizona State University
Tempe, AZ 85281

FROM: Clearinghouse Staff Contact: Mrs. Constance LaMonica

SUBJECT: Environmental Statement Review

Applicant: Bureau of Reclamation

Project Title: Colorado River International
Salinity Control Project

State Application Identifier: 74-80-0015

A copy of a Draft Environmental Statement is attached for your review and comment in accordance with requirements of OMB Circular A-95. Please review the proposal as it affects the plans and programs of your agency and register your response below. Also note a staff contact within your agency in case further consultation is required. Please return this completed form within fifteen (15) days of your receipt of this request.

- No comment on the above project.
- Proposal is supported as written.
- Comments are attached.

Please contact the Clearinghouse should you desire further information, or need additional time for review.

Review Agency Staff Contact

James Schoenwetter

Center for Environmental Research

*Economic Sec
Civil Rights
Indian Affairs
H&Hort
Anthropology
Health*

*Bureau of Mines
Az Mining Ass'n
Arid Lands
Game & Fish
Highway
Land A-63*

*Water
Parks
ARCC
CEPAD*

Authorized Review
Agency Signature
Region IV Region III

ARIZONA STATE
UNIVERSITY

TEMPE, ARIZONA 85281

CENTER FOR ENVIRONMENTAL STUDIES
Colorado River Salinity Control Project
Identifier: 74-80-0015

May 21, 1974

Mrs. Constance LaMonica
Office of Economic Planning and Development
1645 West Jefferson, Room 428
Phoenix, Arizona 85007

ARCHAEOLOGY: This draft statement, as is recognized by its authors, is deficient in information regarding the character and significance of archaeological sites that might be impacted by the proposed construction or by alternatives C-1, C-2, E and F1-F8. In fact, since the draft recognizes that the area is "noted for early Indian history" (p.68) this deficiency should expectably have been corrected before preparation of this draft to enable proper and legal evaluation.

The statement that no archaeological sites are known in the vicinity of the project factures very much oversimplifies the issue involved here. What is "known" in this context obviously means "known to, and containing sufficient evidence to be accepted by, archaeological science." What is "known" then becomes what is known by professional archaeologists. While this is an excellent standard, it must be recognized that the existing number of professional archaeologists is extremely small by contrast, for example, with the number of lawyers or engineers or other such professional groups. Of this small number, an insignificant fraction have ever searched for archaeological sites in this area, and by no stretch of the imagination can what they have accomplished in the past be considered thorough review. This is true even of those portions of the project area where professional archaeologists have specifically worked, if their purpose was not to establish an inventory of sites.

It is quickly granted that the Bureau of Reclamation faces a real and legitimate logistical problem in fulfilling the legal obligation to identify and evaluate archaeological resources potentially impacted by proposed construction. Because professional archaeologists are few in number, and because almost all have academic or museological responsibilities, the accomplishment of archaeological inventories of construction areas is difficult to insure under specified time-frames. But one should ask to what extent the letter and spirit of the Environmental Protection Act may be sacrificed to standards of expediency and logistical ease of project management.

If it is difficult or awkward today to manage that the law be fulfilled as regards archaeological resources, the Bureau informs us today that it is justified in submitting a draft environmental impact

Mrs. Constance LaMonica
May 21, 1974
Page 2

statement that simply promises to establish pertinent facts at a more feasible opportunity. Might not we wonder if the same principle will not be applied to consideration of resources of wildlife, vegetation, etc. at some future time? The question of the degree to which the law's letter and spirit may be eroded is exposed in regard to archaeological resources easily, because these resources are generally not recognized as having the significance of some others (e.g. water quality), and because the logistical difficulties are real and immediate.

Obviously, compromise is a meaningful and valuable policy. But it is not a compromise to put off beyond tomorrow what one cannot do today. In the present case, another course of action would appear more suitable, and may be considered for the future: To be acceptable, a draft EIS should state clearly what actions have been taken to date as regards resources not yet investigated and should provide a timetable which documents the capability of the project to in fact investigate and consider the impact of the project and alternatives on such resources prior to the issuance of a final EIS.

HYDRAULIC ENGINEERING: Proposal is supported as written.

GEOGRAPHY: No comment on project

GEOLOGY: No comment on project

ZOOLOGY: No comment on project

Replies to Comments Made by the
Department of Anthropology
Arizona State University, Tempe, Arizona
(Letter of May 21, 1974)
(Submitted by the State of Arizona, Office of
Economic Planning and Development
by Letter of June 3, 1974)

1. Comment: The main comment is basically that the draft environmental statement "...is deficient in information regarding the character and significance of archeological sites that might be impacted by the proposed construction or by alternatives..." It is suggested that "To be acceptable, a draft environmental impact statement should state clearly what actions have been taken to date as regards resources not yet investigated and should provide a time-table which documents the capability of the project to, in fact, investigate and consider the impact of the project and alternatives on such resources prior to the issuance of a final environmental impact statement."

Reply: As indicated by the draft environmental statement, page 154, archeological surveys were being conducted at all project facility sites at the time the draft environmental statement was being prepared. The objective of these surveys was to establish a complete archeological inventory at the site of all project facilities. These surveys have now been completed and are discussed in the final environmental statement. Archeological clearance has been granted on the sites of all proposed project facilities.

In addition to the surveys the State Liaison Officer for Historic Preservation and the State Archeologists in Arizona and California were consulted relative to the proposed location of project facilities.



United States Department of the Interior

IN REPLY REFER TO

BUREAU OF LAND MANAGEMENT

1792 (911)

State Office
3022 Federal Building
Phoenix, Arizona 85025

BUREAU OF RECLAMATION
OFFICIAL FILE COPY
Rec'd MAY 30 1974

452.

Memorandum

To : Commissioner of Reclamation
From : State Director, Arizona BLM
Subject: Colorado River International Salinity Control Project
Draft EIS 74-39

TO	INIT.	DATE
700		
739		

RECLAMATION FILES

Thank you for the opportunity to review the above-mentioned report. The following suggestions or comments are listed for your consideration.

BLM programs will be directly affected along the outlet drain extension to San Luis. If some of the six bridges mentioned on page 46, were located as listed below, they would serve as access to the recreation lands between the levee and the river. Suggested locations are in the vicinity of:

- Sec. 5, T. 9 S., R. 24 W.
- Sec. 26 or 35, T. 9 S., R. 24 W.
- Sec. 11, T. 10 S., R. 25 W.
- Sec. 26 or 27, T. 11 S., R. 25 W.
- Sec. 34 or 35, T. 11 S., R. 25 W.

Also, work access roads may be of value and serve resource management needs if cooperatively located.

The river stream from Morelos Dam to Hunters Hole has become increasingly used by the public for canoeing and floating. Sufficient flow should be maintained if possible to continue this use. If the water level of Hunters Hole is to be materially lowered (over 1 foot) as a result of the Salinity Control Project, measures should be sponsored by the project to feed this water area from the river or from a well in order to maintain its present values as a fish, wildlife, and recreation resource.

The group of ponds known as Hunters Hole and their outlet to the river should be preserved in such a way as to perpetuate non power boat access and use. This resource has a unique quality worthy of preservation. Such measures would help to offset the environmental impact of the project.

3 FP
5-31

The statement could be strengthened if a discussion concerning actual sources of power were enumerated. The existing plants will need supplemental power sources, which the statement recognizes but does not discuss the sources. This will cause an increase in the total cost of the project when considering available supplies in Southern California and Arizona.

Page 79 - Disposal Area. This should include details on prevention of erosion from the disposal land fills so adjacent areas will not be contaminated by sediment and flocculating agents.

The statement is very well written, and you are to be commended on your treatment of a very involved situation.

Joe T. Fallini

cc
Director (220) & (350)
SD, California SO
Director, DSC

Replies to Comments Made by the
Bureau of Land Management
Phoenix, Arizona
(Memorandum of May 23, 1974)

1. Comment: BLM programs will be directly affected along the outlet drain extension to San Luis. If some of the six bridges mentioned on page 46 were located as listed below, they would serve as access to the recreation lands between the levee and the river. Suggested locations are in the vicinity of:

Section 5, T. 9 S., R. 24 W.
Sections 26 or 35, T. 9 S., R. 24 W.
Section 11, T. 10 S., R. 25 W.
Sections 26 or 27, T. 11 S., R. 25 W.
Sections 34 or 25, T. 11 S., R. 25 W.

Reply: The last two locations listed are corrected to read T. 10 S. rather than T. 11 S.

Selection of bridge sites for the bypass drain will be accomplished with due consideration to existing access roads to those lands on the west side of the Yuma Valley Levee and with due consideration to existing bridges on the West Main Canal. Close contact will be maintained with BLM in order that the suggested locations may be analyzed before implementation.

The Colorado River Basin Salinity Control Act (Public Law 93-320) provides for three bridges on the Cocopah Indian Reservation, and this may increase the total number of bridges to be constructed.

2. Comment: The river stream from Morelos Dam to Hunter's Hole has become increasingly used by the public for canoeing and floating. Sufficient flow should be maintained if possible to continue this use. If the water level of Hunter's Hole is to be materially lowered (over 1 foot) as a result of the salinity control project, measures should be sponsored by the project to feed this water area from the river or from a well in order to maintain its present values as a fish, wildlife, and recreation resource.

Reply: Implementation of the project will essentially render the Colorado River below Morelos Dam dry except for infrequent surface flow from local storms and occasional flood releases from Morelos Dam. Continuation of discharging Wellton-Mohawk drainage flows below Morelos Dam is not permissible under commitments made to Mexico in Minute No. 242.

The water level of Hunter's Hole cannot be maintained by a diversion from the river since there will only be infrequent

flows in this section of the river. Discharge from a well adjacent to Hunter's Hole to maintain the water level must be accounted for as a portion of the 160,000 acre-feet of water the United States is allowed to pump within 5 miles of the boundary since Hunter's Hole is within that distance. Maintaining water levels in Hunter's Hole by pumping is discussed in Chapter IV as a mitigation measure.

3. Comment: The statement could be strengthened if a discussion concerning actual sources of power were enumerated. The existing plants will need supplemental power sources which the statement recognized but does not discuss the sources. This will cause an increase in the total cost of the project when considering available supplies in southern California and Arizona.

Reply: Chapter I of the final statement has been expanded to include further discussion on sources and costs of power requirements.

4. Comment: Page 79 - Disposal Area. This should include details on prevention of erosion from the disposal landfills so adjacent areas will not be contaminated by sediment and flocculating agents.

Reply: This comment has been taken into consideration in the final statement. A more detailed description of the desalting plant operation and the need for and implications involved with disposal sites has been included in the final statement.

The Metropolitan Water District of Southern California

Office of the General Manager MAY 24 1974

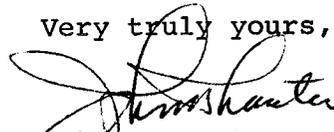
452
Mr. E. A. Lundberg
Regional Director
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

This is in response to your notice of April 8, 1974, transmitting a copy of the Draft Environmental Statement, INT DES 74-39, on the Colorado River International Salinity Control Project for review and comment. The District has worked with the Colorado River Board of California in reviewing the statement, and the comments which you receive from them will include our comments.

Thank you for the opportunity to comment on the draft environmental statement.

Very truly yours,



John H. Lauten
General Manager

A-71

WILLIAMS
ROBERT WILLIAMS

Commissioners
MILTON G. EVANS, Chairman, Flagstaff
ROBERT J. SPILLMAN, Phoenix
WILLIAM H. BEERS, Prescott
CHARLES F. ROBERTS, O.D., Bisbee
FRANK FERGUSON, JR., Yuma

Director
ROBERT A. JANTZEN

Asst. Director, Operations
PHIL M. COSPER

Asst. Director, Services
ROGER J. GRUENEWALD



ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

May 24, 1974

Mr. E. A. Lundberg, Regional Director
Lower Colorado Regional Office
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have reviewed the Draft Environmental Statement on the Colorado River International Salinity Control Project, dated April 1, 1974, and would like to offer the following comments on this proposal.

The consideration given to the effects of this project on wildlife resources leaves something to be desired. This may be in part a result of the lack of sufficient studies to determine exactly what impacts the project would have on wildlife. On the whole, the draft statement does not adequately discuss the many significant negative impacts this project will have upon fish and wildlife resources.

A total of 14,500 acres in Arizona will be reduced in quality for fish and wildlife resources. Most of this land is in the Painted Rock flood control basin. Nothing is said of the 5,576 acres the Arizona Game and Fish Department has under lease in the Painted Rock basin from the U. S. Army Corps of Engineers.

Additional significant losses will occur in the Colorado River below Morelos Dam and the Hunters Hole area when the river is dried up (pages 102, 103, 115). The vegetation and hence the wildlife resources will be severely reduced. The fisheries, of course, will be eliminated. The Draft Environmental Statement does not adequately cover these impacts on the fish and wildlife resources.

The possibility of a fisheries in the 16 miles of concrete lined bypass canal (two feet water depth, 9,000+ ppm TDS) is nill (page 127). This should not in any form be considered mitigation for the loss of the 20 miles of fish and wildlife habitat in the river below Morelos Dam.

Pages 71-72 contain this sentence, "The increase in salinity is due principally to inputs from saline springs, concentrating effects of consumptive use, drainage practices, and reservoir evaporation." What is the percent of each source?

Page 19 of the statement contains these sentences, "Because the size of the desalting plant depends upon the quantity of the drainage waters, studies were made to determine if the quantity of the Wellton-Mohawk drainage waters might be reduced and to determine the quality of the feedwater. The studies indicate that a combination of improved irrigation efficiencies and a reduction in irrigated area can reduce the drainage from the Wellton-Mohawk Division to about 175,000 acre-feet per year." Then on page 25, the report states "This will be accomplished by improving the irrigation efficiency from 58 to 63 percent on the Wellton-Mohawk Irrigation and Drainage District and by reducing the amount of land in the District from 75,000 to 65,000 acres." The 10,000 acre reduction is mostly land that is not now under cultivation. How does this reduce the present salinity? With more efficient irrigation practices, the aquifer in the valley will become saltier than they have been (page 28). This salt will eventually have to go somewhere.

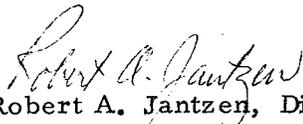
The control of Gila River floodflows is outlined in the draft statement on page 29 as being part of the overall plan. We would ask the question, what floods? Water flowing down this river channel is controlled by Painted Rock flood control dam. The Draft Environmental Statement goes on to say that the control of floods will be accomplished by limiting the releases of water from Painted Rock Dam and to allow the waters to recede through evaporation (page 30). The retention of waters for long periods of time behind Painted Rock Dam will create salinity problems to the point of sterilizing the lands they inundate.

On page 116, the Draft Environmental Statement assumes that the 4200 acres of retired Wellton-Mohawk farm land will "accommodate the nesting of approximately 11,500 white-winged and a slightly higher number of mourning doves". This would only be true if the area reverted to high density riparian vegetation as is present along the Gila River channel. This is unlikely since the area is not in the river bottom. This theory of increased dove nesting habitat is expressed on page 119 referring to the Painted Rock land acquisition. It is not likely this would occur on the inundated lands of Painted Rock.

In the discussion of the borrow and storage areas, we quote: page 106 - "If new borrow areas become essential, vegetation will be lost and wildlife disturbed." page 109 - "Vegetation in these relatively small areas will be destroyed, and any wildlife inhabitants will be displaced." These statements are simply not true. Displaced wildlife cannot find new habitat. If other areas could support more wildlife, they would have already done so. Displaced wildlife, in effect, is lost forever.

Summarizing the project statement, we feel that much more effort would be required to provide for mitigation and enhancement of fish and wildlife resources. No attempts are made at all to compromise the loss of river habitat between Morelos Dam and the Southerly International Boundary. Fencing is the only way to successfully reduce big game losses along the Coachella Canal, not escape ladders, ramps, and foot bridges as described in the statement. Our Department is of the opinion that this statement shows very little consideration whatsoever for wildlife resources, either in the construction plan or in mitigation efforts.

Sincerely,


Robert A. Jantzen, Director

RAJ/cb

Replies to Comments Made by the
Arizona Game and Fish Department
(Letter of May 24, 1974)

1. Comment: The consideration given to the effects of this project on wildlife resources leaves something to be desired. This may be in part a result of the lack of sufficient studies to determine exactly what impacts the project would have on wildlife. On the whole, the draft statement does not adequately discuss the many significant negative impacts this project will have upon fish and wildlife resources.

Reply: Subsequent to the issuance of the draft environmental statement on April 1, 1974, environmental inventories have been completed in the project area. Three teams of workers from Arizona State University conducted resource inventories in the Yuma Valley area. A multidisciplinary team of workers consisting of members of San Diego State University at Calexico; California Department of Fish and Game; Fish and Wildlife Service; Colorado River Board of California; Coachella Valley County Water District and Bureau of Reclamation conducted resource inventories on the Coachella Canal. The results of these studies were the basis for quantifying resource impacts found in Chapter III.

2. Comment: A total of 14,500 acres in Arizona will be reduced in quality for fish and wildlife resources. Most of this land is in the Painted Rock flood control basin. Nothing is said of the 5,576 acres the Arizona Game and Fish Department has under lease in the Painted Rock basin from the U.S. Army Corps of Engineers.

Reply: The 5,576 acres that Arizona Game and Fish Department has under lease should not be materially effected if the land is purchased. The lands are to be purchased only if the present flowage easements do not provide the United States with sufficient interest in the reservoir lands to retain floodwaters for the period of time necessary to accommodate controlled releases. Floodflows would be regulated

to detain larger quantities for a greater period of time. The proposed change in operation criteria should provide considerable enhancement to the area behind Painted Rock Dam and in the eastern boundary of the Wellton-Mohawk Division. The long-term gains may outweigh any immediate degradation. The fish and wildlife resources would remain the responsibility of the game and fish agencies.

3. Comment: Additional significant losses will occur in the Colorado River below Morelos Dam and the Hunter's Hole area when the river is dried up (pages 102, 103, and 115). The vegetation and hence the wildlife resources will be severely reduced. The fisheries, of course, will be eliminated. The draft environmental statement does not adequately cover these impacts on the fish and wildlife resources.

Reply: Additional information regarding these potential impacts has been obtained from recent environmental inventories conducted in the area of the Colorado River below Morelos Dam. Details of the inventories are included in Chapters II, III, and IV of the final environmental statement. A discussion of mitigation is included in Chapter IV.

4. Comment: The possibility of a fishery in the 16 miles of concrete lined bypass canal (2-foot water depth, 9,000 + p/m TDS) is nil (page 127). This should not, in any form, be considered mitigation for the loss of the 20 miles of fish and wildlife habitat in the river below Morelos Dam.

Reply: The assumption that a fishery might develop in the bypass drain is not considered in this statement as mitigation for losses of fish and wildlife habitat in the river below Morelos Dam. Mitigation measures to be provided for such losses are discussed in Chapter IV of this final statement.

5. Comment: Pages 71 and 72 contain this sentence, "The increase in salinity is due principally to inputs from saline springs, concentrating effects on consumptive use, drainage practices, and reservoir evaporation." What is the percent of each source?

Reply: In 1971, the salinity of Colorado River flows was 575 mg/l at Lees Ferry and 885 mg/l at Imperial Dam, an increase of 310 mg/l. In 1971, about 13 percent of this increase was from point sources (mainly saline springs). Consumptive use by irrigation caused 27 percent and consumptive use by phreatophytes caused 11 percent. Salts pickup from irrigation, most of which was carried back by irrigation drains, contributed 8 percent. Salt gain from municipal and industrial use contributed 4 percent. Reservoir evaporation from Hoover, Lake Mohave, and Lake Havasu was responsible for about 21 percent. Diffuse sources mainly from inflow above Hoover Dam contributed an additional 12 percent. In 1971, about 822,000 acre-feet were stored in Lake Mead. It is estimated that this storage resulted in an increase in salinity of about 4 percent. It should be noted that these percentages will change with runoff conditions for a given year. In years of low runoff release of stored water from reservoirs would tend to reduce the increase in salinity in the Lower Basin. Also salinity increase from diffuse sources is a large variable. The salinity increase between Imperial Dam and the Northern International Boundary is mainly caused by consumptive use and salt pickup in return flows from irrigation. A small part of the increase can be attributed to municipal and industrial use by Yuma, Arizona.

6. Comment: The draft environmental statement claims (referring to pages 19 and 25) that a combination of improved irrigation efficiencies and a reduction in irrigation area can reduce the drainage from the Wellton-Mohawk Division to about 175,000 acre-feet per year. However, the proposed 10,000-acre reduction of land in the District is mostly land that is not now under cultivation. How does this reduce the present salinity? With more efficient irrigation practices, the aquifer in the valley will become saltier than it has been (page 28). This salt will eventually have to go somewhere.

Reply: Improved irrigation efficiency is expected to reduce the drainage flow to about 175,000 acre-feet per year. The 10,000-acre reduction includes approximately 6,000 acres that have a right to water, but have not been irrigated. The remaining reduction will include lands that have the lowest irrigation efficiency. Since at the present time about 65,000 acres are in irrigation rotation, the 10,000 acres reduction of irrigable land is intended to preclude an increase in drainage flow. With a higher irrigation efficiency, the salinity of the drainage will actually be higher than with a greater quantity of drainage water. The desalting plant can accommodate these higher salinities easier than greater quantities of water.

7. Comment: The control of Gila River floodflows is outlined in the draft statement on page 29 as being part of the overall plan. We would ask the question, what floods? Water flowing down this river channel is controlled by Painted Rock flood control dam. The Draft Environmental Statement goes on to say that the control of floods will be accomplished by limiting the releases of water from Painted Rock Dam and to allow the waters to recede through evaporation (page 30). The retention of waters for long periods of time behind Painted Rock Dam will create salinity problems to the point of sterilizing the lands they inundate.

Reply: Although Painted Rock Dam does control peak floodflows, releases from the dam cause surface and subsurface damage, particularly in the Wellton-Mohawk Division. Raising the saline ground-water level to or above the root zone of cultivated crops is an example of subsurface damage. Whenever possible, the plan anticipates that releases will be reduced so that the flows do not reach the Wellton-Mohawk Division. Controlled releases will result in percolation of water into the ground above the Division. It is not anticipated that additional land will be inundated for long periods of time. Reclamation of inundated lands should not be necessary under normal conditions. They will not be under water long enough to result in sterilization by the salinity levels for long

periods of time. On December 3, 1973, the water quality was about 630 p/m TDS and the storage was 178,954 acre-feet. On December 3, 1974, the quality was about 1,250 p/m and storage was 31,331 acre-feet.

8. Comment: On page 116, the Draft Environmental Statement assumes that the 4,200 acres of retired Wellton-Mohawk farmland will "accommodate the nesting of approximately 11,500 white-winged and a slightly higher number of mourning doves." This would only be true if the area reverted to high density riparian vegetation as is present along the Gila River channel. This is unlikely since the area is not in the river bottom. This theory of increased dove nesting habitat is expressed on page 119 referring to the Painted Rock land acquisition. It is not likely this would occur on the inundated lands of Painted Rock.

Reply: This section of the statement has been clarified to consider the comment. The degree of improvement in wildlife habitat will be dependent upon the location of the retired lands which will determine if the reversion is to riparian, desert shrub or open desert.

9. Comment: In the discussion of the borrow and storage areas, we quote: Page 106 - "If new borrow areas become essential, vegetation will be lost and wildlife disturbed." page 109 - "Vegetation in these relatively small areas will be destroyed, and any wildlife inhabitants will be displaced." These statements are simply not true. Displaced wildlife cannot find new habitat. If other areas could support more wildlife, they would have already done so. Displaced wildlife, in effect, is lost forever.

Reply: In an intensively cultivated area, annual densities of wildlife are often directly related to crop types and cropping patterns of the agricultural complex. This is especially true in small game species such as rabbit, quail and dove. Fluctuations in the populations are often more dependent upon the availability of food and water, than on natural cover. Many agricultural crops

provide all three essentials including cover. Adequate requirements for reproduction then may be the major limiting factor. Under these conditions, cyclic populations of displaced wildlife can find new habitat under limited circumstances. This, of course, is dependent on a variety of factors, such as individual specific requirements and behavior and conditions of available habitat, such as carrying capacity and limiting factors, and their variability from season to season and year to year.

10. Comment: Summarizing the project statement, we feel that much more effort would be required to provide for mitigation and enhancement of fish and wildlife resources. No attempts are made at all to compromise the loss of river habitat between Morelos Dam and the Southerly International Boundary. Fencing is the only way to successfully reduce big game losses along the Coachella Canal, not escape ladders, ramps and foot bridges as described in the statement. Our Department is of the opinion that this statement shows very little consideration whatsoever for wildlife resources, either in the construction plan or in mitigation efforts.

Reply: There were no firm commitments nor proposals made in the draft environmental statement for wildlife mitigation or enhancement measures simply because none were decided upon or finalized. Environmental inventories and coordination, with respective State and Federal wildlife agencies and other interested groups have been an ongoing process. Wildlife mitigation plans as developed by the two separate Ad Hoc Committees on Fish and Wildlife are discussed in Chapter IV of the final environmental statement.

Escape ladders and ramps may be an ineffective means of reducing big game losses in lined canals; however, it is impractical to fence this portion of the canal because of the low population levels of big game in the area. Big game animals that do frequent the area appear to follow washes to siphons which are safe crossing areas.

MIKE O'CALLAGHAN
GOVERNOR

JACK LEHMAN, CHAIRMAN
LAS VEGAS, NEVADA

THEODORE R. LAWSON, VICE CHAIRMAN
LAS VEGAS, NEVADA

DONALD L. PAFF, ADMINISTRATOR
LAS VEGAS, NEVADA



M. WILLIAM DEUTSCH, MEMBER
LAS VEGAS, NEVADA

MRS. MARY KOZLOWSKI, MEMBER
LAS VEGAS, NEVADA

FRANK M. SCOTT, MEMBER
NEVADA

COLORADO RIVER COMMISSION
OF NEVADA

P.O. Box 1748
LAS VEGAS, NEVADA 89101
TELEPHONE 384-5135

May 24, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Regional Office
U. S. Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

Reference is made to your letter dated April 8, 1974 requesting a review and comment on the Draft Environmental Statement for the Colorado River International Salinity Control Project. We plan to coordinate our review of the statement with other State agencies. Therefore, we will not be responding direct to your request for review.

Sincerely,

A handwritten signature in black ink that reads "Donald L. Paff". The signature is written in a cursive style with a long horizontal stroke at the end.

Donald L. Paff
Administrator



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-CWP-V

24 May 1974

Mr. Gilbert G. Stamm
Commissioner
Bureau of Reclamation
U. S. Department of the Interior
Washington, D. C. 20240

Dear Mr. Stamm:

This is in response to your letter of 11 April 1974 in which you requested Corps of Engineers review and comments on the draft environmental impact statement for the Colorado River International Salinity Control Project, United States and Mexico.

The following comments are furnished:

- a. The authorized project, Gila River and Tributaries Downstream from Painted Rock Reservoir, should be discussed with respect to its relationship to releases from Painted Rock Reservoir.
- b. The retention of floodwaters in Painted Rock Reservoir for a longer period and a change in management of floodflow releases (as noted on pages 30 and 117) would tend to increase the total dissolved solids (TDS) concentration in waters released from the reservoir due to evaporation losses in the reservoir. The environmental impacts should be discussed.
- c. Pages 20 and 30. The statements noting the distance between Painted Rock Dam and Wellton-Mohawk District should be changed to 60 miles.
- d. Page 30, line 5. The sediment allowance should be 200,000 acre-feet instead of 20,000 acre-feet.
- e. The waste disposal site referred to on page 40 is not a military reservation. It is a parcel of Federal land administered by the Bureau of Land Management under the status of reclamation withdrawal.

DAEN-CWP-V
Mr. Gilbert G. Stamm

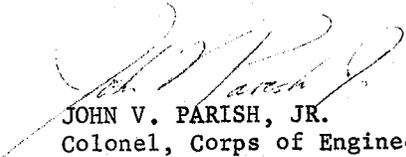
24 May 1974

f. Page 108. Requirements may vary from location to location; however, it is believed that selective efforts should be made to regrass or revegetate disturbed areas rather than wait for natural re-vegetation.

g. Page 111, line 4. Since local residents will not be allowed to use certain roads, there should be included a discussion concerning proposed methods for satisfying their needs for travel.

We appreciate the opportunity to review this environmental impact statement and hope that our comments will be helpful in your development of the final statement.

Sincerely,



JOHN V. PARISH, JR.
Colonel, Corps of Engineers
Executive Director of Civil Works

Replies to Comments Made by the
Department of the Army
Washington, D.C.
(Letter of May 24, 1974)

1. Comment: The authorized project, Gila River and Tributaries Downstream from Painted Rock Reservoir, should be discussed with respect to its relationship to releases from Painted Rock Reservoir.

Reply: The authorized Corps of Engineers' project, Gila River and Tributaries Downstream from Painted Rock Reservoir would be of considerable benefit to the Colorado River Basin Salinity Control Projects in that it would provide flood protection to the Wellton-Mohawk Irrigation and Drainage District and would provide a rectified channel which would pass releases from Painted Rock Reservoir through the District more quickly without allowing as much water to seep into the aquifer. Any water thus entering the aquifer must subsequently be pumped out as drainage water which adds directly to the amount of water that must be handled by the proposed desalting plant at Yuma, Arizona.

2. Comment: The retention of floodwaters in Painted Rock Reservoir for a longer period and a change in management of floodflow releases (as noted on pages 30 and 117) would tend to increase the total dissolved solids (TDS) concentration in waters released from the reservoir due to evaporation losses in the reservoir. The environmental impacts should be discussed.

Reply: The final environmental statement discusses the increased salinity of floodwaters due to increased evaporation because of longer periods of impoundment behind Painted Rock Dam. If the released water infiltrates above the Wellton-Mohawk Division, the increased salinity will have no effect upon the Division. Infiltration will enhance the greenbelt between the Dam and the Division unless salinity of releases is extremely high. If additional floodwaters enter the reservoir that would require larger releases, it is contemplated that the increased releases would not take place until there is sufficient inflow to dilute the salinity of the water remaining in the reservoir.

3. Comment: Pages 20 and 30. The statements noting the distance between Painted Rock Dam and Wellton-Mohawk District should be changed to 60 miles.

Reply: Both statements of distance have been changed in the final environmental statement to approximately 60 miles.

4. Comment: Page 30, line 5. The sediment allowance should be 200,000 acre-feet instead of 20,000 acre-feet.

Reply: This has been changed to 200,000 acre-feet in the final environmental statement.

5. Comment: The waste disposal site referred to on page 40 is not a military reservation. It is a parcel of Federal land administered by the Bureau of Land Management under the status of Reclamation withdrawal.

Reply: This correction has been made. If a waste disposal site is necessary, it would be selected to minimize environmental impacts. **Potential landfill disposal sites under consideration are located on undeveloped desertlands, on the Yuma Mesa and on the Pilot Knob Mesa.**

6. Comment: Page 108. Requirements may vary from location to location; however, it is believed that selective efforts should be made to regrass or revegetate disturbed areas rather than wait for natural vegetation.

Reply: Revegetating areas which have been disturbed during construction is not usually practicable in a desert environment except possibly in selected areas and under special conditions. Decisions regarding the need for revegetation of specific sites will be made in relation to the magnitude of disturbance and the practicality of revegetation and natural revegetation.

7. Comment: Page 111, line 4. Since local residents will not be allowed to use certain roads, there should be included a discussion concerning proposed methods for satisfying their needs for travel.

Reply: Local resident access will be maintained during construction over safe and adequate detour routes.



United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:
L7619
(WR)PSE

MAY 28 1974

Memorandum

To: Commissioner, Bureau of Reclamation

Through: Assistant Secretary for Fish and Wildlife and Parks

From: ^{Associate} Director

Subject: Draft Environmental Statement - Colorado River International Salinity Control Project (DES 74-39)

We have reviewed the subject draft environmental statement and are pleased to offer these comments.

COMMENTS ON THE PROPOSED ACTION

The proposed action would not affect any existing, proposed or known potential units of the National Park System, nor any historic, natural or environmental education properties listed as National Landmarks.

COMMENTS ON THE DRAFT STATEMENT

The summary sheet indicates that as a permanent measure, it is proposed to ". . . modify existing Gila River control measures at Painted Rock Dam, about 58 miles upstream from the Wellton-Mohawk area." Pages 81 and 82 of the draft statement indicate that this modification will consist of operating the reservoir at the 610-foot contour. This will require the purchase of 8,800 acres of private land, much of which is presently under cultivation.

The final statement should indicate the potential of the area for archeological resources within the 610-foot contour. If an archeological survey has been performed of this area in the past, then it should be so stated and described. If the project area has not been surveyed, then a survey should be arranged in accordance with the Reservoir Salvage Act of 1960 (P. L. 86-523), and Executive Order 11593. The results of this survey should be discussed in the final statement, along with the results of the surveys that are currently being performed for the other features of the Colorado River International Salinity Control Project.



Let's Clean Up America For Our 200th Birthday
A-86

Reply to Comment Made by the
National Park Service, Washington, D.C.
(Memorandum of May 28, 1974)

1. Comment: In relation to the modification of Gila River control measures at Painted Rock Dam, the final statement should indicate the potential of the area for archeological resources within the 610-foot contour. If an archeological survey has been performed of this area in the past, then it should be so stated and described. If the project area has not been surveyed, then a survey should be arranged in accordance with the Reservoir Salvage Act of 1960 (P.L. 86-523), and Executive Order 11593. The results of this survey should be discussed in the final statement, along with the results of the survey whether currently being performed for the other features of the Colorado River International Salinity Control Project.

Reply: The Corps of Engineers, the construction and operating entity of Painted Rock Dam and Reservoir, contracted in 1962 for archeological surveys to be performed in the area. Currently, the Corps is in consultation with National Park Service concerning potential impacts and mitigation of those sites identified in the survey that might be affected by the proposed change in operating criteria.



United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

OFFICE OF THE DIRECTOR

DES-74/39

MAY 31 1974

Memorandum

To: Commissioner, Bureau of Reclamation

Through: Assistant Secretary--Energy and Minerals *Bak*

From: Director, Geological Survey

Subject: Draft Environmental Statement -- Colorado River International Salinity Control Project

We have reviewed the subject draft environmental statement as requested in your memorandum of April 11 and we offer the following comments.

There appears to be adequate awareness in the draft environmental statement of potential earthquake damages to facilities of the proposed project. There is also some discussion of emergency measures that could be taken should the bypass drain be damaged by an earthquake. Absent from the draft, however, is discussion of what consideration was given to the siting of facilities and alignment of drains and canals to minimize seismic damage and how the facilities were designed to resist earthquake damage.

The subject statement appears incomplete in reference to the environmental impact of the proposal lining of 49 miles of the Coachella Canal. We assume the estimated 132,000 acre-feet annual savings of water is based upon measurements, which are not referenced in the statement. However, using an average of 2 feet per day seepage rate, this figure appears to be high. Also, the statement is deficient in regard to the impact of the loss of some of the seepage water on local ground water.

Acting *Henry W. Corbett*
Director

A-88

3/6-7

Replies to Comments Made by the
Geological Survey, Reston, Virginia
(Memorandum of May 31, 1974)

1. Comment: Absent from the draft is discussion of what consideration was given to the siting of facilities and alignment of drains and canals to minimize seismic damage and how the facilities were designed to resist earthquake damage.

Reply: Final siting, alignment, and design of the project facilities have not yet been completed. This will all be accomplished in due consideration for the potential seismic activity of the area and the effects on certain features of the project. As stated in the draft environmental statement (page 166) and final environmental statement, (Chapter IV), special foundation treatment may be required for the desalting plant features as a matter of seismic design to compensate for the remote possibility of severe earthquakes, which may cause liquefaction.

2. Comment: The subject statement appears incomplete in reference to the environmental impact of the proposed lining of 49 miles of the Coachella Canal. We assume the estimated 132,000 acre-feet annual savings of water is based upon measurements which are not referenced in the statement. However, using an average of 2 feet per day seepage rate, this figure appears to be high.

Reply: The final statement has been expanded to include further explanation and reference may be found in Chapter I.H.2.b.(2).

For further information refer to the Special Report of August 1973 on Coachella Canal Lining.

3. Comment: The statement is deficient in regard to the impact of the loss of some of the seepage water on local ground water.

Reply: The change in ground-water elevations and depths to ground water are discussed in detail in Chapter III of the final environmental statement. The expanded discussion is based on studies that have been completed since the draft environmental statement was issued.

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

Mr. Gilbert G. Stamm
Commissioner
Bureau of Reclamation
Department of the Interior
Washington, D.C. 20240

MAY 31 1974

Reference: 739
452.1

Dear Mr. Stamm:

This is in reply to your letter of April 11, 1974, addressed to the Commission's Advisor on Environmental Quality, requesting comments of the Federal Power Commission on the draft environmental statement on the Colorado River International Salinity Control Project, United States and Mexico.

The draft environmental statement discusses the environmental impact of a recommended program of structural and non-structural measures for improving the quality of Colorado River water delivered to Mexico. Alternative measures were also considered. The recommended structural measures include salinity control facilities to be constructed in the States of Arizona and California and also in Mexico. Major facilities include a 100-mgd desalting plant to be constructed near Yuma, Arizona, and 49 miles of lined canal constructed to replace a segment of the unlined Coachella Canal in California.

These comments of the Federal Power Commission's Bureau of Power are made in accordance with the National Environmental Policy Act of 1969 and the August 1, 1973, Guidelines of the Council on Environmental Quality. Our principal concern with proposals affecting land and water resources is the possible effect of such proposals on bulk electric power facilities, including potential hydroelectric developments, and on natural gas pipeline facilities.

12
67

Mr. Gilbert G. Stamm

-2-

According to the draft environmental statement, operation of the desalting plant and associated facilities would have a peak power demand of about 35 megawatts and an annual energy requirement of about 276,100,000 kilowatt-hours. The draft statement notes that, although a portion of the energy required might be available from existing generating facilities, the overall power requirements of the area would be increased. Adverse impacts associated with the additional generation and transmission would occur.

The Commission staff notes that there are several existing electric generating facilities in the vicinity of the proposed desalting plant. The existing Yuma Axis steam-electric plant, operated by the Arizona Public Service Company, is adjacent to the desalting plant site. Also, the Pilot Knob and Siphon Drop hydroelectric plants, which are operated in conjunction with the All-American Canal and Yuma Canal projects, respectively, are located in the general vicinity. It does not appear that any of the above-mentioned facilities would be adversely affected by the proposed salinity control measures.

In summary, it appears that the draft environmental statement adequately discusses all matters of concern to the Commission.

Very truly yours,


T. A. Phillips
Chief, Bureau of Power



THE STATE OF NEVADA
EXECUTIVE CHAMBER
CARSON CITY, NEVADA 89701

MIKE O'CALLAGHAN
GOVERNOR

June 6, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Regional Office
U. S. Bureau of Reclamation
Post Office Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We appreciate the opportunity to review the draft environmental statement on the proposed Colorado River International Salinity Control Project which was prepared in support of H.R. 12834 and S. 3094. The State of Nevada believes that the draft environmental statement generally addresses in a proper manner the environmental impacts relating to proposed actions under H.R. 12834 and S. 3094.

As you are aware, the State of Nevada supports the more comprehensive basin-wide programs identified in H.R. 12165 and S. 2940, all of which are not included in the draft statement under review. However, it is believed that the statement does cover and would satisfy some of the same aspects included in H.R. 12165 and S. 2940.

You are to be commended on the comprehensive nature of the statement and the clear identification of beneficial, adverse, and problematic environmental effects and the assessment of the direct and indirect impacts resulting from proposed actions under H.R. 12834 and S. 3094.

Sincerely,


Mike O'Callaghan
Governor of Nevada

Reply to Comment Made by the
State of Nevada
Executive Chamber
(Letter of June 6, 1974)

1. Comment: As you are aware, the State of Nevada supports the more comprehensive basin-wide programs identified in H.R. 12165 and S. 2940, all of which are not included in the draft statement under review. However, it is believed that the statement does cover and would satisfy some of the same aspects included in H.R. 12165 and S. 2940.

Reply: The draft environmental statement was prepared and filed to support H.R. 12834 and S. 3094. The draft environmental impact statement was supplemented on August 27, 1974, with an additional document to cover the protective and regulatory ground-water pumping plan which is part of Title I of the Colorado River Basin Salinity Control Act (Public Law 93-320) signed into law on June 24, 1974.

An overall environmental statement is being prepared to describe the environmental impacts of salinity control measures above Imperial Dam as included in Title II of Public Law 93-320.



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGIONAL OFFICE
50 FULTON STREET
SAN FRANCISCO, CALIFORNIA 94102

OFFICE OF
THE REGIONAL DIRECTOR

Office of Environmental Affairs

June 11, 1974

G. G. Stamm
Commissioner
United States Department of the Interior
Bureau of Reclamation
Washington, D.C. 20240

Dear Mr. Stamm:

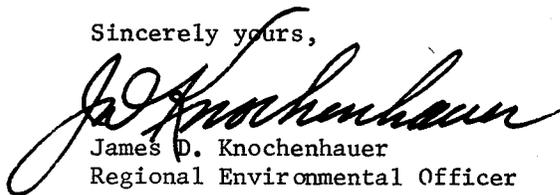
The draft Environmental Impact Statement for the Colorado River International Salinity Control Project has been reviewed in accordance with department procedures as required by Section 102(2)(c) of the National Environmental Policy Act (PL 91-190).

The proposed project is designed to reduce the salinity of the water in the lower Colorado River to an acceptable level and to provide adequate volume to meet international treaty requirements with Mexico. Included is the construction of a Desalting complex and lining of the first 49 miles of the Coachella Canal.

The statement appears to identify the anticipated environmental impacts adequately and includes appropriate safeguards. Reference is made to the presence of construction workers and their families, however no mention is made to the numbers nor the length of residence that may occur. If the concentration of temporary construction workers will result in a need for additional educational, health, medical or social services, the appropriate local governments should be consulted to assure that these needs are known and that adequate services will be available.

Please accept our apologies for the delay in responding to this statement. We were unable to process this in the short time available to us after receipt.

Sincerely yours,


James D. Knochenhauer
Regional Environmental Officer

cc: P. Hayes
W. Muir

7
6-B

A-94

Reply to Comment Made by the
Department of Health, Education, and Welfare
San Francisco, California
(Letter of June 11, 1974)

1. Comment: The statement appears to identify the anticipated environmental impacts adequately and includes appropriate safeguards. Reference is made to the presence of construction workers and their families; however, no mention is made to the numbers nor the length of residence that may occur. If the concentration of temporary construction workers will result in a need for additional educational, health, medical, or social services, the appropriate local governments should be consulted to assure that these needs are known and that adequate services will be available.

Reply: State, County and City governments in the proposed project area have been furnished with copies of the draft environmental statement and have been given the opportunity to comment on this project. These entities will also receive a copy of the final environmental statement. Additional information on the socioeconomic impacts caused by the concentration of construction workers is included in the final environmental statement.



United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
WASHINGTON, D. C. 20245

IN REPLY REFER TO:
Trust Facilitation
EQ (DES 74/39)

452.1

JUN 13 1974

Memorandum

To: Commissioner of Reclamation

From: Martin E. Seneca, Jr. *MES*
Director, Office of Trust Responsibilities

Subject: Comments on Draft Environmental Statement for Colorado River
International Salinity Control Project (DES 74/39)

In response to your request dated April 11, 1974, following are our comments on the subject draft statement.

1. There is grave concern among the Cocopah Indian Tribe that the project will destroy a revenue source the Tribe is in dire need of developing. The source is recreation-tourism along the Colorado River on the Cocopah Reservation land. The area in question contains a very fine white sand beach and is a natural area for Tribal economic development. With construction of the salinity control project, however, the river below Morelos Dam will be dry which will effectively eliminate recreation-tourism on the Reservation.

2. The attached copy of the testimony of the Cocopah Tribe dated April 26, 1974, concerning S.1807, S.2940 and S.3094 (Legislation related to the salinity of the Colorado River) is to be considered an integral part of our comments where it addresses the general topic of salinity control and its effects on the Cocopah Tribe.

Attachment

Sgd Martin E. Seneca Jr.



1/6-18

A-96

Save Energy and You Serve America!



April 26, 1974

SUBCOMMITTEE ON WATER AND POWER RESOURCES
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
UNITED STATES SENATE

TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094
(Legislation related to the salinity of the
Colorado River)

The Cocopah Tribe of Indians supports the general concepts in these bills, but believes that additional provisions are essential in order to protect the rights and interests of the Tribe. The Tribe's proposed amendment, which is supported by the Bureau of Reclamation and which was adopted substantially intact by the House Subcommittee, will be set forth at the end of this testimony. The important background information is as follows.

The Tribe is organized and recognized by the Secretary of the Interior, pursuant to the Indian Reorganization Act of June 18, 1934 (48 Stat. 984), as amended by the Act of June 15, 1935 (Pub.L. No. 74-147). The Tribe is the governing body of the Cocopah Indian Reservation, located southwest of Yuma, Arizona, established by Executive Order No. 2711 on September 27, 1917. The Reservation was thought to consist of 528 acres, although as a result of a recent court decision, discussed below, an additional 377 acres has been added to the Reservation.



In common with many Indian communities, many members of the Tribe are poverty-stricken. Unemployment is a major problem. The Tribe has been striving mightily to develop a self-sufficient economic base on the Reservation, but its efforts have been hampered by several factors. Probably the most severe problem is the small size of the Reservation. The Colorado River Basin in southern Arizona is ideally suited for production of specialty crops but, because of the limited size of the Reservation, agriculture has not provided a means of sustenance for all the tribal members. This situation has been alleviated somewhat as the result of a decision by Judge Walter E. Craig of the United States District Court for the District of Arizona on September 24, 1973.* The Tribe was awarded approximately 877 acres of accreted lands along the Colorado River adjacent to the Reservation. In addition, since 1956, the Tribe has leased two lots covering approximately 62 acres about seven miles southwest of Yuma, Arizona. This additional acreage will help in the continuing struggle for economic viability.

* Cocopah Tribe of Indians v. Morton, No. CIV-70-573-PIX-WRC.

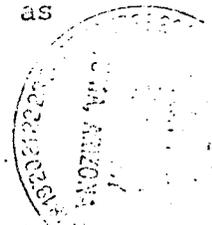


April 26, 1974
TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094
Page Three

A second problem is water. While the Tribe was allotted 2,744 acre feet of water per year by the United States Supreme Court in Arizona v. California, 376 U.S. 340, 344 (1964), the amount of water will not be enough to irrigate the accreted and leased lands in the future. Both of these areas are suitable for intensive agriculture, provided that adequate water is available.

The Cocopah Tribe definitely supports the general thrust of this proposed legislation. The Tribe has long been aware of the dangers of increased salinity in the lower Colorado River. In addition, our Tribe recognizes the legal and moral obligation of the United States to provide the Republic of Mexico with high quality water suitable for irrigation and other useful purposes, and does not wish to take a position that would obstruct the rapid fulfillment of that obligation. Accordingly, the Tribe supports almost all aspects of the Colorado River International Salinity Control Project proposed by the Bureau of Reclamation in its special report of September, 1973.

One aspect of this project poses a serious threat to the future of the Cocopah Reservation. The project as



April 26, 1974

TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094

Page Four

proposed includes a canal to carry off the "reject stream", the highly saline reject water which is not treated by the proposed desalinization plant. This canal for the reject stream, which may be as much as 25 feet wide and six feet deep, will bisect the Cocopah Reservation on a line roughly parallel to the Colorado River. We understand that the proposed easement for the canal will be 100 feet wide. Not only will the canal deprive the Tribe of desperately needed acreage, but it will pose a formidable physical barrier, dividing the main portion of the Reservation from the accreted lands that have just recently been won in court. Furthermore, the combined operation of the desalinization plant and the waste water canal will probably mean that the main channel of the Colorado River, the principal aesthetic and recreational amenity on the Reservation, will be totally depleted for much of the year. The attractiveness of this and other proposed tourist facilities will be diminished, and probably eliminated, if the river no longer flows by the Reservation.

Our Tribe has had a long and difficult struggle to obtain our land. We fought for our accreted land for ten years before a court ruled that it had been rightfully ours all along. In the meantime, we lost a decade of development

April 26, 1974
TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094
Page Five

potential. In addition, our accreted land is already facing major physical barriers -- a railroad levy and a floodplain levy. Now we are told that we must accept this waste water canal.

We do not believe that we should be asked to sacrifice our meager and hard earned resources for the benefit of this project, unless the Tribe receives fair compensation in return. Indeed, tribal land cannot be taken without the consent of the Tribe because the Tribe is organized pursuant to the Indian Reorganization Act. See, 25 U.S.C. §476. The United States government should not attempt to meet its treaty obligations to Mexico by ignoring its trusteeship obligations to the Cocopah Tribe. Accordingly, the Tribe proposes, as compensation for the sacrifices it will be asked to make for the project, that the following action be taken.

Because of its minimal land base, the Tribe is desperately attempting to obtain additional tribal lands. Although the Tribe is seeking to obtain three parcels in the area of the Reservation, this presentation will deal with only one strip of land. The strip of land in question is directly adjacent to the southern boundary of the accreted land which was recently added to the Reservation. The

April 26, 1974

TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094

Page Six

present Reservation boundaries in the affected area are outlined in red on the attached Exhibit A. The parcel involved here is cross-hatched in blue on Exhibit A. *

The Tribe proposes that this legislation provide that the indicated parcel be transferred to the Tribe. The Bureau of Reclamation and the Bureau of Indian Affairs both agree. The House Subcommittee, working on companion legislation, adopted a similar amendment which was presented to it. **

* The Bureau of Reclamation, the Bureau of Indian Affairs, and the Tribe have all assumed that the lower red line on Exhibit A is the southern boundary of the Reservation in the accreted area. Recently, attorneys in the Interior Solicitor's office have suggested that the southern boundary may be the broken red line on Exhibit A. Further details concerning this possible cloud on the title will be supplied by the Tribe's attorneys if the Subcommittee wishes. The strip of land involved here includes both land which is definitely new tribal land (the lower one-half of the area cross-hatched in blue) and land on which there is a possible cloud on the title (the upper one-half of the area cross-hatched in blue). Thus this proposal, to which all interested parties agree, would add new land and would eliminate a possible cloud on the title of land which had always been assumed to be tribal land.

A-102

** The possible cloud on the title, discussed in the above footnote, was not discovered in time to include the affected land in the amendment which was offered at the markup session of the House Subcommittee. Thus, the present House version of the amendment includes only the lower one-half of the cross-hatched area. The Tribe has requested that the additional land be added to the amendment at the House Committee markup session.

April 26, 1974
TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094
Page Seven

The parcel, consisting of approximately 720 acres, is withdrawn reclamation land which is presently managed by the Bureau of Land Management. The parcel is brushy accretion land which is composed primarily of alluvium soil. Although a small part of the parcel is presently being farmed, most of the land is presently unused. This land is particularly suitable for inclusion in the Reservation because it is very similar to the Tribal land directly to the north. The parcels should logically be used as a unit, whether for purposes of agriculture or development.

The transfer of the parcel would fulfill a major dream of the Cocopah Tribe. Accordingly, we request that the bill be amended to add the following subsection:

"The Secretary is authorized and directed to cede the following land to the Cocopah Tribe of Indians, subject to existing government works, to be held in trust by the United States for the Cocopah Tribe of Indians:

Township 9 South, Range 25 West
of the Gila and Salt River
Meridian, State of Arizona:

Section 25: Lots 14, 15, 16, 17,
18, 19, 20, 21, 22, 23, and 29;

Section 26: Lots 1, 8, 9, 10, 11,
12, 13, 14, and 15;

Section 27: Lots 2 and 3;
and all accretion to the above-
described lands.



April 26, 1974
TESTIMONY OF THE COCOPAH TRIBE OF INDIANS
CONCERNING S. 1807, S. 2940, AND S. 3094
Page Eight

The Secretary is authorized and directed to construct three bridges, one of which shall be capable of accommodating heavy vehicular traffic, over the portion of the reject stream which crosses the Reservation of the Cocopah Tribe of Indians. The transfer of lands to the Cocopah Indian Reservation and the construction of bridges across the reject brine channel shall constitute full and complete payment to said Tribe for the rights-of-way required for construction of the reject brine channel and appurtenant electrical transmission lines."

We believe that this proposal is modest, reasonable, and fair. The amendment is supported by all of the interested agencies. If the United States is prepared to spend as much as 133 million dollars on these desalinization facilities largely for the benefit of a foreign country, it should be more than willing to absorb the comparatively minor expense outlined above for its First Citizens.

The Tribe wishes to express its appreciation to the Subcommittee members and to the Subcommittee Staff for the courtesies they have extended to the Tribe.

Respectfully submitted,

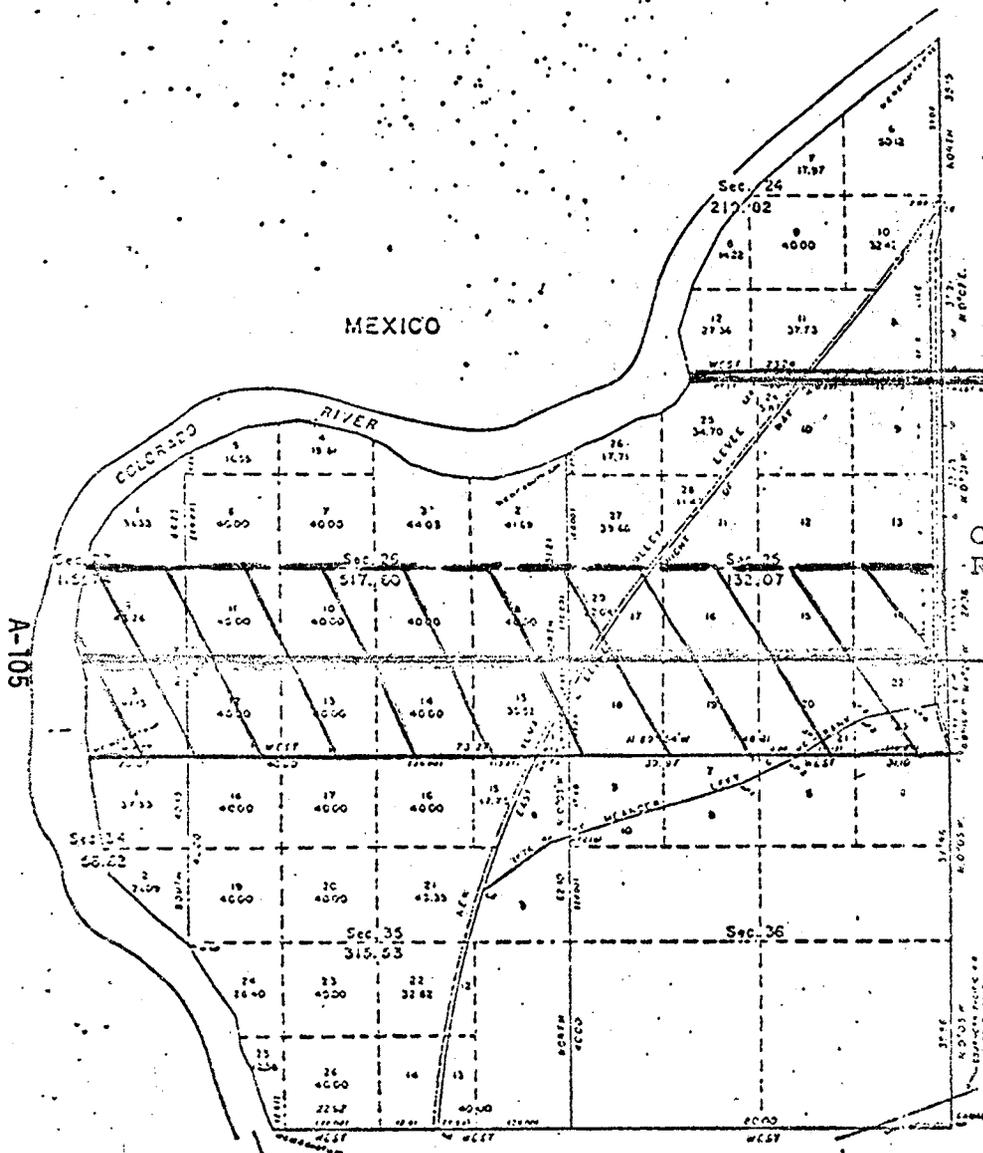
A-104

THE COCOPAH TRIBE OF INDIANS
Robert Barley, Tribal Chairman
Counsel:

Charles F. Wilkinson
E. Glenn Bell III
Native American Rights Fund
1500 Broadway
Seattle, Washington 98102



SECTION 3 SOUTH, RANGE 23 WEST OF THE GREEN AND GREY RIVER MERIDIAN,
 DEPENDENT RESURVEY AND ACCRETION SURVEY.



COCOPAH
 RES.

This plat represents a retracement and re-establishment of the south and east boundaries and subdivision lines claimed to exist on certain parcels in their original positions according to the best available evidence; and, the survey of accretion lands.

The original surveys were executed by T. F. White, Deputy Surveyor, in 1874, as shown upon the official plat approved April 15, 1874. There have been subsequent surveys and resurveys by Arthur W. Brown and C. H. Thomas, Civil Engineers, in 1905-1907, under Group 49, as shown upon the plat approved August 27, 1907; by Francis E. Joy, Civil Engineer, in 1908, under Group 150, as shown upon the plat approved March 26, 1908; and, by Kenneth G. Hall, Civil Engineer, in 1909, under Group 151, as shown upon the plat approved October 20, 1909. Except as to new subdivisions as shown hereon, the bearings and areas are as shown upon the plats of April 15, 1874, August 27, 1907, March 26, 1908 and October 20, 1909.

These surveys were executed by Leonard W. Murphy, Surveying Technician, under the supervision of Forest C. Yundt, Cadastral Surveyor, from November 19, 1960 to January 3, 1961, pursuant to special instructions dated September 15, 1960, for Group 355.

UNITED STATES DEPARTMENT OF THE INTERIOR
 BUREAU OF LAND MANAGEMENT
 Washington, D.C. September 14, 1961

This plat is strictly conformable to the approved field notes, and the survey having been correctly executed in accordance with the requirements of law and the regulations of this Bureau, is hereby accepted.

For the Director
Charles R. Bennett
 Chief, Division of Engineering

Area Surveyed 1359.56 Acres
 Area Returned 1460.13 Acres

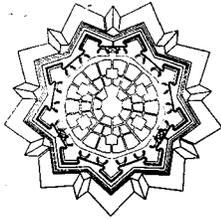
Replies to Comments Made by the
Bureau of Indian Affairs
Washington, D.C.
(Memorandum of June 13, 1974)

1. Comment: There is grave concern among the Cocopah Indian Tribe that the project will destroy a revenue source the Tribe is in dire need of developing. The source is recreation-tourism along the Colorado River on the Cocopah Reservation land. The area in question contains a very fine white sand beach and is a natural area for Tribal economic development. With construction of the salinity control project, however, the river below Morelos Dam will be dry which will effectively eliminate recreation-tourism on the Reservation.

Reply: Implementation of the project will in fact eliminate river oriented recreation and tourism. It is in partial compensation for this lost development potential that P.L. 93-320 authorizes additional lands to be ceded to the Cocopah Reservation.

2. Comment: Testimony of the Cocopah Tribe dated April 26, 1974, concerning legislation related to the salinity of the Colorado River is an integral part of the comments. This testimony asks for additional provisions in order to protect the rights and interests of the Tribe. These provisions entail the Tribe's request, as mitigation for project rights-of-way, for the transferral of additional Reclamation-withdrawn lands located adjacent to the Cocopah Reservation and the construction of three access bridges across the canal on Tribal lands.

Reply: The Colorado River Basin Salinity Control Act of June 24, 1974, authorized and directed the Secretary of the Interior to cede the requested lands to the Cocopah Tribe, pursuant to revised testimony submitted by the Tribe. Three bridges over the portion of the bypass drain which crosses the Reservation of the Cocopah Indians are to be constructed to provide access. The Act instructs that the transfer of lands and construction of bridges shall constitute full and complete payment to the Tribe for rights-of-way required for construction of the bypass drain and electrical transmission lines.



Colorado
Division of Planning

John D. Vanderhoof / Governor

1575 Sherman Street / Denver, Colorado / 80203

Philip H. Schmuck / Director

Department of Local Affairs

Phone OFFICE (303) 492-2179

4521
June 18, 1974

Mr. E. A. Lundberg, Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

SUBJECT: Draft Environmental Statement --
Colorado River International
Salinity Control Program

Dear Mr. Lundberg:

The Colorado State Clearinghouse has reviewed the Draft Environmental Statement for the Colorado River International Salinity Control Program (DES). The DES provides a detailed description of the program but fails to assess some of its larger, long-term impacts.

1. The relationship of the program to other federal projects and federally-sponsored projects that may affect or be affected by the program must be assessed. Council on Environmental Quality (CEQ) guidelines stipulate that "the interrelationships and cumulative environmental impacts of the proposed action and other related Federal projects shall be presented in the statement" (38 FR 20556).
 - a. The relationship of the program to the Colorado River Storage Project should be discussed.
 - b. The relationship of the program to any other proposed federal or federally assisted water development projects in the Upper Colorado River Basin should be discussed.

Bureau of Reclamation
Re: Colorado River International
Salinity Control Program
June 18, 1974
Page 2

2. The "relationship of the proposed action to land use plans, policies, and controls for the affected area" (CEQ guidelines, 38 FR 20553) must be discussed.
 - a. The relationship of the program to existing and proposed development of compact-apportioned water by the Colorado River Basin states must be discussed.
 - (i) Will the program enable the United States to deliver water of adequate quantity and quality under the terms of our agreement with Mexico even if all the basin states develop all of their apportioned water rights?
 - (ii) Will additional controls on the development of these apportioned water rights be required to assure a "permanent and definitive solution" (p. 7)* of the problem?
 - b. The relationship of the program to the Upper Colorado River Basin Water Quality Management Plan being prepared by the Colorado Department of Health must be discussed.
 - c. The relationship of the program to "land use plans, policies and controls" of the counties and municipalities in Colorado that may be affected by the program must be assessed. The Clearinghouse may be of assistance in this matter.
 - d. The relationship of the program to proposed oil shale development in Colorado must be assessed.
3. Alternative sites for the desalting facility (p. 188) should be assessed as part of the DES for the program.

*All page references are to the Draft Environmental Statement, Colorado River International Salinity Control Project, unless otherwise noted.

Bureau of Reclamation
Re: Colorado River International
Salinity Control Program

June 18, 1974

Page 3

I hope these comments will be helpful in preparing a final environmental statement for the program. If the Clearinghouse can be of assistance, please contact me.

Sincerely,



Philip H. Schmuck
Director

PHS/JO/vt

cc: John Bermingham, Assistant to the Governor on Environmental
Affairs and State Planning
J. D. Arehart, Executive Director, Department of Local Affairs
Gil McNeish, Director, Land Use Commission
Frank Rozich, Director, Water Quality Control Division
Tom W. Ten Eyck, Executive Director, Department of Natural Resources
Felix L. Sparks, Director, Water Conservation Board

Replies to Comments Made by the
Colorado Division of Planning
(Letter of June 18, 1974)

1. Comment: The relationship of the program to other Federal projects that may be affected by the program must be assessed, e.g., relationship of program to the Colorado River Storage Project and other Federal assisted water development projects in the Upper Colorado River Basin.

Reply: Specific discussion of other Colorado River Storage Projects has been presented in numerous other environmental impact statements already on file with the Council on Environmental Quality or are in the process of being filed, e.g., Central Arizona Project overall statement, Fryingpan-Arkansas, and Central Utah Project statements, Navajo Project, etc. Such proposals as the coal gasification project and other coal-fired generator plants have also been discussed in separate environmental impact statements. An overall environmental impact statement is being prepared to describe the environmental impacts of salinity control measures above Imperial Dam as included in Title II of Public Law 93-320. The salvage of Colorado River water resulting from the Title I section of the Act will have a direct beneficial effect on all water projects and entities which are dependent on Colorado River water in the lower basin and an indirect benefit to those in the upper basin. Savings of water will help the United States meet its commitments and water allocations, both to Mexico and to water users in the United States.

2. Comment: The relationship of the program to land-use plans, policies, and controls for the affected area must be discussed.

Reply: Title I of Public Law 93-320 provides for the improvement of water quality to Mexico by measures taken below Imperial Dam. The effects on land use practices and planning in the seven basin states are addressed in a general way by suggesting that salvage of Colorado River water will be of benefit to U.S. water users. Land-use planning in each of the seven basin states is dependent on the apportioned water rights of each state. The Colorado River Basin Salinity Control Projects will help to salvage and improve the quality of Colorado River

water which in turn will help to assure the development and maintenance of each state's apportioned water rights. Under normal hydrological conditions and with the proposed project in operations the United States will be able to fulfill its water delivery to Mexico when the basin states develop all of their apportioned water rights. This project and other projects authorized by the Colorado River Basin Salinity Act under Title II will help to minimize the impact of salinity affecting the water quality of the Colorado River. By reducing salt loading of the river it will result in the more effective control of the salinity level as the upper basin states continue development. Control of the salinity level will in turn benefit each of the basin states in their individual land-use planning. Assuming the expected water salvage anticipated from the project is achieved it should be an asset to the assurance of fulfilling water commitments to the upper basin states.

3. **Comment:** Alternate sites for the desalting facility should be assessed as part of the Draft Environmental Statement for the program.

Reply: Alternate sites which may have been or are being considered for the desalting facility would have much the same characteristics as far as environmental impacts are concerned. Both the draft and this final statement describe the site which is considered to have the highest priority. Other proposed sites are discussed throughout the final statement.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

• 19 JUN 1974

Mr. G. G. Stamm
Commissioner
Bureau of Reclamation
Department of the Interior
Washington, D. C. 20240

Dear Mr. Stamm:

This is in response to your letter addressed to Mr. John E. Hirten concerning the draft environmental impact statement on the Colorado River International Salinity Control Project.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. The Federal Highway Administration commented as follows:

"The proposed 2,800 foot long inverted pipe siphon discussed on page 44 crosses the Interstate 8 alignment at the site of the planned Colorado River Crossing; therefore, coordination with the California Department of Transportation District 11 office is recommended to assure the compatibility of the pipe's location with the substructure of the proposed highway bridge."

The Department of Transportation has no further comments to offer nor do we have any objection to this project. However, the concern of the Federal Highway Administration should be addressed in the final environmental impact statement.

The opportunity to review this draft statement is appreciated.

Sincerely,

R. I. PRICE
Rear Admiral, U. S. Coast Guard
Chief, Office of Marine Environment
and Systems

A-112

Reply to Comment Made by the
Department of Transportation
U.S. Coast Guard
Washington, D.C.
(Letter of June 19, 1974)

1. Comment: The proposed 2,800-foot-long inverted pipe siphon discussed on page 44 crosses the Interstate 8 alignment at the site of the planned Colorado River Crossing; therefore coordination with the California Department of Transportation District 11 office is recommended to assure the compatibility of the pipe's location with the substructure of the proposed highway bridge.

The Department of Transportation has no further comments to offer nor do we have any objection to this project. However, the concern of the Federal Highway Administration should be addressed in the final environmental impact statement.

Reply: Coordination meetings have been held with all interested entities concerned with the placement of the pipe siphon. A meeting was held with representatives from the Arizona Highway Department and the California Department of Transportation on December 13, 1973. After hearing the Bureau of Reclamation's plans and examining the preliminary layout drawings, both state entities agreed there was no conflict with present or proposed facilities. This includes the Interstate 8 Colorado River Crossing.



United States Department of the Interior
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR,
BUREAU OF SPORT FISHERIES
AND WILDLIFE

In Reply Refer To:
FSF/ES

JUN 20 1974

Memorandum

To: Commissioner, Bureau of Reclamation
From: Acting Associate,
Director, Bureau of Sport Fisheries and Wildlife
Subject: Draft EIS, Colorado River International Salinity
Control Project (INT DES 74-39)

As requested in your memorandum of April 11, we have reviewed the above statement and offer the following comments:

In general, we find the statement inadequately treats project impacts on fish and wildlife resources. It appears that insufficient project data are available upon which to base a sound impact analysis.

We are greatly concerned over the rationale displayed throughout the report with regard to fish and wildlife habitat losses. In several places habitat losses are considered insignificant as compared to the total of such habitat available. While this may be correct when viewed from one project, it ignores similar losses occurring as the result of other Federal, State, local and private projects. The cumulative effect of such projects can have a significant impact on fish and wildlife resources.

In a number of places it is indicated that animals will be displaced by construction activities or other project effects and some will fail to survive. A more positive statement that most of these animals will fail to survive would be more appropriate.

The scale of the location map is too small for ready comprehension of project features and their location. We suggest that an insert map of larger scale be included for the area from about six miles north of Yuma to the Southerly International Boundary.

Comments on various project features follow:

A water outage in the lower reaches of the Main Outlet Drain would have a direct effect on streamflow below Morelos Dam since it is the main water source for this river reach. We would anticipate a direct fish loss in the lower river as the result of

this water outage. Also some fish would probably become stranded in the canal as flow decreases. Efforts should be made to salvage these fish.

Bypass Drain, Morelos Dam to Southerly International Boundary - This section is grossly inadequate in its coverage of project impacts on fish and wildlife habitat which will be lost as the result of project plans for water presently released immediately downstream of Morelos Dam. It is our understanding that bypassing this water to Mexico will create essentially a dry river bed between Morelos Dam and the Southerly International Boundary. It would also have a significant impact on water levels in Hunter's Hole. Similar data were presented by the International Boundary and Water Commission in an environmental assessment report dated January 1974 covering their vegetative control measures along this segment of the river.

Based on this information, about 20 miles of stream fishing would be lost along with a large portion of the fish inhabiting these waters. Also, the narrow strip of marsh habitat found along both sides of the river, which is utilized by the endangered Yuma clapper rail, would be greatly reduced or eliminated.

Lining the First 49 Miles of Coachella Canal - This title is misleading since the project would include construction of considerable new canal rather than lining of the existing structure. New construction will cause increased habitat losses.

The statement borrows figures relating to fishing recreation from our report on a similar Coachella Canal project (page 63, paragraph 1). As these data were based on certain conditions and assumptions that do not pertain to this project, their use is not valid.

Part II of the report states that seepage along the unlined canal has created about 3,000-5,000 acres of wildlife habitat, 45-50 acres of year-round open waters and 450 acres of temporary open water. However, the loss of this important habitat is barely mentioned in Part II, Environmental Impacts and is not properly covered in Part IV, Mitigation and Enhancement features of the project. Included in this discussion should be a more comprehensive treatment of an earlier proposal to maintain portions of the old canal as fish and wildlife habitat.

Considerably greater effort is needed to provide for mitigation and enhancement of fish and wildlife resources. No consideration is given to mitigation of habitat losses downstream from Morelos Dam nor does the statement discuss mitigation required for habitat losses anticipated along the Coachella Canal. Also, the use of escape ladders, ramps and foot bridges to reduce big-game losses in the canal has met with limited success. Fencing should be considered in this regard. Measures which can be taken to restore disturbed areas should be explored in greater depth and covered in more detail.

Section V, Unavoidable Adverse Effects needs considerably greater depth of discussion with regard to anticipated losses downstream from Morelos Dam and along the Coachella Canal. Losses associated with other project features also should receive greater consideration.

Under Other Alternatives, Page 212, alternative #7, should be given consideration in relation to its application in the Wellton-Mohawk Division. Decreased water application could have considerable impact on size of the desalting plant. This alternative should be covered in detail in this report.

In summation, this statement understates project impacts on fish and wildlife resources and will require considerable revision to accurately delineate these impacts.

Phillip S. Morgan

Replies to Comments Made by the
Fish and Wildlife Service
Washington, D.C.
(Memorandum of June 20, 1974)

1. Comment: In general, we find the statement inadequately treats project impacts on fish and wildlife resources. It appears that insufficient project data are available upon which to base a sound impact analysis.

Reply: When the draft environmental impact statement was issued, there was a limited amount of data on the fish, wildlife, and recreation of the area. In the interim, since the issuance of the draft environmental impact statement, the Bureau of Reclamation has sponsored short-term inventories of the fish, wildlife, and recreational resources which have been completed. Data from these inventories provided the basis for expanded discussions, as found in Chapters II, III, and IV.

2. Comment: We are greatly concerned over the rationale displayed throughout the report with regard to fish and wildlife habitat losses. In several places habitat losses are considered insignificant as compared to the total of such habitat available. While this may be correct when viewed from one project, it ignores similar losses occurring as the result of other Federal, State, local, and private projects. The cumulative effect of such projects can have a significant impact on fish and wildlife resources.

Reply: The cumulative effect of this project is set forth in Chapters III and V of this statement. Mitigation measures compensatory for losses are described in Chapter IV. It would not be a fair comparison to relate mitigated losses of this project to any unmitigated losses incurred by other projects. However, parallels are drawn wherever a direct relationship occurs.

3. Comment: In a number of places it is indicated that animals will be displaced by construction activities or other project effects and some will fail to survive. A more positive statement that most of these animals will fail to survive would be more appropriate.

Reply: This comment has been taken into account in revision of the final environmental statement. However, there is evidence that displaced wildlife can find new habitat under limited circumstances. This, of course, is dependent on a variety of factors such as individual

specific requirements and behavior, condition of available habitat such as carrying capacity and limiting factors, and their variability from season to season and year to year. In an agricultural area such as the Yuma Valley, the variability of the types of crops, the fluctuation of acreage under cultivation and seasonal planting patterns appear to have a more direct impact on wildlife numbers than does the availability of natural habitat.

4. Comment: The scale of the location map is too small for readily comprehension of project features and their location. We suggest that an insert map of larger scale be included for the area from about 6 miles north of Yuma to the Southerly International Boundary.

Reply: A larger scale map showing the above described area has been included in the final environmental statement.

5. Comment: A water outage in the lower reaches of the Main Outlet Drain would have a direct effect on streamflow below Morelos Dam since it is the main water source for this river reach. We would anticipate a direct fish loss in the lower river as the result of this water outage. Also some fish would probably become stranded in the canal as flow decreases. Efforts should be made to salvage these fish.

Reply: Losses of fish in the lower reach of the river are discussed in Chapter III. The accumulative losses of fish are also discussed in Chapters III and V. Mitigation for fish losses has been provided by the project and is discussed in Chapter IV.

The Arizona Game and Fish Department will be notified before water outages occur in the river and in the Main Outlet Drain so that they can formulate a fish salvage operation if they so desire. One or more outages have been occurring each year since the drain features were constructed. The Arizona Game and Fish Department has been notified prior to each outage and will be notified of future outages.

6. Comment: Bypass Drain, Morelos Dam to Southerly International Boundary--This section is grossly inadequate in its coverage of project impacts on fish and wildlife habitat which will be lost as a result of project plans for water presently released immediately downstream of Morelos Dam. It is our understanding that bypassing this water to Mexico will create essentially a dry riverbed between Morelos Dam and the Southerly International Boundary. It would also have a significant impact on water

levels in Hunter's Hole. Similar data were presented by the International Boundary and Water Commission in an environmental assessment report dated January 1974 covering their vegetative control measures along this segment of the river.

Based on this information, about 20 miles of stream fishing would be lost along with a large portion of the fish inhabiting these waters. Also, the narrow strip of marsh habitat found along both sides of the river, which is utilized by the endangered Yuma clapper rail, would be greatly reduced or eliminated.

Reply: The final statement gives a more accurate and quantitative analysis of impacts which will occur as a result of the change in flow below Morelos Dam. Analyses on fish and wildlife habitat, Hunter's Hole, stream fishing and marsh habitat suitable for Yuma clapper rail are extensively discussed in Chapter III.

7. Comment: Lining the first 49 miles of Coachella Canal - This title is misleading since the project would include construction of considerable new canal rather than lining of the existing structure. New construction will caused increased habitat losses.

Reply: This title has been changed to "The First 49 Miles of the Coachella Canal." The loss of habitat resulting from the new alinement and construction has been the basis for determining mitigation by the Ad Hoc Committee for fish and wildlife on the Coachella Canal. A more detailed discussion of losses and mitigation plans are included in Chapters III and IV.

8. Comment: The statement borrows figures relating to fishing recreation from our report on a similar Coachella Canal project (page 63, paragraph 1). As these data were based on certain conditions and assumptions that do not pertain to this project, their use is not valid.

Reply: The draft environmental statement, page 63, shows that a figure of 5,700 angler days per year was derived by taking the total (10,000 angler days per year) given in the Fish and Wildlife Service's (Bureau of Sport Fisheries and Wildlife) report of December 15, 1971, for the entire 86 miles of the

unlined canal and extrapolating to only 49 miles of unlined canal since only this amount is now being considered for lining.

Example:

$$10,000 \text{ angler days} \times \frac{49}{86} = 5,700 \text{ angler days}$$

Data derived from inventories conducted by California Department of Fish and Game, Fish and Wildlife Service, Bureau of Reclamation, and the University of San Diego at Calexico during October and November 1974, reveal that the area under consideration actually supports 6,100 man-days of angler use per year.

9. Comment: Part II of the report states that seepage along the unlined canal has created about 3,000 to 5,000 acres of wildlife habitat, 45 to 50 acres of year-round open waters and 450 acres of temporary open water. However, the loss of this important habitat is barely mentioned in Part II, Environmental Impacts and is not properly covered in Part IV, Mitigation and Enhancement features of the project. Included in this discussion should be a more comprehensive treatment of an earlier proposal to maintain portions of the old canal as fish and wildlife habitat.

Reply: Commitments or proposals for wildlife mitigation measures have been included in Chapter IV. Extensive coordination with respective State and Federal agencies including the Fish and Wildlife Service and other interested groups have resulted in the development of the mitigation measures. Coordination is ongoing where solutions to specific problems have not been resolved. An Ad Hoc Committee, consisting of members of the involved agencies, including the Fish and Wildlife Service, was organized for the purpose of assisting in the development of mitigation plans and to assist the Bureau in carrying through with agreed-upon mitigation measures.

10. Comment: Considerably greater effort is needed to provide for mitigation and enhancement of fish and wildlife resources. No consideration is given to mitigation of habitat losses downstream from Morelos Dam nor does the statement discuss mitigation required for habitat losses anticipated along the Coachella Canal. Also, the use of escape ladders, ramps, and foot bridges to reduce big-game losses in the canal have met with limited success. Fencing should be considered in this regard. Measures which can be taken to restore disturbed areas should be explored in greater depth and covered in more detail.

Reply: As previously stated, Chapter IV has been expanded to include mitigation for losses to be incurred by this project. Both Fish and Wildlife Ad Hoc Committees extensively analyzed previously suggested and other measures, including those suggested in this comment, during the processes of developing mitigation measures.

11. Comment: Section V, Unavoidable Adverse Effects - Needs considerably greater depth of discussion with regard to anticipated losses downstream from Morelos Dam and along the Coachella Canal. Losses associated with other project features also should receive greater consideration.

Reply: This comment has been satisfied in the revised final statement. A more decisive statement as to the impacts of changing the flows in the Colorado River below Morelos Dam on fish and wildlife population has been included in Chapter III and previous replies to this letter. Impacts associated with other project features have also been discussed in more detail.

12. Comment: Under Other Alternatives, page 212, alternative No. 7 should be given consideration in relation to its application in the Wellton-Mohawk Division. Decreased water application could have considerable impact on size of the desalting plant. This alternative should be covered in detail in this report.

Reply: Irrigation efficiency as applied to the Wellton-Mohawk Division has been discussed in the draft environmental statement and in the final environmental statement. Refer to pages 25 through 28 of the draft environmental statement and Chapter I of the final environmental statement for the discussion on the irrigation efficiency program which will be implemented in the Wellton-Mohawk Division.



DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

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June 21, 1974

Mr. Gilbert G. Stamm
Commissioner
Bureau of Reclamation
Department of the Interior

Dear Mr. Stamm:

This is in response to your letter of April 11, 1974, transmitting for our review and comment the Draft Environmental Statement for the Colorado River International Salinity Control Project. The proposed project includes (a) construction and operation of a desalting plant near Yuma, Arizona; (b) replacement of an existing metal flume with a buried siphon; (c) implementation of a program to improve irrigation efficiencies in combination with reducing the size of the project; (d) modification of the existing Gila River control measures at Painted Rock Dam; and (e) concrete lining of a 49 mile section of the Coachella Canal.

The relationship between the irrigation efficiency activities and the land purchase proposal is confusing in some of the sections. Some sections imply that the project will be reduced by 10,000 acres. Other sections indicate that an optimum mix of irrigation efficiency and land purchase will be selected. We were under the impression that the Advisory Committee, mentioned on page 27, will be developing specific information on this matter to guide a final selection. We suggest the results of the Advisory Committee's deliberations be included in the final statement.

The statement would be strengthened if it provided more information on the location and resources required to provide the 35 megawatts annually for this project. This additional energy requirement represents a direct impact of the proposed project and should be covered in more detail in the environmental statement.

Additional comments on the draft environmental statement are enclosed. We appreciate the opportunity to review this document.

Sincerely,

F.H. TSCHIRLEY
Coordinator, Environmental Quality

Enclosure

A-122

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6-26

U. S. DEPARTMENT OF AGRICULTURE

Additional Comments on Draft Environmental Statement
Colorado River International Salinity Control Project

1. There is no time span specified for use of the water saved through lining the Coachella Canal. Also, the legal basis for transferring this water is not specified. The statement should include more information on what is going to happen to the salvaged water after it is no longer used in conjunction with the project.
2. Page 21, line 1 - The statement would be strengthened if it clearly indicated where the water is coming from and the opportunity cost of the water.
3. Page 24, line 1 - The term "extremely promising" is a value judgment. We suggest the text include a statement of probability of success or eliminate the term. A number of value judgments are made throughout the report. Inclusion of more quantitative data to support these judgments would strengthen the statement.
4. Page 26, line 13 - More information on how optimization will be done, along with identifying specific criteria would be helpful. It appears that different segments of society possess different concepts of what optimum means to them. We suggest the discussion be expanded to cover such points.
5. Page 30, line 19 - It may be possible that slower release of floodwater will increase the total quantity of floodwater percolating into the underground aquifer, since water will be running in the channel for much longer periods of time. The statement would be strengthened if this possibility were addressed in this section.
6. Page 64 - Reference is made to "United States List of Endangered Native Fish and Wildlife" - Oct. 13, 1970. The statement should make the necessary changes to consider the species in the June 4, 1973 list.
7. Page 87 ff - Reference is made to wetlands and ponded areas. We suggest this discussion be expanded to differentiate between wet soils and wet lands as classified in the USDI, Fish and Wildlife Circular 39.
8. Page 115 - if a program to increase irrigation efficiency is successful, it appears that less water would need to be diverted into the Wellton-Mohawk Canal system. This point should be discussed in the statement. Water salvaged through lining a portion of the Coachella Canal is recognized as an additional supply that can be released to Mexico to dilute the more saline waters occurring downstream. This same principle would surely hold true for any water salvage activity, including on-farm activities.

9. Page 153, line 1 - Additional information would strengthen the statement. We suggest information be included to identify the beneficiaries, the losers, those who pay and how much, the amount of additional employment, and the effect on the current unemployment rate.

10. Page 187(a) - A table similar to Table 5 showing operation, maintenance and replacement would be helpful.

11. Pages 188 - 212 - The discussion of alternatives, while seemingly broad and all inclusive, does not focus on the total causes of salinity. Wellton-Mohawk is only one of many contributors, but because of its location it has been singled out as a primary cause. The flow of the Colorado River has been so depleted at the return point of the Wellton-Mohawk drain return that it can no longer dilute incoming salt without significant increases in concentration.

One alternative which might be investigated is to pump Wellton-Mohawk drainage flow back up the Colorado River and return it at a point which will permit adequate dilution at the international boundary. This approach, together with major improvements in irrigation efficiency may be less economically and environmentally costly than the proposed project.

12. Page 196 - It is difficult to determine if the cost of inactivating the project is a one-time or annual cost. The average annual cost, including operation, maintenance and replacement, of this alternative compared to the average annual cost of the project as shown in Table 5, page 187(a), would be informative.

13. Page 196, line 21 - What is the source of the 2.0 multiplier? The statement should address indirect costs as well as the discussion on indirect benefits.

Replies to Comments Made by the
Department of Agriculture
Washington, D.C.
(Letter of June 21, 1974)

1. Comment: The relationship between the irrigation efficiency activities and the land purchase is confusing in some of the sections. Some sections imply that the project will be reduced by 10,000 acres. Other sections indicate that an optimum of irrigation efficiency and land purchase will be selected. We were under the impression that the Advisory Committee, mentioned on page 27, will be developing specific information on this matter to guide a final selection. We suggest the results of the Advisory Committee's deliberations be included in the final statement.

Reply: The Advisory Committee's "Special Report on Measures for Reducing Return Flows from the Wellton-Mohawk Irrigation and Drainage District," dated September 1974, recommends reducing the irrigable acreage in the District from 75,000 to 65,000 acres which is about the acreage presently being irrigated. The report also recommends an onfarm irrigation efficiency improvement program with Federal assistance to landowners with the objective of ultimately reducing the drainage return flow from the existing level of about 214,000 acre-feet per year to about 136,000 acre-feet per year. (Loan copies of this report are available at the Yuma Projects Office, P. O. Bin 5569, 3800 Avenue 3 E, Yuma, Arizona 85364.) The Advisory Committee is highly confident that return flows due to drainage requirements will be reduced to 175,000 acre-feet per year and considers it reasonable to expect that return flows will be reduced to 150,000 acre-feet per year by the time the desalting plant is in operation. To obtain this reduction, the Advisory Council recommends system improvement on about 4,000 acres of citrus to convert to pressure systems and treatment on 20,000 acres of gravity system. It is the intention to implement both of these programs.

2. Comment: The statement would be strengthened if it provided more information on the location and resources required to provide the 35 megawatts annually for this project. This additional energy requirement represents a direct impact of the proposed project and should be covered in more detail in the environmental statement.

Reply: Chapter I of the final statement has been expanded to include further discussion on source and transmission of power. While it is true that the energy requirements represent a major impact of the proposed project, they

are secondary impacts with respect to the main purpose of the project. An evaluation of the environmental impacts of generating the required energy has been included in Chapter III.

3. Comment: There is no time span specified for use of the water saved through lining the Coachella Canal. Also, the legal basis for transferring this water is not specified. The statement should include more information on what is going to happen to the salvaged water after it is no longer used in conjunction with the project.

Reply: Expanded discussion has been included in Chapter I of the final environmental statement.

4. Comment: Page 21, line 1 - The statement would be strengthened if it clearly indicated (2) where the water is coming from and (b) the opportunity cost of the water.

Reply: (a) At the present time the State of Arizona is not using all of its entitlement to Colorado River water and will not have facilities to use the water until the Central Arizona Project is completed. However, the United States cannot unilaterally appropriate waters to the State to replace the return flows from the Wellton-Mohawk Irrigation and Drainage District that are being discharged below Morelos Dam because the waters of the Colorado River have all been allocated. Therefore, the equal volume of other water to be discharged to the Colorado River above Morelos Dam is from upstream Colorado River storage and from up to 60,000 acre-feet per year from the Yuma Mesa Well field which discharges above the dam.

(b) Economic, social, and political considerations center on enhancing international comity with the United Mexican States. Since it is impracticable to assess the full beneficial impact of improved quality of water, and since the social and political considerations are outside the realm of normal economic efficiency analysis, no attempt is made to quantify benefits in monetary terms in the environmental statement.

5. Comment: Page 24, line 3 - The term "extremely promising" is a value judgment. We suggest the text include a statement of probability of success or eliminate the term. A number of value judgments are made throughout the report. Inclusion of more quantitative data to support these judgments would strengthen the statement.

Reply: The statement has been revised throughout to give quantitative data on all aspects of the project.

6. Comment: Page 26, line 13 - More information on how optimization will be done, along with identifying specific criteria would be helpful. It appears that different segments of society pose different concepts of what optimum means to them. We suggest the discussion be expanded to cover such points.

Reply: The comment refers to "optimum irrigation management" which is the end result of the irrigation efficiency program. Refer to the report by the Advisory Committee as listed in the Literature Cited section for more information.

7. Comment: Page 30, line 19 - It may be possible that slower release of floodwater will increase the total quantity of floodwater percolating into the underground aquifer, since water will be running in the channel for much longer periods of time. The statement would be strengthened if this possibility were addressed in this section.

Reply: The very purpose of releasing floodwaters from Painted Rock Dam at a slower rate is to obtain maximum infiltration of floodwaters into ground-water aquifers above the irrigation district, before these waters reach and infiltrate the aquifer in the Wellton-Mohawk Division.

8. Comment: Page 64 - Reference is made to "United States List of Endangered Native Fish and Wildlife"--October 13, 1970. The statement should make the necessary changes to consider the species in the June 4, 1973, list.

Reply: The final environmental impact statement references the most current list of endangered species.

9. Comment: Page 87 - Reference is made to wetlands and ponded areas. We suggest this discuss be expanded to differentiate between wet soils and wet lands as classified in the USDI, Fish and Wildlife Circular 39.

Reply: The USDI Circular mentioned above does not differentiate between wet soils and wetlands. It presents the major types of soils found in wetland areas and then differentiates between the 20 wetland types. Using the circular as a guide, the soils of the ponded areas as described on page 87 are alluvial in nature. The ponds or wet areas would include the inland open freshwater type mixed with the inland fresh marsh types.

10. Comment: Page 115 - If a program to increase irrigation efficiency is successful, it appears that less water would need to be diverted into the Wellton-Mohawk Canal system. This point should be discussed in the statement.

Reply: Improved irrigation efficiency will require less diversion of Colorado River water and will result in less drainage return flow and hence a smaller desalting plant. It will not affect consumptive use within the District. Therefore, the lesser diversion has little environmental effect.

Assuming that through irrigation efficiency the drainage from the Wellton-Mohawk Irrigation District is reduced 78,000 acre-feet annually, theoretically consumptive use would remain the same, but the requirement for diversion would be reduced by 78,000 acre-feet per year. The average annual release of water below Parker Dam is approximately 7,000 ft³/s. The decreased requirement of the Wellton-Mohawk Irrigation District would be 78,000 acre-feet or 108 ft³/s. This would amount to a decrease in flow of 1-1/2 percent immediately below Parker Dam. The change downriver at the other major diversions of Headgate Rock Dam and Palo Verde Diversion Weir would be proportionate to the diversions. Environmental impact associated with the decrease in flow of the Colorado River would not be discernable.

11. Comment: Page 153, line 1 - Additional information would strengthen the statement. We suggest information be included to identify the beneficiaries, the losers, those who pay and how much, the amount of additional employment, and the effect on the current unemployment rate.

Reply: Water users in Mexico will benefit from the project because they will receive better quality Colorado River water than they would have in the absence of Minute No. 242 which guarantees Mexico a certain quality of water based on the quality of Colorado River water arriving at Imperial Dam.

Mexican water users will also receive more water as a result of Minute No. 242 because, in recent years, some of the Wellton-Mohawk water has been discharged below Morelos Dam and not replaced with better quality Colorado River water. In other words, Mexico received less than her Treaty allotment of 1,500,000 acre-feet in some years because she voluntarily bypassed some of the Wellton-Mohawk drainage water, which was not replaced, on the contention that it was too saline for use.

The intent of Minute No. 242 and the legislation authorizing the project was that there would be no hardship placed on existing water users in the United States.

The retirement of 10,000 acres of irrigable land in the Wellton-Mohawk Division of the Gila Project would limit development to about the present acreage being irrigated. The land retirement will place a limitation on development in the Division that may have ultimately been placed on the potential development of this acreage because of the Division's entitlement to the use of Colorado River water. In the Gila Reauthorization Act of July 30, 1947, the Wellton-Mohawk Division of the Gila Project was authorized to include an area comprising approximately 75,000 irrigable acres of land, or such number of irrigable acres as can be adequately irrigated by the beneficial consumptive use of no more than 300,000 acre-feet of water diverted annually from the Colorado River. The Supreme Court Decree of March 9, 1964, in regard to the rights of the various lower basin states to use Colorado River water, declared that "consumptive use" means diversions from the stream less such return flows thereto as are available for consumptive use in the United States or in satisfaction of the Mexican Treaty obligation. A study on water use, crops and yields in the Wellton-Mohawk Division for calendar years 1970, 1971 and 1972 revealed that consumptive use as defined by the Supreme Court Decree was about 300,000 acre-feet per year and the area in irrigation rotation was about 65,000 acres. In the absence of authorization or a separate determination that the Wellton-Mohawk Division could increase its water use to more than 300,000 acre-feet per year in accordance with the Supreme Court definition of consumptive use, it is unlikely that more than 65,000 acres in irrigation rotation could be sustained with the Division's Colorado River water allocation.

The legislation provides, either in conjunction with or in lieu of land acquisition, assistance to water users in the Wellton-Mohawk Irrigation and Drainage District in installing system improvements, such as ditch lining, change of field layouts, automatic equipment, sprinkler systems and bubbler systems, as a means of increasing irrigation efficiencies. Costs associated with the improvements and allocated to the water users on the basis of benefits received are to be reimbursed to the United States. All other costs associated with the desalting plant are nonreimbursable.

The legislation authorizes amendment of the contract between the United States and the Wellton-Mohawk Irrigation District for the repayment of costs of the irrigation drainage facilities. That portion of the existing repayment obligation owing to the United States and allocable to irrigable acreage eliminated from the District shall be nonreimbursable. If deemed appropriate, the District shall be given credit against its outstanding repayment obligation to offset any increase in operation and maintenance assessments per acre which may result from the District's increased operation and maintenance base.

The legislation authorizes acquisition of additional lands or interests in lands in Painted Rock Reservoir for temporary storage during periods of flooding to permit operation of the dam and reservoir so that the United States can meet the obligations of Minute No. 242. This acquisition may or may not be required and the legislation states: "No funds shall be expended for acquisition of land or interests therein until it is finally determined by a Federal court of competent jurisdiction that the Corps of Engineers presently lacks legal authority to use said lands for this purpose."

The city of Yuma may benefit from better quality water from the desalting plant if such water is available. The legislation states: "Any desalted water not needed for the purpose of this title may be exchanged at prices and under terms and conditions satisfactory to the Secretary and the proceeds therefrom shall be deposited in the General Fund of the Treasury. The City of Yuma, Arizona, shall have first right of refusal to any such water." The conditions under which water may be available to Yuma have not been determined.

The legislation authorizes concrete lining of the Coachella Canal or construction of a new concrete-lined canal for the first 49 miles. The United States is entitled to temporary use, during the interim period, of the water saved from seepage by lining or reconstruction of the canal. The water saved will be used to replace the Wellton-Mohawk water being bypassed and not utilized for delivery to Mexico. The interim period shall commence upon completion of the lining project and shall terminate when the Secretary of Interior delivers main stream Colorado River water to California in an amount less than the sum of the quantities requested by (1) the California agencies under contracts made pursuant to Section 5 of the Boulder Canyon Project Act and (2) Federal establishments to meet their water rights acquired in California in accordance with the Supreme Court decree in Arizona against California.

The cost of the canal lining project is to be repaid in 40 equal annual payments beginning the year following completion of construction. The repayment is to be prorated between the United States and the Coachella Valley County Water District. During the interim period, the annual repayment installments are to be nonreimbursable. After the interim period the annual repayment installments, or portions thereof, are to be paid by the Coachella Valley County Water District.

During the period of June 1973 through September 1974 the unemployment rate in Yuma County, Arizona, varied between 5.0 and 8.2 percent.^{1/} The September 1974 unemployment rate was 6.4 percent. The prevailing unemployment rate when construction activities commence cannot be predicted, however, Yuma County and particularly the Yuma area will benefit from increased economic activity because of the project and this will provide a beneficial impact on the unemployment rate.

12. Comment: Page 187 (a) - A table similar to Table 5 showing operation, maintenance, and replacement would be helpful.

Reply: A discussion of the operation and maintenance cost of the desalting plant, including cost for energy, is included in Chapter I.

^{1/}Labor Market Information Report for Title II of Comprehensive Manpower Act, Department of Economic Security, Yuma County, Arizona

13. Comment: Pages 188-212 - The discussion of alternatives, while seemingly broad and all inclusive, does not focus on the total causes of salinity. Wellton-Mohawk is only one of many contributors, but because of its location it has been singled out as a primary cause. The flow of the Colorado River has been so depleted at the return point of the Wellton-Mohawk drain return that it can no longer dilute incoming salt without significant increases in concentration.

One alternative which might be investigated is to pump Wellton-Mohawk drainage flow back up the Colorado River and return it at a point which will permit adequate dilution at the international boundary. This approach, together with major improvements in irrigation efficiency, may be less economically and environmentally costly than the proposed project.

Reply: This project, as discussed in the Draft Environmental Statement, is concerned primarily with measures required to implement commitments made to Mexico in Minute No. 242. Other projects have been authorized to reduce salinity concentrations above Imperial Dam, i.e., Title II of the same legislative authorization, the Colorado River Basin Salinity Control Act (Public Law 93-320). Discharge of Wellton-Mohawk drainage flows to any point on the Colorado River above Morelos Dam would be inconsistent with the objectives of Title II, Public Law 93-320, would not comply with requirements of Minute No. 242 and would be contrary to the National standard for effluent discharge into navigable waters.

14. Comment: Page 196 - It is difficult to determine if the cost of inactivating the project is a one-time or annual cost. The average cost, including operation, maintenance, and replacement, of this alternative compared to the average annual cost of the project as shown in Table 5, page 187(a), would be informative.

Reply: Cost estimates relating to the alternative of total shutdown of the Wellton-Mohawk Division are given as direct one-time costs. The average annual cost of this alternative for future years would at the most be speculative. The total annual economic impact in 1973 from \$36.5 million annual crop income on the business community, on industry, on income from taxes,

and on all areas affected by this flow of income is estimated by the University of Arizona to represent \$5 for every dollar of agricultural income providing a total annual impact of \$182,500,000 from crop income.

Based on an earlier study by the Bureau of Reclamation, updated with the help of the University of Arizona, the annual contribution to Federal taxes is estimated at \$24 million. Contribution to State income is estimated at \$2.4 million; State sales tax at \$4.4 million. Yuma County receives \$1.2 million from this area annually in property taxes. The total estimated contribution to taxes by the Wellton-Mohawk District farm economy was \$32 million in 1973.

15. Comment: Page 196, line 21 - What is the source of the 2.0 multiplier? The statement should address indirect costs as well as the discussion on indirect benefits.

Reply: Various studies have indicated that the multiplier should be in the range of 2 to 5. Studies prepared by the University of Arizona have suggested that a multiplier of 5 would not be out of line. Considering the intensive farming operations that would be lost to the area, the multiplier is a conservative estimate of the indirect losses which would be experienced with inactivation of the project. The 1973 gross economic benefits from the entire Wellton-Mohawk Irrigation and Drainage District were estimated at \$36,500,000. The application of a multiplier which would include such factors as primary and secondary benefits, propensity to spend, opportunities foregone, service-related economics, educational contributions and losses and other intangibles associated with secondary impacts would increase the annual benefits to a more realistic estimate as to what segment of the Yuma County economy is actually attributable to the Wellton-Mohawk District.

Rt. 1 Box 594~~5~~
Yuma, Arizona!
85364
June 24, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
Boulder City, Nevada

Dear Mr. Lundberg:

My family and I are residents of the Yuma area. We own land and farm it in the river bed below Morelos Dam. My children and many of their friends spend hundreds of hours each year riding their horses and playing in the vicinity of the river. Hundreds of other people also use the riverbed as a recreation area.

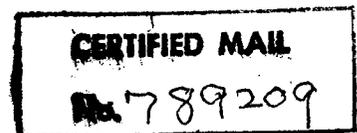
We are disturbed at the prospect of an open salinity drain and its inevitable dusty ditch banks being carved from this already narrow strip of wild. Besides devouring a good piece of the already scant wildlife habitat and play area on the west margin of the valley it will no doubt have two dusty ditch banks similar to the Wellton Mohawk drain north of us. This creates a serious dust problem for the people and vegetation nearby. Additionally these ditches restrict access to the riverbed for substantial stretches further reducing its value for recreation.

In view of these inevitable and irreparable damages to our environment and life style that an open ditch will create I think that an underground drain should be built instead. This would minimize the environmental damage as vegetation could regrow, the elevated dusty ditch bank roads would not be necessary, the width of the right of way required might not be quite as great and the access to the riverbed would not be restricted. Although it would be somewhat more expensive than an open ditch it is not prohibitively so.

Sincerely,

Caroline Jessen
Caroline Jessen

A-134



Reply to Comment Made by
Ms. Caroline Jessen
(Letter of June 24, 1974)

1. Comment: We are disturbed at the prospect of an open salinity drain and its inevitable dusty ditch banks being carved from this already narrow strip of wild. Besides devouring a good piece of the already scant wildlife habitat and play area on the west margin of the valley it will no doubt have two dusty ditch banks similar to the Wellton Mohawk drain north of us. This creates a serious dust problem for the people and vegetation nearby. Additionally these ditches restrict access to the riverbed for substantial stretches further reducing its value for recreation.

In view of these inevitable and irreparable damages to our environment and life style that an open ditch will create I think than an underground drain should be built instead. This would minimize the environmental damage as vegetation could regrow, the elevated dusty ditch bank roads would not be necessary, the width of the right of way required might not be quite as great and the access to the riverbed would not be restricted. Although it would be somewhat more expensive than an open ditch it is not prohibitively so.

Reply: The extension of the bypass drain will be required to go from just below Morelos Dam to the Santa Clara Slough in Mexico and has been planned as a concrete-lined canal section of 353 ft³/s capacity. The objection to an open canal of this type and size is understandable, but the tremendous cost of constructing an underground conduit of equal capacity could not be justified.

Current plans are for most of the bypass drain extension to be built within the right-of-way of the Yuma Valley levee along the riverside toe thereof. Access across the bypass drain extension will be provided at infrequent intervals or at existing roadway crossings and there should be little adverse effect on present recreational uses of the riverbed. Every effort is being made to minimize any adverse effects on the environment.

CALIFORNIA FARM BUREAU FEDERATION

ALLAN GRANT
President

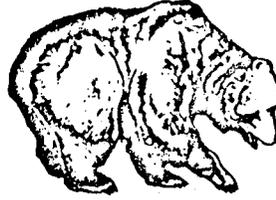
JUL 2 1974

FREDERICK J. HERINGER
1st Vice-President

HOWARD WACKMAN, II
2nd Vice-President

RICHARD W. OWENS
Secretary

ROBERT P. SIMPSON
Treasurer



PUBLIC AFFAIRS DIVISION
JAMES C. ELLER, Manager
11TH & L BUILDING
SACRAMENTO, CALIF., 958
TELEPHONE: 916 - 446-4647



June 28, 1974

Carol L.
Colin Salinity

U.S. Department of Interior
Office of Saline Water and Bureau of Reclamation
and
U.S. Department of State
International Boundary and Water Commission

Dear Sirs:

The California Farm Bureau Federation wishes to comment on your Draft Environmental Statement, Proposed Colorado River International Salinity Control Project.

We are a voluntary, dues paying private organization composed of 63,000 member families with agricultural interests. Although you have solicited comments on the "Draft" only from public agencies and an extremely limited number of environmental organizations, you have not requested comments from any landowner or land operator groups. We are sure that this is an oversight on your part which we hope you will promptly rectify. With the exception of 2 privately owned public utilities, a racial group and one engineering firm, all the non-governmental groups from which you requested comments were recreationally oriented. We do not believe you can receive a well balanced commentary from such a narrow segment of the population's interest, particularly in view of the absence of taxpayer groups. We therefore believe you should consider our comments particularly, and that you should also solicit comments from other taxpaying groups.

The construction of the Wellton-Mohawk Project (WMP) was not based on sound economic prognoses. It may not at that time have been known as such, but economics now seem to clearly point this out. The WMP may not be the single cause of our problem with Mexico, but without this project, no subsequent construction projects would now be necessary to settle the requirements of Minute 242--namely to deliver to Mexico water of a salinity not more than 115 ppm over Imperial Dam quality.

The already questionable economic value of the WMP will not be rectified by building in more costs, even though these may have been authorized by Congress.

The WMP can not pay for its own irrigation and drainage costs at current true costs for energy, let alone justify either the 98 million dollar capital costs or the operational costs (not only not listed in table of contents but also not even mentioned in the text) of the desalter, which we understand are expected to be about \$1,500,000.00 per month. This amounts to more than \$24.00 per acre per month based on the total acres proposed to be maintained under irrigation in the WMP which causes the problem. No mention of this is made in the draft. We believe this to be an inexcuseable omission which should not only be corrected in the final EIS but must be fully developed therein. Our chief criticism of this "Draft", however, is that it offers no information of substance to indicate that alternative actions have been seriously considered and compared with the solution favored in the "Draft".

We believe true facts would clearly show the advantages of either of two alternatives, one of which is not even considered in the "Draft". It is highly probable that the government should buy back the interest of the fee title holders in the Wellton-Mohawk Project. No figures are given on this alternative. If this is not a viable and favorable alternative then the next one which should be studied is the use of that Wellton-Mohawk Drain water for evaporation in the cooling towers of the electric generation facilities which are currently planned to be built in that part of the United States but on other higher quality sources of water.

Although this Draft EIS is about an inch and a half thick, in our opinion it qualifies in no other way as a true study of the impacts of the proposal and alternatives to the proposal. It must, therefore, be rewritten in "Draft" form and recirculated, prior to being put in "Final" form.

Sincerely,

William I. DuBois

William I. DuBois
Director of Natural Resources

Replies to Comments Made by the
California Farm Bureau Federation
(Letter of June 28, 1974)

1. Comment: We are a voluntary, dues paying private organization composed of 63,000 member families with agricultural interests. Although you have solicited comments on the "Draft" only from public agencies and an extremely limited number of environmental organizations, you have not requested comments from any landowner or land operator groups. We are sure that this is an oversight on your part which we hope you will promptly rectify. With the exception of two privately owned public utilities, a racial group and one engineering firm, all the nongovernmental groups from which you requested comments were recreationally oriented. We do not believe you can receive a well balanced commentary from such a narrow segment of the population's interest, particularly in view of the absence of taxpayer groups. We therefore believe you should consider our comments particularly, and that you should also solicit comments from other taxpaying groups.

Reply: OMB Circular No. A-95 and the Council on Environmental Quality have outlined guidelines for soliciting comments and review of draft environmental statements. The guidelines suggest that comments be solicited from Federal, Federal-State, State, and local agencies which have jurisdiction by law or special expertise with respect to any environmental impact involved. The guidelines also suggest that agencies should make provisions for facilitating the comment of public and private organizations and individuals by announcing the availability of draft environmental statements and by making copies available to entities that request an opportunity for comment.

The above-mentioned guidelines were followed in soliciting comments for the draft environmental statement. All private individuals and organizations with interest pertaining to the draft environmental statement are invited to comment regardless of whether or not they have been actively requested to submit comments. In an effort to reach as many individuals as possible for comment, the availability of the draft environmental statement was announced in the Federal Register and local newspapers so that more

comments would be generated from the concerned public. Reclamation also has a policy of providing copies of environmental statements to as many public libraries in the project area as possible. The subject statement was sent to 17 libraries in the project vicinity. A public hearing is conducted on all draft environmental statements. The hearing on the salinity control statement was held in Yuma, Arizona, on October 5, 1974. The notice of the hearing was announced numerous times on radio, television, and in local newspapers. Notices of the Public Hearing were mailed to over 600 separate entities and individuals.

2. Comment: The construction of the Wellton-Mohawk Project (WMP) was not based on sound economic prognoses. It may not at that time have been known as such, but economics now seem to clearly point this out. The WMP may not be the single cause of our problem with Mexico, but without this project, no subsequent construction projects would now be necessary to settle the requirements of Minute No. 242--namely to deliver to Mexico water of a salinity not more than 115 p/m over Imperial Dam quality.

The already questionable economic value of the WMP will not be rectified by building in more costs, even though these may have been authorized by Congress.

The WMP cannot pay for its own irrigation and drainage costs at current true costs for energy, let alone justify either the 98 million dollar capital costs or the operational costs (not only not listed in table of contents but also not even mentioned in the text) of the desalter, which we understand are expected to be about \$1,500,000.00 per month. This amounts to more than \$24.00 per acre per month based on the total acres proposed to be maintained under irrigation in the WMP which causes the problem. No mention of this is made in the draft. We believe this to be an inexcusable omission which should not only be corrected in the final environmental impact statement but must be fully developed therein.

Reply: The Wellton-Mohawk Division of the Gila Project was authorized and constructed in accordance with Reclamation Law. The Wellton-Mohawk Irrigation and Drainage District is repaying the cost of the constructed works to the United States.

The costs of desalting the Wellton-Mohawk return flows have been designated nonreimbursable by Congress as stated in Title I of the Colorado River Basin Salinity Control Act. The operation, maintenance, replacement and power costs of the desalting complex are estimated to range from \$9.8 million to \$11.7 million annually.

3. Comment: Our chief criticism of this "Draft", however, is that it offers no information of substance to indicate that alternative actions have been seriously considered and compared with the solution favored in the "Draft".

We believe true facts would clearly show the advantages of either of two alternatives, one of which is not even considered in the "Draft". It is highly probable that the government should buy the interest of the fee title holders in the Wellton-Mohawk Project. No figures are given on this alternative. If this is not a viable and favorable alternative then the next on which should be studied is the use of that Wellton-Mohawk Drain water for evaporation in cooling towers of the electric generation facilities which are currently planned to be built in that part of the United States, but on other higher quality sources of water.

Reply: In the draft environmental statement, Chapter VIII, three alternatives to the project are presented and discussed. Alternatives to specific features and eight alternatives to the project, all of which were seriously considered, and were presented previously in the Brownell report to the President and in the Final Environmental Impact Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico, which has been filed with the Council on Environmental Quality by the State Department.

The alternative of total shutdown of the Wellton-Mohawk Division, which would involve the government's buying back the interests of the fee title holders is presented as an alternative to the draft environmental statement. Figures are given on this alternative on page 190 of the draft environmental statement. "The direct costs of such a measure are estimated at between \$125 and \$150 million."

Use of Wellton-Mohawk waters in the cooling towers of an electrical generating plant is a possibility. However,

use of the water in this way is not a conservative use of the water as additional waters from the Colorado River would have to be released to Mexico to replace this return drainage flow. Also, this use of water would not solve the problem of eliminating the discharge of saline drainage flows into the Colorado River in the shortest time span possible as agreed to with Mexico in Minute No. 242.

4. Comment: Although this Draft environmental impact statement is about an inch and a half thick, in our opinion it qualifies in no other way as a true study of the impacts of the proposal and alternatives to the proposal. It must therefore, be rewritten in "Draft" form and recirculated, prior to being put in "Final" form.

Reply: Although we have received many favorable and concurring comments on the draft environmental statement, we recognize the need for substantial revision before it can be finalized. The very meaning of the preface-- "Draft"--Environmental Statement recognizes that it is such, and in most instances is subject to extensive revision before being filed with the Council on Environmental Quality as a final environmental impact statement. Council on Environmental Quality guidelines state that-- a draft statement should be as complete as possible at the time it is prepared--and that--substantive comments received on the draft should be given full consideration when preparing the final environmental statement.

NORMAN B. LIVERMORE, JR.
SECRETARY

RONALD REAGAN
GOVERNOR OF
CALIFORNIA

OFFICE OF THE SECRETARY
RESOURCES BUILDING
1416 NINTH STREET
95814

Department of Conservation
Department of Fish and Game
Department of Navigation and
Ocean Development
Department of Parks and Recreation
Department of Water Resources



Air Resources Board
Colorado River Board
San Francisco Bay Conservation and
Development Commission
State Lands Commission
State Reclamation Board
State Water Resources Control Board
Regional Water Quality Control Boards

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

JUL 2 1974.

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
U. S. Department of the Interior
Post Office Box 427
Boulder City, NV 89005

Dear Mr. Lundberg:

The State of California has reviewed the Draft Environmental Statement for the Colorado River International Salinity Control Project, dated April 1, 1974, which was submitted to the Office of Intergovernmental Management (State Clearinghouse) within the Governor's Office. Participating in this review, which fulfills the requirements under Part II of the U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969, were the Departments of Transportation, Food and Agriculture, Health, Conservation, Fish and Game, Navigation and Ocean Development, Parks and Recreation, and Water Resources; the State Water Resources Control Board; the Solid Waste Management Board; and the Colorado River Board of California.

The State's general comments are given below and the specific comments are attached.

Proposed Legislation

The statement reports that it was prepared in support of H.R. 12834 and S. 3094. Both of these bills are obsolete since on June 24, 1974, the President signed the Colorado River Basin Salinity Control Act. The environmental statement should be directed toward this act.

Objectives of the Project

The statement's description of the objectives of the project is only partially correct. The proposed action will control only the relationship between the salinity at Imperial Dam and the salinity at Morelos Dam and will have no counteracting effect on the salinity increases caused by continued Upper Basin development. To prevent future salinity increases to Mexico, it will be necessary to have a basinwide Colorado River salinity control program.

According to the statement, desalting the Wellton-Mohawk drain water will save about 132,000 acre-feet of water annually in the United States. However, the purpose of the desalting plant is to upgrade the quality of the drain water to meet the requirements of Minute No. 242. Therefore, there will be no saving of water.

The section of the statement that describes the period which starts after authorization by Congress of necessary works and necessary funds and ends with the commencement of operation of the desalting plant should be rewritten to make the following points:

1. After the necessary authorizations by Congress, all Wellton-Mohawk drain water will be replaced by other water. Because no facilities to replace the water will be available for several years, the United States will be debited the amount of releases to Mexico required to replace the Wellton-Mohawk drain water.
2. After completion of the new Coachella Canal, the United States will be credited with an amount of water equal to that saved by the construction of the new canal.
3. The crediting to the United States of the above amount of water is temporary and ends the first year that the Secretary of the Interior does not meet all the water delivery requests of the California agencies holding Colorado River water rights. This will most likely occur when the United States commences deliveries to the Central Arizona Project.
4. The statement should not say that "The water saved can be used as replacement water...." The water saved because of lowering of delivery requirements by the Coachella Valley County Water District after completion of the new Coachella Canal will be stored in Colorado River reservoirs. An amount equal to the Coachella Canal salvage will be credited to the United States for the purpose of delivering water to Mexico as a replacement for the bypassed Wellton-Mohawk water.

The statement should also say that, after the desalting plant is in operation, any credits from the savings due to Coachella Canal lining would be used to: (a) offset past debits, (b) credit against brine discharge from the desalting plant, and (c) accumulate credits to offset future brine discharges.

Power Sources

The statement reports that electric energy required for the desalting complex will be supplied by private and public (nonfederal and federal) entities in the southwest area. However, the bills active in Congress provide that the Secretary of the Interior shall use sources of power that will not diminish the supply available to preference customers from federal power systems operated by the Secretary.

Water Rights

The reference to the Secretary of the Interior's allocation of water for fish and wildlife areas along the Coachella Canal from the water to be salvaged from the lining of the canal should be corrected; all Colorado River water in California is apportioned and there is no water available for consumptive use for new purposes on a permanent basis. The relative priority of such allocation would be so low that the water right would be realized only on a short-run basis. Moreover, the United States is prohibited, by the Supreme Court decree in Arizona v. California, from releasing Colorado River water except in accordance with the allocations made within that decree. If further reservations of main-stream water are made by the United States, these reservations would be subject to present perfected rights and to rights under contracts made under Section 5 of the Boulder Canyon Project Act. The practical result of this would be that, after the Central Arizona Project is in operation when California is likely to be cut back in its Colorado River diversions, there would be no water available from such an allocation.

The reference to an allocation or nonallocation of a specific amount of water for consumptive use for the Salton Sea National Wildlife Refuge is not applicable to this project and should be deleted.

According to the statement, the State of California will have to determine the priority of use of the 4.4 million acre-feet of California's diversion of water from the Colorado. This is not the case, however, because priorities of water already have been set by the State and the agencies holding water rights under the California Seven-Party Water Agreement. These priorities were incorporated into and confirmed by contracts between the United States and California water agencies. Present perfected rights will be determined by the Supreme Court in accordance with Article VI of the decree in Arizona v. California.

Augmentation of the Flow of the Colorado River

The section of the statement concerning augmentation of the Colorado River should be deleted or substantially qualified because neither California State Water Project water nor weather modification are believed to be viable alternatives for augmenting the flow of the River. Also, the estimate that augmentation of the Colorado River could lower the 1978 projected salinity at Morelos Dam by 347 ppm is not supported in the report and appears excessive.

The statement suggests that a short-term agreement might possibly be negotiated whereby Colorado River water presently being diverted by Southern California could be withheld and the diversions replaced by California State Water Project water. This is not considered to be a workable alternative. Such an exchange would require approval of the Metropolitan Water District of Southern California which has gone on record in opposition. The approval of other agencies holding contracts for the delivery of water from the Colorado River would also be required. Furthermore, the unused capacity in the California Aqueduct of the State Water Project, which would have to be utilized in implementing the alternative, will be needed to carry out plans now being formulated for storing water in dewatered zones of ground water basins.

Weather modification is also an improbable alternative at the present time. The first sentence under this alternative acknowledges that further research and experimentation will be required. The cited estimate of 2.0 million acre-feet per year of additional streamflow in the Upper Colorado River Basin is at variance with recent Bureau of Reclamation estimates that only 1.3 million acre-feet per year would be produced. It is understood that neither figure can be firmly supported at present. It is questionable that the addition of even 2.0 million acre-feet to Upper Basin streamflow would reduce the salinity at the Northerly International Boundary by 70 ppm, as reported in the statement. A reduction in salinity of this size would probably require that a large quantity of water bypass the Mexican diversion point. Such a waste of the River's water supply to the Gulf of California would be an unwise use of water and should not be proposed. The statement did not include the assumptions made regarding the estimated salinity reductions, such as (1) the estimated salinity of the augmented runoff in the Upper Basin before it arrives at the mainstream of the Colorado River, (2) whether or not any of the augmented supply is consumptively used in the Lower Basin, and (3) how much, if any, water is wasted to the Gulf of California. A description of the assumptions made should accompany any estimate of salinity reduction to weather modification.

Feasibility of Desalting Plant

The report's description of the proposed desalting plant and the state of the art of the technology of membrane desalting leaves the impression that the proposal is uncertain. Because of the energy requirements and the high estimated cost of this plant, efforts should be made to strengthen these portions of the report in order to justify such a large expenditure.

Desalting Plant Wastes

Information should be provided on the expected frequency or risk of temporary diversions. The expected effects of temporary diversions, if any, of the waste stream to the Colorado River should be discussed.

Coachella Canal

During the lining of the Coachella Canal, adequate precautions must be taken to prevent any waste materials (sewage, oil, construction materials, etc.) from entering the adjacent existing canal throughout the construction period. Justification should be given for the decision to accept the 10 percent loss caused by leaving 37 miles of the Coachella Canal unlined.

Solid Waste Management

The quantity of solid wastes generated in the construction phases of this project in California should be estimated. The impact of this waste load on existing solid waste disposal services should be assessed and the quantity of wastes generated should be correlated with the solid waste management planning activities of Imperial County.

Seismicity Design Criteria

Additional geologic and seismic information should be provided. This data should be conclusive enough to clarify questions related to the design of engineered structures.

The final environmental statement should also include information regarding the potential for liquefaction, hydro-compaction, seismic-compaction and ground rupture.

The following statement is made in the environmental statement, "Special Foundation Treatment will be required for all structures as a matter of seismic design to compensate for the remote possibility of severe earthquakes, which may cause liquefaction". This "special treatment" should be described in sufficient detail to permit reviewers to determine the adequacy and effectiveness of the "treatment".

Fish and Wildlife

The statement does not meet the requirements of the National Environmental Policy Act because it does not adequately treat the impact on fish and wildlife and the alternatives to mitigate fish and wildlife losses.

The onsite mitigation measures contained in the Bureau of Sport Fisheries and Wildlife report of December 15, 1971, are mentioned but are dismissed as impractical to accomplish. If the Bureau of Reclamation cannot mitigate onsite wildlife losses, it should consider offsite mitigation measures, for instance, measures applied outside of the Colorado River drainage where water is available to create replacement habitat.

Suitable offsite mitigation could be accomplished by purchasing and irrigating an estimated 3,000 to 5,000 acres.

Description of Alternatives

The report's description of alternatives includes details on only three: total shutdown of the Wellton-Mohawk Division, augmentation, and moratorium on basin development. As previously noted, augmentation is not an alternative and should be deleted.

The details on the "Other Alternatives" is said to be contained in the Environmental Impact Statement prepared by the Brownell Task Force and in the Department of State's Final Environmental Impact Statement that was filed with CEQA in 1973. A review should be made of this section of the report to be sure that enough information on alternatives is included to comply with the requirements of the National Environmental Policy Act.

Mr. E. A. Lundberg

-6-

Thank you for the opportunity to review and comment on this Draft Environmental Statement.

Sincerely yours,

N. B. LIVERMORE, JR.
Secretary for Resources

By

Paul L. Clifton

Attachment

cc: Director of Management Systems
State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814
(SCH No. 74042263)

A-147

SPECIFIC COMMENTS ON THE
DRAFT ENVIRONMENTAL STATEMENT

Colorado River International
Salinity Control Project

These specific comments are an integral part of the State's comments.

1st Unnumbered Page of "Summary"

Under Item 2 (the brief description of the action), the use of the term "interim measure" to describe the Coachella Canal replacement could be misconstrued because the new lined canal will be permanent. It should be made clear that the reference to interim measure means only the temporary use by the United States of a quantity of water equal to that salvaged by the new lined Coachella Canal.

The third sentence states that the complex will divert about 43,000 acre-feet of 9,600 ppm TDS water to Santa Clara Slough in Mexico. It should be made clear that this is the brine discharge from the desalting plant, not an existing water supply.

Page 5, last paragraph

This paragraph describes the appointment of Herbert Brownell as Special Representative and the assistance provided by an Interagency Task Force. It would probably be useful to mention at this point that the seven-state Committee of Fourteen also met and consulted with Mr. Brownell and advised him during his deliberations.

Page 14, 1st sentence

The description of the formal agreements and contracts that govern the management of the River should also mention power contracts and water contracts with entities other than irrigation districts.

Page 14, Item 1.b.

This description of Minute No. 218 should also indicate that it was extended on two occasions.

Page 15, 1st sentence

We recommend changing "major compacts and agreements" to "major compacts, legislation, and court decisions".

Page 48, last paragraph, second sentence

This sentence should be rewritten as discussed in the general comments under "Objectives of the Project".

Page 101, 1st paragraph

The first sentence is incorrect. The measures proposed for below Imperial Dam would have no counteracting effect on the salinity increases caused by continued Upper Basin development. Also there is no mention of the proposed basinwide salinity control program, which includes measures upstream from Imperial Dam and which would be effective in counteracting the continued increase in salinity of the Colorado River water flowing to the Lower Basin.

Page 114, 1st paragraph

In the second sentence of this paragraph, it is recommended that "salinity" be replaced by "average annual salinity".

Page 138, last sentence of last paragraph

This sentence should be rewritten as discussed in the general comments under "Objectives of the Project".

Page 142, 3rd paragraph

It is stated that recommendations for mitigating actions will be coordinated with the California Department of Fish and Game and the Bureau of Sport Fisheries and Wildlife. The Colorado River Board and the agencies holding Colorado River contracts should also be included in the coordination described.

Page 151, last paragraph

According to the proposed schedule for the desalting plant, power will be needed in four to five years. It is therefore necessary to discuss alternative power sources at this time, and we recommend that this be done.

Concerning the regional seismicity related to the Desalting Plant, if no estimates of earthquake-induced accelerations are required, then the report is acceptable. If, however, accelerations are required, the report should be completed to indicate this value. The following comments may prove useful:

1. The Sand Hills fault, which may tie in with the Algodones fault, is not a positive identification but was inferred.
2. Brune and Allen (1965) observed no microearthquakes associated with the Sand Hills fault (station at Glamis).
3. CIF catalog shows no major earthquakes ($M \geq 6.0$) have occurred within 50 km of the site; even if one were to occur ($\Delta = 50$ km), it would induce perhaps 0.2 g acceleration.
4. Dr. Hill's array has operated for a year in the Imperial Valley and has located no shocks that could be associated with the Sand Hills fault.
5. The possible creep identified (100 km) northwest of the site may be due to sympathetic adjustment during the Borrego Mountain "quake".
6. The bedrock acceleration map indicates a possible 0.3 g to 0.4 g acceleration, but it assumes an active Sand Hills fault.

The following references could be consulted regarding the seismicity design criteria:

1. Allen, C., St. Amand, P., Richter, C., and Nordquist, J. (1965); Relationship between seismicity and geologic structure in the southern California region, BSSA, v. 55, n. 4, p. 753.
2. Brune, J., and Allen, C. (1967); A micro-earthquake survey of the San Andreas fault system in southern California, BSSA, v. 57, no. 2, p. 277.
3. Greensfelder, R. (1972); Maximum expected bedrock accelerations from earthquakes in California (under revision for publication). California Division of Mines and Geology, Sacramento, California 95814.
4. Hileman, J., Allen, C., and Nordquist, J. (1973); Seismicity of the southern California region: 1 January 1932 to 31 December 1972, Seismological Laboratory, California Institute of Technology, Pasadena, California 91109.
5. Hill, Dr. D. seismologist, USGS, Menlo Park, California; personal communication, June 1974.
6. Jennings, C. (1973); Preliminary Report 13, Preliminary Fault and Geologic Map: Scale 1:750,000, California Division of Mines and Geology, Sacramento, California 95814.

Replies to Comments Made by the
Resources Agency of California
Sacramento, California
(Letter of July 2, 1974)

1. Comment: The statement reports that it was prepared in support of H. R. 12834 and S. 3094. Both of these bills are obsolete since on June 24, 1974, the President signed the Colorado River Basin Salinity Control Act. The environmental statement should be directed toward this act.

Reply: The draft environmental statement was prepared and filed on April 1, 1974, to support legislative action of H.R. 12834 and S. 3094 which were being considered in Congress at the time. On April 1, 1974 a supplement to the draft environmental impact statement was issued to describe the additional features included in the final version of Title I, Public Law 93-320. A public hearing on all features of Title I was conducted in Yuma, Arizona on October 5, 1974. The final environmental statement has been revised to describe the environmental considerations relative to Title I of the Colorado River Basin Salinity Control Act (Public Law 93-320).

2. Comment: The statement's description of the objectives of the project is only partially correct. The proposed action will control only the relationship between the salinity at Imperial Dam and the salinity at Morelos Dam and will have no counteracting effect on the salinity increases caused by continued Upper Basin development. To prevent future salinity increases to Mexico, it will be necessary to have a basinwide Colorado River salinity control program.

Reply: The draft environmental statement on page 22 states that the project will stabilize the quality of Colorado River water delivered to Mexico at Morelos Dam. This is true, but separate measures included in the Title II Section of Public Law 93-320 will require implementation in the Colorado River Basin upstream from Imperial Dam to maintain the stability of the water quality. The Title I project will help to stabilize it by eliminating one concentrated salt source.

3. Comment: According to the statement, desalting the Wellton-Mohawk drainage water will save about 132,000 acre-feet of water

annually in the United States. However, the purpose of the desalting plant is to upgrade the quality of the drain water to meet the requirements of Minute No. 242. Therefore, there will be no saving of water.

Reply:

All of the Wellton-Mohawk drainage water amounting to about 175,000 acre-feet per year is currently being discharged below Morelos Dam into the Colorado River channel without any credit toward the Treaty of 1944. As a result, this water is not being used beneficially and in that sense is lost as a resource and will continue to be lost until the desalting complex is functioning. Through the desalting process about 132,000 acre-feet of water annually will be desalted and blended and put back into beneficial use. In this sense the project will save water.

4. Comment:

The section of the statement that describes the period which starts after authorization by Congress of necessary works and necessary funds and ends with the commencement of operation of the desalting plant should be rewritten to make the following points:

1. After the necessary authorizations by Congress, all Wellton-Mohawk drain water will be replaced by other water. Because no facilities to replace the water will be available for several years the United States will be debited the amount of releases to Mexico required to replace the Wellton-Mohawk drain water.
2. After completion of the new Coachella Canal, the United States will be credited with an amount of water equal to that saved by the construction of a new canal.
3. The crediting to the United States of the above amount of water is temporary and ends the first year that the Secretary of the Interior does not meet all the water delivery requests of the California agencies holding Colorado River water rights. This will most likely occur when the United States commences deliveries to the Central Arizona Project.
4. The statement should not say that "The water saved can be used as replacement water...." The water saved because of lowering of delivery requirements by the

Coachella Valley County Water District after completion of the new Coachella Canal will be stored in Colorado River reservoirs. An amount equal to the Coachella Canal salvage will be credited to the United States for the purpose of delivering water to Mexico as a replacement for the bypassed Wellton-Mohawk water.

Reply: These suggestions have been considered in the revision of the final environmental statement.

5. Comment: The statement should also say that, after the desalting plant is in operation, any credits from the savings due to Coachella Canal lining would be used to: (a) offset past debits, (b) credit against brine discharge from the desalting plant, and (c) accumulate credits to offset future brine discharges.

Reply: This comment has been considered in the revision of the final environmental statement.

6. Comment: The statement reports that electric energy required for the desalting complex will be supplied by private and public (non-federal and federal) entities in the southwest area. However, the bills active in Congress provide that the Secretary of the Interior shall use sources of power that will not diminish the supply available to preference customers from federal power systems operated by the Secretary.

Reply: Chapter I of the final statement has been expanded to include further discussion of power requirements. The use of Navajo Project power will not diminish the supply available to preference customers from Federal power systems operated by the Secretary.

7. Comment: The reference on page 169 to the Secretary of the Interior's allocation of water for fish and wildlife areas along the Coachella Canal from the water to be salvaged from the lining of the canal should be corrected; all Colorado River water in California is apportioned and there is no water available for consumptive use for new purposes on a permanent basis. The relative priority of such allocation would be so low that the water right would be realized only on a

short-run basis. After the Central Arizona Project is in operation when California is likely to be cut back in its Colorado River diversions, there would be no water available from such an allocation.

Reply: This comment is reflected in the final environmental statement.

8. Comment: The reference on page 141 to an allocation or nonallocation of a specific amount of water for consumptive use for the Salton Sea National Wildlife Refuge is not applicable to this project and should be deleted.

Reply: This reference has been deleted in the final environmental statement.

9. Comment: According to the statement on page 169, the State of California will have to determine the priority of use of the 4.4 million acre-feet of California's diversion of water from the Colorado. This is not the case, however, because priorities of water already have been set by the State and the agencies holding water rights under the California Seven-Party Water Agreement. These priorities were incorporated into and confirmed by contracts between the United States and California water agencies. Present perfected rights will be determined by the Supreme Court in accordance with Article VI of the decree in Arizona v. California.

Reply: The statement has been changed to convey the meaning of the above comment.

10. Comment: The section of the statement concerning augmentation of the Colorado River should be deleted or substantially qualified because neither California State Water Project water nor weather modification are believed to be viable alternatives for augmenting the flow of the river. Also, the estimate that augmentation of the Colorado River could lower the 1978 projected salinity at Morelos Dam by 347 p/m is not supported in the report and appears excessive.

Reply: The section on alternatives to the proposed project must discuss the principle alternatives which have in any way been considered. This is why the alternatives of augmentation of the Colorado River and the utilization of the

full capacity of the California Aqueduct are included in the statement, although it may not appear to be a viable or workable alternative.

The figure of 347 p/m is only an estimate and is variable according to the degree of augmentation of the flow of the Colorado River.

11. Comment: The report's description of the proposed desalting plant and the state of the art of the technology of membrane desalting leaves the impression that the proposal is uncertain. Because of the energy requirements and the high estimated cost of this plant, efforts should be made to strengthen these portions of the report in order to justify such a large expenditure.

Reply: The certainty of the proposal was established when Congress enacted Public Law 93-320 on June 24, 1974. A more detailed discussion of the energy requirements has been included in the final environmental statement.

12. Comment: Information should be provided on the expected frequency or risk of temporary diversions. The expected effects of temporary diversions, if any, of the waste stream to the Colorado River should be discussed.

Reply: There will be no expected diversion of the brine from the bypass drain to the Colorado River. If a situation arises such as major repairs or maintenance on the bypass drain, it is expected that the entire desalting process will stop until brine flows can resume without hinderance.

13. Comment: During the lining of the Coachella Canal, adequate precautions must be taken to prevent any waste materials (sewage, oil, construction materials, etc.) from entering the adjacent existing canal throughout the construction period.

Reply: Provisions relating to the prevention of spillage of pollutants into water courses are a standard requirement for construction of government project facilities. See the 1974 Environmental Guidebook for Construction published by the U.S. Bureau of Reclamation.

14. Comment: Justification should be given for the decision to accept the 10 percent loss caused by leaving 37 miles of the Coachella Canal unlined.

Reply: The principal thrust of an environmental statement is concerned with the environmental implication of the proposed project. It is not a justification of why other projects were not proposed. The lining of the last 37 miles of the canal would result in a water salvage of 12,000 acre-feet. Environmental impacts and economics would be disproportionate to the relatively minor water salvage at this point in time.

15. Comment: The quantity of solid wastes generated in the construction phases of this project in California should be estimated. The impact of this waste load on existing solid waste disposal services should be assessed and the quantity of wastes generated should be correlated with the solid waste management planning activities of Imperial County.

Reply: The quantity of solid wastes which will be generated in Imperial County, California during the construction phases of the project should be minimal. Disposal of solid waste materials will be accomplished in coordination with and under approval of the appropriate Imperial County authorities.

16. Comment: Additional geologic and seismic information should be provided. These data should be conclusive enough to clarify questions related to the design of engineered structures.

The final environmental statement should also include information regarding the potential for liquefaction, hydro-compaction, seismic-compaction, and ground rupture.

The following statement is made in the environmental statement, "Special Foundation Treatment" will be required for all structures as a matter of seismic design to compensate for the remote possibility of severe earthquakes, which may cause liquefaction." This "special treatment" should be described in sufficient detail to permit reviewers to determine the adequacy and effectiveness of the "treatment."

Reply: Final siting, alignment, and design of the project facilities are not complete. Design will be

accomplished with due consideration for the potential seismic activity of the area. Additional tests will have been made prior to final design of engineered structures. Final designs will be published in the project specification booklets.

17. Comment: The statement does not meet the requirements of the National Environmental Policy Act because it does not adequately treat the impact on fish and wildlife and the alternatives to mitigate fish and wildlife losses.

The onsite mitigation measures contained in the Bureau of Sport Fisheries and Wildlife report of December 15, 1971, are mentioned but are dismissed as impractical to accomplish. If the Bureau of Reclamation cannot mitigate onsite wildlife losses, it should consider offsite mitigation measures, for instance, measures applied outside of the Colorado River drainage where water is available to create replacement habitat.

Suitable offsite mitigation could be accomplished by purchasing and irrigating an estimated 3,000 to 5,000 acres.

Reply: The discussion concerning impacts to fish and wildlife and their habitats has been revised to more adequately define losses that will occur due to construction and operation of project facilities. As a result of an interdisciplinary team inventory of the environment of the area, a very thorough analysis was accomplished by the Ad Hoc Committee on Fish and Wildlife. Results are included throughout the final environmental statement.

18. Comment: The report's description of alternatives includes details on only three: total shutdown of the Wellton-Mohawk Division, augmentation, and moratorium on basin development. As previously noted, augmentation is not an alternative and should be deleted.

The details on the "Other Alternatives" is said to be contained in the Environmental Impact Statement prepared by the Brownell Task Force and the Department of State's Final Environmental Impact Statement that was filed with the Council on Environmental Quality in 1973. A review should be made of this section of the report to be sure that enough information on alternatives is included to

comply with the requirements of the National Environmental Policy Act.

Reply: The draft environmental statement was written with due consideration to the National Environmental Policy Act and to the Council on Environmental Quality guidelines. Additional information on alternative measures is already available in the above-mentioned publications, and it would be redundant to include complete descriptions of all of these again. The alternatives which received the most consideration or which imposed the most significant impacts on the environment are discussed in detail.

19. Comment: First unnumbered page of "Summary -- Under Item 2 (the brief description of the action", the use of the term "interim measure" to describe the Coachella Canal replacement could be misconstrued because the new lined canal will be permanent. It should be made clear that the reference to interim measure means only the temporary use by the United States of a quantity of water equal to that salvaged by the new lined Coachella Canal.

The third sentence states that the complex will divert about 43,000 acre-feet of 9,600 p/m TDS water to Santa Clara Slough in Mexico. It should be made clear that this is the brine discharge from the desalting plant, not an existing water supply.

Reply: These clarifications have been made in the final environmental statement.

20. Comment: Page 5, last paragraph--This paragraph describes the appointment of Herbert Brownell as Special Representative and the assistance provided by an Interagency Task Force. It would probably be useful to mention at this point that the seven-state Committee of Fourteen also met and consulted with Mr. Brownell and advised him during his deliberations.

Reply: This addition has been made in the final environmental statement.

21. Comment: Page 14, first sentence--The description of the formal agreement and contracts that govern the management of

the river should also mention power contracts and water contracts with entities other than irrigation districts.

Reply: This change has been made in the final environmental statement.

22. Comment: Page 14, Item 1.b.--This description of Minute No. 218 should also indicate that it was extended on two occasions.

Reply: This change has been made in the final environmental statement.

23. Comment: Page 15, first sentence--We recommend changing "major compacts and agreements" to "Major, compacts, legislation, and court decisions".

Reply: This change has been made in the final environmental statement.

24. Comment: Page 101, first paragraph--The first sentence is incorrect. The measures proposed for below Imperial Dam would have no counteracting effect on the salinity increases caused by continued Upper Basin development. Also there is no mention of the proposed basinwide salinity control program, which includes measures upstream from Imperial Dam and which would be effective in counteracting the continued increase in salinity of the Colorado River water flowing to the Lower Basin.

Reply: The paragraph corresponding to that on page 101 of the draft statement has been rewritten. A general discussion of the provisions of Title II of Public Law 93-320, Colorado River Basin Salinity Control Project, is included in the final environmental statement. Title II legislation deals primarily with salinity control measures above Imperial Dam, including the Upper Basin states. A separate environmental statement will be prepared on Title II impacts.

25. Comment: Page 114, first paragraph--In the second sentence of this paragraph, it is recommended that "salinity" be replaced by "average annual salinity".

Reply: This change has been made in the final environmental statement.

26. Comment: Page 142, third paragraph--It is stated that recommendations for mitigating actions will be coordinated with the California Department of Fish and Game and the Bureau of Sport Fisheries and Wildlife. The Colorado River Board and the agencies holding Colorado River contracts should also be included in the coordination described.

Reply: This change has been made in the final environmental statement.

27. Comment: Page 151, last paragraph--According to the proposed schedule for the desalting plant, power will be needed in 4 to 5 years. It is therefore necessary to discuss alternative power sources at this time, and we recommend that this be done.

Reply: See our reply to Comment No. 6 above.

28. Comment: Pages 92 and 166--Concerning the regional seismicity related to the Desalting Plant, if no estimates of earthquake-induced accelerations are required, then the report is acceptable. If, however, accelerations are required, the report should be completed to indicate this value.

Reply: Design criteria for the desalting plant will include considerations of the earthquake potential in the area. However, these criteria have not been fully developed at this time.

THE COLORADO RIVER WATER CONSERVATION DISTRICT

THIRD FLOOR, FIRST NATIONAL BANK BUILDING

P.O. BOX 1120

GLENWOOD SPRINGS, COLORADO 81601

303/945-8522

July 8, 1974

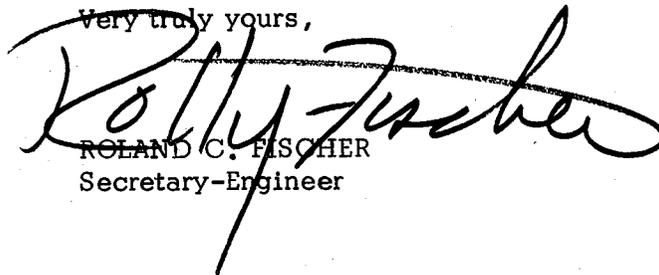
Mr. E. A. Lundberg
Regional Director
Lower Colorado Regional Office
U. S. Bureau of Reclamation
P.O. Box 427
Boulder City, Nevada 89005

Dear Ed:

Enclosed are this District's comments on the Department of Interior, Department of State Draft Environmental Statement, "Proposed Colorado River International Salinity Control Project."

Thank you for granting us a time extension to submit our comments.

Very truly yours,



ROLAND C. FISCHER
Secretary-Engineer

RCF:ebg
Encl.

THE COLORADO RIVER WATER CONSERVATION DISTRICT

THIRD FLOOR, FIRST NATIONAL BANK BUILDING
P.O. BOX 1120
GLENWOOD SPRINGS, COLORADO 81601
303 945-8522

COMMENTS OF
THE COLORADO RIVER WATER CONSERVATION DISTRICT
ON
"DEPARTMENT OF INTERIOR
DEPARTMENT OF STATE
DRAFT ENVIRONMENTAL STATEMENT
INT DES 74-39
PROPOSED COLORADO RIVER INTERNATIONAL
SALINITY CONTROL PROJECT"

July 8, 1974

Basically the Colorado River Water Conservation District recognizes the Federal intention that the Proposed Colorado River International Salinity Control Project or a similar project will be built and that this draft environmental impact statement has not been prepared and circulated to consider the possibility of not building the project. Although our comments are premised upon this recognition and in the interest of brevity they are in some instances terse, they are submitted as constructive criticism and we know that they will be given careful and objective consideration.

We would like to suggest that in the future comments on environmental impact statements effecting the Colorado River should be solicited from interested agencies in the Colorado River Basin in Colorado. We notice in the summary portion at the front (and from the list of agencies beginning on page 214) of the Draft Environmental Statement that the only Colorado organization from which comments have been requested was the Colorado Water Conservation Board in Denver. There are many agencies in the Colorado River Basin in Colorado from which comments should have been solicited. We also notice that in the listing of libraries that are repositories for this environmental statement, none of those libraries were in the State of Colorado, much less in the State of Colorado in the Colorado River Basin. These two oversights very probably reflect the orientation of the Bureau of Reclamation Boulder City, Nevada office. That is, the office is understandably orientated to Nevada, Arizona and California. However, it would be well in the future to remember that the headwater states have a very real and legitimate interest in every activity affecting the Colorado River.

While the Draft Environmental Statement does mention Upper Colorado River Basin projects, it does not mention the amount of water that those projects will beneficially use. On page 15 there is a list of what the Draft Statement calls "Major compacts and agreements regulating the Colorado River flows within the United States". This District would like to urge that the final environmental impact statement include the Colorado River Basin Project Act of 1968 (Public Law 90-537, 90th Congress, S. 1004, September 30, 1968).

On page 151 under the subheading "Energy" we notice that it is anticipated that a portion of the electrical energy required for operation of the features may be available from existing facilities but over all power requirements in the area will be significantly increased. Whatever the power requirements may be, it should be recognized that the Upper Basin power revenues must not be reduced as a result thereof and that over all availability of power to the Upper Basin must not be reduced. Further, on "energy" we note on page 179 that there will be a general increase in power needs in the areas and that ultimately there will be commitments on such natural resources as gas, coal, oil or nuclear fuel when the former federal load is assumed by utilities. The Federal Power Commission is currently discouraging the use of natural gas to generate electrical energy. The statement on page 179 appears to be inconsistent with other Federal policy.

Though surely not intentional, the general tone of the draft statement implies that optimum beneficial use of Colorado River Basin water is in the Lower Basin and Mexico. For example, the discussion of the consideration given to the Upper Basin sharing costs and to the consideration of a moratorium on future Federally-financed development, impliedly in the Upper Basin. Future beneficial use in the Upper Basin should receive more emphasis in the final statement.

Replies to Comments Made by the
Colorado River Water Conservation District
Glenwood Springs, Colorado
(Letter of July 8, 1974)

1. Comment: In the future, comments on environmental impact statements effecting the Colorado River should be solicited from interested agencies in the Colorado River Basin in Colorado. There are many agencies in the Basin from which comments should have been solicited. We also notice that in the listing of libraries that are repositories for this environmental statement, none of those libraries were in the State of Colorado, much less in the State of Colorado in the Colorado River Basin. It would be well in the future to remember that the headwater states have a very real and legitimate interest in every activity affecting the Colorado River.

Reply: In compliance with OMB Circular No. A-95 revised, the comments and views of state and local agencies which are authorized to develop and enforce environmental standards on certain Federal or Federally-assisted projects affecting the environment pursuant to Section 102(a)(C) of the National Environmental Policy Act of 1969 and the recommendations of the Council on Environmental Quality, official comments are solicited through the State clearinghouses. This is based primarily upon Section 401(a) of the Intergovernmental Cooperation Act of 1968.

Since project construction, facilities, and direct environmental impacts will take place mainly in the Lower Basin and particularly in its extreme southern end, a more comprehensive solicitation of comments was directed toward these areas. Comments from Upper Basin states were formally solicited from state executive offices and clearinghouses. It is recognized that the headwater states have legitimate interest in this project as well as others pertaining to the Colorado River, and neither the content of the environmental statement nor failure to solicit more comments from the Upper Basin states was intended to disregard this interest.

2. Comment: While the draft environmental statement does mention Upper Colorado River Basin projects, it does not mention the amount of water that those projects will beneficially use.

Reply: The allocation of water rights within an individual state is usually an instate decision as to the utilization of the state's apportioned water allocation from the Colorado River. The decision the state makes regarding the allocation of these rights will normally determine beneficial use of the water.

3. Comment: On page 15 there is a list of what the draft statement calls "Major compacts and agreements regulating the Colorado River flows within the United States." This District would like to urge that the final environmental impact statement include the Colorado River Basin Project Act of 1968 (Public Law 90-537, 90th Congress, S. 1004, September 30, 1958).

Reply: The Colorado River Basin Project Act (82 Stat. 885) referred to in the draft environmental statement under I.C.2.(8), on page 15 is Public Law 90-537.

4. Comment: On page 151 under the subheading "Energy" we notice that it is anticipated that a portion of the electrical energy required for operation of the features may be available from existing facilities, but overall power requirements in the area will be significantly increased. Whatever the power requirements may be it should be recognized that the Upper Basin power revenues must not be reduced as a result thereof and that overall availability of power to the Upper Basin must not be reduced.

Reply: Acquisition and use of electrical power for the project facilities will have no effect on the power revenues and availability of power in the Upper Basin. As stated in the draft environmental statement, "Electric energy required for the desalting complex will be supplied by entities operating within the greater southwest area."

5. Comment: We note on page 179 that there will be a general increase in power needs in the areas and that ultimately there will be commitments on such natural resources as gas, coal, oil or nuclear fuel when the former Federal load is assumed by utilities. The Federal Power Commission is currently discouraging the use of natural gas to generate electrical energy. The statement on page 179 appears to be inconsistent with other Federal policy.

Reply: There are no present plans to utilize Federal hydro-electric generating capacity to supply the required desalting complex load. The potential of developing area geothermal resources for electric power production to serve Federal loads in this area is presently being analyzed and in addition, the interim use of a portion of the United States' entitlement in the Navajo Project in which the Bureau is a Participant is being considered. Utilization of these resources would not require the commitment of such scarce fuels as natural gas and oil.

The environmental statement has been revised to reflect these present plans.

6. Comment: Though surely not intentional, the general tone of the draft statement implies that optimum beneficial use of Colorado River Basin water is in the Lower Basin and Mexico. For example, the discussion of the consideration given to the Upper Basin sharing costs and to the consideration of a moratorium on future Federally financed development, impliedly in the Upper Basin. Future beneficial use in the Upper Basin should receive more emphasis in the final statement.

Reply: The draft environmental statement was not meant to downgrade the future beneficial use of Colorado River water in the Upper Basin. The Lower Basin has developed its uses and allocation of Colorado River water far ahead of the Upper Basin. Even though this does not mean that optimum beneficial use of the water is in the Lower Basin, the alternative only points out that if there were to be moratorium on future development in the Colorado River Basin, the Upper Basin would be most affected.

Rt. 1, Box 21-M
Somerton, Arizona
October 13, 1974

Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada

Dear Sirs:

One adverse affect of the lowering of the water table by pump-
ing groundwater out of the Yuma Valley will be that of effect-
ively drying up the Colorado River below Morelos Dam. In the
Environmental Statement concerning the Salinity Control Project,
the conclusion is drawn that this area would eventually be
dried up by pumping on the Mexican side of the border and that
any wells north of the boundary line would only serve to
accelerate an unavoidable end. This answer only serves as an
easy way to avoid finding a solution to the problem. This area
of ground-water is far too valuable to man and wildlife to be
allowed to be pumped dry without any effort being made to save it.

Man now realizes that it is beginning to be ever evident that
the planet Earth is not a constantly enduring entity. But
that it can be permanently damaged, and in some cases man can
be responsible for obliterating a vital part of his natural
environment. Thus the concern for protection of natural resources -
including wildlife - is imperative in order to maintain the
planet in its life-giving and life-sustaining form. Therefore,
the protection of a species of life that may be endangered
includes the habitat in which it lives to insure that the
biological needs for life are met.

The Hunter's Hole area of the Colorado River below Morelos
Dam provides habitat for many forms of wildlife. The rich
riparian growth attracts many migratory birds, nesting birds,
small animals and, of course fish. The Colorado River provides
a life-line to many animals in our area of the Sonoran Desert -
and in many cases - it provides a critical island of survival.
This is the situation that pertains to the Yuma Clapper Rail.
This bird is on the list of endangered species and is known
to inhabit the area marked for oblivion below Morelos Dam.
However, under the Endangered Species Act of 1973, Section 7,
no federal agency may take any action jeopardizing the continued
existence of an endangered species or destroy or modify the
habitat of such a species. This act also has provisions by
which private citizens or organizations may file suit against a
government agency which may be in violation of the act. The
removal of surface-water in the area around Hunter's Hole by
the pumping of ground-water is clearly a modification and very
possibly a destruction of the babitat of an endangered species
and is thereby in violation of the Endangered Species Act.

Recent enlarged interest in environmental matters along with the rise of influential groups dedicated to the preservation of wildlife could result in costly delays in the salinity project until the legal questions involved are settled. However, a modification of the project that would retain the surface-water in the Hunter's Hole area seems to be the logical solution. Surely, in an undertaking of this scope, changes can be made to preserve the area in question without seriously altering the ultimate purpose of the project.

We appreciate the opportunity to express our views on this proposal and do ask that very serious consideration be given to alternatives to settling the fate of the Hunter's Hole area of the Lower Colorado River.

Sincerely,

Mr. and Mrs. R. J. Robinson

Mr. and Mrs. R. J. Robinson
Rt. 1, Box 21-M
Somerton, Arizona
85350

Reply to Comment Made by
Mr. and Mrs. R. J. Robinson
(Letter of October 13, 1974)

1. Comment: The Hunter's Hole area of the Colorado River below Morelos Dam provides habitat for many forms of wildlife. The rich riparian growth attracts many migratory birds, nesting birds, small animals, and, of course fish. The Colorado River provides a lifeline to many animals in our area of the Sonoran Desert-- and in many cases it provides a critical island of survival. This is the situation that pertains to the Yuma Clapper Rail. This bird is on the list of endangered species and is known to inhabit the area marked for oblivion below Morelos Dam. However, under the Endangered Species Act of 1973, Section 7, no Federal agency may take any action jeopardizing the continued existence of an endangered species or destroy or modify the habitat of such a species. This act also has provisions by which private citizens or organizations may file suit against a Government agency which may be in violation of the act. The removal of surface-water in the area around Hunter's Hole by the pumping of ground water is clearly a modification and very possibly a destruction of the habitat of an endangered species, and is thereby in violation of the Endangered Species Act.

Recent enlarged interest in environmental matters along with the rise of influential groups dedicated to the preservation of wildlife could result in costly delays in the salinity project until legal questions involved are settled. However a modification of the project that would retain the surface water in the Hunter's Hole area seems to be the logical solution. Surely, in an undertaking of this scope, changes can be made to preserve the area in question without seriously altering the ultimate purpose of the project.

Reply: The discontinuance of bypassing the flow from the Wellton-Mohawk Irrigation and Drainage District below Morelos Dam will have an adverse impact on the river and the Hunter's Hole area south of the Dam. Studies indicate the ponds of Hunter's Hole are supported by local ground water.

The flow of high salt content water from the Wellton-Mohawk Irrigation and Drainage is at the present maintaining the level of the ponds by backflow into the lower pond. Water analysis reveals the TDS (salinity) in the ponds is increasing at a rapid rate, and in pond No. 3 is now in excess of 4,000 p/m TDS. The concern for saving Hunter's Hole has been a high priority for mitigation measures. This subject is discussed in detail in Chapter IV of the final environmental impact statement.

In compliance with the Endangered Species Act, Reclamation has filed a detailed report of the status of Yuma clapper rail on the lower Colorado River with the Fish and Wildlife Service for its review and concurrence that the project will not jeopardize the continued existence of the species. At a maximum, approximately one percent of the known population of Yuma clapper rail on the lower Colorado **has been** reported to inhabit the area south of Morelos Dam to the Mexican border. With the documented knowledge of the expansion of numbers and habitat of this species it is doubtful that potential loss of habitat in this area would be critical to the survival of the population. Perhaps this may be a good example of **displaced wildlife** being able to move into another area of expanding habitat without any undue competition with already existing members of its own species.



The Maricopa Audubon Society

PHOENIX, ARIZONA

October 14, 1974

Re: LC 150, 120.1
Comment on INT DES 74-39 & 74-83

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Sir:

I have reviewed the two environmental impact statements on the Colorado River Basin Salinity Control Project and have surveyed the area from Morelos Dam to San Luis along the Colorado River.

I understand your point about the eventual destruction of the riparian habitat in the area in question by Mexican pumping of the underlying water table. However, I am disturbed by the loss of the habitat particularly in light of the continued loss along other portions of the Lower Colorado secondary to water salvage dredging operations. My concern is for all the wildlife living and migrating through this area. My chief concern is for the Yuma Clapper Rail because of the continuing projects which markedly decrease its breeding habitat.

I have two suggestions for mitigation. The first would be to supply enough low salt water to Hunter's Hole to keep it from drying up. At best salinity would be a problem but I believe that most of the fish and other wildlife now using the area are quite tolerant of brackish water. The Clapper Rail, of course, does well in salt marshes. My second suggestion would be to allow the reject stream from the

desalinization plant to flow in the present channel at least as far as the Mexican border. While the amount of water would be less , there should be no need to bulldoze or dredge the river channel as has been done in the past and good stands of tules attractive to the Yuma Clapper Rail should develop. Salt seepage into the underlying water table should not be a problem with the siting of the of the pumping stations as they are planned in the project. If this is feasible it would have the further advantage of reducing the cost of the project.

Thank you,

Robert E.G. Norton, M.D.
Vice President
Maricopa Audubon Society
6801 N. 11th Place
Phoenix, Arizona 85014

Replies to Comments Made by
Maricopa Audubon Society
(Letter of October 14, 1974)

1. Comment: I understand your point about the eventual destruction of the riparian habitat in the area in question by Mexican pumping of the underlying water table. However, I am disturbed by the loss of the habitat, particularly in light of the continued loss along other portions of the lower Colorado secondary to water salvage dredging operations. My concern is for all the wildlife living and migrating through this area. My chief concern is for the Yuma clapper rail because of the continuing projects which markedly decreased its **breeding** habitat.

Reply: During the 1974 multiagency Yuma clapper rail census on the lower Colorado River preliminary data indicate the presence of approximately 7 to 11 responding rails in the reach of the river from Morelos Dam to the Southerly International Boundary. Included in that date, the Hunter's Hole area accounted for four birds responding on one occasion and one bird on another. Total count data from the 1974 Yuma clapper rail census resulted in a total count of 1,200 birds on the lower Colorado River, including 134 in the Imperial Valley of California. Data from a similar survey made in 1973 reveals that a total of 889 clapper rail were counted on the lower Colorado River from Davis Dam to the Gulf of California. In a 1973 study, Ohmart stated that due to the increase in stabilized marsh areas as a result of dams on the river, the Yuma clapper rail has expanded its original range of habitat far to the north and suggests in the near future it may be recorded in southern Nevada. The discontinuance of Wellton-Mohawk irrigation flows below Morelos Dam will have an impact on the riparian communities in that area including Hunter's Hole. Mitigation and enhancement measures for this area are discussed in Chapter IV of the final environmental statement.

2. Comment: I have two suggestions for mitigation. The first would be to supply enough low salt water to Hunter's Hole to keep it from drying up. At best salinity would be a problem but I believe that most of the fish and other wildlife now using the area are quite tolerant of brackish water. The clapper rail, of course, does well in salt marshes.

My second suggestion would be to allow the reject stream from the desalinization plant to flow in the present channel at least as far as the Mexican border. While the amount of water would be less, there should be no need to bulldoze or dredge the river channel as has been done in the past and good stands of tules attractive to the Yuma clapper rail should develop. Salt seepage into the underlying water table should not be a problem with the siting of the pumping stations as they are planned in the project. If this is feasible it would have the further advantage of reducing the cost of the project.

Reply: Utilization of byproduct water would be completely contrary to the concern for the exclusion of high salt content water percolating into the ground-water system along the International Boundary in the Yuma Valley. The suggestion of utilizing the brine water discharge in the river channel to the Mexican border would have the same implications, but to a greater degree of severity. Regardless of the method used to transfer byproduct water to the Gulf of California there will be no need to bulldoze or dredge the river channel. Mitigation is planned for the Hunter's Hole area and is discussed in detail in Chapter IV of the final environmental statement.

October ^{10/27} 1974

Regional Director
Bureau of Reclamation
P.O. Box 427
Boulder City, Nevada
89005

In regards to the Salinity Central Project on the Colorado River:

- 1) Why aren't other states that are allocated water from the Colorado River involved in the water which is committed to Mexico? Why does it all come out of Arizona's allotment? Couldn't part of the 1,500,000 acre feet come from all of the states involved?
- 2) Why must the precious wildlife habitats be shut off from water? Couldn't water be supplied to these areas?
- 3) What effect will the salt from the plant have on the Gulf? Have studies been made on the impact of changes in Salinity on marine life?

I feel these items should be considered in the implementation of the project.

Sincerely,

JeAnne Dombrowski
(Biology & Environment
Teacher)
P.O. Box 503
Somerton, Arizona
85350

Replies to Comments Made by
JoAnne Dombrowski
(Letter of October 14, 1974)

1. Comment: Why aren't other states that are allocated water from the Colorado River involved in the water which is committed to Mexico? Why does it all come out of Arizona's allotment? Couldn't part of the 1,500,000 acre-feet come from all the states involved?

Reply: Water of the Colorado River was divided between the Upper and Lower Colorado River Basins in the Colorado River Compact which was signed in 1922 by a commissioner of each of the seven states in the basin and by a representative of the United States. The Upper Basin states are Colorado, New Mexico, Utah and Wyoming, and the Lower Basin States are Arizona, California and Nevada. The dividing point on the river between the Upper and Lower Basins is at Lees Ferry which is defined as a point 1 mile below the mouth of the Paria River in northern Arizona. The compact apportions from the Colorado River system to each of the Upper and Lower Basins in perpetuity for exclusive beneficial consumptive use a total of 7,500,000 acre-feet annually. The compact further provides that the states of the Upper Basin will not cause the flow of the river at Lees Ferry to be depleted below an aggregate of 75 million acre-feet for any period of 10 consecutive years. The compact cleared the way for compacts or agreements within the Upper and Lower Basins to further divide the water among the states.

With respect to Mexico the compact provides that if, as a matter of international comity, the United States recognized the right of Mexico to use waters of the Colorado system, such waters available as surplus over and above that allocated to the Upper and Lower Basin States were to be utilized to fulfill the obligation. If such surplus proved insufficient to satisfy the obligation, the burden of the deficiency was to be borne equally by the Upper and Lower Basins.

In the Colorado River Project Act of September 30, 1968, which, among other things, authorized the Central Arizona

Project, Congress declared that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation and the Basin states were relieved of the obligations imposed on them by the Colorado River Compact so long as the Secretary of the Interior determines and proclaims that means are available and in operation which augment the water supply of the Colorado River system in such quantity as to satisfy the requirement of the Treaty.

The Colorado River Basin Salinity Control Act of June 24, 1974, recognizes the United States' obligation to satisfy the requirements of the 1944 Water Treaty and authorized construction of the necessary works to meet the salinity requirements of Minute No. 242. Therefore, the Colorado River Basin States have been relieved of the obligation of the 1944 Water Treaty with Mexico.

However, the Supreme Court Decree of March 9, 1964, declared that "consumptive use" means diversions from the stream less such return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation. The allocations of Colorado River water to the various states is in terms of consumptive use and the Supreme Court Decree clarified the manner in which the allocations of Colorado River are accounted. This is important to the state of Arizona because the Wellton-Mohawk return flows are not creditable to Arizona unless these return flow are usable to satisfy the requirements of the Mexican Water Treaty. Congress authorized construction of the desalting plant to treat the return flows so they can be utilized to satisfy the Mexican Treaty requirement and the salinity requirement of Minute No. 242.

Congress also authorized construction of well fields south of Yuma, Arizona. The major portion of the water from the well fields is to be delivered to Mexico at the Southerly International Boundary at San Luis, Arizona and San Luis, Sonora, Mexico. Mexico has agreed to accept 140,000 acre-feet of water at the Southerly International Boundary in satisfaction of the 1944 Treaty. Because the major portion of the water to be pumped originates as percolated Colorado River

water applied for irrigation in the Yuma area, Arizona would be credited for the return flow in accordance with the Supreme Court Decree. The allocation of Colorado River water within Arizona is such that any pumped water delivered to Mexico at the Southerly International Boundary will, in effect, make a like quantity of water available for diversion to the Central Arizona Project.

2. Comment: (a) Why must the precious wildlife habitats be shut off from water?

(b) Couldn't water be supplied to these areas?

Reply:

(a) The current flow in the Colorado River below Morelos Dam is sustained on a regular basis by the drain water being pumped from the Wellton-Mohawk Irrigation and Drainage District. The drain water contains an average of 3800 p/m of TDS. The very reason it is being bypassed is since 1971, Mexico will not accept it as treaty water. The thrust of Minute No. 242 was to prevent the further **infiltration of** the high salt content water into the ground water aquifer. The existing well fields in Mexico which are pumping an average of 160,000 acre-feet per year and those in the Yuma Valley and on the Yuma Mesa, currently pumping 60,000 acre-feet of water per year will eventually have an adverse impact on the wildlife habitat along the river below Morelos Dam. The existing pumping is being conducted without benefit of **mitigation. The project does explore mitigation plans to provide water to Hunter's Hole and replacement measures for other areas affected by the project. These measures are discussed in detail in Chapter IV of the final environmental statement.**

(b) Local storms, infrequent **floodflows from upstream** seepage from the dam and some agricultural drainage will provide a limited amount of water to the river below Morelos Dam. There are plans to provide water for Hunter's Hole. Other mitigation is planned upstream and adjacent to the Main Outlet Drain. Details are included in Chapter IV of the final environmental statement.

3. Comment: (a) What effect will the salt from the plant have on the Gulf?

(b) Have studies been made on the impact of changes in salinity on marine life?

Reply:

(a) Field surveys indicate 60 cubic feet per second of byproduct stream from the desalting plant may not physically reach the Gulf of California. This will depend upon the location of the outfall in Santa Clara Slough as determined by the Mexican Government. Santa Clara Slough is an extremely large (estimated 103,000 acres and relatively level salt flat. A small (approximately 75 acres) marsh area, supported by irrigation drainage water, is located at the northeast corner of the Slough. The remainder is barren salt flat with occasional hummocks of salt cedar, salt grass and creosote bush. The TDS of the water in the northeast corner of the slough averages 5,000 p/m at the upper end and 82,000 p/m at its termination, approximately 4-1/2 miles downstream where it spreads out and evaporates. The distance from the southern end of the open water area to the Gulf is approximately 19 miles. The salt content of the byproduct water will be approximately 9,600 p/m as compared to sea water which has approximately 36,000 p/m salt content. Actually the introduction of the 60 ft³/s of byproduct water into Santa Clara Slough will likely result in an expansion of the existing marsh and a significant enhancement of the fish and wildlife habitat.

(b) Specific studies have not been made regarding impact of changes in salinity on marine life in this area. Field surveys do indicate there is little possibility that byproduct water will ever reach the Gulf. If this does occur it is likely that by the time contact is made with the Gulf the salinity level of the byproduct water through the evaporation process will have reached a level comparable to that of sea water. The physical condition of Santa Clara Slough reveals that historically a flushing process of the Slough has occurred on a regular basis. Under the existing condition flushing with gulf water could only occur under extreme storm tide conditions.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO, CALIFORNIA 94111

E. A. Lundberg, Regional Director
Lower Colorado Region
Bureau of Reclamation
Boulder City NV 89005

NOV 8 1974

Dear Mr. Lundberg:

The Environmental Protection Agency has received and reviewed the draft environmental statement for the Colorado River International Salinity Control Project, prepared by the Bureau of Reclamation, the Office of Saline Water, and the U. S. Section, International Boundary and Water Commission, in support of H.R. 12834 and S. 3094.

EPA's comments on the draft statement have been classified as Category ER-2, specifically environmental reservations on the proposed action with insufficient information presented in the draft environmental statement. Definitions of the categories are provided on the enclosure and our extensive comments will be found on a second enclosure. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the impact statement at the draft stage.

EPA appreciates the opportunity to comment on this draft statement and requests one copy of the final statement when available.

Sincerely,

L. Russell Freeman, Deputy

acting
Paul De Falco, Jr.
Regional Administrator

Enclosures

cc: Council on Environmental Quality
Department of the Interior,
Secretary's Field Representative

A-180

Comments on the proposed Colorado River International Salinity Control Project.

EPA's primary concern with this proposed action is the lack of an adequate description of the problem of salinity in the Colorado River system and a full discussion of the broad range of alternatives which can be applied to resolve the issue of salinity in the Colorado River Basin.

The final environmental statement should discuss the degree to which maintenance of salinity at or below current levels in the lower main stem (i.e., at Imperial Dam) represents a tacit assumption of Minute 242. If salinity levels at Imperial Dam are permitted to rise, then the proposed project may not of itself represent a permanent and definitive solution to the salinity problem referred to in the Joint Communique of President Nixon and President Echeverria, dated June 17, 1972. To the extent that maintenance or improvement of current levels at Imperial Dam is essential to meeting our commitment under Minute 242, the final environmental statement should discuss the degree to which the proposed project contributes to treating the salinity issue as a basin-wide problem. EPA believes that only through a basin-wide approach can the water quality goals of Minute 242 be achieved and the viability of the River's beneficial uses be protected.

The draft environmental statement assumes a 1978 salinity level of 910 ppm at Imperial Dam. This assumption is contrary to the recommendations adopted at the conclusion of the 1972 State/Federal Conference in the Matter of Pollution of the Interstate Waters of the Colorado River. EPA suggests that discussion be included on how this assumption was derived (910 ppm) and the justification for project planning using assumptions contrary to the 1972 Enforcement Conference recommendations.

The environmental statement should discuss the effective life of the proposed project, and what additional projects may be planned or needed to accomplish the permanent and definitive solution to the salinity problem.

The final environmental statement should discuss the extent to which applicable water law in the seven basin States places constraints upon or expands the alternatives available for affecting a permanent and definitive solution to the international problem of the salinity of the Colorado River. The environmental statement should also discuss the extent to which applicable State water law may jeopardize the ability of the proposed project to realize the goals of Minute 242.

The draft environmental statement categorized specific project alternatives as either treating, eliminating or bypassing, or replacing from other sources the drainage flows from Wellton-Mohawk. The latter two approaches should receive additional attention. For example, whereas the proposed total shutdown of the Wellton-Mohawk Division may be an undesirable alternative, partial shutdown of Wellton-Mohawk combined with other withdrawals of land and improved water management practices over a greater portion of the Basin may be an effective alternative.

To complete the discussion of alternatives, the environmental statement should incorporate as a minimum the alternatives of vegetative management, irrigation practices, and substitution of waters from above Imperial Dam which were developed in the Final Environmental Statement: Possible Options for Reducing the Salinity of the Colorado River Water Flowing to Mexico which you referred to on page 189 of the draft environmental statement. EPA strongly believes that the full range of options developed in that final environmental statement are highly relevant to the proposed action and should be fully disclosed and discussed.

In addition to the comments on the discussion of basin-wide problem definition and alternatives, EPA notes several questions with respect to specific project features:

- a. EPA notes that the desalting complex will have a significant energy requirement. However, the environmental impacts of supplying energy requirements are not fully discussed in the draft statement. Power sources should be identified, as should the pressure this energy requirement will generate to expand existing installed capacity. The environmental impacts of obtaining and transporting fuels for power generation should also be addressed.
- b. Supplies of various chemicals, including chlorine, algaecides and sulfuric acid, will be needed in the operation of the desalting complex. What quantities of these and other chemicals will be normally stored on-site? What provisions have been made for spill prevention and control? What safety measures and response capabilities will be available to cope with any accident during transportation? What specific algaecides will be employed? What will be their long-term effect on the environment after discharge in either product water or brine?

- c. The impact on the receiving water quality in the Colorado River from the product stream should be expanded. The concentration of nutrients in the M.O.D.E. which discharges to the Colorado River should be stated, and the probable water quality impacts discussed. The temperature of the discharge should be stated, and the probable water quality impacts of the thermal plume analyzed and discussed.

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Replies to Comments Made by the
Environmental Protection Agency
San Francisco, California
(Letter of November 8, 1974)

1. Comment: EPA's primary concern with this proposed action is the lack of an adequate description of the problem of salinity in the Colorado River system and a full discussion of the broad range of alternatives which can be applied to resolve the issue of salinity in the Colorado River Basin.

Reply: Public Law 93-320, Colorado River Basin Salinity Control Act, authorized basin-wide provisions to control salinity of water delivered to users in the United States and Mexico. As stated in Chapter I, this statement addresses itself to Title I of the Act, wherein measures are provided to control salinity problems below Imperial Dam. A detailed description of those problems is also found in Chapter I.

A separate environmental statement is being prepared to address Title II of the Act, wherein measures are provided to control salinity problems above Imperial Dam. A description of those salinity problems above Imperial Dam will be included in that statement.

The broad range of alternatives that theoretically might be open to the United States in reducing salinity of waters below Imperial Dam were thoroughly assessed in the final environmental impact statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico. Details of the alternatives for measures to control salinity above Imperial Dam are included in the environmental statement on Title II salinity control measures.

2. Comment: The final environmental statement should discuss the degree to which maintenance of salinity at or below current levels in the lower main stem (i.e., at Imperial Dam) represents a tacit assumption of Minute 242. If salinity levels at Imperial Dam are permitted to rise, then the proposed project may not of itself represent a permanent and definitive solution to the salinity problem referred to in the Joint Communique of President Nixon and President Echeverria, dated June 17, 1974.

Reply: Minute No. 242 provides for limitation and control of salinity of water delivered to Mexico at the Northerly International Boundary and deals only with the differential of salinity between Imperial Dam and Northerly International Boundary. The legislation providing for implementation of Minute No. 242, Public Law 93-320, provides, however, for measures upstream of Imperial Dam under Title II of the Act that are intended to prevent progressive deterioration of quality of flows arriving at Imperial Dam.

3. Comment: To the extent that maintenance or improvement of current levels at Imperial Dam is essential to meeting our commitment under Minute 242, the final environmental statement should discuss the degree to which the proposed project contributes to treating the salinity issue as a basin-wide problem. EPA believes that only through a basin-wide approach can the water quality goals of Minute 242 be achieved and the viability of the River's beneficial uses be protected.

Reply: Provisions of Minute 242 relative to salinity of water delivered to Mexico provide in part in Resolution 1-a that "...the approximately 1,360,000 acre-feet (1,677,545,000 cubic meters) delivered upstream of Morelos Dam have an annual average salinity of no more than 115 p/m \pm 30 p/m U.S. Count (121 p/m \pm 30 p/m Mexican count) over the annual average salinity of Colorado River waters which arrive at Imperial Dam...." This resolution assures that the salinity of water delivered to Mexico at Morelos Dam will be only about 115 p/m more than the water used in the United States that arrives at Imperial Dam. The Minute does not discuss the future salinity at Imperial Dam.

It was noted that the future salinity at Imperial Dam is a concern to water users in the United States as well as to users in Mexico. This was recognized in Title II of Public Law 93-320 which directs the Secretary of the Interior to implement the salinity control policy adopted for the Colorado River in the "Conclusions and Recommendations" published in the Proceedings of the Reconvened Seventh Session of the Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries in the States of California, Colorado, Utah, Arizona, Nevada, New Mexico, and Wyoming, held in Denver, Colorado, on April 26-27, 1972.

The Secretary is also directed to expedite the investigation planning and implementation of a salinity control program and he is authorized to construct, operate, and maintain the following salinity control units: (1) the Paradox Valley Unit, (2) the Grand Valley Unit, (3) the Crystal Geyser Unit, and (4) the Las Vegas Wash Unit.

It is expected that implementation of the salinity control projects will assure salinities at Imperial Dam and will be in accord with the salinity control policy.

4. Comment: The draft environmental statement assumed a 1978 salinity level of 910 p/m at Imperial Dam. This assumption is contrary to the recommendations adopted at the conclusion of the 1972 State/Federal Conference in the Matter of Pollution of the Interstate Waters of the Colorado River. EPA suggests that discussion be included on how this assumption was derived (910 p/m) and the justification for project planning using assumptions contrary to the 1972 Enforcement Conference recommendations.

Reply: The assumption of a 1978 salinity level of 910 p/m at Imperial Dam is a projection for planning purposes of the potential increase in salinity by 1978 based on recent and projected upstream development and assuming basin runoff is the 1941-1970 average annual runoff. It was assumed that salinity control projects would not be constructed by 1980 and that the effect of projects not requiring construction would be small. Additional studies are being made using monthly operation studies to project the range of salinities that would occur with projected upstream development, with salinity control projects **coming** on line as scheduled, and repeating the historic runoff pattern following the 1973 reservoir storage conditions.

Thirteen cycles of the historic runoff pattern will be operated starting at successive 5-year increments. The Colorado River salinity level at Imperial used in the final plant design will be selected on the basis of the results of the operation study. The design of the desalting plant must be based on projections of the most likely salinities at Imperial and must recognize that salinity control projects may not be built in time to prevent salinity levels at Imperial exceeding 1972 levels at least for an interim period.

5. Comment: The environmental statement should discuss the effective life of the proposed project, and what additional projects may be planned or needed to accomplish the permanent and definitive solution to the salinity problem.

Reply: No additional projects, other than the desalting complex, are contemplated to accomplish the salinity objective of Minute No. 242. The desalting complex is to be designed for an estimated useful life of 100 years.

6. Comment: (a) The final environmental statement should discuss the extent to which applicable water law in the seven basin states places constraints upon or expands the alternatives available for affecting a permanent and definitive solution

to the international problem of the salinity of the Colorado River.

(b) The environmental statement should discuss the extent to which applicable state water law may jeopardize the ability of the proposed project to realize the goals of Minute No. 242.

Reply:

(a) Water law in the seven basin states has no bearing on the "permanent and definitive solution" to the international problem of the salinity of the Colorado River. As stated in Chapter I, the Minute entitled "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River" was formally approved by the two governments.

(b) State water law should not jeopardize the ability of the proposed project to realize the goals of the Minute. As discussed in Chapter I of the final environmental statement, the Project Plan is considered the permanent solution to the Colorado River international salinity problem with Mexico.

7. Comment:

The draft environmental statement categorized specific project alternatives as either treating, eliminating, or bypassing, or replacing from other sources the drainage flows from Wellton-Mohawk. The latter two approaches should receive additional attention. For example, whereas the proposed total shutdown of the Wellton-Mohawk Division may be an undesirable alternative, partial shutdown of Wellton-Mohawk combined with other withdrawals of land and improved water management practices over a greater portion of the Basin may be an effective alternative.

To complete the discussion of alternatives, the environmental statement should incorporate as a minimum the alternatives of vegetative management, irrigation practices, and substitution of waters from above Imperial Dam which were developed in the Final Environmental Statement: Possible Options for Reducing the Salinity of the Colorado River Water Flowing to Mexico which you referred to on page 189 of the draft environmental statement. EPA strongly believes that the full range of options developed in that final environmental statement are highly relevant to the proposed action and should be fully disclosed and discussed.

Reply:

The draft statement was prepared in support of H.R. 12834 and S. 3094. Public Law 93-320, H.R. 12165 was enacted into law on June 24, 1974, wherein certain specific measures not included in the original bills were authorized to meet the objectives of that law. Following the enactment of P.L. 93-320, a supplement to the original draft environmental impact statement was issued to cover those additions. The possible options included in the State Department's final environmental statement are listed in the draft and final statements on the salinity project.

Chapter VIII of this statement discusses the alternatives of eliminating or bypassing flows **considered before and** during legislation processes to the degree that they are pertinent to the legislated project. Again this statement is geared to specific projects authorized by specific legislation precluding implementation of studied alternatives.

The Final Environmental Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico is available for review at the Bureau of Reclamation's Lower Colorado Regional Office, Boulder City, Nevada 89005.

8. Comment: EPA notes that the desalting complex will have a significant energy requirement. However, the environmental impacts of supplying energy requirements are not fully discussed in the draft statement. Power sources should be identified, as should the pressure this energy requirement will generate to expand existing installed capacity. The environmental impacts of obtaining and transporting fuels for power generation should also be addressed.

Reply:

Chapters I and III of the final environmental statement have been expanded to include further discussion on source and transmission of power and related impacts. The 446 gWh required to operate the desalting complex and well field each year will reduce energy schedules to other utilities from the Navajo Project by the same amount, which will require additional replacement capacity. However, the Navajo Project power was contracted for by the present contractors for an interim period only, subject to recapture by the United States for other purposes of the Colorado River Basin Project Act. Since the inservice date of the Central Arizona Project is tentatively scheduled for January 1985, this recapture may require the present contractors to accelerate the schedule of layoff replacement capacity from 1985 to 1980.

9. Comment: Supplies of various chemicals, including chlorine, algaecides and sulfuric acid, will be needed in the operation of the desalting complex. What quantities of these and other chemicals will be normally stored on-site? What provisions have been made for spill prevention and control? What safety measures and response capabilities will be available to cope with any accident during transportation? What specific algaecides will be employed? What will be their long-term effect on the environment after discharge in either product water or brine?

Reply: The operation of the desalting complex will require the use of various chemicals for the pretreatment process and for the cleaning system of the membrane units. Final determination has not been completed on the exact desalting process or combination of processes to be used; and, field testing concerning the various desalting methods and chemical requirements is still in progress. However, a preliminary engineering report has been completed which discusses the use of chemicals that will probably be required. Chapter I of the final environmental statement has been expanded to include discussions of some of the findings of the preliminary report.

10. Comment: The impact on the receiving water quality in the Colorado River from the product stream should be expanded. The concentration of nutrients in the M.O.D.E. which discharges to the Colorado River should be stated, and the probable water quality impacts discussed. The temperature of the discharge should be stated, and the probable water quality impacts of the thermal plume analyzed and discussed.

Reply: The exact concentration of nutrients in the product stream which discharges to the Colorado River will be dependent on the concentration of nutrients in the Wellton-Mohawk drain water and the desalting process that will be applied. The product stream will probably consist of a blend of Wellton-Mohawk drainage water and the desalting plant product water. The ratio of this blend has not been established at this point, however, on the basis of the Preliminary Engineering Report it is estimated to be 99 million gallons per day (Mgal/d) desalting plant product water to be blended with 18 (Mgal/d) of Wellton-Mohawk drainage water for a total discharge to the Colorado River of 117 (Mgal/d). It is expected that this blended discharge will contain the following concentration of nutrients:

Nitrates @ 1.6 p/m

Phosphates @ 0.09 p/m

The desalting process will not add any heat to the product water during the desalting process.

The flow of the Colorado River at the discharge of the blended product stream is expected to be approximately 430,000 Mgal/d based on records of the last four years. Since the flow of the product stream (117 Mgal/d) is only 0.03 percent of the River's flow at the point of discharge the water quality impacts are not expected to be significant.

APPENDIX B

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

8-28-74

Mr. Gilbert G. Stamm
Commissioner
Bureau of Reclamation
Department of the Interior
Washington, D.C. 20240

Reference: 739
452.1

Dear Mr. Stamm:

This is in reply to Acting Commissioner Sullivan's letter of August 29, 1974, addressed to the Commission's Advisor on Environmental Quality, requesting comments of the Federal Power Commission on the supplement to the draft environmental statement on the Colorado River International Salinity Control Project, United States and Mexico.

By letter to you dated May 31, 1974, I transmitted comments on the initial draft environmental statement which addressed primarily the construction of a 100-MGD desalting plant near Yuma, Arizona, and 49 miles of lined canal to replace a segment of the Coachella Canal in California. The supplement to the draft statement discusses construction of an associated ground water pumping project capable of pumping 160,000 acre-feet annually for use in the United States and for delivery to Mexico in satisfaction of the United States - Mexico Water Treaty of 1944.

According to the supplemental statement, operation of the pumping project would require some 52,000,000 kilowatt-hours of electric energy annually and increase the local system load by about 7 megawatts. This would be in addition to the annual energy requirements of 276,100,000 kilowatt-hours and the peak power demand of 35 megawatts required by

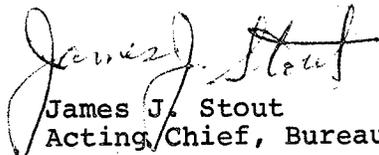
Mr. Gilbert C. Stamm

-2-

the desalting plant and associated facilities. As discussed in the supplemental statement, generation of this additional electric energy would result in the consumption of fossil or nuclear fuels and could create additional air pollution problems in the area of the generating plant. Generation by steam-electric facilities could also entail some water problems due to consumptive use from evaporation in the cooling process or in thermal discharges to the streams.

The opportunity to review this supplement to the draft environmental statement is appreciated.

Very truly yours,



James J. Stout
Acting Chief, Bureau of Power

Federal Power Commission
Washington, D.C.
(Letter of September 26, 1974)

1. Comment: According to the supplemental statement, operation of the pumping project would require some 52,000,000 kilowatt-hours of electric energy annually and increase the local system load by about 7 megawatts. This would be in addition to the annual energy requirements of 276,100,000 kilowatt-hours and the peak power demand of 35 megawatts required by the desalting plant and associated facilities. As discussed in the supplemental statement, generation of this additional electric energy would result in the consumption of fossil or nuclear fuels and could create additional air pollution problems in the area of the generating plant. Generation by steam-electric facilities could also entail some water problems due to consumptive use from evaporation in the cooling process or in thermal discharges to the streams.

Reply: Since the publication of the draft statement, additional data on power requirement and source have been generated and incorporated into the final statement.



STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

**S. E. REYNOLDS
STATE ENGINEER**

**Bataan Memorial Building
STATE CAPITOL
SANTA FE, NEW MEXICO 87501**

September 26, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Ed:

Your August 30, 1974 letter enclosed for review and comment a copy of the Supplement to the Draft Environmental Statement on the Colorado River Basin Salinity Control Project.

The report has been reviewed and I believe that the draft statement adequately describes the environmental impact of the proposed ground water pumping project.

Sincerely,

A handwritten signature in cursive script, appearing to read "S. E. Reynolds".

S. E. Reynolds
State Engineer

SER:re

cc: Mr. David King, State Clearinghouse

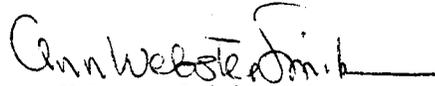
Advisory Council
On Historic Preservation

Mr. E. F. Sullivan
Acting Commissioner
Bureau of Reclamation
U.S. Department of the Interior
Washington, D.C. 20240

Dear Mr. Sullivan:

This is in response to your request of September 11, 1974, (739.452.1) for comments on the Draft Environmental Statement for Colorado River International Salinity Control Project (DES 74-83), Arizona. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that your Draft Environmental Statement appears adequate regarding our area of expertise and we have no further comment to make at this time.

Sincerely yours,



Ann Webster Smith
Director, Office of Compliance

C. E. Brabyn
4515 Fairfield Drive
Corona del Mar, California 92625

673-5642

September 30, 1977

Regional Director
Lower Colorado Region
Bureau of Reclamation
P.O. Box 427
Boulder City, Nevada 89005

Dear Sir:

At this writing I am planning to attend a hearing to be held October 5 at the Mary Elizabeth Post School auditorium in Yuma on the \$34,000,000 Well System to be located south of Yuma, and which would provide up to 160,000 acre-feet of pumped water annually to irrigators in the United States and Mexico.

My family and I are owners of the East $\frac{1}{2}$ of Section 16, Township 11 South, Range 24 West, G.S.R.M., comprising 287.96 acres. We have had some engineering done on the property and thoroughly expect to use it at some time in the reasonably near future to produce crops in the impending era of food shortages.

Notice of the hearing mentioned in the first paragraph above states, "Delivery of 125,000 acre-feet of pumped water to Mexico will be beneficial in that it will maintain flow at the southerly international boundary as required under an agreement with Mexico, designated Minute No. 242, and will conserve a corresponding amount of Colorado River water in upstream reservoirs for use in the United States."

At the time we purchased the East $\frac{1}{2}$ of Section 16 referred to above, the only requirement for drilling wells was that after a well was drilled on the Yuma Mesa, landowner was required to advise the State Land Department in Phoenix of the particular 10-acre plot on which it was drilled. At this writing there is still no limitation regarding the drilling of wells on the Mesa.

Regional Director
Lower Colorado Region
Bureau of Reclamation

September 30, 1974

Page 2

We do not feel that it would be equitable to set up a pumping system that would drain the water from under lands on the Yuma Mesa, giving such water to Mexico and protecting the water table upstream "for use in the United States". Such a requirement would automatically lower the flexibility, and hence the value of the property on the Mesa.

We trust that in the interest of fairness the rights of landowners on the Mesa will be protected in whatever final action is taken.

Very truly yours,



C. E. Brabyn

CEB
olp

CC - Mr. Robert E. Grounds, Yuma County Agricultural Agent

Replies to Comments Made by
Mr. C. E. Brabyn
(Letter of September 30, 1974)

1. Comment: At the time we purchased the East $\frac{1}{2}$ of Section 16, the only requirements for drilling wells was that after a well was drilled on the Yuma Mesa, landowner was required to advise the State Land Department in Phoenix of the particular 10-acre plot on which it was drilled. At this writing there is still no limitation regarding the drilling of wells on the mesa.

Reply: While there is presently no restriction on drilling and pumping under State law, Minute No. 242 of the International Boundary and Water Commission places a limit of 160,000 acre-feet on total pumping in each country within 5 miles of Arizona-Sonora land boundary. This would restrict full development of the land within 5 miles of the border except by importing water from beyond the 5-mile distance.

2. Comment: We do not feel that it would be equitable to set up a pumping system that would drain the water from under lands on the Yuma Mesa, giving such water to Mexico and protecting the water table upstream "for use in the United States." Such a requirement would automatically lower the flexibility and hence the value of the property on the Mesa.

Reply: Under the protective and regulatory ground-water pumping plan, the lands within the 5-mile area will be equitably acquired. Without the plan, ground-water levels will drop due to ongoing Mexican and U.S. pumping. Continued development of mesa lands with the use of pumped ground water would contribute a hastening effect of ground-water drawdown. Under no project conditions, the value of the lands would likewise be reduced and there would be no provisions for acquiring lands at an equitable price.



United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

L7619 (RMR)CS

OCT 1 1974

Memorandum

To: Commissioner, Bureau of Reclamation

Through: Assistant Secretary for Fish and Wildlife and Parks *Spencer 10/2*

From: ^{Acting} Associate Director, Park System Management

Subject: Supplement to the Draft Environmental Statement (DES 74-39) - Colorado River International Salinity Control Project

As requested in your memorandum of August 30, 1974, we have reviewed the subject material and offer the following comments.

No established or studied units of the National Park System appear to be adversely affected by the proposal. The proposal also does not appear to adversely affect any site registered as a National Historic, Natural or Environmental Education Landmark, or any site listed as eligible for such registration.

The supplement to the draft environmental statement indicates the National Register of Historic Places was consulted. It would be desirable to establish that the published list of all such properties in the Federal Register for February 19, 1974, and all subsequent monthly supplements, were consulted.

The statement does not clearly confirm consultation with the State Historic Preservation Officer for the state of Arizona. He is Mr. Dennis McCarthy, Director, State Parks Board, 1688 West Adams, Phoenix, Arizona 85007. The final environmental statement should reflect that he was consulted to determine whether the proposal will affect any cultural site which may be in the process of nomination to the National Register of Historic Places and contain a copy of his response.



B-9

Let's Clean Up America For Our 200th Birthday

We note references in the Supplement to the draft environmental statement to the fact that a detailed archeological survey on the project sites of all features proposed for construction has been completed. It is not clear whether this is a reference to the well sites only or also includes the corridors to carry the proposed pipelines. Page 52 includes the following statement: "Procedures developed by the Advisory Council on Historic Preservation will be followed in the event potential historical sites are identified."

Under Sections 1(3) and 2(b) of Executive Order 11593, it is the responsibility of the initiating agency to complete all needed surveys in advance of construction for the purpose of identifying all potential sites of cultural significance. One wonders whether the reference to "potential historical sites" would be used in this context had adequate surveys been made. Rather, the recovery of archeological artifacts is thought of as occurring at sites which, though surveyed, presented no surface evidence of the possible presence of such resources.

Joe Brown

Replies to Comments Made by the
National Park Service
Washington, D.C.
(Memorandum of October 1, 1974)

1. Comment: The supplement to the draft environmental statement indicates the National Register of Historic Places was consulted. It would be desirable to establish that the published list of all such properties in the Federal Register for February 19, 1974, and all subsequent monthly supplements, were consulted.

Reply: Historical properties listed in the Federal Register of February 4, 1975, and subsequent monthly supplements up to the time of this printing have been consulted in the preparation of the final environmental statement.

2. Comment: The statement does not clearly confirm consultation with the State Historic Preservation Officer for the state of Arizona. He is Mr. Dennis McCarthy, Director, State Parks Board, 1688 West Adams, Phoenix, Arizona 85007. The final environmental statement should reflect that he was consulted to determine whether the proposal will affect any cultural site which may be in the process of nomination to the National Register of Historic Places and contain a copy of his response.

Reply: Copies of the draft environmental statement and the supplement were sent to the State Historic Preservation Officer for Arizona, but no comments were received from his office.

3. Comment: We note references in the supplement to the draft environmental statement to the fact that a detailed archeological survey on the project sites of all features proposed for construction has been completed. It is not clear whether this is in reference to the well sites only or also include the corridors to carry the proposed pipelines.

Reply: The pipelines are considered as features proposed for construction. The archeological survey included the proposed routes or corridors which the pipelines will follow.

4. Comment: Page 52 includes the following statement: "Procedures developed by the Advisory Council on Historic Preservation will be followed in the event potential historical sites are identified."

Under Sections 1(3) and 2(b) of Executive Order 11593, it is the responsibility of the initiating agency to complete all needed surveys in advance of construction for the purpose

of identifying all potential sites of cultural significance. One wonders whether the reference to "potential historical sites" would be used in this context had adequate surveys been made. Rather, the recovery of archeological artifacts is thought of as occurring at sites which, though surveyed, presented no surface evidence of the possible presence of such resources.

Reply:

Reference to "potential historical sites" is used in conjunction with potential archeological sites. If during the construction phase of the project artifacts are uncovered, the site of discovery could possibly be valued as a historical site.



SPLED-E

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

2 October 1974

Mr. E. F. Sullivan
Acting Commissioner
United States Department of the Interior
Bureau of Reclamation
Washington, D.C. 20240

Dear Mr. Sullivan:

This is in response to your letter of 29 August 1974 in which you requested Corps of Engineers review and comments on the supplement to the draft environmental statement (DES 74-39) on the Colorado River Salinity Control Project.

We have no comment concerning the supplement. Incidentally, our comments on the draft environmental statement are contained in a letter dated 15 May 1974 which was sent to your office.

Thank you for the opportunity to review and comment on this supplement.


GARTH A. FUQUAY
Chief, Engineering Division

B-13

PETER C. BYRNE
DAVID S. ELLSWORTH

LAW OFFICES OF
BYRNE & ELLSWORTH
152 FIRST AVENUE - P. O. BOX 1749
YUMA, ARIZONA 85364

TELEPHONE 783-4406
AREA CODE 602

October 3, 1974

Regional Director
Bureau of Reclamation
Lower Colorado Region
P. O. Box 427
Boulder City, Nevada 89005

Re: Colorado River International Salinity Control Project

Gentlemen:

Fortuna Water Company, Inc. is a water utility franchised since 1962 to serve domestic water in southern Yuma County, particularly in the San Luis area. Presently, we are serving more than 200 users and are obligated to serve all additional applicants. Rates are set by the Arizona Corporation Commission based upon, among other considerations, the expense of supplying water.

We view the Colorado River International Salinity Control Project as a possible threat to our ability in the future to fulfill our obligations under our franchise. We presently maintain two wells in the San Luis area pumping good quality water from a depth of approximately 200 feet. Removal of 160,000 acre feet per year will in all probability lower the water table, thus increasing the cost of water, facilities and delivery of domestic water. Further, we are concerned that the quality of the water may be detrimentally effected. The projected growth of the San Luis area forces us to be concerned about future availability of sufficient water of good quality to serve the domestic users.

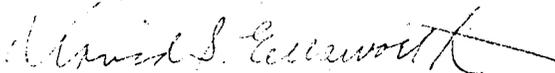
Fortuna Water Company respectfully asserts that it has a prior right to underground waters in the area of the proposed project for the benefit of the present and future residents of that area. We assert that no action taken in connection with the proposed project should be allowed to

Bureau of Reclamation
October 3, 1974
Page Two

jeopardize these rights. Further, we assert that the rights of all residents should be jealously guarded by the Government in considering this project.

Very truly yours,

BYRNE & ELLSWORTH



David S. Ellsworth

cc: Department of Interior
Bureau of Reclamation
Yuma Projects Office
Avenue 3E
Yuma, Arizona 85364

Mr. Les Barkley, President
Fortuna Water Company, Inc.
RFD Box 76
Somerton, Arizona

Replies to Comments Made by the
Law Offices of Byrne & Ellsworth for the
Fortuna Water Company, Inc.
(Letter of October 3, 1974)

1. Comment: We view the Colorado River International Salinity Control Project as a possible threat to our ability in the future to fulfill our obligations under our franchise. We presently maintain two wells in the San Luis area pumping good quality water from a depth of approximately 200 feet. Removal of 160,000 acre-feet per year will in all probability lower the water table, thus increasing the cost of water, facilities and delivery of domestic water. Further, we are concerned that the quality of the water may be detrimentally effected. The projected growth of the San Luis area forces us to be concerned about future availability of sufficient water of good quality to serve the domestic users.

Reply: The present wells will probably not be affected appreciably during their lifetime. Upon their replacement they should be lowered sufficiently to permit continued use. If the replacement wells are drilled only to the depth of the existing wells, they will most likely be affected by the ongoing ground-water withdrawal caused by existing Mexican and U.S. pumping irregardless of the protective and regulatory ground-water pumping plan.

2. Comment: Fortuna Water Company respectfully asserts that it has a prior right to underground waters in the area of the proposed project for the benefit of the present and future residents of that area. We assert that no action taken in connection with the proposed project should be allowed to jeopardize these rights. Further, we assert that the rights of all residents should be jealously guarded by the Government in considering this project.

Reply: Arizona ground-water laws do not preclude the owner of other land in the adjacent area from pumping nor do they grant a "prior right" to preclude such development.



ARIZONA DEPARTMENT OF TRANSPORTATION

206 South Seventeenth Avenue Phoenix, Arizona 85007

JACK WILLIAMS
Governor

October 3, 1974

Highways Division

WILLIAM A. ORDWAY
Director

Mr. E. A. Lundberg
Bureau of Reclamation
Lower Colorado Regional Office
U.S. Department of the Interior
Post Office Box 427
Boulder City, NV 89005

Re: Draft Supplement to the
Environmental Statement
Colorado River International
Salinity Control Project
State Identifier: 74-80-0015

Dear Mr. Lundberg

The Arizona Highways Division's Environmental Planning Services has reviewed the Draft Supplement to the Environmental Statement for the Colorado River International Salinity Control Project.

There appears to be no conflicts with present or five-year-programmed Arizona State Highway projects as the proposal is outlined at this time.

We note you state on pages 31 and 49 of the proposal that the new water pipeline will cross under U.S. Highway 95 in San Louis, Arizona, and there will be some minimal interference with road traffic at the time of construction. Prior to construction, please coordinate this portion of the construction plan with our Arizona Highways Division's District I Engineer, Mr. Miley C. Livesay, telephone number 261-7381, 2140 West Hilton Avenue, Phoenix, Arizona 85009.

We appreciate the opportunity to review the plan and make comment.

Yours very truly

WM. N. PRICE
State Engineer

Mason J. Toles
MASON J. TOLES, Manager
Environmental Planning Services

MJT:ADG:as

cc Mrs. Constance LaMonica
Office of Economic Planning
and Development

Mr. Miley C. Livesay
Highways Division, ADOT

B-17



Arizona Department of Transportation
Phoenix, Arizona
(Letter of October 3, 1974)

1. Comment: We note you state on pages 31 and 49 of the proposal that the new water pipeline will cross under U.S. Highway 95 in San Luis, Arizona, and there will be some minimal interference with road traffic at the time of construction. Prior to construction, please coordinate this portion of the construction plan with our Arizona Highways Division's District I Engineer, Mr. Milem C. Livesay, telephone number 261-7381, 2140 West Hilton Avenue, Phoenix, Arizona 85009.

Reply: Construction of the pipeline across U.S. Highway 95 at San Luis will be coordinated with the Arizona Highways Division's District I Engineer as requested.



DAVE WILLIAMS
DIRECTOR

Arizona
State Land Department

1624 WEST ADAMS
PHOENIX, ARIZONA 85007
602-271-4634



ANDREW L. BETTAY
STATE LAND COMMISSIONER

October 3, 1974

E. A. Lundberg
Regional Director
U. S. Bureau of Reclamation
Post Office Box 247
Boulder City, Nevada 89005

RE: INT DES 74-83

Dear Mr. Lundberg:

This office has reviewed the supplement to the Draft Environmental Statement on the Colorado River International Salinity Control Project and offers the following comments for consideration.

Under Section III, No. 7 SOCIAL AND ECONOMIC STRUCTURE, page 40 states: "Construction and land acquisition cost for the protection and regulatory pumping project are estimated to be \$34 million of which about \$16 million are the estimated acquisition cost of 23,500 acres of State of Arizona land in the Yuma-Mesa."

The report states that 35,000 acre feet of water will be used in the 5 mile restricted area, however, it does not give any detail of the breakdown of the water use for agricultural and other uses. The State Land Department is uncertain as to whether the present agricultural lands are to be acquired or if part of the 35,000 acre feet is allocated to the state lands for continued use.

The state trust lands which are within the 5 mile restriction area are at least under consideration for compensation, however, Plate No. 5 shows that the decline will extend beyond the 5 mile limitation causing an adverse affect to state trust lands which are not within the 5 mile restricted area.

The State Land Department takes the position that the commitment to Mexico in limiting the pumpage within the 5 mile area makes it a national obligation and that the trust should be compensated not only for the lands which will be acquired for the project but also the lands which will have an increased pumping cost because of the project. This increased cost will be to the detriment of the state trust and should be compensated for by the federal government.

E. A. Lundberg
October 3, 1974
Page Two

Arizona's Groundwater Code makes percolating waters a part of the land and must be used for a reasonable use on the land from which it is drawn. ||

Significant in any consideration shall be due compensation to the affected existing lessees of state trust land, both those who have developed the land and those who for years have paid substantial rents in reliance upon a peaceful longterm use of the land. The inequities that can occur as a result of a Washington based remote control action in ignorance of the rights of individuals on the ground are too severe to anticipate that the state trust will be freed of equitable considerations to deal with the United States Government outside the confines of a formal court action unless the interests of the private parties have been fairly dealt with beforehand.

Very truly yours,

Wm Joe Melling

Wm. Joe Melling, Director
Water Rights Division

WJM:jar

cc: Constance LaMonica (74-80-0015)
Arizona Office of Economic Planning
and Development
3003 North Central Avenue
Phoenix, Arizona 85012

Replies to Comments Made by the
Arizona State Land Department
Phoenix, Arizona
Letter of October 3, 1974

1. Comment: Under Section III, No. 7, Social and Economic Structure, page 40 states: "Construction and land acquisition cost for the protection and regulatory pumping project are estimated to be \$34 million of which about \$16 million are the estimated acquisition cost of 23,500 acres of State of Arizona land in the Yuma-Mesa."

The report states that 35,000 acre feet of water will be used in the 5 mile restricted area, however, it does not give any detail of the breakdown of the water use for agricultural and other uses. The State Land Department is uncertain as to whether the present agricultural lands are to be acquired or if part of the 35,000 acre feet is allocated to the state lands for continued use.

Reply: Under full development of the protective pumping plan, 35,000 acre-feet would be available for agricultural or other uses in the United States. First priority for such use would be for existing agricultural developments. Other private land not purchased or partially developed state land would also be considered to the extent that water would be available. Water available from the protective pumping facilities would be furnished only to high efficiency pressure irrigation systems. Land for which no water would be available would be purchased.

2. Comment: The state trust lands which are within the 5 mile restriction area are at least under consideration for compensation, however, Plate No. 5 shows that the decline will extend beyond the 5 mile limitation causing an adverse affect to state trust lands which are not within the 5 mile restricted area.

Reply: Under the terms of Minute No. 242, there is no restriction to pumping beyond the 5-mile distance. The only effect on this land would be a greater pumping lift, but remaining within economical limits for good agricultural land. The pumping lift in other parts of the State is substantially greater than would be expected in this area.

3. Comment: The State Land Department takes the position that the commitment to Mexico in limiting the pumpage within the 5 mile area makes it a national obligation and that the

trust should be compensated not only for the lands which will be acquired for the project but also the lands which will have an increased pumping cost because of the project. This increased cost will be to the detriment of the state trust and should be compensated for by the federal government.

Arizona's Groundwater Code makes percolating waters a part of the land and must be used for a reasonable use on the land from which it is drawn.

Reply: The primary recharge for the ground water presently underlying the south Yuma Mesa is deep percolation from the Bureau of Reclamation's projects of the Yuma Mesa and Yuma Valley. The irrigation water applied on these projects is Colorado River water delivered under water contracts pursuant to the Boulder Canyon Project under which the United States has reserved the right to recover excess water.

4. Comment: Significant in any consideration shall be due compensation to the affected existing lessees of state trust land, both those who have developed the land and those who for years have paid substantial rents in reliance upon a peaceful longterm use of the land. The inequities that can occur as a result of a Washington based remote control action in ignorance of the rights of individuals on the ground are too severe to anticipate that the state trust will be freed of equitable considerations to deal with the United States Government outside the confines of a formal court action unless the interests of the private parties have been fairly dealt with beforehand.

Reply: The price paid for any land acquired by the United States will be based on the fair market value of the land. Past rental payments have no affect on the value of the land unless there was also a corresponding investment in development of the land.

JACK WILLIAMS
GOVERNOR

OFFICE OF
State Land Department

STATE OF ARIZONA
Phoenix, Arizona 85007

ANDREW L. BETTWY
STATE LAND COMMISSIONER

October 8, 1974 1074

Mr. Edward A. Lundberg
Regional Director, Lower Colorado Region
U. S. Bureau of Reclamation
Post Office Box 247
Boulder City, Nevada 89005

Dear Mr. Lundberg:

Please add the following as a supplement to the Arizona ~~State Land Department~~ comments on the Supplement to the Colorado River International Salinity Control Project draft environmental statement. The same reflects what was paraphrased at your hearing in Yuma on October 5, 1974.

"Your Honor and Hearing Officers:

I am Andrew L. Bettwy and appear here in the capacity of Arizona State Land Commissioner. In that function I am responsible for protecting Arizona's interests in its Trust's lands.

This Trust has about 20,000 acres within the 5-mile area to be dewatered.

It also has about 20 thousand acres more that will be equally made useless for all practical purposes by this project due to loss of the useful water; subsidence and invasions of sour water will very likely cause other damage. Barring the opportunity to find other Federal lands of equivalent potential for which to trade these lands to the U. S. Government, it appears that the U. S. should budget to compensate for these losses. A trade seems unlikely due to the lack of willingness on the part of various Federal bureaus to allow encroachment upon their respective reserves. Accordingly, it is my recommendation that at current values, acquisition costs of the specific lands within the 5-mile corridor and compensation for those which will inevitably be destroyed by being dewatered should be anticipated in the neighborhood upwards of 60 million dollars. Additional consideration for inflation and appreciation that would normally occur to the date of taking should be anticipated also.

The position of the Trust is that the waters to be removed are groundwaters not subject to appropriation, and consequently concern property of the respective landowner.

The glaring inadequacy of the draft EIS is that it fails almost completely to concern itself with the private party interests to be affected and the economic values that are involved and relevant to the total environment.

It is appropriate to face the hearing officers as being the United States of America. No one else knows the problems. No one else can take care to avoid injury to people who are helpless in the wake of Federal actions. I appeal to you to

keep your thinking clearly divided between the project and people. The EIS is completely inadequate and a failure on the subject of people and their property affected by the project.

Just today, October 5, 1974, the news announced that a Senate Interior Subcommittee approved 3-million dollars for 30 some odd families displaced by the San Carlos Indian Mineral Strip decision. This has been going on since 1968. The mineral strip is a fact of Federal action made without prior provisions for individual rights to satisfy a national program, and like the subject at hand, a national obligation.

The burden of your salinity project would not appear to be Arizona's nor of some of its people; in any event, it is surely not the burden of the State Trust or its lessees.

The State's concern, as trustee, relates to the people who deal with it as lessees. Those people have relied upon Arizona's reliance on the integrity of the Trust and lease much of the land to be affected.

As lessees, they are in a complete variety of stages of development.

Some are nearing the stage of initiating long time planned development.

All have paid substantial rents over a long period of time in expectation and in reliance on the integrity of their lease.

Some now complain, and justifiably, that they should pay no more rent. The position of the Trust is that it is still in business and it should be entitled to receive its rents. It is obvious that to force more development will serve no one.

These situations become demoralizing. The owner cannot sell, he is foolish to maintain or improve his land and a blight extends over the entire area.

An intimately detailed report should be made by you to indicate what, where, when, how much, about each interest involved, and that should be a priority. As to State trust lessees, our records are available to you and we will cooperate in supplying any data, and are available to confer at any time.

Perhaps a solution for some will be to ignore certain lands in the project and to guarantee these people adequate water. In any event, your plans as to the people interest should be made and disclosed so that each person affected can be dealt with and compensated, and they as well as the Trust can move on to productive efforts.

It is unconscionable, unjust and not within the constitutional concepts of our country to injure even one person in the national interest.

The message of this potential injustice is yours to take to Washington, to document and to insist that it not occur.

Justice for and due compensation for the people involved should have priority over the project.

Mr. Edward A. Lundberg

-3-

October 8, 1974

In all cases where people are referred to, this comment relates only to State lessees.

Your prepared material, in my opinion, does not adequately consider the loss of agricultural base, and, to my knowledge, no direct attempt has been made to interface with the landowners and occupants of the trust land.

The concern should be to prevent an injustice, not to defend or later attempt to justify it.

If the people are taken care of properly and timely; if Federal bureaus can relax their territorial imperative on their present reserves, then the State Trust can and should cooperate and work aggressively to minimize and possibly eliminate the monetary cost of the project by trading lands with the U. S. Government.

It is in that sequence that events must occur to free the State of any real and equitable duty to its lessees and to free the State, as trustee, to deal with the Trust according to the laws that govern it."

Sincerely,



ALB:rm

B-25

Replies to Comments Made by the
Arizona State Land Department
Phoenix, Arizona
(Letter dated October 8, 1974)

1. Comment: It also has about 20 thousand acres more that will be equally made useless for all practical purposes by this project due to loss of the useful water; subsidence and invasions of sour water will very likely cause other damage. Barring the opportunity to find other Federal lands of equivalent potential for which to trade these lands to the U.S. Government, it appears that the U.S. should budget to compensate for these losses. A trade seems unlikely due to the lack of willingness on the part of various Federal bureaus to allow encroachment upon their respective reserves. Accordingly, it is my recommendation that at current values, acquisition costs of the specific lands within the 5-mile corridor and compensation for those which will inevitably be destroyed by being dewatered should be anticipated in the neighborhood upwards of 60 million dollars. Additional consideration for inflation and appreciation that would normally occur to the date of taking should be anticipated also.

Reply: The effect on State trust lands beyond the 5-mile distance was previously answered under Comment No. 2, to the October 3, 1974 letter. The reply to Comment No. 3 is also germane. Subsidence on the sandy Yuma Mesa land is not likely. As to invasions of sour water, the estimate of the International Boundary and Water Commission ^{1/} is that under the lands in the United States in the Yuma area, there is 55 million acre-feet of useable water that is recoverable.

2. Comment: The position of the Trust is that the waters to be removed are groundwaters not subject to appropriation, and consequently concern property of the respective landowner.

Reply: It is planned to acquire the land from which the water is to be pumped and, therefore, title will be in the name of the United States.

3. Comment: The glaring inadequacy of the draft Environmental Impact Statement is that it fails almost completely to concern

^{1/} Memorandum Report MR-73-1, Appendix A, Ground Water Conditions in the Colorado River Delta Area, United States and Mexico. Harshbarger and Company, February 17, 1973.

itself with the private party interests to be affected and the economic values that are involved and relevant to the total environment.

Reply: It is assumed that in this context, private party interests refer to the leases of State trust land. The United States would deal with the landowner (in this case, the State of Arizona) in the acquisition and the landowner (State) would have to deal with its lessees. This is not to imply that the officers of the United States have a lack of concern for the lessee, but they are obligated to deal with the record landowners.

4. Comment: An intimately detailed report should be made by you to indicate what, where, when, how much, about each interest involved, and that should be a priority. As to State trust lessees, our records are available to you and we will cooperate in supplying any data, and are available to confer at any time.

Reply: Records of landownership within the 5-mile distance of the land boundary were checked prior to the issuance of the draft statement. The records of the State Land Department have been rechecked. Detailed investigations of physical developments on the land are a part of the appraisal process prior to acquisition.

5. Comment: If the people are taken care of properly and timely; if Federal bureaus can relax their territorial imperative on their present reserves, then the State Trust can and should cooperate and work aggressively to minimize and possibly eliminate the monetary cost of the project by trading lands with the U.S. Government.

Reply: The possibility exists, and is authorized by the legislation, for trading for other Federal land in Arizona. As of this time, however, no mutually satisfactory terms or identification of lands have been worked out.



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

State Office
3022 Federal Building
Phoenix, Arizona 85025

IN REPLY REFER
1792 (911)
Your reference:
739

October 4, 1974

Memorandum

To : Commissioner, Bureau of Reclamation

From : State Director, Arizona

Subject: Supplement to the Draft Environmental Statement (DES 74-39)
Colorado River International Salinity Control Project

In response to your request, the following questions, comments and suggestions on the subject project are offered:

1. Has consideration been given to obtaining credit from Mexico for their withdrawal of 45-50,000 acre-feet per year of ground water from the Yuma Mesa and Yuma Valley?
2. With the projected drying up of Hunter's Hole and the associated loss of the riparian habitats, is it possible to maintain by surface pumping the backwater ponds with the 35,000 acre-feet of water which will be available annually for agricultural or other use in the United States?
3. The statement indicates that, "Mexican pumping alone will dry up Hunter's Hole, but concurrent pumping in both Mexico and the United States will accelerate it." The period of extended life of the "no-action" alternative to Hunter's Hole is not indicated.
4. The statement contains cost projections in terms of land acquisition, construction and energy requirements for delivery of the water, but it does not include in the estimates a corresponding loss in basic recreational income to the Yuma community through loss of the wildlife habitats, not to mention the effect of habitat loss on rare and endangered wildlife species. While we cannot estimate the corresponding loss in basic recreational income at this time, we believe it should be measured and added to the cost of developing and delivering an annual 160,000 acre-feet of water so as to make the cost element raised by the statement more representative of the economics involved.

5. The statement would be improved if quantity references were consistent throughout. The use of "gallons per minute," "acre-foot per day," and "cubic feet per second" is confusing.
6. It is suggested that a glossary be included to define terms such as "granular-clastic sediments." This is a technical term which may not be understood by the lay reader.

J. T. Fallini

cc
WO BLM (220)

B-29

2

Replies to Comments Made by the
Bureau of Land Management
Phoenix, Arizona
(Memorandum of October 4, 1974)

1. Comment: Has consideration been given to obtaining credit from Mexico for their withdrawal of 45-50,000 acre-feet per year of ground water from the Yuma Mesa and Yuma Valley?

Reply: It has been determined that underflow across the Sonoran land boundary cannot be charged against Mexico's guaranteed deliveries under the 1944 United States-Mexico Water Treaty.

2. Comment: With the projected drying up of Hunter's Hole and the associated loss of the riparian habitats, is it possible to maintain by surface pumping the backwater ponds with the 35,000 acre-feet of water which will be available annually for agricultural or other use in the United States?

Reply: The means of maintaining water levels in the ponds at Hunter's Hole have been studied in detail during deliberations of the Ad Hoc Committee for mitigation measures for the desalting complex. Pumping of ground water to preserve the Hunter's Hole ponds will be considered as a part of the 160,000 acre-foot per year limitation as specified by **Minute No. 242. The final environmental statement in Chapter IV presents the method of preserving Hunter's Hole which is considered by the committee to be the best of several alternatives.**

3. Comment: The statement indicates that, "Mexican pumping alone will dry up Hunter's Hole, but concurrent pumping in both Mexico and the United States will accelerate it." The period of extended life of the "no action" alternative to Hunter's Hole is not indicated.

Reply: Additional tables and figures have been incorporated into the final environmental statement to show the comparative ground-water drawdown with or without the protective and regulatory ground-water pumping. With protective pumping, the water level at Hunter's Hole will drop about 16 feet in 10 years and 51 feet in 50 years. Without protective pumping the Mexican pumping and current U.S. pumping will draw the water level at Hunter's Hole down about 7 feet in 10 years and 19 feet in 50 years. Therefore, the projected dry-up of Hunter's Hole without protective pumping will be within 10 to 20 years.

4. Comment: The statement contains cost projections in terms of land acquisition, construction and energy requirements for delivery of the water, but it does not include in the estimates a corresponding loss in basic recreational income to the Yuma community through loss of the wildlife habitats, not to mention the effect of habitat loss on rare and endangered wildlife species. While we cannot estimate the corresponding loss in basic recreational income at this time, we believe it should be measured and added to the cost of developing and delivering an annual 160,000 acre-feet of water so as to make the cost element raised by the statement more representative of the economics involved.

Reply: Studies have been completed on the recreational use and projected use of the area of the project. Additional inventories regarding wildlife habitat loss and a thorough discussion of the impacts on the endangered Yuma clapper rail have been completed and are included in the discussion of mitigation in the final environmental statement. Copies of the subject studies have been provided to the Bureau of Land Management. The exact income resulting to Yuma County from the recreational use of the outdoor recreation, including hunting and fishing, has not been determined. Mitigation measures aimed at the replacement of these losses have been planned with the assistance of the Ad Hoc Committee on fish and wildlife of which BLM is a member, and are discussed in detail in Chapter IV. The cost of these measures are included as a project cost and are consistent with the objectives of the project.

5. Comment: The statement would be improved if quantity references were consistent throughout. The use of "gallons per minute," "acre-feet per day," and "cubic feet per second" is confusing.

Reply: Hydrological terms in regard to measurement of volume of water have been made more consistent throughout the statement.

6. Comment: It is suggested that a glossary be included to define terms such as "granular-clastic sediments." This is a technical term which may not be understood by the lay reader.

Reply: There are numerous technical terms used throughout this statement that are the only available verbiage which provide a professional description. Where there may be some confusion in understanding the meaning of a given term, a definition is included in parentheses immediately following such terms.



Yuma Natural Resources Conservation District

450 West 24th Street - Yuma, Arizona 85364

October 4, 1974

E. A. Lundberg, Regional Director
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

RE: LC-150 - 120.1

Dear Sir:

In response to the Supplement to the Draft Environmental Statement on the Colorado River Basin Salinity Control Project, we have several comments and recommendations.

The Yuma Natural Resource Conservation District has been actively involved in long-range land use planning on the Yuma mesa. It has been our objective to plan for the expansion of agricultural production to compensate for the increase in urbanization. To do this, land and water must be available, and the Yuma mesa is one of the few areas in the country that has a unique combination of resources that can be developed. Currently there are 13,000 acres of State of Arizona land that could be developed for agriculture. The 5-mile distance will restrict such development.

The Supplement points out that 23,500 acres of State of Arizona land would have to be acquired for the regulatory pumping project. Also, it proposes that efforts should be made to negotiate the acquisition of State lands by means of exchange for Federal lands elsewhere. We recommend that this exchange be made within Yuma County and involve land of comparable potential.

The need to preserve State land within Yuma County is evidenced by the fact that only 7% of the land in Yuma County is privately owned. It is hoped that the State land can be converted to private ownership in the near future and increase the tax base.

Groundwater levels will drop considerably, thus making it necessary for present wells to be modified. There are no considerations as to who is responsible for deepening wells.

Also, it is proposed that pump water be made available to private owners; but there are no considerations as to how this water is to be made available (such as delivery systems and water quantity).

A total of 160,000 acre feet per year is to be pumped from the Yuma mesa of which 35,000 acre feet will be for agricultural or other use in the United States. The use of the additional 125,000 acre feet that will be credited to the United States is not specified. We submit that this 125,000 acre feet allocation should be obligated to Yuma County.

The Yuma NRCD is interested in the preservation of Hunter's Hole. We realize the problems that are involved to maintain this area, but it is hoped that a feasible solution can be found.

Water conservation is a primary concern of the Yuma NRCD. With the advent of more efficient irrigation systems and better management, the groundwater recharge will decrease significantly. As a result, the well field may not be capable of pumping 160,000 acre feet per year and Colorado River water may again have to be utilized to fulfill Mexico's allocation.

We hope these comments are helpful and that you can give them careful consideration in formulating policies or legislative proposals.

Sincerely,



Dave Crist, Chairman
Yuma Natural Resource Conservation District

Replies to Comments Made by the
Yuma Natural Resources Conservation District
Yuma, Arizona
(Letter of October 4, 1974)

1. Comment: (a) The Supplement points out that 23,500 acres of State of Arizona land would have to be acquired for the regulatory pumping project. Also, it proposes that efforts should be made to negotiate the acquisition of State lands by means of exchange for Federal lands elsewhere. We recommend that this exchange be made within Yuma County and involve land of comparable potential.

(b) The need to preserve State land within Yuma County is evidenced by the fact that only 7% of the land in Yuma County is privately owned. It is hoped that the State land can be converted to private ownership in the near future and increase the tax base.

Reply: (a) Exchange of State land for Federal land in Yuma County may be possible. However, while land of comparable potential for sustained agricultural production may be available for exchange, it is highly unlikely that a comparable water supply could be provided for the exchanged land.

(b) The United States cannot anticipate the State's plans for converting its land in the 5-mile limit area to private ownership. If the United States acquires the land, it is unlikely it would then sell the land for private development since this would tend to defeat the reason for acquisition by the United States.

2. Comment: Groundwater levels will drop considerably, thus making it necessary for present wells to be modified. There are no considerations as to who is responsible for deepening wells.

Also, it is proposed that pump water be made available to private owners; but there are no considerations as to how this water is to be made available (such as delivery systems and water quantity).

A total of 160,000 acre feet per year is to be pumped from the Yuma mesa of which 35,000 acre feet will be for agricultural or other use in the United States. The use of the additional 125,000 acre feet that will be credited to the United States is not specified. We submit that this 125,000 acre feet allocation should be obligated to Yuma County.

Reply: The authorization did not provide for deepening private wells. Most of the private wells affected are small wells at homesites in the Yuma Valley. The plan does provide for making water available for irrigation on the south Yuma Mesa in the event that the owners of those wells currently being used for irrigation would prefer being furnished water from the project wells at a negotiated price rather than to replace their existing wells.

The 125,000 acre-feet of pumped ground water delivered to Mexico as treaty water will be used by Mexico primarily for agriculture. However, it is Mexico's option to use the water for any purpose.

3. Comment: The Yuma NRCD is interested in the preservation of Hunter's Hole. We realize the problems that are involved to maintain this area, but it is hoped that feasible solution can be found.

Reply: A plan for the preservation of the Hunter's Hole ponds and surrounding vegetation has been explored by the Ad Hoc Committee on fish and wildlife and is discussed in the mitigation chapter.

4. Comment: Water conservation is a primary concern of the Yuma NRCD. With the advent of more efficient irrigation systems and better management, the groundwater recharge will decrease significantly. As a result, the well field may not be capable of pumping 160,000 acre feet per year and Colorado River water may again have to be utilized to fulfill Mexico's allocation.

Reply: The duration of pumping and the associated ground-water decline will be affected, in time, by the ground-water recharge. The major portion of the recharge is associated with irrigation on the Yuma Mesa in the Yuma Mesa Irrigation and Drainage District. The installation of more efficient irrigation systems and the better management would reduce the recharge. However, there is enough ground water in storage that will allow pumping for at least 50 years. Pumping eventually will be reduced to the amount of recharge.



ARIZONA CONSERVATION COUNCIL

P. O. Box 11312 Phoenix, Arizona 85061

October 5, 1974

Mr. Edward A. Lundberg
Regional Director
Bureau of Reclamation
Boulder City, Nevada

Dear Mr. Lundberg;

The Arizona Conservation Council is pleased to comment on the supplement to the draft environmental statement (INT DES 74-39^{file}) on the Colorado River Basin Salinity Control Project. We would like to submit the following statement and ask that it be included in the hearing record and final environmental statement.

1. In the explanation of this project there appears to no particular relationship to this project and salinity control. The question occurs as to why this is a supplement to the previous salinity control impact statement as opposed to being presented seperately.

2. On page 59 of the draft statement the last sentence concludes "Although some wildlife involved will probably survive on adjacent lands" This is generally not true since any adjacent habitat can be normally presumed to be supporting its capacity of wildlife, hence when a given purportion of habitat is destroyed that same portion of wildlife will cease to exist.

3. It is regretable that the Bureau of Reclamation has omitted any specific plan for the overall mitigation of habitat losses due to this project. Hopefully such mitigation would be a significant part of the environmental impact of a project where 2300 acres of riparian habitat and 15 acres of ponds are being added to a destruction that will eliminate a total of 14,000 acres of habitat. The attitude that this loss would happen in any case presumes a great deal about the longevity and effects of the pumping in Mexico and also suggests that the Bureau of Reclamation intends to thereby wash their hands of any of the effects of their own actions on the environment. We would like to suggest to the Bureau that their obligation to the public not only includes the reclamation that they preform so vigorously but also a multiple use management where public lands are involved. To this extent we feel that this statement must include mitigation plans to reasonably guarentee their enactment via planning and appropriation along with the opportunity of public purview.

please continue

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ARIZONA CONSERVATION COUNCIL

PAGE 2 response to draft environmental statement INT DES 74-39

We would further suggest that the Bureau of Reclamation include in this statement specific allocations of 5000 acre feet of water for habitat mitigation and roughly 1% to 5% of the total project costs (\$3,000,000 to \$15,000,000) be provided to the Arizona Game and Fish Department for the study and implimentation of this mitigation. It is our expectation that these sums which are quite small in view of the total project costs could have a tremendous effect in restoring the environmental losses embodied in this project. We can see no reason why this country and state should simply construct such projects without including repair of the damages they cause.

We thank you for the opportunity to respond to your impact statement.

Sincerely,

Lyndon Keefer
Chairman
Arizona Conservation Council

B-37

Replies to Comments Made by the
Arizona Conservation Council
Phoenix, Arizona
Letter of October 5, 1974

1. Comment: In the explanation of this project there appears to be no particular relationship to this project and salinity control. The question occurs as to why this is a supplement to the previous salinity control impact statement as opposed to being presented separately.

Reply: Protective and regulatory pumping was authorized by Title I of Public Law 93-320 along with the salinity control measures. After authorization of protective pumping in the legislation, a statement was prepared and issued as a supplement in an effort to include the cumulative effects of the associated measures.
2. Comment: On page 59 of the draft statement the last sentence concludes "Although some wildlife involved will probably survive on adjacent lands" This is generally not true since any adjacent habitat can be normally presumed to be supporting its capacity of wildlife, hence when a given proportion of habitat is destroyed that same portion of wildlife will cease to exist.

Reply: In an intensively cultivated area, annual densities of wildlife are often directly related to crop types and cropping patterns of the agricultural complex. This is especially true in small game species such as rabbit, quail, and dove. Fluctuations in the populations are often more dependent upon the availability of food and water than on natural cover. Many agricultural crops provide all three essentials including cover. Adequate requirements for reproduction then may be the major limiting factor. Under these conditions, cyclic populations of displaced wildlife can find new habitat under limited circumstances. This, of course, is dependent on a variety of factors, such as individual specific requirements and behavior, and conditions of available habitat, such as carrying capacity and limiting factors and their variability from season to season and year to year.
3. Comment: (a) It is regrettable that the Bureau of Reclamation has omitted any specific plan for the overall mitigation of habitat losses due to this project. Hopefully such mitigation would be a significant part of the environmental impact of a project where 2,300 acres of riparian

habitat and 15 acres of ponds are being added to a destruction that will eliminate a total of 14,000 acres of habitat. The attitude that this loss would happen in any case presumes a great deal about the longevity and effects of the pumping in Mexico and also suggests that the Bureau of Reclamation intends to thereby wash their hands of any of the effects of their own actions on the environment. We would like to suggest to the Bureau that their obligation to the public not only includes the reclamation that they perform so vigorously but also a multiple use management where public lands are involved. To this extent we feel that this statement must include mitigation plans to reasonably guarantee their enactment via planning and appropriation along with the opportunity of public purview.

(b) We would further suggest that the Bureau of Reclamation include in this statement specific allocation of 5,000 acre-feet of water for habitat mitigation and roughly 1% to 5% of the total project costs (\$3,000,000 to \$15,000,000) be provided to the Arizona Game and Fish Department for the study and implementation of this mitigation. It is our expectation that these sums which are quite small in view of the total project costs could have a tremendous effect in restoring the environmental losses embodied in this project. We can see no reason why this country and state should simply construct such projects without including repair of the damages they cause.

Reply:

(a) The confidential negotiations between the United States and Mexico, regarding the Title I section of the Colorado River Basin Salinity Control Projects did not include specific details of fish and wildlife mitigation. Subsequent to the removal of the confidential status of this report, immediate negotiations were initiated with fish and wildlife agencies for commensurate mitigation for fish and wildlife resources. These measures are included and discussed in detail in Chapter IV of the final environmental statement. This includes a discussion of the 12 acres of ponds in the Hunter's Hole complex and the impact on 3,190 acres of riparian vegetation south of Morelos Dam, including the 30 to 40 acres of endangered Yuma clapper rail habitat.

(b) Cost of mitigation is now a part of the overall project cost and meets the objectives of the project. The estimate of cost associated with mitigation is not generally based upon a percentage of the project but is related to the actual cost of the best possible means of replacing losses that occur as a result of the project. The allocation of a specific water right to a project within Arizona is entirely dependent upon the discretion and priorities of the state in determining the significance for the consumptive use of water. Plans have been formulated for water supply for mitigation measures which include a freshwater supply for Hunter's Hole. Details for these mitigation plans are included in Chapter IV of the final environmental statement. Another significant concern of the project impact is the effect on human resources. As the purpose of the project is improvement of human conditions, it is consistent with the National Environmental Policy Act of 1969, Section 2, which states in part, "...encourage production and enjoyable harmony between man and his environment..." The primary objective of the project is to improve the quality of water delivered to the human population in Mexico.

WILLIAM H. WHEELER
CHAIRMAN
PETER F. BIANCO
VICE CHAIRMAN
WESLEY E. STEINER
EXECUTIVE DIRECTOR
AND
STATE WATER ENGINEER
VIRGINIA FRONABARGER
SECRETARY



Arizona Water Commission

222 NORTH CENTRAL AVENUE, SUITE 800

Phoenix, Arizona 85004

TELEPHONE (602) 258-7561

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ANDREW L. BETTWEY
MARSHALL HUMPHREY

October 10, 1974

Mr. E. A. Lundberg, Regional Director
United States Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

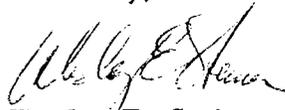
I wish to commend you and your staff for the excellence of the supplement to the Draft Environmental Statement on the Colorado River Basin Salinity Control Project (INT DES 74-39). The supplement to the draft statement clearly and adequately treats the environmental impacts of the protective groundwater pumping project authorized as a feature of Title I of the Colorado River Basin Salinity Control Act of 1974 (PL 93-320).

I have two specific improvements to suggest. On page 39 I urge deletion of the last sentence of the paragraph concluding at the top of the page. While 160,000 acre-feet per year of water could be spread on thirteen thousand acres of leased lands, certainly those lands would not "readily require more than 160,000 acre-feet of pumped water." The statement tends to imply that the Federal government would not oppose such an application as excessive. Instead, a sentence should be added that quantifies the much lesser acreage that has actually been developed.

I also recommend that your last sentence in Section G on page 52 be amended to read, "Water will be available, however, to supply the agricultural needs on already developed private and state land and some water may be available for limited additional agricultural, municipal, and industrial use."

Thank you for the opportunity to comment.

Sincerely,


Wesley E. Steiner
Executive Director

Arizona Water Commission
Phoenix, Arizona
(Letter of October 10, 1974)

1. Comment: I have two specific improvements to suggest. On page 39, I urge deletion of the last sentence of the paragraph concluding at the top of the page. While 160,000 acre-feet per year of water could be spread on 13,000 acres of leased lands, certainly those lands would not "readily require more than 160,000 acre feet of pumped water." The statement tends to imply that the Federal government would not oppose such an application as excessive. Instead, a sentence should be added that quantifies the much lesser acreage that has actually been developed.

Reply: The sentence in question has been changed in the final environmental statement to impart more clearly its intended meaning.

2. Comment: I also recommend that your last sentence in Section G on page 52 be amended to read, "Water will be available, however, to supply the agricultural needs on already developed private and state land and some water may be available for limited additional agricultural, municipal and industrial use."

Reply: This sentence has been amended in the final environmental statement to read as requested.



United States Department of the Interior

BUREAU OF OUTDOOR RECREATION
WASHINGTON, D.C. 20210

U. S. GOVERNMENT PRINTING OFFICE

D6427-LCO

OCT 10 1974

Memorandum

To: Commissioner of Reclamation

From: *fr* Director

Subject: Supplement to the Draft Environmental Statement (DES 74-39)
Colorado River International Salinity Control Project

We have reviewed subject draft supplement as requested in your memorandum of August 30, 1974, and offer the following comments:

The statement indicates that the proposed pumping project will cause the lowering of the ground water table in the project area at an increased rate over that expected with only the Mexican pumps in operation, resulting in accelerated adverse impacts to vegetation, fish and wildlife resources, and related recreation values. It would be most desirable for the environmental statement to compare the incidence of impacts over time with and without project operations. While we recognize that quantification of some impacts, e.g. vegetation losses, may be difficult, others should be more tractable. For example, if the ponds in the Hunter's Hole area will dry up approximately ten years following the start of project pumping, how soon will they be dry with only the Mexican pumps in operation? A knowledge of the difference in incidence of impacts over time is essential in assessing the project's net impact, and in determining mitigation requirements.

The discussion of alternatives is deficient in failing to consider alternative means of satisfying treaty requirements. While it may well be that alternative sources of water supply will ultimately prove inferior in economic and environmental impacts to the proposed pumping project, it would seem nevertheless that the construction agency has the burden of demonstrating that this is indeed the case.

At Humbert Hill

Bureau of Outdoor Recreation
Washington, D.C.
(Memorandum of October 10, 1974)

1. Comment: The statement indicates that the proposed pumping project will cause the lowering of the ground-water table in the project area at an increased rate over that expected with only the Mexican pumps in operation, resulting in accelerated adverse impacts to vegetation, fish and wildlife resources, and related recreation values. It would be most desirable for the environmental statement to compare the incidence of impacts over time with and without project operations. While we recognize that quantification of some impacts, e.g. vegetation losses, may be difficult, others should be more tractable. For example, if the ponds in the Hunter's Hole area will dry up approximately 10 years following the start of project pumping, how soon will they be dry with only the Mexican pumps in operation? A knowledge of the difference in incidence of impacts over time is essential in assessing the project's net impact, and in determining mitigation requirements.

Reply: See reply to Comment No. 3, letter from the Bureau of Land Management, Phoenix, Arizona, dated October 4, 1974.

2. Comment: The discussion of alternatives is deficient in failing to consider alternative means of satisfying treaty requirements. While it may well be that alternative sources of water supply will ultimately prove inferior in economic and environmental impacts to the proposed pumping project, it would seem nevertheless that the construction agency has the burden of demonstrating that this is indeed the case.

Reply: There may be other means of augmenting the flow of the Colorado River but no alternative means have been identified for converting the effect of Mexico pumping on continued increases in the underflow across the boundary caused by Mexican pumping.



TOM BRADLEY
Mayor

Commission
BURTON J. GINDLER, *President*
MICHAEL GLAZER
GEORGE H. KENNEDY
PATRICIA C. NAGLE
HERBERT C. WARD
MARY J. BORN, *Secretary*

ROBERT V. PHILLIPS, *General Manager and Chief Engineer*
PAUL H. LANE, *Chief Engineer of Water Works and Assistant Manager*
JAMES L. MULLOY, *Chief Electrical Engineer and Assistant Manager*
WILLIAM D. SAUGHAU, *Chief Financial Officer*

October 10, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

Supplement to the Draft
Environmental Statement - Proposed Colorado River
International Salinity Control Project

Thank you for your August 30, 1974 notice of review period for the subject Statement, assigned Control Number INT DES 74-83, on proposed regulatory and protective groundwater pumping in Yuma County, Arizona. This program was specified in the Colorado River Basin Salinity Control Act of 1974 (P.L. 93-320).

My May 14, 1974 letter to you discussed several areas in which we found the Draft Environmental Statement, INT DES 74-39, to be inadequate. This finding was based, in part, on the Statement's failure to explore alternatives to a no-pumping policy for the United States along the international boundary near San Luis. We are pleased to see the Supplement to the Statement does evaluate alternatives and finds such a pumping program would be beneficial and preferable to the no-action policy.

We further expressed concern in our earlier letter over the Statement's failure to propose a permanent and definitive solution to the international salinity problem of the Colorado River.

The intent of both Minute 242 of the International Boundary and Water Commission and P.L. 93-320 is, of course, to furnish acceptable quality water to Mexico. The projects proposed in your draft Statement and Supplement, however, are not designed to stabilize the salinity of water delivered to Mexico; the salinity of this water could increase to unacceptable levels with the expected increase of salinity at Imperial Dam.

B-45

Mr. E. A. Lundberg

- 2 -

October 10, 1974

We feel that the Statement as supplemented remains inadequate in that it does not consider any means to stabilize the salinity of the Colorado River at Imperial Dam.

As you are aware, Congress wrote into the Bureau's 1974-75 budget funds totaling \$1,650,000 for advance planning on the Las Vegas Wash, Paradox Valley, Grand Valley and Crystal Geyser projects. These works, authorized in Title II of P.L. 93-320, are aimed at controlling salinity in the Colorado main stem, which would include Imperial Dam. Under the new Congressional Budget and Impoundment Act, this planning must be accomplished unless Congress approves a deferral or rescision of funds.

The 1974 Western Governors' Conference held in Albuquerque, New Mexico, approved a resolution urging that authorized projects in Titles I and II of P.L. 93-320 "must be funded and carried out simultaneously."

We recommend that your draft EIS be revised to include consideration of means to control the salinity of water at Imperial Dam. It would appear that a prime alternative to be explored would be the Title II projects mentioned above.

We appreciate the opportunity to review and comment on your Statement and Supplement and trust that our remarks will receive appropriate attention.

Sincerely,


ROBERT V. PHILLIPS
General Manager and Chief Engineer

cc: Mr. Myron Holburt
Colorado River Board of California
California State Building, Room 8103
107 South Broadway
Los Angeles, California 90012

Replies to Comments Made by the
Department of Water and Power
City of Los Angeles
(Letter of October 10, 1974)

1. Comment: The intent of both Minute 242 of the International Boundary and Water Commission and P.L. 93-320 is, of course, to furnish acceptable quality water to Mexico. The projects proposed in your draft statement and supplement, however, are not designed to stabilize the salinity of water delivered to Mexico; the salinity of this water could increase to unacceptable levels with the expected increase of salinity at Imperial Dam.

We feel that the Statement as supplemented remains inadequate in that it does not consider any means to stabilize the salinity of the Colorado River at Imperial Dam.

Reply: The draft of the environmental statement was prepared to support the report on the measures required to comply with Minute No. 242, which specifies that the United States shall adopt measures to assure that the water delivered to Mexico upstream from Morelos Dam has an annual average salinity of no more than 115 p/m \pm 30 p/m over the average salinity of the Colorado River waters which arrives at Imperial Dam. The report on the Colorado River International Salinity Control Project and the draft environmental statement, along with the February 1972 report on the Colorado River Water Quality Improvement Program, led to the authorization of the Colorado River Basin Salinity Control (Projects) Act of June 24, 1974, Public Law 93-320.

Construction of well fields for protective and regulatory ground-water pumping was authorized in the Act for the purpose of utilizing the ground waters underlying lands in the United States to the benefit of the United States' interest. These ground waters in the Yuma, Arizona area exist partly as a result of irrigation on Yuma Mesa and in the Yuma Valley. The supplement to the draft environmental statement on the Colorado River International Salinity Control Project was issued August 24, 1974, to provide for the protective and regulatory ground-water pumping.

Title I of the Act provides for the measures necessary to control the salinity of the river water at Morelos Dam

without bypassing drainage flows from Wellton-Mohawk. Title II of the Act provides for the upstream measures necessary to stabilize the salinity of the Colorado River at Imperial Dam. Minute No. 242 does not address itself to the measures required to stabilize the salinity of the Colorado River above Imperial Dam. Therefore, the report on the Colorado River International Salinity Control Project and environmental statement were limited to measures necessary downstream from Imperial Dam.

2. Comment: As you are aware, Congress wrote into the Bureau's 1974-75 budget funds totaling \$1,650,000 for advance planning on the Las Vegas Wash, Paradox Valley, Grand Valley and Crystal Geysers projects. These works, authorized in Title II of Public Law 93-320, are aimed at controlling salinity in the Colorado main stem, which would include Imperial Dam. Under the new Congressional Budget and Impoundment Act, this planning must be accomplished unless Congress approves a deferral or rescission of funds.

Reply: The Bureau of Reclamation is initiating the planning studies for the projects authorized in Title II of Public Law 93-320 in accordance with the provision of that law. Implementation of the actions upstream from Imperial Dam outlined in Title II of the law will maintain the quality of the river at or below its present level.



by Ansel Adams in *This Is the American Earth*

SIERRA CLUB

Mills Tower, Santa Fe, New Mexico 87501

National Water Resources Committee

152 East San Mateo Road
Santa Fe, New Mexico 87501

12 October 1974

Mr E A Lundberg, Regional Director
Lower Colorado Region
US Bureau of Reclamation
Post Office Box 427
Boulder City, Nevada 89005

Subject: Comments on Supplement to
Draft EIS, Colorado River Internation-
al Salinity Control Project.

Dear Mr Lundberg:

Thank you for sending me a copy of the Draft Environmental Statement Supplement (INT DES 74-83) for the Colorado River International Salinity Control Project, and for the opportunity to submit comments. According to the Federal Register for 30 August 1974, these are due within 45 days of the notice published in that issue, that is by 14 October 1974. Please consider these comments in the preparation of the final EIS and publish them therein. You will recall that comments have already been submitted on behalf of the Sierra Club pertaining to the original Draft Environmental Statement (INT DES 74-39), by Mr John A McComb, Southwest Representative of the Club, under date of 13 May 1974.

This draft EIS quite clearly describes a tradeoff which is adverse to the environmental quality objective in the affected area and which is an inevitable result of the project described. It is not explained, however, to what objective prescribed by the Water Resources Council the advantages of the tradeoff would accrue. It is unlikely that these would accrue to any economic development objective, whether national or regional, because to all appearances the costs of the project will decisively outweigh any ostensible benefits.

To the detached observer the childish aspect of the project is readily apparent. To undertake what can be aptly described as a "pumping war" in this time of inflation and shortages of both energy and money, when it is so obvious that an international agreement for the management of the ground water along the boundary is both a reasonable goal and a necessity, is nothing short of absurd. Yet the alternative of trying for an international agreement is not even considered.

Surely an international agreement in so obvious a case should be achievable in a relatively few years, in fact in a sufficiently short time to avoid undue loss of ground water to the Mexican pumping and in the same way to avoid concurrent environmental damage.

Parenthetically, and considering the precedent that might be a conse-

12 October 1974

quence of the proposed pumping war, it is amusing to imagine what might be the result of this precedent. One can visualize rows of wells along both sides of every state boundary, each state pumping away furiously either to dewater its neighbor for its own benefit, or conversely to defend itself against pumping aggression, something new in the world.

With regard to the environmental quality objective, the destruction of much of the biota of the affected area, certainly all that part which is adapted to any but very xeric conditions, is inevitable if the project is carried forward as proposed. On the other hand, such a result is not nearly so predictable on the basis of the Mexican pumping alone. As a matter of fact, it is clear from Plate 3 that the destructive effect would be materially delayed without the multiplying effect of pumping on the US side of the boundary. It would certainly be reasonable to delay the project until an international agreement for the management of the boundary ground waters can be arranged. During such a delay for a relatively short time, it is not a sure thing that the biota of the US side would be noticeably affected, nor would the costs of the project in both energy and funds be loaded onto the national economy during this critical period. If an effort to obtain international agreement should fail, a reasonable delay while trying for it would not prevent going forward with the project for the purposes now planned if that should appear to be an intelligent conclusion at the time.

In any event, the treatment of environmental impact in the draft EIS is inadequate because the necessary information for the assessment of impact is not available. On Pages 18, 19, 21, and 22, pertaining to vegetative communities, fish fauna, wildlife populations, and recreational use, respectively, the same remark is made that "studies are currently under way," and that the results of these studies will be used in preparing the final EIS. It is thus obvious that the present draft is incomplete and can have no claim to providing an acceptable study of environmental impact, and that the next stage cannot be the final EIS but must be a new draft. This new draft should be prepared whenever the results of the current studies become available. As already brought out, it is certain that the effect of the Mexican pumping alone will be much less destructive than if pumping occurs on the US side also, hence it is only reasonable to await complete information in order to do a complete job of evaluating the proposed trade-off now so casually accepted by the Bureau of Reclamation.

With regard to the economic development objective, whether described as national or regional, the draft EIS is not clear, although from what information is given it would appear that the project should prove to be relatively expensive. The costs of construction and land acquisition are said on Page 40 to be \$34,000,000. An electric energy requirement of about 52,000,000 kilowatthours per year is estimated on Page 10, although no estimate of the cost of this energy is provided. As for benefits, the project is intended to provide "protective and regulatory pumping" with the objective described on Page 6. In a few words, this objective can be described as taking the ground water which is the common international target before Mexico can get it, without regard to the accelerated destruction of the most valuable biotic resources of the area or to the alternative that an international ground water agreement could quite possibly be reached within a relatively short time. As matters stand, if the project should be built as planned but an agreement with Mexico should be achieved in perhaps four or five

Dr. A. Lundberg

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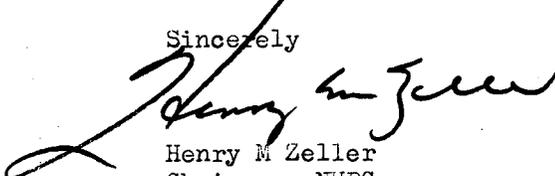
12 October 1974

years, then the remaining life of the project, some 45 years, would represent a clear waste except for perhaps a few incidental benefits which may be claimed.

The draft EIS does not provide any comparison of benefits and costs. It seems clear, however, if the environmental costs of the project, including those inherent in the production of the energy necessary for pumping, are considered in connection with the total dollar costs of construction and land acquisition, together with the operation and maintenance costs for a fifty year life, that this total of both monetary and other costs will in all probability dwarf the unquantified benefits obtained by "protective and regulatory pumping." Add to this likely disparity the possibility that most of the project life may be simply wasted (assuming that there will be an effort toward an international ground water management agreement), and the project appears unwarranted, to say the least. In any event, the draft EIS should be rewritten (see above).

To conclude from an environmental point of view, the tradeoff described in the draft EIS which is adverse to the environmental quality objective, costing the ultimate but certain destruction of the most interesting, esthetic, enjoyable, and therefore valuable plants and animals of the affected area, is clearly unacceptable. The project described in this supplemental EIS would continue the comedy of errors discussed in our comments on the original draft EIS.

Sincerely



Henry M Zeller
Chairman, NWRC

Replies to Comments Made by the
Sierra Club
Santa Fe, New Mexico
(Letter of October 12, 1974)

1. Comment: The draft EIS quite clearly describes a tradeoff which is adverse to the environmental quality objective in the affected area which is an inevitable result of the project described. It is not explained, however, to what objective prescribed by the Water Resources Council the advantages of the tradeoff would accrue. It is unlikely that these would accrue to any economic development objective, whether national or regional, because to all appearances the costs of the project will decisively outweigh any ostensible benefits.

Reply: The Water Resources Council established principles and standards for planning of projects pertinent to water and related land resources. These principles and standards establish a procedure whereby various alternatives are displayed and evaluated as an aid in identifying tradeoffs.

The international situation that resulted in Minute No. 242 is exceptional in complexity and somewhat beyond the scope of the objectives of the principles and standards promulgated by the Water Resources Council. However, the alternatives for resolution of the Colorado River salinity problem were extensively investigated by a Federal inter-agency task force. It was determined that pumping by Mexico south of the International Boundary separating Sonora, Mexico, and Arizona, south of Yuma, was detrimental to United States' interests. Therefore, a pumping plan was authorized in Title I of the Colorado River Basin Salinity Control Act of June 24, 1974, that, in effect, will make a quantity of water available in the Colorado River basin that would not be available in the absence of the project. The adverse environmental impacts have been identified and ad hoc committees established to assist in the development of plans for mitigation. In the project it is unlikely that impacts associated with Mexico's pumping, although of a lesser magnitude, would be mitigated.

2. Comment: To the detached observer the childish aspect of the project is readily apparent. To undertake what can be aptly described as a "pumping war" in this time of inflation and shortages of both energy and money, when it is so obvious

that an international agreement for the management of the ground water along the boundary is both a reasonable goal and a necessity, is nothing short of absurd. Yet the alternative of trying for an international agreement is not even considered.

Surely an international agreement in so obvious a case should be achievable in a relatively few years, in fact in a sufficiently short time to avoid undue loss of ground water to the Mexican pumping and in the same way to avoid concurrent environmental damage.

Parenthetically, and considering the precedent that might be a consequence of the proposed pumping war, it is amusing to imagine what might be the result of this precedent. One can visualize rows of wells along both sides of every state boundary, each state pumping away furiously either to dewater its neighbor for its own benefit, or conversely to defend itself against pumping aggression, something new in the world.

Reply: In Recommendation No. 5 of Minute No. 242, it was agreed to limit pumping by each country to 160,000 acre-feet per year pending on international agreement on the use of ground water. The effect of this, insofar as it concerns Mexico, is to preclude any expansion of wells or pumping during this period. There is no reason to believe, however, that an international treaty on use of ground water would eliminate the use of the present Mexican well field, since Mexico has invested substantial sums of money in its development and apparently feels that it needs the water from this source.

3. Comment: With regard to the environmental quality objective, the destruction of much of the biota of the affected area, certainly all that part which is adapted to any but very xeric conditions, is inevitable if the project is carried forward as proposed. On the other hand, such a result is not nearly so predictable on the basis of the Mexican pumping alone. As a matter of fact, it is clear from Plate 3 that the destructive effect would be materially delayed without the multiplying effect of pumping on the U.S. side of the boundary. It would certainly be reasonable to delay the project until an international agreement for the management of the boundary ground waters could be arranged. During such a delay for a relatively short time, it is not a sure thing that the biota of the U.S. side would be

noticeably affected, nor would the costs of the project in both energy and funds be loaded onto the national economy during this critical period. If an effort to obtain international agreement should fail, a reasonable delay while trying for it would not prevent going forward with the project for the purposes now planned if that should appear to be an intelligent conclusion at the time.

Reply: Delaying the project pending conclusion of an international ground-water agreement would not be consistent with Recommendation No. 9 of Minute No. 242, wherein the United States has agreed to undertake and complete at the earliest practical date measures to implement the resolution of the Minute.

4. Comment: In any event, the treatment of environmental impact in the draft EIS is inadequate because the necessary information for the assessment of impact is not available. On pages 18, 19, 21, and 22, pertaining to vegetative communities, fish fauna, wildlife populations, and recreational use, respectively, the same remark is made that "studies are currently under way," and that the results of these studies will be used in preparing the final EIS. It is thus obvious that the present draft is incomplete and can have no claim to providing an acceptable study of environmental impact, and that the next stage cannot be the final EIS but must be a new draft. This new draft should be prepared whenever the results of the current studies become available. As already brought out, it is certain that the effect of the Mexican pumping alone will be much less destructive than if pumping occurs on the U.S. side also, hence it is only reasonable to await complete information in order to do a complete job of evaluating the proposed tradeoff now so casually accepted by the Bureau of Reclamation.

Reply: Due to the confidentiality of the negotiations on the proposed solution to the salinity problem with Mexico that occurred between the United States and the Mexican Government, detailed fish and wildlife considerations were not included in the initial legislation. Subsequent to the lifting of the confidential status of the project, concerns for the fish and wildlife resources that would be affected by the project were pursued. Environmental inventories were initiated, completed, and analyzed. Plans for mitigation are now included as a part of the project and are discussed in detail in the final environmental statement.

Reports of the environmental inventories conducted in the project area are available for review at the Bureau of Reclamation Office in Boulder City. The results of these environmental inventories have been instrumental in coordination with the fish and wildlife agencies in developing acceptable mitigation plans for the project. The planning and coordination in this respect has advanced to the degree of concurrence in mitigation measures. The implementation of these measures will be the responsibility of the construction agency and will be conducted with the assistance of Ad Hoc Committees on fish and wildlife consisting of members of the various conservation agencies.

5. Comment: With regard to the economic development objective, whether described as national or regional, the draft EIS is not clear, although from what information is given, it would appear that the project should prove to be relatively expensive. The costs of construction and land acquisition are said on Page 40 to be \$34,000,000. An electric energy requirement of about 52,000,000 kilowatthours per year is estimated on Page 10, although no estimate of the cost of this energy is provided. As for benefits, the project is intended to provide "protective and regulatory pumping" with the objective described on Page 6. In a few words, this objective can be described as taking the ground water which is the common international target before Mexico can get it, without regard to the accelerated destruction of the most valuable biotic resources of the area or to the alternative that an international ground water agreement could quite possibly be reached within a relatively short time. As matters stand, if the project should be built as planned but an agreement with Mexico should be achieved in perhaps four or five years, then the remaining life of the project, some 45 years, would represent a clear waste except for perhaps a few incidental benefits which may be claimed.

Reply: The international situation that resulted in Minute No. 242 and the resulting restrictions on pumping of ground water along the International Boundary south of Yuma, Arizona, does not lend itself to the type of analysis developed for water and related land resources planning established by the Water Resources Council. The alternatives for resolution of the Colorado River salinity problem were extensively investigated by a Federal inter-agency task force and the "protective and regulatory pumping" plan was subsequently formulated pursuant to the provisions of Minute No. 242.

Due to the fact that Mexico has installed and is pumping wells immediately south of the International Boundary, it is highly unlikely that she will agree to other provisions on pumping in this area than those provided in Minute No. 242.

6. Comment: The draft EIS does not provide any comparison of benefits and costs. It seems clear, however, if the environmental costs of the project, including those inherent in the production of the energy necessary for pumping, are considered in connection with the total dollar costs of construction and land acquisition, together with the operation and maintenance costs for a fifty year life, that this total of both monetary and other costs will in all probability dwarf the unquantified benefits obtained by "protective and regulatory pumping." Add to this likely disparity the possibility that most of the project life may be simply wasted (assuming that there will be an effort toward an international ground water management agreement), and the project appears unwarranted, to say the least. In any event, the draft EIS should be rewritten (see above).

Reply: Chapter I of the final statement includes discussion on benefits and costs of the protective and regulatory ground-water pumping plan. The plan, authorized by Public Law 93-320 to implement an international agreement, provides measures discussed in Chapter IV to mitigate losses to be incurred which are described in Chapter III. As previously stated, to delay the plan until any future international ground-water pumping agreement could be reached, would not be consistent with the current agreement. Neither would such a delay be in the interest of international comity.

Governor
JACK WILLIAMS

Commissioner
MILTON G. EVANS, Chairman, Flagstaff
ROBERT J. SPILLMAN, Phoenix
WILLIAM H. BEERS, Prescott
CHARLES F. ROBERTS, O.D., Bisbee
FRANK FERGUSON, JR., Yuma

Director
ROBERT A. JANTZEN

Asst. Director, Operations
PHIL M. COSPER

Asst. Director, Services
ROGER J. GRUENEWALD



ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

October 18, 1974

Mr. E. A. Lundberg, Regional Director
Lower Colorado Region
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

The Arizona Game and Fish Department has reviewed the Supplement to the Draft Environmental Statement, INT-DES 74-83, Colorado River International Salinity Control Project. We offer the following comments on the statement and proposal.

The proposed protective and regulatory ground water pumping project obviously will result in the loss of all the quality fish and wildlife habitat in and adjacent to the Colorado River below Morelos Dam. Additional fish and wildlife habitat will be lost as a result of drain channels drying, due to the lowering of the ground water table.

Quantified, using the figures in the DES, this amounts to 2,340 acres of riparian vegetation located between the levee and the east bank of the Colorado River below Morelos Dam. Fifteen surface acres of ponds (Hunters Hole area) and 60 miles of open drainage channels in the Yuma Valley (of which 40 miles are significant fish and wildlife habitat) will be lost. Additionally, the 20 or so miles of flowing water in the Colorado River below Morelos Dam will be lost. This is substantial and a major impact on the fish, wildlife and outdoor recreational resources in southern Yuma County.

One major question which is unanswered comes from a statement repeated at least seventeen times in the DES, "...the impacts associated with the lowering of the ground water level will eventually occur even

without the project as a result of continued pumping of the existing Mexican well field." Plates 3, 4 and 5 show the estimated decrease of ground water for 10 years of Mexican pumping, 10 years of both U.S. and Mexican pumping and 50 years of pumping on both sides of the border. The question is: What will be the magnitude of a decreasing water table with only Mexican pumping after a fifty year period? If Mexico alone withdraws 160,000 acre feet of water per year, will it take twice as long (100 years) to bring about the same amount of environmental damages? If that is true, then three or four generations of hunters, fishermen and outdoor recreationists will lose the opportunity to utilize this quality habitat as a result of the project.

The DES fails to answer many other questions related to the impacts of the project. Several are to be answered from studies underway and will be included in the final statement. However, the opportunity to review and comment on these unanswered impacts is denied in the draft statement. These questions are:

1. Pages 10 & 43, "Evaluations are presently underway to determine the most feasible solution to obtaining a source of energy for the project."
2. Page 18, "Studies are currently underway to quantify and analyze the vegetative communities along the Colorado River below Morelos Dam."
3. Page 19, "Studies are currently underway to quantify and analyze the fish fauna in the Colorado River below Morelos Dam."
4. Page 21, "Studies are currently underway to quantify and analyze wildlife populations along the Colorado River below Morelos Dam."
5. Page 22, "Studies are currently underway to determine recreational uses of the lower Colorado River."
6. Page 33, "A quantitative impact on riparian vegetation is undeterminable." This statement is in conflict with the rest of the paragraph on page 33 and 34, which reports that cattails and bullrushes will be lost, but other species (saltcedar, quailbrush, arrowweed, mesquite, willows and cottonwoods) will be affected to only a limited

degree. We believe that the majority of tree form vegetation will be lost as has happened in other areas of Arizona where a decline in the water table has occurred (Gila River, Santa Cruz River).

7. Page 35, "Studies indicate that pumping both existing and proposed wells can continue for 50 years and probably longer." What happens after that? Is the U.S. still committed to deliver water to Mexico and from what source?
8. Pages 36, 37 & 44, the problem of future land subsidence was not fully answered.
9. Page 48, "The impacts of the project on riparian vegetation, fish, wildlife and recreation use as a direct result of the project is presently unquantified."
10. Page 48, "The complete evaluation will be presented in the final environmental statement on the entire International Salinity Control Project."

By its own admission, the Draft Environmental Statement is incomplete. It does not express the impacts which will result from the project and therefore, lacks the information required for adequate review.

The comment on page 48, "Equitable mitigation measures will be proposed after the magnitude of these unquantified amenities are established" is most important as it directly concerns the duties and responsibilities of the Arizona Game and Fish Department. The entire International Salinity Control Project will result in drastic and significant losses of fish and wildlife habitat across a wide and diverse area--from Painted Rock Dam on the Gila River to the southernly international border on the Colorado River. It is the earnest hope and desire of this Department that equitable mitigation for the loss of vast quantities of valuable fish and wildlife habitat becomes a reality. This Department will work with willingness and sincere cooperation to see these mitigation measures to completion.

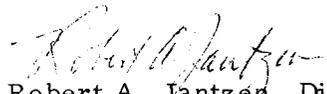
Mr. E. A. Lundberg

-4-

October 18, 1974

We appreciate the opportunity to review the DES and look forward to seeing the final statement when the results of the studies and the answers to the questions are presented.

Sincerely,


Robert A. Jantzen, Director

RAJ/cb

Replies to Comments Made by the
Arizona Game and Fish Department
Phoenix, Arizona
Letter of October 18, 1974

1. Comment: The proposed protective and regulatory ground-water pumping project obviously will result in the loss of all the quality fish and wildlife habitat in and adjacent to the Colorado River below Morelos Dam. Additional fish and wildlife habitat will be lost as a result of drain channels drying due to the lowering of the ground-water table.

Quantified, using the figures in the draft environmental statement, this amounts to 2,340 acres of riparian vegetation located between the levee and the east bank of the Colorado River below Morelos Dam. Fifteen surface acres of ponds (Hunter's Hole area) and 60 miles of open drainage channels in the Yuma Valley (of which 40 miles are significantly fish and wildlife habitat) will be lost. Additionally, the 20 or so miles of flowing water in the Colorado River below Morelos Dam will be lost. This is substantial and a major impact on the fish, wildlife and outdoor recreational resources in southern Yuma County.

Reply: As a result of recently completed environmental inventories of the area in the Yuma Valley to be affected by the project, the impacts are more specifically quantified in Chapter III of the final environmental statement. In addition, a more precise discussion is presented in regard to the impacts of ground-water drawdown with only the Mexican and existing United States pumping as compared to that resulting from the operational status of the proposed protective pumping feature. As a result of a more exact quantification of the environmental resources in the project area, acceptable mitigation concepts have been negotiated and details are being planned with the Arizona Game and Fish Department and the Fish and Wildlife Service through an Ad Hoc Committee for fish and wildlife for a full-time coordinator on the staff of the Arizona Game and Fish Department. Details of impacts are discussed in Chapter III and mitigation concepts are listed in Chapter IV of the final environmental statement. A quantification of both impacts and mitigation measures has been included. Project funds are being utilized to support the efforts of the Fish and Wildlife Service in their assistance in developing design data regarding mitigation concepts. In addition, a contract has been negotiated with the Arizona Game and Fish Department for a full-time coordinator with the

responsibility to: Analyze and equate details of impacts with recommended mitigation concepts; gather and assist the Bureau in preparing design data for mitigation measures; and to advise the Bureau in the implementation of mitigation features. The coordinator will serve in the capacity of liaison between the Bureau, Arizona Game and Fish Department, and the Fish and Wildlife Service, and act in an advisory capacity to the Ad Hoc Committee for fish and wildlife.

2. Comment: One major question which is unanswered comes from a statement repeated at least 17 times in the draft environmental statement, "...the impacts associated with the lowering of the ground-water level will eventually occur even without the project as a result of continued pumping of the existing Mexican well field." Plates 3, 4 and 5 show the estimated decrease of ground water for 10 years of Mexican pumping, 10 years of both U.S. and Mexican pumping and 50 years of pumping on both sides of the border. The question is: What will be the magnitude of a decreasing water table with only Mexican pumping after a 50 year period? If Mexico alone withdraws 160,000 acre-feet of water per year, will it take twice as long (100 years) to bring about the same amount of environmental damages? If that is true, then three or four generations of hunters, fishermen and outdoor recreationists will lose the opportunity to utilize this quality habitat as a result of the project.

Reply: Additional analog model runs have been made to estimate the water-table decline with Mexico's pumping and pumping of the existing Yuma Mesa wells and the additional water-table decline with operation of the protective and regulatory pumping wells. As discussed in the text and in Table 32, the existing U.S. and Mexican pumping will result in a ground-water drawdown in a 10-year period of 7 feet at Hunter's Hole. With the project well field in the U.S. combined with the Mexican pumping the 10-year drawdown will be 16 feet. In 50 years the drawdown from existing pumping will equal 19 feet. With the project and with the Mexican pumping the drawdown of the ground-water elevation will be 51 feet. The average depth of the Hunter's Hole ponds is approximately 6 feet with a maximum depth of 18 feet. Within a 10-year period with existing pumping the reduction of the ground-water level will result in an almost total demise of the Hunter's Hole pond as an open water area with or without the protective and regulatory ground-water pumping feature of the project. Relative impacts due to the declining

ground-water levels with or without the pumping plan are discussed in more detail in Chapter III of the final statement.

3. Comment: The draft environmental statement fails to answer many other questions related to the impacts of the project. Several are to be answered from studies underway and will be included in the final statement. However, the opportunity to review and comment on these unanswered impacts is denied in the draft statement. These questions are:

Reply: The response to the comment for an opportunity to review impacts and mitigation is covered in response Nos. 1 and 3. Answers to Specific questions 1 through 10 are provided as follows:

Question: -1. Pages 10 and 43, "Evaluations are presently underway to determine the most feasible solution to obtaining a source of energy for the project."

Reply: Discussion on source of energy for the project has been expanded upon in Chapter I.

Question: -2. Page 18, "Studies are currently underway to quantify and analyze the vegetative communities along the Colorado River below Morelos Dam."

-3. Page 19, "Studies are currently underway to quantify and analyze the fish fauna in the Colorado River below Morelos Dam."

-4. Page 21, "Studies are currently underway to quantify and analyze wildlife populations along the Colorado River below Morelos Dam."

-5. Page 22, "Studies are currently underway to determine recreational uses of the lower Colorado River."

Reply: When the draft environmental impact statement was issued, there were not as much data available as now exists on the vegetation, fish, wildlife, and recreation of the area. In the interim, since the issuance of the draft environmental statement, the Bureau of Reclamation has sponsored short-term inventories of the vegetation, fish and wildlife, and recreational resources which have been completed. Information from these inventories has been included in the discussion in Chapters II and III. The inventory reports are listed in the Literature Cited section. Copies of the reports have been made available to the Arizona Game and Fish Department and are available upon request. In addition,

data from ongoing and long-term studies of the river system from Davis Dam to the Southerly International Boundary were used to improve reliability of data obtained from the short-term inventories. The long-term studies were started prior to project authorization and for a different purpose. They will continue for 2 to 3 years, with or without the project. However, information obtained from these studies may be useful in a further understanding of the environment of the area.

Question: -6. Page 33, "A quantitative impact on riparian vegetation is undeterminable. This statement is in conflict with the rest of the paragraph on pages 33 and 34, which reports that cattails and bullrushes will be lost, but other species (saltcedar, quail-brush, arrowweed, mesquite, willows and cottonwoods) will be affected to only a limited degree. We believe that the majority of tree form vegetation will be lost as has happened in other areas of Arizona where a decline in the water table has occurred (Gila River, Santa Cruz River).

Reply: A current prediction of impacts, along with references, are included in the final environmental statement in Chapter III.

The impact on riparian vegetation resulting from all of the features of Title I, P.L. 93-320 has been determined to adversely affect 2,353 acres of riparian habitat in the Yuma Valley below Morelos Dam. Additional detail may be found in Chapter IV, D.I.C.

Question: -7. Page 35, "Studies indicate that pumping both existing and proposed wells can continue for 50 years and probably longer." What happens after that? Is the U.S. still committed to deliver water to Mexico and from what source?

Reply: The magnitude of the ground-water level drawdown and the design of the wells will determine the length of time pumping could continue. The drawdown will depend on the amount of ground water in storage, the ground-water recharge, and the ground-water withdrawal. The design of the Mexican wells and the preliminary design of the United States wells, along with the estimated quantity of water in storage and the existing estimated recharge, would allow combined pumping for at least 50 years. The amount of pumping after 50 years would be governed by the amount of ground-water recharge and the economics of pumping from greater depths.

The United States is obligated to deliver 150,000 acre-feet annually of Colorado River water to Mexico. Any quantity of water up to 140,000 acre-feet that is not delivered to Mexico across the land boundary at San Luis, Sonora, Mexico and San Luis, Arizona, must be delivered to Mexico upstream of Morelos Dam pursuant to the terms of the 1944 Water Treaty and Minute No. 242.

Question: -8. Page 36, 37 & 44, the problem of future land subsidence was not fully answered.

Reply: It is estimated that in 50 years of pumping the upper 100 feet of the zone of saturation will be dewatered. The pore space in the 100 feet of predominately sandy sediments will not be greatly diminished as the sands are dewatered, due to the size, shape and arrangement of the grains. It is expected that there will be only a few tenths of a foot of subsidence within the 100-foot decline contour. The effect on the east side of Yuma Valley and U.S. 95 will be even less.

This matter is discussed in the reply to the comment made by the United States Coast Guard in its letter of October 21, 1974.

Question: -9. Page 48, "The impacts of the project on riparian vegetation, fish, wildlife, and recreation use as a direct result of the project is presently unquantified."

Reply: A quantitative estimate of the impacts on the riparian vegetation has now been made. This discussion in Chapter III of the final environmental statement includes a more detailed evaluation of the impacts resulting from the drawdown by the pumping of the existing United States and Mexican well fields as opposed to the combined pumping of well fields on both sides of the International Boundary. Proposed impacts are similar with the exception of the acceleration of the drawdown upon operation of the protective and regulatory pumping fields in the United States. It is expected that the majority of the riparian losses will occur away from the streambed and approximately 1 to 3 miles downstream from Morelos Dam where the effect of the seep water from Morelos Dam will no longer have an effect. The impact of the drawdown on the particular plant species is an estimate in relation to the expected drawdown. The vigor, age, and density of a particular species is significant in its survival and will be directly related to the degree that drawdown occurs. A quantitative estimate of vegetative losses

is included in the discussion in Chapter III of the final environmental statement.

Question: -10. Page 48, "The complete evaluation will be presented in the final environmental statement on the entire International Salinity Control Project." By its own admission, the draft environmental statement is incomplete. It does not express the impacts which will result from the project, and therefore, lacks the information required for adequate review.

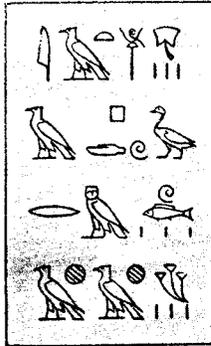
Reply: As a direct result of completed environmental inventories and comments from the Arizona Game and Fish Department, other concerned agencies and individuals, and comments received at the October 5, 1974 public hearing, a more precise evaluation of the impacts of the project is included in the final environmental statement. The draft was issued in compliance with the National Environmental Policy Act and the Council on Environmental Quality guidelines which stipulate the draft should be as complete as possible at the time of preparation and distributed to all concerned agencies, entities, and individuals for comments and suggestions. Substantive comments should be incorporated into the project plan whenever possible. The final environmental statement has been responsive to the substantive comments. The Bureau of Reclamation has worked directly with the Arizona Game and Fish Department as an individual entity, plus the provision of project funds for a full-time fish and wildlife coordinator, and with the Game and Fish Department through the fish and Wildlife Ad Hoc Committee. The close coordination has been made in order to effect a full and adequate review of the impacts of the project and analyze the value of benefits to be derived from mitigation concepts. The coordination will continue through the design stage and implementation of mitigation features.

Prior to submission of the final environmental statement for filing with the Council on Environmental Quality, the section of Chapter IV, Mitigation Measures, was reviewed by the Arizona Game and Fish Department.

4. Comment: The Comment on page 48, "Equitable mitigation measures will be proposed after the magnitude of these unquantified amenities are established" is most important as it directly concerns the duties and responsibilities of the Arizona Game and Fish Department. The entire International Salinity Control Project will result in drastic and significant losses of fish and wildlife habitat across a wide and

diverse area--from Painted Rock Dam on the Gila River to the southerly international border on the Colorado River. It is the earnest hope and desire of this Department that equitable mitigation for the loss of vast quantities of valuable fish and wildlife habitat becomes a reality. This Department will work with willingness and sincere cooperation to see these mitigation measures to completion.

Reply: As outlined in the draft environmental statement, equitable mitigation concepts have now been included in the final environmental statement and are discussed in detail in Chapter IV. These mitigation concepts were negotiated through the Arizona Game and Fish Department and will be constructed under the auspices of the contracting agency with guidance from a full-time coordinator on the staff of the Arizona Game and Fish Department, the Ad Hoc Committee consisting of members of the Arizona Game and Fish Department and other concerned agencies. The section of Chapter IV dealing with fish and wildlife mitigation has been reviewed by the Arizona Game and Fish Department. Their comments and suggestions have been considered in preparation of the final environmental statement. The Arizona Game and Fish Department has exerted a great deal of effort, willingness, and sincere cooperation in the development of the mitigation measures for the salinity control project.



THE WILDLIFE SOCIETY

October 18, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
P. O. Box 427
Bolder City, Nevada 89005

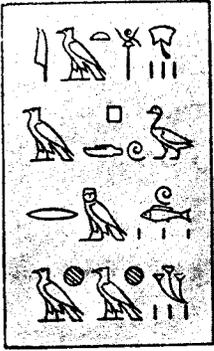
Dear Mr. Lundberg:

The Arizona Chapter, The Wildlife Society has reviewed the Supplement to the Draft Environmental Statement, INT-DES 74-83, Colorado River International Salinity Control Project. The following comments are our feelings on the proposal.

First, this project is a disaster for fish and wildlife. The lowering of the water table as a result of this pumping project will cause the destruction of all prime habitat south of Morelos Dam. The wildlife, their recreational and scientific values will just disappear in time - and be replaced with low value habitat. The water oriented fish and wildlife habitat in the southwest is so rare and so significant, any loss of habitat results in a substantial change in the total wildlife population and species composition.

We recognize the responsibility of the United States to live up to international commitments, but we also feel it is the duty of the government to recognize and protect the natural resources of this country. We urge that all mitigation measures proposed, be equitable and that they are implemented in a timely manner to insure that fish and wildlife species are not lost in the interim.

We do not feel the DES is adequate. The statement is filled with lines stating that studies are under way and that this data will be presented in the final. These studies refer to fish, wildlife, recreation, vegetation, power sources and land subsidence. How can one comment on the impacts of this project if the impacts are admittedly not included in the Draft Statement?



THE WILDLIFE SOCIETY

ARIZONA CHAPTER

Mr. E. A. Lundberg

- 2 -

October 18, 1974

The Draft Statement also does not answer the question of the difference in impacts if only Mexico pumped 160,000 acre feet of water per year. The monotonous statements that "impacts will occur even without the project" is not entirely true. The difference in years required for these impacts to occur may be significant. Twice as long, for example, is more than a lifetime of the expected outdoor recreation activities of a person - and that is significant.

In summary, we feel that spending \$150,000,000 to improve the quality of water delivered to Mexico will have very few positive benefits for the people of the U.S. The spending of this amount of money will have a beneficial short term economic impact on the area, however, the environmental damages are long term and significant.

Thank you for the opportunity to review and comment on this significant proposal.

Sincerely,

William R. Hernbrode
Secretary-Treasurer

WRH:cg

The Wildlife Society
Arizona Chapter
(Letter of October 18, 1974)

1. Comment: First, this project is a disaster for fish and wildlife. The lowering of the water table as a result of this pumping project will cause the destruction of all prime habitat south of Morelos Dam. The wildlife, their recreational and scientific values will just disappear in time, and be replaced with low value habitat. The water oriented fish and wildlife habitat in the south-west is so rare and so significant, any loss of habitat results in a substantial change in the total wildlife population and species composition.

Reply: As a result of the completion of environmental inventories within the project area an accurate quantification of the impacts is presented in Chapter III of the final environmental statement. The discussion also includes a current analysis of an analog model which gives a more precise prediction of the ground-water drawdown as related to Mexican and United States' pumping. Impacts associated with the net differences and losses resulting from the project are quantified. Mitigation plans for these losses have been negotiated with the Arizona Game and Fish Department and other concerned conservation agencies. Mitigation is discussed in Chapter IV of the final environmental statement.

The primary habitat below Morelos Dam is approximately 18-20 acres of cattails immediately below the Dam and in the vicinity of the Hunter's Hole area. This acreage below the Dam will not be affected by the project as it is primarily supported by seep water from Morelos Dam, irrigated lands to the east and the unlined section of the Alamo Canal to the west. Mitigation plans include an attempt to preserve the Hunter's Hole ponds and the immediate vegetation in the area. A principle concern has been for the endangered Yuma clapper rail that has been found in this area. Responses to comments from the Fish and Wildlife Service and the Arizona Game and Fish Department discussed in detail the concern for the Yuma clapper rail and the procedures that are being incorporated to minimize loss of the 30-40 acres of suitable Yuma clapper rail habitat below Morelos Dam. It has been determined that the loss will not be critical to the survival of the species. A detailed discussion of this aspect is also included in Chapter IV of the final environmental statement.

2. Comment: We recognize the responsibility of the United States to live up to international commitments, but we also feel it is the duty of the government to recognize and protect the natural resources of this country. We urge that all mitigation measures proposed, be equitable and that they are implemented in a timely manner to insure that fish and wildlife species are not lost in the interim.

Reply: Mitigation plans included in the environmental statement have been developed with the cooperation of the Arizona Game and Fish Department, Fish and Wildlife Service and other interested conservation entities. The implementation of these measures will be the responsibility of the contracting agency and will be included under guidance of an Ad Hoc Fish and Wildlife Committee consisting of members of the various involved conservation agencies.

3. Comment: We do not feel the draft environmental statement is adequate. The statement is filled with lines stating that studies are under way and that this data will be presented in the final. These studies refer to fish, wildlife, recreation, vegetation, power sources and land subsidence. How can one comment on the impacts of this project if the impacts are admittedly not included in the Draft Statement?

Reply: Due to the confidential nature of the negotiations between the United States and Mexican governments which led to the ultimate passage of Public Law 93-320 of which Title I is the subject project and environmental statement, detailed provisions for fish and wildlife were not included in the original legislation. Subsequent to the lifting of the confidential restriction on these negotiations, environmental inventories were initiated to quantify the impacts that would result from the project. These studies have been completed and are discussed in detail in the impact chapter of the final environmental statement. The results of the inventories are the basis for which mitigation measures have been included as a part of the project. Mitigation was proposed and planned in cooperation with representatives from the State and Federal game and fish agencies and other involved conservation entities.

A more accurate estimate of land subsidence is included in the environmental statement. A definitive source of power which includes several alternative sources has

been obtained and is discussed in the final environmental statement. As a result of the review and comments on the draft environmental statement, supplement to the draft statement and from a public hearing conducted in Yuma, Arizona on October 5, 1974, numerous alterations and improvements to the environmental acceptability of the project have now been incorporated into the project plan.

4. Comment: The Draft Statement also does not answer the question of the difference in impacts if only Mexico pumped 160,000 acre feet of water per year. The monotonous statements that "impacts will occur even without the project" is not entirely true. The difference in years required for these impacts to occur may be significant. Twice as long, for example, is more than a lifetime of the expected outdoor recreation activities of a person - and that is significant.

Reply: This is discussed in the reply to Comment 2 of the letter from the Arizona Game and Fish Department dated October 18, 1974, included in this appendix.



United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
WASHINGTON, D. C. 20245

IN REPLY REFER TO:

Trust Facilitation
EQ (DES 74/39 DES 74/83)

OCT 18 1974

Memorandum

To: Commissioner of Reclamation
From: Deputy Director, Office of Trust Responsibilities

Subject: Review of Supplement to the Draft Environmental Statement (DES 74/39
DES 74/83) Colorado River International Salinity Control Project

A review of the subject supplement by the Phoenix Area Office, Bureau of Indian Affairs has determined that the proposed water pumping will have no adverse effects on the Indian interests of the area.



B-73

Save Energy and You Serve America!



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

Mr. E. F. Sullivan
Acting Commissioner
Department of the Interior
Bureau of Reclamation
Washington, D. C. 20240

Dear Mr. Sullivan:

This is in response to your letter of 29 August 1974 addressed to Mr. John E. Hirten concerning a supplement to the draft environmental statement on the Colorado Salinity Control Project.

The Department of Transportation has reviewed the material submitted. The Federal Highway Administration had the following comment to offer:

"We cannot make any attempt at evaluating the possible magnitude of subsidence in the area of U. S. Route 95, because the only information provided is the computed drawdown of the ground water surface, not actual elevations of existing and projected surfaces. This latter information coupled with actual soil boring logs would enable an engineering estimate of subsidence to be made. We believe at least the ground water surface elevations should be included in the EIS."

The Department of Transportation has no other comments to offer nor do we have any objection to this project. However, the concern of the Federal Highway Administration should be addressed in the environmental impact statement.

The opportunity to review this supplemental is appreciated.

Sincerely,

W. E. Caldwell

W. E. CALDWELL
Captain, U.S. Coast Guard
Deputy Chief, Office of Marine
Environment and Systems
By direction of the Commandant

Reply to Comment Made by the
United States Coast Guard
Washington, D.C.

Letter of October 21, 1974

1. Comment: "We cannot make any attempt at evaluating the possible magnitude of subsidence in the area of U.S. Route 95, because the only information provided is the computed drawdown of the ground water surface, not actual elevations of existing and projected surfaces. This latter information coupled with actual soil boring logs would enable an engineering estimate of subsidence to be made. We believe at least the ground water surface elevations should be included in the EIS."

Reply: While there is clay present in the near surface sediment on the east side of Yuma Valley where the head in the coarse gravel zone aquifer will be lowered by some 40 feet, there is insufficient weight of overburden to completely dewater the clay lenses and trigger subsidence.

The amount of protective pumpage is estimated to be in the order of 160,000 acre-feet in Mexico and 50,000 acre-feet in the United States. It is estimated that in 50 years the upper 100 feet of the zone of saturation will be dewatered. The texture of the sediments in the upper 100 feet of the saturation is predominately sandy with low porosity.

The pore space is not greatly diminished as the sands are dewatered due to size, shape and arrangements of the grains. It is expected that there will be only a few tenths of a foot subsidence within the 100-foot decline contour. The effect on the east side of Yuma Valley and U.S. 95 will be even less.

The environmental statement has been revised to reflect these thoughts on subsidence.



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGIONAL OFFICE

50 FULTON STREET

SAN FRANCISCO, CALIFORNIA 94102

OFFICE OF
THE REGIONAL DIRECTOR

Office of Environmental Affairs

October 21, 1974

Mr. E. F. Sullman
Acting Commissioner
Bureau of Reclamation
Department of the Interior
Washington, D.C. 20240

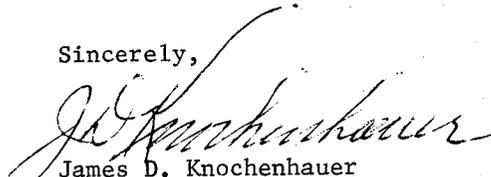
Dear Mr. Sullman:

The Supplement to the Draft Environmental Impact Statement for the Colorado River International Salinity Control Project has been reviewed in accordance with the interim procedures of the Department of Health, Education and Welfare as required by Section 102(2)(c) of the National Environmental Policy Act (PL 91-190).

In our comments of June 11, 1974 (copy of which is attached) we raised the issue of the possible increase in public services that may be required by the construction workers and their families. These comments remain unchanged after reviewing the supplement.

The opportunity to review this material was appreciated.

Sincerely,


James D. Knochenhauer
Regional Environmental Officer

cc: P. Hayes
W. Muir

Reg. TX

Office of Environmental Affairs

June 11, 1974

G. C. Stamm
Commissioner
United States Department of the Interior
Bureau of Reclamation
Washington, D.C. 20240

Dear Mr. Stamm:

The draft Environmental Impact Statement for the Colorado River International Salinity Control Project has been reviewed in accordance with department procedures as required by Section 102(2)(c) of the National Environmental Policy Act (PL 91-190).

The proposed project is designed to reduce the salinity of the water in the lower Colorado River to an acceptable level and to provide adequate volume to meet international treaty requirements with Mexico. Included is the construction of a Desalting complex and lining of the first 49 miles of the Coachella Canal.

The statement appears to identify the anticipated environmental impacts adequately and includes appropriate safeguards. Reference is made to the presence of construction workers and their families, however no mention made to the numbers nor the length of residence that may occur. If the concentration of temporary construction workers will result in a need for additional educational, health, medical or social services, the appropriate local governments should be consulted to assure that these needs are known and that adequate services will be available.

Please accept our apologies for the delay in responding to this statement. We were unable to process this in the short time available to us after receipt.

Sincerely yours,

James D. Knochenhauer
Regional Environmental Officer

cc: P. Hayes ✓
W. Muir

B-77

Reply to Comment Made by the
Department of Health, Education, and Welfare
San Francisco, California
(Letter of October 21, 1974)

1. Comment: In our comments of June 11, 1974 (copy of which is attached) we raised the issue of the possible increase in public services that may be required by the construction workers and their families. These comments remain unchanged after reviewing the supplement.

Reply: See reply to comments of Department of Health, Education, and Welfare of June 11, 1974, on the Draft Environmental Statement.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Washington, D. C. 20250

OCT 31 1974

Mr. Gilbert G. Stamm
Commissioner
Bureau of Reclamation
Department of the Interior

Dear Mr. Stamm:

This is in response to your letter to Dr. Byerly dated August 29, 1974, requesting our review and comment on the supplement to the draft environmental statement on the Colorado River International Salinity Control Project, dated August 27, 1974. The statement has been referred to the Soil Conservation Service for reply.

This supplement covers the environmental effects of ground water pumping. The proposed project includes the Yuma Mesa Boundary Well Field and the Yuma Valley Boundary Well Field.

The existing aquatic habitat such as in the backwater ponds of Hunter's Hole (about 12 surface acres) is a scarce resource. It appears the resource will be lost with or without the project due to the pumping already underway in Mexico. On page 39, it says, "Under the proposed project, whatever water is not required for preserving the historic surface deliveries across the land boundary near San Luis will be available for limited use on existing developed areas or possibly for some new agricultural, municipal, or industrial development." In view of the proximity of Hunter's Hole to the West Main Channel, we suggest the statement indicate the feasibility and desirability of pumping water to maintain aquatic habitat in some of the existing backwater ponds.

The proposal will make 35,000 acre-feet of water per year available for agriculture and other uses in the United States. We suggest the statement include a brief discussion of the added technical assistance that will be required to properly develop the resource.

Page 20, footnote 1, refers to the Federal Register of October 13, 1970. The revised list of endangered species included in the July 27, 1973, edition should be used to identify an endangered species.

On page 25, total mineral concentrations in ground water are given in parts per million. The statement would be strengthened if it included a quantitative breakdown, in parts per million, of the chemical composition of the salinity. Also, we suggest including a discussion

TC-75



Mr. Gilbert G. Stama

2

which covers the possibility of saltwater intrusion which may result from continuous pumping.

Page 38 The statement would be strengthened if it included more quantitative information concerning direct and indirect economic effects. For example, it would be helpful to estimate the number of employment opportunities, salaries to be paid, and the duration of employment. The indirect economic impacts could be discussed in this section.

Page 41 - We suggest including an estimate of the economic effects of increased power demands created by this project.

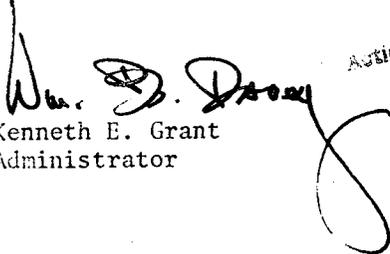
Page 42 - A discussion of where the additional resources will come from to supply the energy for the project would be helpful. The marginal sources of energy are coal, oil and nuclear power and all have significant environmental impacts.

Page 52 - Section G would be strengthened if it included more quantitative information on the adverse effects on the economic and social structure.

Page 54, Section L - The increase in energy demand and its indirect effect on the energy supply to other regions could be estimated and included in this section.

We appreciate the opportunity to review this material.

Sincerely,

 Acting
Kenneth E. Grant
Administrator

B-80

Replies to Comments Made by the
Soil Conservation Service
Washington, D.C.
(Letter of October 21, 1974)

1. Comment: The existing aquatic habitat such as in the backwater ponds of Hunter's Hole (about 12 surface acres) is a scarce resource. It appears the resource will be lost with or without the project due to the pumping already underway in Mexico. On page 39, it says, "Under the proposed project, whatever water is not required for preserving the historic surface deliveries across the land boundary near San Luis will be available for limited use on existing developed areas or possibly for some new agricultural, municipal, or industrial development." In view of the proximity of Hunter's Hole to the West Main Channel, we suggest the statement indicate the feasibility and desirability of pumping water to maintain aquatic habitat in some of the existing backwater ponds.

Reply: The description of the water to be used in the United States resulting from protective pumping has been expanded in the final environmental statement. Mitigation plans have been developed in an effort to maintain the water level and surface acreage in the Hunter's Hole complex of ponds. Water will be available from an on-site well in an attempt to maintain the permanency of these ponds. The fish, wildlife and recreational management of these ponds will be the responsibility of the state agencies.

2. Comment: The proposal will make 35,000 acre-feet of water per year available for agriculture and other uses in the United States. We suggest the statement include a brief discussion of the added technical assistance that will be required to properly develop the resource.

Reply: The Yuma Mesa has a proven history of successful irrigation development on lands within the boundaries of the Yuma Mesa Irrigation and Drainage District. Flood irrigation practices are used on these lands predominately for citrus production. Flood irrigation for production of citrus within the boundaries of the Hillander "C" Irrigation District, which is within the restricted pumping zone, has resulted in inefficient use of water, and continued use of flood irrigation practices would limit additional development. However, additional development could proceed with

the use of pressure systems which are highly efficient. Recent information indicates that pressure systems are being installed on lands in the Hillander "C" Irrigation and Drainage District.

The Colorado River Basin Salinity Control Act does not provide for technical assistance to farmers. Since the limitation of pumping in the 5-mile restricted zone is gross pumping rather than net acreage, any water made available for agriculture use should be used by means of high pressure irrigation systems. Although the Colorado River Basin Salinity Control Act does not provide for technical assistance to familiarize the restricted zone, the resulting Department of Agriculture technical assistance programs oriented toward efficient water use could be beneficially applied to support additional development in the affected area.

3. Comment: Page 20, footnote 1, refers to the Federal Register of October 13, 1974. The revised list of endangered species included in the July 27, 1973, edition should be used to identify an endangered species.

Reply: The current list of endangered species has been used to identify the endangered species that may be found in the project area.

4. Comment: (a) On page 25, total mineral concentrations in ground water are given in parts per million. The statement would be strengthened if it included a quantitative breakdown, in parts per million, of the chemical composition of the salinity.

(b) Also, we suggest including a discussion which covers the possibility of saltwater intrusion which may result from continuous pumping.

Reply: (a) **Information has been added to the statement under Chapter II.D.4.a.**

(b) The possibility of saltwater intrusion from the Gulf of Mexico was evaluated but considered so remote that discussion of the possibility was discounted. The distance involved, amounts of freshwater available, differential of head, transmissibility of subsoils and the depth of freshwater was all taken into consideration and concluded that the economic benefit of pumping would cause Mexico to stop pumping long before saltwater would intrude into waters pumped by the United States.

5. Comment: Page 38 - The statement would be strengthened if it included more quantitative information concerning direct and indirect economic effects. For example, it would be helpful to estimate the number of employment opportunities, salaries to be paid, and the duration of employment. The indirect economic impacts could be discussed in this section.

Reply: Our reply to the two comments made by the Department of Health, Education, and Welfare (letters of June 11 and October 21, 1974) discusses the estimated increase in labor force requirements and durations of employment as a result of the installation of a desalting complex in the Yuma area. No estimates have been made concerning individual salaries and job classifications since these will be based on the salary schedules prevailing at the time of construction. Minimum wage rates will be determined by the Secretary of Labor pursuant to the provisions of the Davis-Bacon Act, 40 USC 276(a), as amended.

The report entitled "An Arizona Trade-Off Model Analysis of a Proposed Desalting Complex in Yuma County, Arizona" prepared by the State of Arizona, Office of Economic Planning and Development (OEPD) was discussed in our aforementioned reply. The following discussion presents some additional findings of the OEPD report:

The total employment impact on Yuma County will be greater than the employment directly related to the construction and operation of the complex. The initial increase in employment represents only the immediate impact of the desalting complex on the local economy. The spending of the basic sector from new income for supportive goods will cause employment to also rise in the nonbasic sectors.

Projections of total additional annual Yuma County personal income for the years 1978 through 1981, 1980 and 1990 are presented on the following tabulation (Source: Planning Division, Arizona Office of Economic Planning and Development):

<u>Year</u>	<u>Additional Annual Personal Income</u>
1978	\$2,174,000
1979	3,177,000
1980	3,097,000
1981	1,876,000
1985	583,000
1990	670,000

The greatest change in annual personal income is indicated to occur in 1979 with an increase of \$3,177,000 over normal projections for that year. Increases in personal income are expected to taper off until 1990, when the increase in annual personal income is expected to be \$670,000.

We are not aware of any similar studies being conducted concerning the impacts on Imperial County, California, as a result of the proposed Coachella Canal lining plan.

6. Comment: Page 41 - We suggest including an estimate of the economic effects of increased power demands created by this project.

Reply: The use of Navajo Project power on an interim basis as discussed in Chapter I will provide the most economical source of energy from the inservice date of 1980 through such time as the power may be required for use by the Central Arizona Project. Annual costs for capacity are estimated to be \$2,340,000 which will reply, with interest, a portion of the costs of the Navajo Project. Operation and maintenance and fuel costs are estimated to be approximately \$2,600,000 per year.

There will not be any increase in the investment cost of the project due to the utilization of the above-mentioned resource. The Navajo Project power was contracted for by the present contractors for an interim period only, subject to recapture by the United States for other purposes of the Colorado River Basin Project Act.

An investment cost of approximately \$1,340,000 will be required to construct transmission lines and substations associated with the Desalting Plant and the Protective Pumping Well Field. During the construction phase, many labor skills will be utilized providing additional employment in the Yuma, Arizona area. There will not be an appreciable increase in operation or maintenance employment or population since the transmission system will be integrated into the existing system, utilizing, to a large extent presently staffed operating and maintenance crews.

7. Comment: Page 42 - A discussion of where the additional resources will come from to supply the energy for the project would be helpful. The marginal sources of energy are coal, oil and nuclear power and all have significant environmental impacts.

Reply: The final statement has been expanded to include further discussion of the environmental impacts of supplying the project energy requirements.

8. Comment: Page 52 - Section G would be strengthened if it included more quantitative information on the adverse effects on the economic and social structure.

Reply: The statement recognizes there may be unavoidable adverse effects as a result of limiting agricultural development within the 5-mile zone. It would be difficult to determine, however, a quantitative value to attach to the "adverse effect" on the economic and social structure since there is no definite plan or schedule for development of the land in the 5-mile zone. While several thousand acres of State land have been under lease for agricultural development for time, the development has not occurred. To attach a quantitative value to crop production foregone would be totally unrealistic in the absence of definite commitments on the part of the lessee to develop. The possibility exists for development of similar land outside the 5-mile zone which, if developed, could offset some or all the adverse effects of not developing the land within the 5-mile zone.

We therefore feel there are too many **unknowns to relate** quantitative values to the adverse effects on the economic and social structure.

9. Comment: The increase in energy demand and its indirect effect on the energy supply to other Regions could be estimated and included in this section.

Reply: **The energy required to operate the desalting complex and well field each year will reduce energy schedules to other utilities from the Navajo Project by the same amount, which will require additional replacement capacity. However, the Navajo Project power was contracted for by the present contractors for an interim period only, subject to recapture by the United States for other purposes of the Colorado River Basin Project Act. Since the inservice date of the Central Arizona Project is tentatively scheduled for January 1985, this recapture may require the present contractors to accelerate the schedule of layoff replacement capacity from 1985 to 1980.**



United States Department of the Interior

BUREAU OF MINES
WASHINGTON, D.C. 20240

October 23, 1974

DES 74-39

Memorandum

To: Commissioner of Reclamation
Through: ^{Deputy} Assistant Secretary--Energy and Minerals *Ex. 11-1*
From: Director, Bureau of Mines **OCT 21 1974**
Subject: Supplement to the draft environmental statement, Departments of Interior and State, Colorado River International Salinity Control Project, Arizona

Our Intermountain Field Operation Center, Denver, has reviewed the supplement to the draft environmental statement for the Colorado River International Salinity Control Project prepared by the Bureau of Reclamation and the Department of State. This supplement concerns the construction and operation of two well fields adjacent to the international boundary in the southwest corner of Yuma County, Arizona. The fields would pump 160,000 acre-feet of ground water annually from beneath Yuma Mesa and Yuma Valley. Structural measures of the project would require 105 acres and the future use of about 34,400 acres on Yuma Mesa would be limited. Apparently, but not positively stated in the supplement, the restrictions on land use would not preclude mineral resource development.

Geothermal energy resources are the only known mineral resources in the region that might be adversely affected by the proposed project; severe drawdown of ground water at the project site might affect hot-water systems also in the Salton Trough. Because we are not qualified to determine the relationships among these ground water and geothermal systems and, thus, to assess the possibility of adverse effects, we suggest that a qualified hydrologist consider this possibility.

Further, the supplemental statement would be more complete if the status of mineral rights on project lands, including the 23,900 acres of State and 1,600 acres of private land that would be acquired, were described. Specifically the acreage of purchased and subordinated mineral rights should be listed and the policy governing mineral rights decisions stated.

T. V. Faller
Thomas V. Faller
Director

B-86

6
11-1

Replies to Comments Made by the
 Bureau of Mines
 Washington, D.C. 20240
 (Memorandum of October 23, 1974)

1. Comment: Geothermal energy resources are the only known mineral resources in the region that might be adversely affected by the proposed project; severe drawdown of ground water at the project site might affect hot-water systems also in the Salton Trough. Because we are not qualified to determine the relationships among these ground water and geothermal systems and, thus, to assess the possibility of adverse effects, we suggest that a qualified hydrologist consider this possibility.

Reply: Specific reference in our reply is made to the effect of ground-water withdrawal from Reclamation's border well field on an underlying or nearby thermal convective system. A reconnaissance appraisal of the geothermal potential of the Yuma area made on the basis of available data failed to show any geothermal anomalies in the vicinity of the well field. The most significant source of information was a deep "strat" test drilled to 10,561 feet by the Exxon Corporation. Bore hole logging at the completion of drilling gave the following bottom hole temperatures:

<u>Temperatures</u> (°F.)	<u>Time Since Circulation Stopped</u> (Hours)
248	9
268	12
280	18

On the basis of the foregoing, it is estimated that the bottom hole equilibrium temperature is 320°F.

The test penetrated a stratigraphic section as follows:

<u>Depth Interval</u> (feet)	<u>Formation</u>	<u>Lithology</u>
0-3161	Colorado River Deltaic Sediments	Layers of clear quartz sand, brown silt, reddish brown clay and round gravel and cobbles

<u>Depth Interval</u> (feet)	<u>Formation</u>	<u>Lithology</u>
3161-4087	Transition Zone Sediments	Medium grained sand and gray clay shale, locally fossiliferous
4087-6964	Bouse	Interbedded sand and sandstone and shale with foraminifera
6964-10,561	Kinter	Volcanic tuff and solidified lava with some interflow sedimentary beds

2. Comment: The supplemental statement would be more complete if the status of mineral rights on project lands, including the 23,900 acres of State and 1,600 acres of private land that would be acquired, were described. Specifically the acreage of purchased and subordinated mineral rights should be listed and the policy governing mineral rights decisions stated.

Reply: No metal mineral deposits are believed to underlie project lands at mineable depths. Nonmetallic deposits are also not present in commercial quantities in the saturated reservoir rocks. Accumulation of hydrocarbons is not anticipated due to the age and makeup of the ground-water reservoir. Exploration for hydrocarbons in deeper rocks is not adversely affected by the project.



United States Department of the Interior

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE SERVICE

WASHINGTON, D.C. 20240

In Reply Refer To:
FWS/ES

OCT 11 1974

Memorandum

To: Commissioner, Bureau of Reclamation
Action and Control

From: Director, Fish and Wildlife Service

Subject: Draft Supplement to the Environmental Statement on
the Colorado River International Salinity Control
Project (INT DES 74-83)

We have reviewed the above supplemental statement as requested in Mr. E. F. Sullivan's memorandum of August 30, and offer the following comments for your consideration:

In general, we find the statement inadequately treats project impacts on fish and wildlife resources. It appears that insufficient project data are available to serve as a basis for sound impact analysis.

We note that data on fish and wildlife resources are entirely qualitative, and not treated quantitatively, as other aspects of the project. There is no discussion whatsoever of mitigation measures for fish and wildlife, nor have any costs been indicated for such measures. To date, there has been no significant field level coordination of project planning with the Fish and Wildlife Service.

Habitat for the endangered Yuma clapper rail will be eliminated, yet no mention is made of complying with the requirements of Section 7 of the Endangered Species Act of 1973. This factor must be considered and discussed in the statement.

The impact discussion section of the statement treats the pumping aspect of the project alone, and does not seem to take into account, other aspects of the salinity control project described in the impact statement of April 1, INT DES 7439. For example, in that statement



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Save Energy and You Serve America!

it was indicated that the Colorado River essentially will be dewatered below Morelos Dam, but that impact is not discussed. A well organized statement would seem to necessitate incorporation of the details of the supplement into the April 1 document. Lack of a coordinated discussion of the details of the two documents makes review difficult, leaves questions unanswered, and may lead to unnecessary criticism of EIS due to confusion in the mind of the reader.

The pumping aspects of the project should be related to other aspects of the salinity control problem. A more in-depth comparison of ground water drawdown without and with the project should be provided. A plate similar to Plate 5, showing estimated decrease in groundwater levels based upon 50 years of Mexican pumping only, would help serve this purpose.

On pages 39 and 52, the report indicates that water not needed to meet United States-Mexico Water Treaty requirements will be available for use on existing developed areas, or possibly for new agricultural, municipal or industrial development. Consideration should also be given to the use of this water to develop areas for mitigation of fish and wildlife project-caused losses.

Our Service is perturbed by two statements on page 48. "Equitable mitigation measures will be proposed after the magnitude of these unquantified amenities are established", and, "The complete evaluation will be presented in the final environmental statement on the entire International Salinity Control Project." From these comments it would appear that this draft environmental statement is premature. After these "amenities" have been established, quantified, and discussed in relation to compensatory measures that prevent or compensate for fish and wildlife losses, a meaningful draft environmental statement can be prepared. These items should be completely evaluated in a draft to be made available for agency review prior to issuance of a final statement.

The opportunity to comment on this draft supplemental report is appreciated. If there are any questions concerning our comments or if we can be of assistance to you in revising the statement, we would be pleased to assist.

W. L. Olds, Jr.

B-90

Replies to Comments Made by the
Fish and Wildlife Service
Washington, D.C. 20240
(Office Memorandum of October 24, 1974)

1. Comment: In general, we find the statement inadequately treats project impacts on fish and wildlife resources. It appears that insufficient project data are available to serve as a basis for sound impact analysis.

Reply: The Fish and Wildlife Service's letter of comments pointed out several areas in Chapters III and IV where additional quantification of impacts on fish and wildlife resources needed strengthening and that a more definitive presentation of mitigation measures would be necessary. Representatives of the Fish and Wildlife Service have assisted the Bureau of Reclamation in the refinement of these concerns. Their personnel, along with members of the Arizona Game and Fish Department, and the entire Ad Hoc Committee for Fish and Wildlife, have made a substantial contribution toward a qualitative and quantitative analysis of impacts, and have concurred in the mitigation concepts discussed in Chapter IV.

Prior to the submission of the final environmental statement for filing with the Council on Environmental Quality, the section of Chapter IV, Mitigation Measures, and the response to comments contained in this letter have been reviewed at the field level by the Fish and Wildlife Service.

Consistent with the requirements of the Fish and Wildlife Coordination Act and the obligation of the construction agency (Reclamation) under the National Environmental Policy Act, funds are now being provided to the Fish and Wildlife Service for personnel assistance in developing details of mitigation concepts included in this final environmental statement.

Since the draft environmental statement was issued, current environmental inventories in the project area have been completed, analyzed, and are included in the description of impacts and the chapter on mitigation. Copies of the inventories have been provided to the Fish and Wildlife Service. These reports were the basis for mitigation proposals developed by the Ad Hoc Committee on fish and wildlife for the desalting complex and protective and regulatory ground-water pumping of which the Fish and Wildlife Service is a member.

2. Comment: We note that data on fish and wildlife resources are entirely qualitative, and not treated quantitatively, as other aspects of the project. There is no discussion whatsoever of mitigation measures for fish and wildlife, nor have any costs been indicated for such measures. To date, there has been no significant field level coordination of project planning with the Fish and Wildlife Service.

Reply: With the exception of the protective pumping feature of the salinity control project, the other features of the project now embodied in Title I of Public Law 93-320 were a direct result of confidential negotiations between the United States and Mexican Governments. The draft environmental statement was prepared in response to the administration's negotiations and accompanied the introduction of the original bills H.R. 12834 and S. 3094 through the legislative process. The final bill, H.R. 12165, was passed into law on June 24, 1974, and included the feature on protective pumping. Immediately upon the passage of the bill into law, and the removal of the confidential nature of the negotiations, the environmental statement was distributed. Subsequent to this distribution, a supplement covering the protective pumping feature was prepared and distributed on August 27, 1974. Following those two actions, intensive field negotiations for mitigating measures were initiated.

Due to the nature of the negotiations there was no feasibility-level planning of fish and wildlife mitigation potential with either State game and fish agencies or Federal agencies. Upon being made public, the proposal was discussed at numerous meetings in which Fish and Wildlife Service representatives were involved. These meetings included preliminary discussions of impacts and potential mitigating measures. With the exception of the Coachella Canal, funds for fish and wildlife were not included in the original bill. Since that time a legal opinion was rendered indicating that mitigation could be accomplished and funds for mitigation could be made available through project appropriations. Formal meetings to study mitigation proposals were initiated with the Fish and Wildlife Service and other concerned agencies in mid-November. The mitigation concepts developed by the groups are outlined in detail in Chapter IV. Ad Hoc Committees for fish and wildlife were established in July 1974 and November 1974, respectively, for the purpose of developing equitable mitigation measures for fish and wildlife impacts of the project and assisting the Bureau of Reclamation in carrying through on the mitigation plans. The committees consist of representatives of the Bureau of

Reclamation, Arizona and California Game and Fish Departments, Fish and Wildlife Service, Bureau of Land Management, Arizona Water Commission, International Boundary and Water Commission, Colorado River Board of California, Coachella Valley County Water District, Wellton-Mohawk Irrigation and Drainage District, Imperial Irrigation District, Yuma County Water Users' Association, and the Yuma County Board of Supervisors. Mitigation concepts were arrived at by detailed and quantitative analysis and discussion of wildlife resource impacts. Much of the data included in the evaluation have resulted from environmental inventories that were completed subsequent to the issuance of the draft environmental statement. These details are included as a section in Chapters III and IV. Final cost estimates for the mitigation measures have not been determined, however, general cost estimates have been an ongoing subject of discussion of the Ad Hoc Committee and are included in meeting notes.

3. Comment: Habitat for the endangered Yuma clapper rail will be eliminated, yet no mention is made of complying with the requirements of Section 7 of the Endangered Species Act of 1973. This factor must be considered and discussed in the statement.

Reply: Section 7 of the Endangered Species Act of December 28, 1973, and its relationship to the endangered Yuma clapper rail received broad consideration in the discussion of impacts in Chapters III and IV of the final environmental statement. In addition to the discussion in the final environmental statement a procedure for compliance with Section 7 of the Endangered Species Act, consistent with the Secretary's memorandum of October 16, 1974, has been initiated. The October 16 memorandum designated the Fish and Wildlife Service as the responsible agency for implementation of the Act. It further requested each Federal agency develop a procedure for compliance. In response to these directions Reclamation developed reports of the status of endangered species habitat in the project area which were submitted to the Fish and Wildlife Service at the field level for comment and recommendations. The reports include an analysis of the population density, quantification of the existing habitat, impact of the project on habitat, mitigation measures, resulting net change in habitat and conclusion that impacts stemming from the project will not result in habitat loss that would jeopardize the continued existence of the species. The Fish and Wildlife Service was requested to consult with the affected States in concurring with the recommendation. Following the receipt of comments from

the Fish and Wildlife Service, the reports will be revised to include those comments and forwarded from the Commissioner, Bureau of Reclamation, to the Director, Fish and Wildlife Service for formal recognition of compliance with Section 7 of the Endangered Species Act of 1973.

4. Comment: The impact discussion section of the statement treats the pumping aspect of the project alone, and does not seem to take into account other aspects of the salinity control project described in the impact statement of April 1, 1974, INT DES 7439. For example, in that statement it was indicated that the Colorado River essentially will be dewatered below Morelos Dam, but that impact is not discussed. A well-organized statement would seem to necessitate incorporation of the details of the supplement into the April 1 document. Lack of a coordinated discussion of the details of the two documents makes review difficult, leaves questions unanswered, and may lead to unnecessary criticism of EIS due to confusion in the mind of the reader.

Reply: The supplement was issued to specifically discuss the environmental impacts of the protective and regulatory ground-water pumping feature of the project, a feature added by Congress. The original draft environmental statement issued on April 1, 1974, discussed in detail other features of the project that were included in the original legislation sent to Congress. The supplement, in lieu of redundancy in many areas, referred to that document. The final environmental statement includes an overall discussion of the impacts of all of the features included in Title I of Public Law 93-320 and assesses the concerns set forth by the comment. Dewatering of the Colorado River below Morelos Dam will be a direct result of the desalinization complex. Ground-water drawdown in the Yuma Valley area will be a direct impact from ground-water pumping in both the United States and Mexico. Impacts of all phases of the project have been thoroughly discussed with the Fish and Wildlife Service and mitigation concepts have been planned with the assistance of Fish and Wildlife Service personnel. The purpose of the supplement was to comply with the requirements of the National Environmental Policy Act, Council on Environmental Quality guidelines, and Reclamation Instructions, in an effort to update significant changes in a project that occurred after the original environmental statement had been filed with the Council on Environmental Quality.

5. Comment: The pumping aspects of the project should be related to other aspects of the salinity control problem. A more in-depth comparison of ground-water drawdown without and

with the project should be provided. A plate similar to Plate 5, showing estimated decrease in ground-water levels based upon 50 years of Mexican pumping only, would help serve this purpose.

Reply: The final environmental statement relates the protective and regulatory ground-water pumping program to the requirements of Minute No. 242 and other aspects of the salinity control project. A more detailed discussion of the with/without impacts of the project are included in Chapter III. This discussion is based on current analog models which show the ground-water drawdown in the Yuma Valley with the existing pumping as compared to the drawdown of the ground-water in the Yuma Valley when the protective and regulatory pumping on the United States' side is operational. New plates resulting from the updated analog model have been included and depict a 50-year pumping drawdown which will result from Mexican pumping and existing pumping in the United States.

6. Comment: On pages 39 and 52, the report indicates that water not needed to meet United States-Mexico Water Treaty requirements will be available for use on existing developed areas, or possibly for new agricultural, municipal or industrial development. Consideration should also be given to the use of this water to develop areas for mitigation of fish and wildlife project-caused losses.

Reply: As outlined in the Mitigation chapter, a plan has been developed to utilize from 1 to 5 ft³/s (726 to 3,630 acre-feet per year) of ground water to maintain the ponds and surrounding vegetation in the Hunter's Hole area. Water pumped for Hunter's Hole will not be charged against the Arizona entitlement, but it will be counted against the maximum of 160,000 acre-feet of ground water that can be pumped within the 5-mile boundary in the United States in a 1-year period. Mitigation measures are discussed more fully in the final environmental statement under Chapter IV.

7. Comment: Our Service is perturbed by two statements on page 48. "Equitable mitigation measures will be proposed after the magnitude of these unquantified amenities are established," and "The complete evaluation will be presented in the final environmental statement on the entire International Salinity Control Project."

From these comments it would appear that this draft environmental statement is premature. After these "amenities" have been established, quantified, and discussed in relation

to compensatory measures that prevent or compensate for fish and wildlife losses, a meaningful draft environmental statement can be prepared. These items should be completely evaluated in a draft to be made available for agency review prior to issuance of a final statement.

Reply:

The Bureau of Reclamation does not feel the supplement to the draft environmental statement was issued prematurely. As prescribed by the Council on Environmental Quality guidelines, Section 1500.7, Item (a), the draft environmental statement was as complete as possible at the time it was prepared. The supplement regarding protective and regulatory pumping was issued in an effort to discuss a change in the project that was added by Congress after the draft statement was filed. Following the completion of the environmental inventories and comparative evaluation of impacts resulting from the project and field-level negotiations with representatives of the Fish and Wildlife Service and the Arizona Game and Fish Department, mitigation measures have been planned with the assistance of the Fish and Wildlife Service as a part of the project and are discussed in detail in Chapter IV. The final environmental statement includes a complete evaluation of the impacts of the entire project regarding fish and wildlife resources. All of the mitigation proposals and plans for the project have been developed with the assistance of the Ad Hoc Committees of which the Fish and Wildlife Service is a member. Unquantified impacts that may have existed in the draft statement have been refined. The quantification of impacts has been refined by the increased availability of resource data, comments and suggestions from the Ad Hoc Committees and close field liaison with the fish and wildlife agencies. The two Ad Hoc Committees will remain in effect until the mitigation measures have been completed. As outlined in the response to Comment No. 1 of this letter, Fish and Wildlife Service personnel have reviewed these sections of the final environmental statement dealing with fish and wildlife resources and have comments on this letter of response. The major field-level comments received from the Fish and Wildlife Service requested further clarification of the following: (1) The use of water to sustain the ponds at Hunter's Hole; (2) mitigation measures for the Coachella Canal be listed consecutively and not defined as reimbursable or nonreimbursable; (3) operation and maintenance costs for mitigation be assigned as project costs; (4) clarification of analog models on ground-water drawdown; and (5) a request not to prematurely designate a site for the proposed Wildlife Management Area. Other minor wording changes were suggested for improving sentence structure and clarification.

In addition to reviewing the responses to their letter of comment on two occasions, fish and wildlife representatives reviewed the fish and wildlife Sections on mitigation and responded in writing. Two field representatives of Fish and Wildlife Service conducted a two-day review of Chapters III and IV with Reclamation personnel in their Boulder City Office. Their comments and suggestions have been extensively incorporated into the final environmental statement. The representatives of Fish and Wildlife Service were most helpful in resolving mitigation concepts and improving the overall quality of the statement.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO, CALIFORNIA 94111

E. A. Lundberg
Regional Director
Lower Colorado Region
Bureau of Reclamation
Boulder City NV 89005

File NOV 1 1974

Dear Mr. Lundberg:

The Environmental Protection Agency has received and reviewed the draft Supplement to the environmental statement for the Colorado River International Salinity Control Project, prepared by the Bureau of Reclamation and the U. S. Section-International Boundary and Water Commission.

EPA's comments on the draft Supplement to the environmental statement have been classified as Category ER-2, specifically environmental reservations on the proposed action. Definitions of the categories are provided on the enclosure, and our extensive comments will be found on a second enclosure. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

EPA appreciates the opportunity to comment on this draft environmental statement and requests one copy of the final environmental statement when available.

Sincerely,

L. Russell Freeman, Deputy

Acting Paul De Falco, Jr.
Regional Administrator

Enclosures

cc: Council on Environmental Quality, Wash., D.C. 20460
Department of Interior, Secretary's Field Representative

8-98

Comments on the Draft Supplement,

Colorado River International Salinity Control Project

The proposed United States well spacing pattern represents an "interceptor" system rather than one which matches the geometry of the Mexican withdrawal pattern. The United States essentially proposes a program designed to intercept subsurface flows and subsequently reverse the hydraulic gradient along the entire border, including the limitrophe section, while simultaneously lowering the ground water table.

Hunter's Hole, Gadsden Ponds and contiguous areas owe their existence to a significant degree to irrigation returns in the Yuma Valley. Depression of the ground water table will not only eliminate seepage but also greatly decrease flows in valley drainage canals and channels, and will lead to destruction of the riparian wildlife habitat. The environmental statement should discuss alternatives for well spacing patterns which would achieve the project purposes without having to withdraw water from a line of interceptor wells along the limitrophe section of the Colorado River.

Page 8 provides a brief reference to salinity levels; however, a more precise discussion of the water quality impacts of the proposed action should be discussed. The water quality characteristics of the ground water should be set forth; and the impact of the stream of pumped ground waters on the receiving waters of the Colorado River should be analyzed and discussed.

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Replies to Comments Made by the
Environmental Protection Agency
San Francisco, California
(Letter of November 1, 1974)

1. Comment: The proposed United States well spacing pattern represents an "interceptor" system rather than one which matches the geometry of the Mexican withdrawal pattern. The United States essentially proposes a program designed to intercept subsurface flows and subsequently reverse the hydraulic gradient along the entire border, including the limitrophe section, while simultaneously lowering the ground water table.

Reply: Pumping of the proposed United States' wells would intercept water that Mexico is now pumping from below United States territory. However, pumping of the Yuma Mesa Boundary Well Field will not reverse the gradient separating Sonora, Mexico and Arizona on the South Yuma Mesa. Pumping of the Yuma Valley Boundary Well Field could, in time, level off and possibly reverse the hydraulic gradient along the limitrophe section.

2. Comment: Hunter's Hole, Gadsden Ponds and contiguous areas owe their existence to a significant degree to irrigation returns in the Yuma Valley. Depression of the ground-water table will not only eliminate seepage but also greatly decrease flows in valley drainage canals and channels, and will lead to destruction of the riparian wildlife habitat.

Reply: The approximately 12 surface acres of water in the Hunter's Hole pond complex are primarily maintained by ground water. Currently the flow bypassed from the Wellton-Mohawk irrigation and drainage ditches since June 1972, has maintained the elevation of the surface of the ponds to that equal to the elevation of the river. Backflow from this 3,700 p/m TDS water has resulted in an increase in the salinity level within the ponds to approximately 5,000 p/m TDS. Mitigation plans included in Chapter IV discuss in detail the efforts being made to maintain these ponds in their current status. Ground water that will be utilized to maintain the pond levels will result in a freshening effect of the ponds and should retard the rise in salinity levels now being experienced. As discussed in the draft environmental statement, the ground-water drawdown in the Yuma Valley will eventually result in dewatering of the Yuma Valley drains and consequently, a proportionate loss in

riparian habitat. The final environmental statement includes a detailed analysis of anticipated drawdown as a direct result from ground-water pumping in Mexico. It further discusses the acceleration of ground-water drawdown that will result from pumping in the United States. Plates resulting from analog models are included to specifically define the areas of concern.

3. Comment: The environmental statement should discuss alternatives for well spacing patterns which would achieve the project purposes without having to withdraw water from a line of interceptor wells along the limitrophe section of the Colorado River.

Reply: Several alternative sites for the Yuma Valley Well Field have been considered and corresponding analog models have been run for each site. Data from the analog models indicate that regardless of the location of the well field in the southern portion of Yuma Valley or along the southwest edge of the Yuma Mesa the rate and quantity of ground-water withdrawal will be essentially the same. The advantage of having the well field along the river rather than near the mesa is that the protective pumping well field would be less likely to reduce the efficiency of, or otherwise affect the existing Yuma Mesa well field.

4. Comment: Page 8 provides a brief reference to salinity levels; however, a more precise discussion of the water quality impacts of the proposed action should be discussed. The water quality characteristics of the ground water should be set forth; and the impact of the stream of pumped ground waters on the receiving waters of the Colorado River should be analyzed and discussed.

Reply: More discussion of water quality has been added in Chapter II.D.4.a. and Chapter III.E.1.a. The impact of the quality of the pumped waters should be negligible to any water users in the United States as they are presently using water from the same aquifer. There will be no impact to waters of the Colorado River because, as stated on page 42 under Description of the Project Features, the pumped water will discharge at the Boundary Pumping Plant where it will flow by gravity across the Southerly International Boundary.

Do not type to the left of dotted line.

COVER SHEET for FEDERAL GRANT APPLICATION/AWARD NOTIFICATION
ARIZONA

1 APPLICATION DATE
yr mo day
19 _____

3. APPLICANT - Organizational Unit
Bureau of Reclamation, Lower Colorado Region

4. ADDRESS - Street or P. O. Box
P O Box 427

2 FEDERAL EMPLOYER ID NO.

5. CITY
Boulder City

6. COUNTY

7. STATE 8. ZIP CODE
NV 89005

9. PROG NO. / FEDERAL AGENCY
**15599 Department of Interior
Bureau of Reclamation**

10. TYPE OF ACTION
a New c Modification
b Continuation

11. TYPE OF CHANGE (Complete if 10b or 10c was checked)
a Increased Dollars b Increased Duration
c Decreased Dollars d Decreased Duration

13. Other Scope Change
a b Cancellation

14. EXISTING FED GRANT ID
14b. EXISTING CLEARINGHOUSE ID

15. REQUESTED FUND START 19 _____

16. FUNDS DURATION _____ (Months)

17. EST. PROJECT START 19 _____

18. EST. PROJECT DURATION _____ (Months)

19. APPLICANT TYPE Enter Letter J
A. State F. School District
B. Interstate G. Community Action Agency
C. COG H. Sponsored Organization
D. County I. Indian
E. City J. Other

FUNDS REQUESTED (For Changes Show Only Amt. of Inc. (+) or Dec. (-))
20a. FEDERAL GRANT (/ \$) _____ .00
20b. FEDERAL LOAN (/ \$) _____ .00
21. STATE (/ \$) _____ .00
22. LOCAL (/ \$) _____ .00
23. OTHER (/ \$) _____ .00
24. TOTAL (20,21,22,23) (/ \$) _____ 1 .00

25. BRIEF TITLE OF APPLICANT'S PROJECT **Colorado River International Salinity Control Project INT DES 74-83**

26. PROJECT ABSTRACT (60 Characters Per Line - 5 Lines). Attach 1-2 Page Project Summary For Review.

Supplement to the Draft Environmental Statement INT DES 74-39, dated April 1, 1974.

27. AREA OF PROJECT IMPACT (Indicate City, County, State, etc.)
AREAWIDE, YUMA, MOHAVE AND COCONINO COUNTIES, ARIZONA

28. CONGRESSIONAL DISTRICT
Of Applicant Districts Impacted By Project

29. Environmental Assessment Required By State/Federal Agency?
If Yes, Attach. Yes No

30. CLEARINGHOUSE(S) TO WHICH SUBMITTED
a State b Area Wide

31. a NAME OF CONTACT PERSON
E. A. Lundberg, Regional Dir.

b ADDRESS - Street or P. O. Box
P. O. Box 427, Boulder City, Nevada

c TELEPHONE NO.

200 MULTIPLE CLEARINGHOUSE

203 204

33. ACTION BASED ON REVIEW OF
a Notification
b Application

33. ACTION TAKEN
a With Comment c Waived
b Without Comment d Unfavorable

A 274800015

35. CLEARINGHOUSE IMPACT CODE
STATE WIDE Yes No
County, City Png Area County, City Png Area County, City Png Area County, City Png Area County, City Png Area

36. STATE PLAN REQUIRED
 Yes No

74 09 12

38. FINAL CLEARINGHOUSE ACTION DATE
19 **74** mo **11** day
[Signature]
James A. Davis

39. CERTIFICATION - The applicant certifies that to the best of his knowledge and belief the above data are true and correct and filing of this form has been duly authorized by the governing body of the applicant.

40. a NAME (Print or Type) b TITLE c SIGNATURE of Authorized Representative d TELEPHONE NUMBER

41. DATE MAILED TO FEDERAL / STATE AGENCY yr mo day 19 _____ 42. NAME OF FEDERAL / STATE AGENCY TO WHICH THIS APPLICATION SUBMITTED

43. GRANT APPLICATION ID (Assigned by Federal Agency) 52. Application Rec'd. yr mo day 19 _____

44. GRANTOR AGENCY

45. ORGANIZATIONAL UNIT

46. ADMINISTERING OFFICE

R E V I S I O N S	Amended Applic. Received	R E V I S I O N S	54. Exp. Action Revised As Of	R E V I S I O N S
	yr mo day		yr mo day	
	19 _____		19 _____	
	19 _____		19 _____	

47. ADDRESS - Street or P. O. Box 48. CITY 49. STATE 50. ZIP CODE 51. TELEPHONE NUMBER

FINAL ACTION FINAL DATES yr mo day 55. a Awarded b Rejected c Withdrawn 19 _____

56. FUNDS AVAILABLE 19 _____ 57. ENDING DATE 19 _____

58. FEDERAL GRANT ID 65. MULTIPLE PROGRAM LINK

59. FEDERAL FUND ACCOUNT NUMBER

66. REMARKS

TO: Office of Economic Planning
and Development, 3rd Floor
1624 West Adams Street
Phoenix, Arizona 85007

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
 Proposal is supported as written
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature..... Harry Higgins

Date..... 11-22-74

Title..... Plng. Dir.

Telephone..... 271-5005

Mr. John P. Dickinson
Dept. of Economic Security
Post Office Box 6123
Phoenix, AZ 85005

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
 Proposal is supported as written
 Comments as indicated below

Comments: (Use additional sheets if necessary)

The project is supported with the proviso that the land rights, water rights, and any other related interests of the Cocopah Tribe of Indians and any other federally recognized tribe of Indians affected by this project are protected and that no action affecting them shall be taken in relation to this project without the consent of the respective tribal governments.

Reviewer's Signature.....

John P. Lyon

Date..... September 25, 1974

Title..... Indian Specialist.....

Telephone..... 271-5881

R-105



ARIZONA DEPARTMENT OF TRANSPORTATION

206 South Seventeenth Avenue Phoenix, Arizona 85007

JACK WILLIAMS
Governor

October 3, 1974

Highways Division

WILLIAM A. ORDWAY
Director

Mr. E. A. Lundberg
Bureau of Reclamation
Lower Colorado Regional Office
U.S. Department of the Interior
Post Office Box 427
Boulder City, NV 89005

Re: Draft Supplement to the
Environmental Statement
Colorado River International
Salinity Control Project
State Identifier: 74-80-0015

Dear Mr. Lundberg

The Arizona Highways Division's Environmental Planning Services has reviewed the Draft Supplement to the Environmental Statement for the Colorado River International Salinity Control Project.

There appears to be no conflicts with present or five-year-programmed Arizona State Highway projects as the proposal is outlined at this time.

We note you state on pages 31 and 49 of the proposal that the new water pipeline will cross under U.S. Highway 95 in San Louis, Arizona, and there will be some minimal interference with road traffic at the time of construction. Prior to construction, please coordinate this portion of the construction plan with our Arizona Highways Division's District I Engineer, Mr. Milem C. Livesay, telephone number 261-7381, 2140 West Hilton Avenue, Phoenix, Arizona 85009.

We appreciate the opportunity to review the plan and make comment.

Yours very truly

WM. N. PRICE
State Engineer

Mason J. Toles
MASON J. TOLES, Manager
Environmental Planning Services

MJT:ADG:as

cc Mrs. Constance LaMonica
Office of Economic Planning
and Development

Mr. Milem C. Livesay
Highways Division, ADOT

B-106



Dr. James Schoenwetter
Center for Environmental Studies
Department of Anthropology
Arizona State University
Tempe, AZ 85281

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
 Proposal is supported as written
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature

James Schoenwetter

Title

Center for Env. Studies

Date

27 Sep 74

Telephone

TO: Mr. William H. Dresher
Dean, College of Mines
Dir., Az. Bureau of Mines
The University of Arizona
Tucson, Arizona 85721

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
 Proposal is supported as written
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature.....

William H. Dresher

Date.....

Sept. 25, 1974

Title.....

Director

Telephone.....

884-2733

TO:

Mr. K. E. Foster, Ass't Dir.
College of Earth Sciences
Office of Arid Lands Studies
1201 East Speedway
Tucson, Arizona 85719

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

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- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature Ken Foster

Date

Title

Telephone

TO: Dr. James L. Schamadan, Dir.
Department of Health Services
1740 West Adams Street
Phoenix, Arizona 85007

State Application Identifier (SAI)

State AZ Number 75-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations



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- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature: *James D. Goff*
JAMES D. GOFF, P.E., ASSISTANT DIRECTOR
DIVISION OF ENVIRONMENTAL HEALTH SERVICES
Title:

Date: SEP 26 1974

Telephone:

Mr. Les Ormsby, Admin.
Arizona Power Authority
1810 West Adams Street
Phoenix, Arizona 85005

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature..... *L Ormsby*

Date.....

Title.....

Telephone.....



JACK WILLIAMS
GOVERNOR

Arizona
State Land Department

1624 WEST ADAMS
PHOENIX, ARIZONA 85007
602 - 271-4634



ANDREW L. BETTBY
STATE LAND COMMISSIONER

October 3, 1974

74-80-0015

E. A. Lundberg
Regional Director
U. S. Bureau of Reclamation
Post Office Box 247
Boulder City, Nevada 89005

RE: INT DES 74-83

Dear Mr. Lundberg:

This office has reviewed the supplement to the Draft Environmental Statement on the Colorado River International Salinity Control Project and offers the following comments for consideration.

Under Section III, No. 7 SOCIAL AND ECONOMIC STRUCTURE, page 40 states: "Construction and land acquisition cost for the protection and regulatory pumping project are estimated to be \$24 million of which about \$16 million are the estimated acquisition cost of 23,500 acres of State of Arizona land in the Yuma-Mesa."

The report states that 35,000 acre feet of water will be used in the 5 mile restricted area, however, it does not give any detail of the breakdown of the water use for agricultural and other uses. The State Land Department is uncertain as to whether the present agricultural lands are to be acquired or if part of the 35,000 acre feet is allocated to the state lands for continued use.

The state trust lands which are within the 5 mile restriction area are at least under consideration for compensation, however, Plate No. 5 shows that the decline will extend beyond the 5 mile limitation causing an adverse affect to state trust lands which are not within the 5 mile restricted area.

The State Land Department takes the position that the commitment to Mexico in limiting the pumpage within the 5 mile area makes it a national obligation and that the trust should be compensated not only for the lands which will be acquired for the project but also the lands which will have an increased pump- ing cost because of the project. This increased cost will be to the detriment of the state trust and should be compensated for by the federal government.

E. A. Sundberg
October 9, 1974
Page Two

Arizona's Groundwater Code makes percolating waters a part of the land and must be used for a reasonable use on the land from which it is drawn.

Significant in any consideration shall be due compensation to the affected existing leases of state trust land, both those who have developed the land and those who per years have paid substantial rents in reliance upon a peaceful longterm use of the land. The inequities that can occur as a result of a Washington based remote control action in ignorance of the rights of individuals on the ground are too severe to anticipate that the state trust will be freed of equitable considerations to deal with the United States Government outside the confines of a formal court action unless the interests of the private parties have been fairly dealt with beforehand.

Very truly yours,



Wm. Joe Fellinger, Director
Water Rights Division

WJF:jar

cc: Constance Lalonica (74-80-0015)
Arizona Office of Economic Planning
and Development
3003 North Central Avenue
Phoenix, Arizona 85012

TO:

Mr. Roland H. Sharer
State Liaison Officer, AORCC
4433 N. 19th Ave., Suite 203
Phoenix, AZ 85015

State Application Identifier (SAI)

State AZ Number 74-80-0015 ✓

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

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- No comment on this project
 Proposal is supported as written
 Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature

Roland H. Sharer

Title

State Liaison Officer

Date

Dec 16, 1974

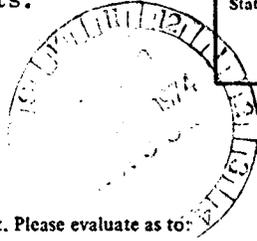
Telephone

271-5813

TO: Mr. ~~██████████~~ ~~██████████~~ ~~██████████~~ Russell Clark
Northern Az. Council of Govts.
P.O. Box 57
Flagstaff, AZ 86001

State Application Identifier (SAI)

State AZ Number 74-80-0015



From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
- Proposal is supported as written
- Comments as indicated below

- Respond Directly to Applicant
- Respond to the State Clearinghouse

Comments: (Use additional sheets if necessary)

[Empty box for comments]

Reviewer's Signature Russell E. Clark

Date 10-2-74

Title A-95 Conclunator

Telephone 774-1895

✓

TO:

Robert Kennerly, Exec, Dir.
District IV COG
377 S. Main St. Rm. 202
Yuma, AZ 85364

State Application Identifier (SAI)

State AZ Number 74-80-0015

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

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- No comment on this project
- Proposal is supported as written
- Comments as indicated below

- Respond Directly to Applicant
- Respond to the State Clearinghouse

Comments: (Use additional sheets if necessary)

[Empty box for comments]

Reviewer's Signature: Robert Kennerly
Title: Exec Dir

Date: 9-30-79
Telephone: 703-1886

Robert Kennerly, Exec. Dir.
District IV COG
377 S. Main St., Rm. 202
Yuma, AZ 85364

State Application Identifier (SAI)

State AZ

Number 74-80-007B

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

- (1) the program's effect upon the plans and programs of your agency
- (2) the importance of its contribution to State and/or areawide goals and objectives
- (3) its accord with any applicable law, order or regulation with which you are familiar
- (4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

- No comment on this project
- Proposal is supported as written
- Comments as indicated below

Respond to Applicant

Respond to Clearinghouse

Comments: (Use additional sheets if necessary)

Reviewer's Signature Brian H. Bahenik

Date 12-5-77

Title Dir. of Physical + Natural Resources

Telephone 782-1886

Reply to Comment Made by the
Department of Economic Security
(Dated September 25, 1974)
(Submitted with transmittal from Arizona State Clearinghouse
November 22, 1974)

1. Comment: The project is supported with the proviso that the land rights, water rights, and any other related interests of the Cocopah Tribe of Indians and any other federally recognized tribe of Indians affected by this project are protected and that no action affecting them shall be taken in relation to this project without the consent of the respective tribal governments.

Reply: The rights and interests of the Cocopah Tribe of Indians were recognized in P.L. 93-320. Close coordination will be maintained with the Tribe throughout the planning and implementation of the project.

WINSTON B. LIVERMORE, JR.
SECRETARY

RONALD REAGAN
GOVERNOR OF
CALIFORNIA

OFFICE OF THE SECRETARY
RESOURCES BUILDING
1416 NINTH STREET
95814

Department of Conservation
Department of Fish and Game
Department of Navigation and
Ocean Development
Department of Parks and Recreation
Department of Water Resources



All Department Board
Conservation Board
San Francisco Bay Conservation and
Development Commission
State Lands Management Board
State Lands Commission
State Reclamation Board
State Water Resources Control Board
Regional Water Quality Control Boards

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

DEC 17 1974

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
U. S. Department of the Interior
Post Office Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

The State of California has reviewed the "Supplement to the Draft Environmental Statement Colorado River International Salinity Control Project", dated August 27, 1974, which was submitted to the Office of Planning and Research (State Clearinghouse) in the Governor's Office for review.

The review, conducted by the Departments of Food and Agriculture, Transportation, Health, Conservation, Fish and Game, Navigation and Ocean Development, Parks and Recreation, and Water Resources; the State Water Resources Control Board; the Solid Waste Management Board; and the Colorado River Board of California, fulfills the requirements under Part II of the U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969.

Mr. Wesley Steiner, Chairman of the seven state Committee of Fourteen, has presented a policy statement at the October 5, 1974, hearing in support of the Draft Environmental Statement. California participated in the preparation of that statement and supports it.

The State's comments are as follows:

Regulatory pumping. An additional policy matter concerns Point 5 of Minute 242, which provides for a future comprehensive agreement on ground water between the United States and Mexico in the border area. Until such an agreement is reached, each country must limit its pumping within a 5-mile zone along the International Boundary to 160,000 acre-feet per year. Mexico has installed its wells; the United States has not. The United States should promptly enter into negotiations with Mexico to determine if a satisfactory agreement can be reached that would eliminate or significantly reduce the need for expending \$34 million for a well field. Meetings should be held with the Committee of Fourteen in the near future with respect to these negotiations.

Summary page. The one-page "Summary" should clarify the difference between the values for well field pumping (160,000 acre-feet per year) and the delivery to Mexico (125,000 acre-feet per year) by including an additional statement to indicate that the remaining 35,000 acre-feet per year will be used in the United States for agricultural and other purposes.

Page 2, second paragraph, fourth sentence. This sentence states that Mexico intends to pump 160,000 acre-feet per year from its well fields. The statement should make reference to Minute 242 wherein Mexico agreed to limit its pumping to 160,000 acre-feet per year, even though it may have installed capacity for pumping a greater amount.

Page 5, second paragraph, fourth sentence. It is stated that the proposed well fields will be designed to pump 160,000 acre-feet annually. However, Plates 4 and 5, which show the results of the analog model studies, indicate 150,000 acre-feet annually from the proposed 35 new wells, with an additional 10,000 acre-feet coming from the existing Mesa and Valley wells. Also, an estimate should be given for the present pumpage from the existing 15 wells within the United States 5-mile zone (shown on Plate 1) and some indication of the future disposition of these wells because the total pumpage on the United States side of the border will be limited to 160,000 acre-feet per year from all wells.

It should be clarified that the pumpage from the 35 new wells will be gradually phased in as the surface flows in the drainage canals begin to decrease as a result of lowered ground water tables. It would not be reasonable to assume that the full amount of the indicated 125,000 acre-feet annually of pumped ground water would be delivered at the southerly International Boundary for perhaps 5 to 10 years because of some flow remaining in the surface drains. Thus, the total amount of pumping from the wells and flow in the drains would be 125,000 acre-feet per year.

Page 8, second paragraph. The report states that the salinity of the ground water to be pumped is 1,000 to 1,500 ppm and the salinity of the water now delivered to the southerly International Boundary ranges from 1,400 to 1,600 ppm. The agreement with Mexico requires water delivered upstream of Morelos Dam to meet certain salinity levels, but this requirement does not apply to water delivered from the wells. To avoid confusion the difference in the quality requirements of the two sources should be discussed here or on page 4.

Page 10, first sentence. Some of the alternative sources of energy for the well fields and desalting complex that are presently being evaluated should be listed.

Page 29, second paragraph. The report indicates that the pumping in Mexico, even without the United States pumping project, will eventually eliminate drainage channel flows and backwater ponds such as Hunter's Hole. An indication of the time required for the pumping in Mexico to have these adverse effects should be discussed.

Mr. E. A. Lundberg

-3-

Plates 4 and 5, following page 40. As noted in a previous comment, these plates indicate that the 35 proposed new wells will pump only 150,000 acre-feet per year whereas the text, on page 5, states that the combined well field pumpage will be 160,000 acre-feet per year.

Page 53, first paragraph. The report indicates that Hunter's Hole is an important resource in the area and that it will be lost. The report should include the results of a study to determine whether these ponds might be preserved by some means or replaced elsewhere. It is noted on page 48 that studies to qualify impacts such as this are underway and that mitigation measures may be proposed later.

Page 65, item B. The report appears to be deficient because there is no discussion of alternatives to the proposed plan other than a 'No Action' alternative. The alternative of negotiating an agreement on the use of ground water to eliminate or reduce the need for a well field should be discussed.

Thank you for the opportunity to review and comment on this supplement to the Draft Environmental Statement.

Sincerely yours,

N. B. LIVERMORE, JR.
Secretary for Resources

By 

AIRMAIL

cc: Director of Management Systems
State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, California 95814
(SCH No. 74042263)

B-121

Replies to Comments Made by The
Resources Agency of California
Sacramento, California
(December 17, 1974)

1. Comment: Regulatory pumping. An additional policy matter concerns Point 5 of Minute No. 242, which provides for a future comprehensive agreement on ground water between the United States and Mexico in the border area. Until such an agreement is reached, each country must limit its pumping within a 5-mile zone along the International Boundary to 160,000 acre-feet per year. Mexico has installed its wells; the United States has not. The United States should promptly enter into negotiations with Mexico to determine if a satisfactory agreement can be reached that would eliminate or significantly reduce the need for expending \$34 million for a well field. Meetings should be held with the Committee of Fourteen in the near future with respect to these negotiations.

Reply: In Recommendation No. 5 of Minute No. 242, it was agreed to limit pumping by each country to 160,000 acre-feet per year pending an international agreement on the use of ground water. The effect of this, insofar as it concerns Mexico, is to preclude any expansion of wells or pumping during this period. There is no reason to believe, however, that an international treaty on use of ground water would eliminate the use of the present Mexican well field, since Mexico has invested substantial sums of money in its development and apparently feels that it needs the water from this source.

2. Comment: Summary page. The one-page "Summary" should clarify the difference between the values for well field pumping (160,000 acre-feet per year) and the delivery to Mexico (125,000 acre-feet per year) by including an additional statement to indicate that the remaining 35,000 acre-feet per year will be used in the United States for agricultural and other purposes.

Reply: The "Summary" has been rewritten to include all measures provided for under Title I, Colorado River Basin Salinity Control Project. The comment has been taken under consideration in the final statement to include expanded explanatory statements.

3. Comment: Page 2, second paragraph, fourth sentence. This sentence states that Mexico intends to pump 160,000 acre-feet per

year from its well fields. The statement should make reference to Minute 242 wherein Mexico agreed to limit its pumping to 160,000 acre-feet per year, even though it may have installed capacity for pumping a greater amount.

Reply: Reference to Minute 242 and the requirement therein on pumping quantity limitations has been made repeatedly throughout the final statement.

4. Comment: Page 5, second paragraph, fourth sentence. It is stated that the proposed well fields will be designed to pump 160,000 acre-feet annually. However, Plates 4 and 5, which show the results of the analog model studies, indicate 150,000 acre-feet annually from the proposed 35 new wells, with an additional 10,000 acre-feet coming from the existing Mesa and Valley wells. Also, an estimate should be given for the present pumpage from the existing 15 wells within the United States' 5-mile zone (shown on Plate 1) and some indication of the future disposition of these wells because the total pumpage on the United States' side of the border will be limited to 160,000 acre-feet per year from all wells.

Reply: Additional analog model runs have been made and the results have been included in the statement that approximate groundwater declines with better estimates of quantities of water pumped under the proposed plan. Also pumping of the proposed protective and regulatory wells has been modeled to commence 5 years after the initiation of pumping of the Mexican wells and the existing wells in the Yuma Mesa Well Field. The exact time when the Yuma Valley drains would cease to flow will depend on the amount of pumping from the existing and proposed wells and when the existing Yuma Valley wells that discharge to the Yuma Valley drains would no longer be required for agricultural drainage. Therefore, pumping of the proposed wells will be phased in so that the flows in the Yuma Valley drains and pumpage from the proposed wells will result in 125,000 acre-feet per year being delivered to Mexico at the Southerly International Boundary.

According to U.S. Geological Survey data, 32,590 acre-feet of ground water were pumped for irrigation in 1973 within 5 miles of the Arizona-Sonora boundary. It is estimated that an additional 200 acre-feet of ground water were pumped for use in San Luis, Arizona and Gadsden, Arizona and from one well in Section 33, Township 10 South, Range 24 West, Gila and Salt River Meridian for which no data are available.

There are also about 109 domestic wells at farm homesites within 5 miles of the Arizona-Sonora boundary for which no pumping data are available. However, the amount of water pumped from these wells is believed to be insignificant when compared to the amount of ground water pumped for irrigation within the 5-mile zone.

5. Comment: Page 8, second paragraph. The report states that the salinity of the ground water to be pumped is 1,000 to 1,500 p/m and the salinity of the water now delivered to the Southerly International Boundary ranges from 1,400 to 1,600 p/m. The agreement with Mexico requires water delivered upstream of Morelos Dam to meet certain salinity levels, but this requirement does not apply to water delivered from the wells. To avoid confusion the difference in the quality requirements of the two sources should be discussed here or on page 4.

Reply: It is pointed out on page 4 under Part 2, Agreement with Mexico that "United States will continue to deliver to Mexico on the land boundary at San Luis and in the limitrophe section of the Colorado River downstream from Morelos Dam approximately 140,000 acre-feet (172,689,000 cubic meters) annually with a salinity substantially the same as that of the waters customarily delivered there." This is a separate provision from the requirements in the agreement for delivery of water at the northerly International Boundary.

The third sentence of the first full paragraph on page 4 will be revised as follows:

"The agreement^{2/} provides the criteria for the delivery of water upstream of Morelos Dam and further provides that 'The United States will continue to deliver to Mexico on the land boundary at San Luis and the limitrophe section of the Colorado River downstream from the Morelos Dam approximately 140,000 acre-feet (172,689,000 cubic meters) annually with salinity substantially the same as that of the waters customarily delivered there.'"

6. Comment: Some of the alternative sources of energy for the well fields and desalting complex that are presently being evaluated should be listed.

Reply: See our reply to Comment No. 3 made by the Bureau of Land Management in their memorandum dated May 23, 1974.

7. Comment: Page 29, second paragraph. The report indicates that pumping in Mexico, even without the U.S. Pumping Project, will eventually eliminate drainage channel flows and back-water ponds such as Hunter's Hole. An indication of the time required for the pumping in Mexico to have these adverse effects should be discussed.

Reply: Additional analog model runs have been made for 10 years and 50 years, respectively, of pumping only the existing Yuma Mesa wells and Mexican wells and the results have been included in the statement. From these runs and additional runs made for the same time period with the existing pumpage and additional pumpage of the protective and regulatory pumping wells, a tabulation has been prepared to present the difference in water-table decline at various locations under the anticipated pumping regimens. This tabulation has been included in the statement.

The analog model runs reveal that in 10 years of pumping of the existing Yuma Mesa wells and Mexican wells, water levels will decline 5 to 10 feet in the major portion of Yuma Valley. This amount of decline will significantly reduce flows in the Yuma Valley drains as the majority of these drains are less than 5 feet deep. Hunter's Hole ponds vary from about 3 feet to about 18 feet deep. The deeper areas of these ponds would remain in 10 years in the absence of additional United States pumping. The estimated water table decline at Hunter's Hole ponds with the existing limited States' and Mexican wells pumping is 19 feet in 50 years.

8. Comment: Plates 4 and 5, following page 40. As noted in a previous comment, these plates indicate that the 35 proposed new wells will pump only 150,000 acre-feet per year whereas the text, on page 5, states that the combined well field pumpage will be 160,000 acre-feet per year.

Reply: Plates depicting results of new runs on the analog model of ground-water pumping at the rate of 160,000 acre-feet per year have been included in the final statement.

9. Comment: Page 53, first paragraph. The report indicates that Hunter's Hole is an important resource in the area and that it will be lost. The report should include the

results of a study to determine whether these ponds might be preserved by some means or replaced elsewhere. It is noted on page 48 that studies to qualify impacts such as this are underway and that mitigation measures may be proposed later.

Reply: Several studies have recently been conducted to determine the evolutionary status of the Hunter's Hole complex and their contribution to the fish and wildlife along the Colorado River below Morelos Dam. Studies regarding mitigation proposals by the Ad Hoc Committee for fish and wildlife for the desalting complex have also been completed. The results of these studies were utilized by the Ad Hoc Committee in recommending mitigation measures for the Hunter's Hole pond complex. These recommendations are included in detail in Chapter IV of the final environmental statement.

10. Comment: Page 65, item B. The report appears to be deficient because there is no discussion of alternatives to the proposed plan other than a "No Action" alternative. The alternative of negotiating an agreement on the use of ground water to eliminate or reduce the need for a well field should be discussed.

Reply: Deposition of pumped water will be to maintain Southerly International Boundary deliveries to Mexico near levels experienced in recent years as required under Minute 242 and for use by United States water users. The suggested alternative of negotiating an agreement on the use of ground water is not within the scope of this statement, geared to specific projects authorized by specific legislation, precluding implementation of studied alternatives.

APPENDIX C

APPENDIX C

SUMMARY
OF
COMMENTS AND REPLIES

presented orally or in writing for inclusion in the official proceedings of the October 5, 1974, public hearing on the Colorado River Basin Salinity Control Project, Title I, Draft Environmental Statement and its Supplement

Replies to Comments at the Public Hearing
October 5, 1974

1. Mr. Elliott Waits, Director, Yuma-Mesa Irrigation and Drainage District, Yuma, Arizona (Comments of Mr. L. E. Brazeel submitted as an attachment)

Comment:

-1. Mr. Waits disagreed with the concept of allocation of 35,000 acre-feet of water from the well field for purposes within the United States and the remaining 125,000 acre-feet scheduled for delivery to Mexico. He recommended the water be used to develop agriculture in Yuma County with the exception of the small amounts of water that would be needed to fulfill the Paragraph 1(b) of Minute 242. He questioned the premise that the 140,000 acre-feet limitrophe delivery being met by agriculture drainage and irrigation waste waters from Yuma Valley would dry up as being purely speculative.

Reply:

If the quantity of water delivered to Mexico near San Luis is less than the proposed 125,000 acre-feet, the return flow credit for the State of Arizona would be diminished below historical quantities at that location. This, in turn, would reduce the quantity of water Arizona could divert from the Colorado River within its allocated share of 2.8 million acre-feet. The allocation of Colorado River water entitlements is a decision that must be resolved within the State of Arizona and should be reflected in the determination of the Arizona Water Commission.

Comment:

-2. Mr. Waits stated that it was purely speculative that the 140,000 acre-feet delivery to Mexico at San Luis from Yuma Valley agricultural drainage and irrigation wasteway waters would dry up.

Reply:

The analog model of the Yuma area aquifer constructed by the U. S. Geological Survey is sufficiently accurate to predict the hydrologic conditions within reasonable limits. The existing pumping regimen is already causing hydrologic stresses that reduced the flow across the land boundary near San Luis to 117,840 acre-feet in 1973 and to a projected flow for 1974 of 106,954 acre-feet.

Comment:

-3. Mr. Waits expressed concern that the tax base of Yuma County would be effected by the failure to increase the amount of agricultural production. If the water is taken from beneath the land, the land is then worthless to Yuma County, with no potential at all and it will revert back to desert and have no value at all.

Reply:

Essentially all of the land contemplated for acquisition is state-owned and is not currently on the tax rolls. Acquiring the land by the United States would not reduce the tax base but it might preclude future broadening of the tax base.

Comment:

-4. The written statement by Mr. Eugene Brazeel, Yuma County Administrative Office, on behalf of the Yuma County Board of Supervisors, while approving most of the proposed measures, expressed concern with the 25 wells proposed to be drilled near the Mexican border. He requested that any water in excess of that needed to supply the 140,000 acre-feet delivery to Mexico at the San Luis border remain available for development of agricultural lands on the mesa near the border. He outlined the belief that the water pumped belongs to Yuma County first since this is where it is generated.

Reply:

It was contemplated under the proposed plan that a portion of the 160,000 acre-feet of pumped water would be available for use on the south Yuma Mesa area. However, this water would be restricted to use on those lands already developed for agriculture purposes and possibly some additional lands with the condition that irrigation practices utilize highly efficient systems such as the pressure systems used in "drip irrigation".

2. Dr. Stephen Liston, Maricopa Audubon Society, Phoenix, Arizona

Comment:

-1. Dr. Liston stated that his concern for the Salinity Control Project was directed to the irreparable damage to the riparian vegetation and

wildlife associated with the plan and its impact on the habitat below Morelos Dam. The preservation of Hunter's Hole and at least some of the lower Colorado River riparian areas below Morelos Dam should be accomplished.

Reply:

Plans for the preservation of the five ponds at Hunter's Hole and some vegetation in the surrounding area have been thoroughly explored by the Ad Hoc Committee on fish and wildlife. The mitigation process has been resolved through an Ad Hoc Committee on fish and wildlife consisting of members of the various conservation agencies and water districts. The approximately 6-8 acres of prime Yuma clapper rail habitat immediately below Morelos Dam will not be lost. This area will continue to receive a water supply from seepage under the Dam, from agricultural irrigation immediately to the east and from the unlined Alamo Canal to the west of the river channel. The estimated drawdown of the ground water in the Hunter's Hole area with the existing pumping in the United States and the pumping of 160,000 acre-feet in Mexico is approximately 7 feet in 10 years. This effect alone would be detrimental to the Hunter's Hole area and other riparian areas along the Colorado River below Morelos Dam. The ground-water drawdown will be at such a slow rate with or without the United States' pumping project that few of the phreatophytes will be lost. Hydrophytic vegetation south of the area influenced by the drainage from the Alamo Canal and irrigated fields will be affected.

Comment:

-2. The preservation should include consideration for the endangered (a) Yuma clapper rail, (b) peregrine falcon and (c) southern bald eagle and the threatened (d) California black rail and (e) the California yellow-billed cuckoo.

Reply:

(a) One of the prime considerations for preservation of this area is the consideration for the endangered Yuma clapper rail found intermittently throughout the area. A detailed report on compliance with Section 7 of the 1973 Endangered Species Act has been filed with the United States Fish and Wildlife Service for approval. (b) and (c) Peregrine falcon and the southern bald eagle are only infrequent visitors to the area. The project will not adversely affect these two endangered species. (d) The California black rail is not included on the Secretary's list of endangered species in the United States. It is considered by the state of California to be threatened. In a

1973 study by Mr. Repking and Dr. Ohmart, approximately 112 California black rail were inventoried above Laguna Dam as far north as Martinez Lake. This species did not originally inhabit the lower Colorado River. Indications are that this population is presently expanding. There have been no recorded observations of black rail south of Morelos Dam. (e) The California yellow-billed cuckoo has been recorded in the area south of Morelos Dam.

Comment:

-3. Concern was expressed for the nesting area of quail and dove, for fish--catfish, bass, mullet, frogs, and insects, and for the recreational use of the area.

Reply:

Inventories of the area reveal that white-winged dove, mourning dove, and ground dove do use this area extensively for nesting. Analog models regarding the proposed decline of the ground-water level indicate that nesting trees utilized by white-winged and mourning doves will eventually be affected by the ground water. The impact will be related to the ability of the plant species to expand its root system to stay within the range of the water table. After the water table recedes to approximately 50 feet below the surface, there may be additional impacts on nesting areas for dove and quail.

A 1974 inventory of the Hunter's Hole and a separate inventory of the river from Morelos Dam to the Southerly International Boundary reveal that a fair fishery is located in Hunter's Hole. There is a population of flathead catfish and other warm water species within the river channel itself. However, very little use is made of this particular segment of the fishery. The best populations of mullet and bass are located within the Hunter's Hole complex. Frogs are predominantly associated with Hunter's Hole and with the Yuma Valley drains. There will be some adverse effect on the frog population if the ground-water level declines to a point where the drains are affected. There should be no adverse effect upon the terrestrial inset population of the area. The aquatic insects associated with the river channel will be affected.

Quantitative details regarding the existing wildlife resource base, anticipated impacts and mitigation measures are included in detail in Chapters III and IV.

A recreational inventory completed by members of Arizona State University in November 1974, reveals there is considerable

recreation potential within the Limitrophe Division. However, at the time there is practically no use. Mitigation measures associated with wildlife features should enhance the potential for recreational use within the area.

3. Mr. Lowell O. Weeks, General Manager-Chief Engineer, Coachella Valley County Water District

Comment:

-1. Mr. Weeks stated that the Coachella Valley County Water District is willing to enter into negotiations with the Secretary for a repayment contract for the concrete lining of the Coachella Canal from Drop 1 to Siphon 7. The District concurred in general with the draft environmental statement and recommended its adoption. Mr. Weeks stated the facilities contemplated will benefit areas both within the United States and the Republic of Mexico.

Reply:

Comments made by Mr. Weeks did not require further discussion.

4. Mr. Robert Carter, General Manager of the Imperial Irrigation District and Member of the Colorado River Board of California

Comment:

-1. Mr. Carter endorsed the environmental statement and the objectives of the project toward improvement of the salinity of the Colorado River water for Mexico. He stated that Imperial was willing to give up its capacity in the Coachella Canal and let the water be used to a better purpose than irrigating undeveloped lands in the Imperial District that require water in excess of 20 acre-feet per acre per year. He expressed concern that the project will not use power that is now being used by the lower Colorado River allottees.

Reply:

To alleviate such concerns, Congress provided in Public Law 93-320, which authorized the desalter, that "The Secretary shall use sources of electric power supply for the desalting complex that will not diminish the supply of power to preference customers from Federal power systems operated by the Secretary."

5. Mr. Wesley E. Steiner, Executive Director and State Water Engineer of the Arizona Water Commission and Chairman, Committee of Fourteen

Comment:

-1. Mr. Steiner discussed the history of the participation of the Committee of 14 with Special Ambassador Brownell relative to the program eventually agreed upon with Mexico. The Committee found the authorized project to be the best alternative and concludes that the environmental statement was adequate. Mr. Steiner urged the Bureau of Reclamation's consideration of the technical changes suggested in letters from a number of the Colorado Basin States.

Reply:

Letters of comment on the draft environmental impact statement were received from the States of Arizona, California, Nevada, Colorado and Wyoming. Each comment was considered and the responses to these comments are included in Appendices A and B.

6. Mr. Jim Clevenger, City Administrator, City of Yuma (Speaking for Mr. Ersel Byrd, Mayor of the City of Yuma)

Comment:

-1. Mr. Clevenger expressed the support of the Colorado River Basin Salinity Control Act by the City of Yuma. Benefits to the City would include improved relations with Mexico, the City's first right-of-rejection on surplus water from the plant and a beneficial impact on the economy of the entire area.

Reply:

These comments require no additional discussion.

7. Mr. Tom Choules, Attorney, Wellton-Mohawk Irrigation and Drainage District

Comment:

-1. Mr. Choules stated the District supports the Colorado River International Salinity Control Project and urges proceeding as rapidly as possible to complete the environmental impact statement so that

construction may begin. He suggested that arrangements be made with the Arizona Game and Fish Department to use some of its water, delivered through the Yuma Valley's transmission system in order to retain the water in Hunter's Hole with the necessary lining of that area as a means of keeping that Hole not only with fresher water, but also with a more secure supply. He also suggested sinking a well and pumping water to maintain Hunter's Hole. Mr. Choules emphasized that the Game and Fish people have no right to any of the waters from underground and wasteways, and, as part of the environment is to mitigate damages caused by a project, they (Game and Fish) must, of necessity, become a party to part of the expense of mitigation. He emphasized that the Bureau of Reclamation should take into consideration the legal implications of mitigation and insure that obligation for mitigation would not be an imposition or obligation upon water users who have contractual rights in order to satisfy the wants of those who do not have contractual rights.

Reply:

Contact was made with the Arizona Game and Fish Department in regards to obtaining a portion of its water allocation from the Central Arizona Project for use in preserving the Hunter's Hole area and other areas below Morelos Dam. At this time there is no firm allocation of water from the Central Arizona Project assigned to the Arizona Game and Fish Department. There may be a potential for use of water from this source in the future. Consideration has been given to supply the Hunter's Hole pond complex with water through the Yuma Valley drain system. However, the unavailability of water precludes further consideration of this alternative at this time. Mitigation concepts explored by the Ad Hoc Committee for Hunter's Hole considered pumping of fresh-water into the ponds from an adjacent deep well. This pumping would provide a sustained source of water for Hunter's Hole and would add considerable enhancement to the improvement and maintenance of the water quality. The pumping plan would coincide with the construction of a small weir to separate the ponds from the river channel. These mitigation procedures have been negotiated with members of the Arizona Game and Fish Department and the Ad Hoc Committee for fish and wildlife for the desalting complex.

The Fish and Wildlife Coordination Act of 1958 states that the cost of construction of mitigation measures must be borne by the construction agency. The general procedure for involving cost of a State game and fish agency is through the planning of measures and the management and operation of a facility after it is developed. Present plans call for a management agreement for these areas to be developed with the responsible agency.

Reclamation and the Fish and Wildlife Service have worked through the Department of the Interior's Field Solicitor to develop and understand the legal responsibilities associated with the mitigating measures of the project. Mitigation included in the project has been reviewed by the Field Solicitor. There will be no infringements on the existing contractual rights of water users within the project area.

Comment:

-2. Mr. Choules stated that he hoped the impact of the 160,000 acre-foot limitation within the 5-mile area would be such that either the landowners would be adequately compensated or, preferably, water for the development of these lands could be brought from wells beyond the 5-mile limit.

Reply:

If the United States buys any of the land, it will be on the basis of adequate compensation based on value appraisals. Transporting water for development of land within the 5-mile area from wells beyond the 5-mile limit is not precluded under Minute No. 242 or any other restriction, however, such a plan is not contemplated at this time.

Comment:

-3. Mr. Choules requested the Bureau of Reclamation not to condemn any of the land (in the Wellton-Mohawk Division) because of its effect on the environment in the area, to only buy from willing sellers, and hopefully only to buy the right of that land to water, so that all the land will not be taken off the tax rolls, or to impose some obligation on a farmer who doesn't wish to lose his land. He requested the Bureau look at possible land exchanges, the purchase of water rights rather than the land, and the ability to drill wells to farm some of the land that will become nonirrigable with certain limitations.

Reply:

Acreage reduction in the Wellton-Mohawk Division is intended to be a "means" of helping to reduce the quantity return flows which will be treated in the desalting plant. If the United States does not acquire the land in fee, either through negotiated purchase or condemnation, the United States would have little effective control over the future use of the land. Buying the right to water for land which the United States does not own does not accomplish the goal of reduced flows unless the Wellton-Mohawk Irrigation and Drainage Division agrees to reduce its diversions from the Colorado River in the amount of water right purchased by the United States. Acquisition of land in fee will provide opportunity

for the United States to lease the land for storage areas for farm products, and other uses which are compatible with the agricultural community. However, a final determination has not yet been made to acquire the land in fee and the Bureau is actively studying the feasibility of land exchanges, purchase of water rights only, and lease-back arrangements. Under lease-back arrangements for irrigation with ground water, it would be highly unlikely that the United States would participate financially in installing wells for such irrigation.

Comment:

-4. Mr. Choules stated that if the Federal government buys the 6,000 acres in the Wellton-Mohawk Division to add to the 4,000 not now in production to achieve a 10,000-acre reduction, then the agricultural community will suffer immensely from that type of environment. Fields would go back to weeds which would affect the adjacent farmer. If the United States then decides to dispose of those lands, there could be uses contrary to the best uses of an agricultural community, such as subdivisions with pesticide controls that might make farming around them impossible.

Reply:

Acquisition of developed land by the United States does not necessarily mean the land would then go back to native vegetation and thus adversely affect the adjoining farms. There are several alternatives available to the United States for use of the land to preclude any adverse effect on surrounding farms. There is a possibility that some of the land could be leased for farming with ground water or for other uses which would be compatible with the agricultural development. Disposition of acquired land by the United States could be controlled by stipulation in any land sales contract to assure that the land would be used in a manner compatible with existing uses.

Comment:

-5. Mr. Choules expressed concern for the effect that the 160,000 acre-foot pumping from the well field will have on the farming community in the Yuma area, on the municipal water supplies for the community of San Luis, Arizona, and on the shallow domestic wells in the Yuma Valley.

Reply:

These impacts caused by ground-water withdrawal will eventually take place with or without implementation of the protective and regulatory ground-water pumping project due to restrictions already imposed on ground-water pumping within the 5-mile limit by Minute No. 242 and due to ongoing U.S. and Mexican pumping. The protective pumping project will hasten the effects, but even if the project were not implemented, and agricultural development of mesa lands within the 5-mile zone with

pumped ground water were allowed, this would still have the same effect as the project on hastening the ground-water withdrawal. See the reply to comment 2 of Mr. Mellon's public hearing comments for additional information on impacts related to domestic wells.

Comment:

-6. Mr. Choules assumed that the statement would provide at least some review of the ability of the desalting plant to handle waters so that the District would not have any difficulty in having to bypass large amounts of water for which no return flow credit would be received.

Reply:

The desalting plant will be sized so that the United States can meet its obligations pursuant to Minute No. 242. The plan includes irrigation efficiency improvement measures and irrigable acreage reduction in the Wellton-Mohawk Irrigation and Drainage District to reduce the return flows from the District due to normal drainage requirements to 175,000 acre-feet or less annually. The bypassing of large amounts of creditable return flows are not anticipated. However, there may be extreme hydrologic conditions on the Colorado River that would allow bypassing all of the Wellton-Mohawk return flows. In such cases the desalting plant would not have to operate.

If significant infiltration from Gila River floodflows required evacuation of additional water over and above that required for adequate drainage due to irrigation operations, some water would have to be bypassed because the plant would not be sized to treat such amounts of water. The plan includes purchase of lands or interest in lands, if required, in Painted Rock Reservoir so that flood releases can be controlled to minimize infiltration of Gila River floodflows.

Comment:

-7. The Bureau of Reclamation was requested to take into consideration the environmental effects of Title II, which Mr. Choules suggested were going to be a great benefit, not only to the farming community, but to game and fish, and all wildlife people if the river upstream can be improved. These benefits would automatically affect the environmental impact of the law.

Reply:

Authority to construct, operate, and maintain the Paradox Valley Unit and Grand Valley Unit in Colorado, the Crystal Geyser Unit, Utah and

Las Vegas Wash Units, Nevada, and to expedite the investigations of the units of the Colorado River Water Quality Improvement Program was provided under Title II of Public Law 93-320. The collective impact of the initial salinity control units will result in a decrease in salinity concentration of the Colorado River at Imperial Dam of about 48 milligrams per liter (mg/l). The annual removal of salt from the river system by implementing the initial phase is estimated to be over 500,000 tons of salt. The overall program could remove over 1.6 million tons of salt per year. The direct benefits of measures taken under Title II of Public Law 93-320 will accrue to the Lower Colorado River Basin states of Arizona, California, Nevada, New Mexico, and to the Republic of Mexico. Salinity reduction will result in improved water quality for over 1 million acres of irrigated farmland and over 17 million people, mostly in the lower basin of the river. Direct benefits from the implementation of this program will accrue to the Gila and Yuma Projects since the irrigation water for these projects is diverted at Imperial Dam. A general "umbrella-type" environmental statement is being prepared to provide an overall evaluation of the basin-wide alternatives and cumulative effects upstream from Imperial Dam of both authorized and proposed salinity control works, measures, and facilities.

8. Mr. William DuBois, California Farm Bureau Federation, Sacramento, California

Comment:

-1. The main thesis of the comments presented by Mr. DuBois concerned the translocation of prospective electrical generating facilities and consideration of the alternative for use of Wellton-Mohawk drain water as a coolant for a generating station, either coal-fired or nuclear, that could be constructed in the area in lieu of the desalting plant. Mr. DuBois stated a generating facility in place of the desalting plant could use virtually all the water from the Wellton-Mohawk drain, provide needed energy to the Southwest rather than drawing on the existing supply, help to alleviate the future shortage of water in the Colorado River that would result from demands by future generating requirements, result in the destruction of little or no agricultural land, could use the drain ditch to the gulf of California for bypass of blowdown water and result in not spending \$16 million a year of American taxpayers' money for interest on capitol cost and operation of the desalting plant.

Reply:

Use of Wellton-Mohawk waters in the cooling towers of an electric generating plant is a possibility. However, the Arizona utilities have no present plans for any generating stations, either nuclear or fossil, in the Yuma area. In addition, use of the water in this way is not a conservative use of the water as additional water from the Colorado River would have to be released to replace this return drainage flow.

Comment:

-2. Mr. DuBois' last concern with the environmental impact statement was it did not consider in enough detail why it is justified to maintain the Wellton-Mohawk project rather than buy it out and thus avoid all the hassle.

Reply:

Buying out the Wellton-Mohawk Division of the Gila Project would involve buying the land and improvements and an attempt to relocate the farm families so they could continue farming elsewhere. The remainder of the farm-supporting businesses in the area would disappear because of lack of activity. The social activities associated with the schools and churches would cease. There would also be considerable adverse effect on the national environment. Most of the riparian growth along the Gila River which is supported by irrigation drainage water would cease. The agricultural land that furnished food and cover for wildlife would be lost.

The gross crop value in the Wellton-Mohawk Division, Gila Project, was \$31,966,811 in 1973.^{1/} The loss of the agricultural production and the associated businesses supported by it would be severe to Yuma County and the state of Arizona.

Because of the adverse economic and social impacts associated with the alternative, it was not selected for implementation.

^{1/}1973 Crop Census Report, Yuma Projects Office, Yuma, Arizona

9. Mr. Archie Mellon, President, Yuma County Water Users' Association,
Yuma, Arizona

Comment:

-1. Mr. Mellon expressed concern regarding the Department of the Interior's failure to consult with the Association representatives in the planning of the project, the lack of availability of analog studies showing the magnitude and effect of the underground withdrawal of water in the Yuma Valley and the lack of effort to consult with the Association during the preparation of the environmental impact statement.

Reply:

Inasmuch as the protective and regulatory pumping plan was not proposed by the United States, planning work for such a plan was not undertaken until it was authorized by Congress as a part of the Title I measures of Public Law 93-320. The urgency for implementation of the other Title I features because of international concerns dictated that the supplement to the draft environmental statement be prepared and circulated as soon as possible after enactment of P.L. 93-320. Consequently, not all of the analog model studies were completed prior to issuance; however, the analog model studies were completed and made available to the Association and there were consultations prior to the public hearing on October 5, 1974.

Comment:

-2. Mr. Mellon stated that the pumping, when coupled with Mexico's pumping, will cause economic and physical damage to the association and its members in the form of land subsidence which will cause damage to the irrigation system operated by the association, and the drying up of shallow domestic wells which will have to be deepened and more expensive pumping equipment installed.

Reply:

Land subsidence has been a problem elsewhere when ground-water levels have been lowered significantly in areas where there are fine-grained clay soils. Only the east side of the Yuma Valley and the vicinity of the apex of the ground-water mound appear to contain sufficient shallow clays to permit any significant subsidence. It is unlikely, however, that any damaging subsidence will occur. Domestic wells that penetrate the gravel aquifer would not be affected other than increasing the pumping head. Shallow wells, however, particularly in the southern portion of Yuma Valley will be affected. As the water table drops more than about 20 feet below the ground surface,

suction lift pumps will no longer be effective and will have to be replaced with submersible pumps. Some of the present domestic wells, undoubtedly, are not large enough in diameter for the installation of this type of pump. Also, as the water table drops below the bottom of shallow wells, they will have to be replaced with deeper wells. The ground-water elevations will lower with present pumping but at a slower rate than with the additional protective pumping in the United States. The increased number of wells and pumps that would have to be replaced before the end of their useful lives resulting from the accelerated rate of ground-water lowering cannot be determined. The total number of small-diameter domestic and stock-watering wells in the Yuma Valley within 5 miles of the Southerly International Boundary was determined by the U. S. Geological Survey to be 109 domestic wells. It is not known how many of these wells are shallow and how many are deep enough to penetrate the gravel aquifer.

Comment:

-3. In order that the Valley Division can be protected from the admitted damages which the report agrees will occur, the Yuma County Water Users' Association requested the following written assurances:

(1) Guaranteed diversion from the river of additional water for farming that will be required because of the lowered water table and to supplement the additional seepage losses from the 115 miles of unlined distribution system, or in lieu thereof, concrete lining the system.

(2) Guaranteed reimbursement for damages to private and community domestic water systems.

(3) Guaranteed reimbursement for subsidence damage to private lands, Association distribution system and allied facilities.

(4) Reimbursement to the Association for the cost of delivering water to Mexico through the boundary pumping plant retroactive to the date of the legislation authorizing the International Salinity Control Projects.

(5) That the 10 proposed wells in the Yuma Valley boundary well field be moved to the Yuma Mesa.

Reply:

- (1) Deep-rooted crops, such as alfalfa, draw some water from the ground water if it is sufficiently shallow. The quantity of water that the valley division water users are entitled to under their water right application contracts is that quantity required for beneficial use on crops so that if additional water applications are required because of the lowering of the ground water, such water use is justified under the contracts and would be available.
- (2) No guarantee for reimbursement can be made in advance. If damages occur, the responsibility for reimbursement will have to be determined based on available evidence of the circumstances.
- (3) It is unlikely that any damaging subsidence will occur. Should it occur, however, the responsibility for reimbursement for damages will have to be determined at that time based on available evidence of the circumstances. No commitment for reimbursement can be made in advance.
- (4) There is no provision on P.L. 93-320 to reimburse the Association for the cost of delivering water to Mexico through the boundary pumping plant; however, the pumping cost to the Association will reduce each year due to decreased flow.
- (5) The number and location of the wells have not been fixed because of conflicting interests within the state of Arizona. The Association will be afforded full opportunity to participate in the plan determination. The analog model demonstrates, however, that moving the 10 wells out of Yuma Valley and relocating them on the Yuma Mesa will not change appreciably the configuration of ground-water levels in the Yuma Valley.

10. Mr. Andrew Bettwy, Commissioner, Arizona State Land Department, Phoenix, Arizona

Comment:

- 1. Mr. Bettwy's principal concern appeared to be the impacts on the present and potential tenants of the State trust land and the lack of communication between the Federal government in planning the project with the State Land Department in utilizing State trust land as a part of the project.
- 2. Mr. Bettwy estimated the cost of the land to the Federal government, without exchange, at approximately \$60 million plus

inflation and depreciation values. Mr. Bettwy stated that about 20,000 acres of trust land within the 5-mile boundary would be dewatered and about 20,000 to 30,000 additional acres would be equally affected and likely destroyed for all practical purposes by virtue of the subsidence and removal of water from the underground (source).

-3. He suggested perhaps a solution for some will be to ignore certain lands in the project and to guarantee those people adequate water.

-4. Mr. Bettwy emphasized that the burden of the project should not fall on the people of Arizona, the State Land Department, nor the tenants of the State Land Department, but is the responsibility of the Federal government.

-5. He recommended the Bureau of Reclamation become involved in a detailed report for each parcel of ground, stating what and where use is intended and the proposals for compensation to the individual.

-6. Mr. Bettwy offered to cooperate fully to undertake exchanges for value of equal potential and perhaps avoid much, if not all, of the money loss that could be involved. Without this cooperation the State trust and the Governor may be uncooperative until the people of the State have been taken care of fully.

Reply:

See the replies to comments made in the October 8, 1974, letter from the Arizona State Land Department in Appendix B of the statement.

11. Mr. David Smith, Individual, Yuma, Arizona

Comment:

-1. Mr. Smith presented several questions concerning the project. Can you specify how the power for the proposed plant will be produced? If not, when will such information be available to the public?

Reply:

See our reply to Comment No. 3 made by the Bureau of Land Management, Phoenix, Arizona, in its letter of May 23, 1974.

Comment:

-2. Will the proposed reverse osmosis plant meet all United States' water obligations with Mexico?

Reply:

The United States is obligated by the 1944 Water Treaty to deliver 1,500,000 acre-feet of Colorado River water annually to Mexico. Minute No. 242 requires that the treaty waters delivered to Mexico upstream of Morelos Dam have an average annual salinity of no more than 115+30 parts per million of total dissolved solids over the annual average salinity of Colorado River waters which arrive at Imperial Dam.

The United States has been meeting its obligation under the 1944 Water Treaty and under several other minutes (subordinate agreements) negotiated with Mexico pursuant to the Treaty. Since June 25, 1974, the day following enactment of Public Law 93-320, which among other things authorized construction of the desalting plant to treat the Wellton-Mohawk return flows, the United States has been meeting its obligation under Minute No. 242 by bypassing the Wellton-Mohawk return flows around Morelos Dam. However, bypassing the Wellton-Mohawk return flows results in a loss of water to the river system. The desalting plant will reduce the loss of water to the amount of the reject water from the desalting plant. The reject water will be conveyed in a concrete-lined channel to the Santa Clara Slough in Mexico.

Replacement of the reject stream from the desalting plant and of any Wellton-Mohawk water bypassed to the Santa Clara Slough to accomplish essential operation, except at times when there exists surplus water of the Colorado River under the 1944 Water Treaty, is a national obligation according to Public Law 90-537 (Colorado River Basin Project Act) and reaffirmed in Public Law 93-320. Studies to identify feasible measures to provide adequate replacement water are to be completed no later than June 30, 1980.

Comment:

-3. If so, why is there still a proposal to build the so-called Yuma dual-purpose nuclear powerplant in 6 to 8 years, which would also perform a desalinization function? Further, if a second plant is required, why not simply build a larger reverse osmosis plant to begin with?

Reply:

The proposal to build the Yuma dual-purpose nuclear powerplant has not materialized. The Arizona utilities have no present plans for any generating stations, either nuclear or fossil, in the Yuma area.

12. Mr. Allen Marlatt, President, Yuma County Farm Bureau, Wellton, Arizona

Comment:

-1. Mr. Marlatt stated his surprise when he learned the project plan recommended the abandonment of present farmlands and calling to a halt for further development of other lands in Yuma County, Arizona, and Imperial County, California. His direct concerns were with the 10,000-acre reduction in acreage in the Wellton-Mohawk Project and the implications associated with abandoned farmlands which indicates failure and the loss of economic benefits which hurt all the people involved.

Reply:

The irrigable acreage reduction in the Wellton-Mohawk Division, Gila Project will limit additional development that could increase return flows. The Wellton-Mohawk Division was authorized under the Gila Reauthorization Act of July 30, 1947, to include an area comprising approximately 75,000 irrigable acres of land, or such number of irrigable acres as can be adequately irrigated by the beneficial consumptive use of no more than 300,000 acre-feet of water diverted annually from the Colorado River. The area in irrigation rotation in 1973 was 65,644 acres. Therefore, the irrigated area after the irrigable acreage reduction program in the Wellton-Mohawk Division provided for in Public Law 93-320 will be approximately the same acreage that is being irrigated in the Division.

Reducing the irrigable acreage in the Wellton-Mohawk Division by about 10,000 acres will be consistent with the 300,000 acre-feet consumptive use allocation of Colorado River water specified in the Gila Reauthorization Act. With about 65,000 acres in irrigation rotation during 1970, 1971, and 1972, the consumptive use was about 300,000 acre-feet per year under the concept of diversions less return flows. In time, as the state of Arizona is utilizing its full entitlement of Colorado River water, it is anticipated that the water usage in the Division of 300,000 acre-feet per year, using the concept

of diversions less return flows, will be a limiting criteria as to how many acres can be irrigated in the Division.

Comment:

-2. Mr. Marlatt was concerned with the loss of tax revenue to the County and State. He questioned the thesis that reducing the irrigable acreage of the Wellton-Mohawk Division would reduce the return flow, and suggested that to reduce the return flow there was a need to spread the same waters on more acres and be more efficient with that water.

Reply:

The irrigable acreage reduction will not significantly reduce the tax revenue because the acreage being irrigated will remain approximately the same. See reply to previous comment.

The reduction in irrigable acreage, by itself, will not reduce the return flow. However, Public Law 93-320 provides for assistance to farmers in installing irrigation system improvements to improve irrigation efficiencies which will reduce return flows.

The available water cannot be spread over more acreage because the Division's entitlement to the use of Colorado River water will most probably be determined by the concept of diversions less return flows as discussed in the reply to the previous comment. If the available water were spread over more acreage, a limitation would have to be imposed on the amount of water a farmer could divert. Water limitations would impose other limitations such as what crops a farmer could grow and the resulting economic constraints on his farming operation.

Comment:

-3. Mr. Marlatt believed it would be better to plan some other type of generating plant and use the Wellton-Mohawk Division drain water for cooling and at the same time as disposing of the salt water, power could be generated rather than using power.

Reply:

The Arizona utilities have no present plans for any generating stations, either nuclear or fossil, in the Yuma area. See our reply to Comment No. 3 made by the California Farm Bureau Federation in its letter of June 22, 1974.

13. Mr. Les Barkley, President, Fortuna Water Company, Inc.,
Somerton, Arizona (Note: Letter from Byrne and Ellsworth
Law Offices of October 3, 1974, contained same comments)

Comment:

-1. Mr. Barkley viewed the Colorado River Basin Salinity Control Project as a possible threat to the ability of the Fortuna Water Company to fulfill its obligation of water service to the existing 200 users and additional future applicants. He expressed concern that removal of 160,000 acre-feet of ground water per year will lower the ground-water table resulting in an increased cost for water, facilities, and delivery of domestic water, and the quality of the water may be detrimentally affected.

Reply:

It is estimated that existing pumping in the United States and Mexico will result in water table drawdowns of 12 feet and 26 feet in 10 years and 50 years, respectively, in the vicinity of San Luis, Arizona. Operation of the protective and regulatory well fields will increase the estimated drawdown to 22 feet and 59 feet in 10 years and 50 years, respectively. Therefore, protective and regulatory pumping will increase the water table drawdown 10 feet in 10 years and 33 feet in 50 years over that which will be experienced with existing pumping. The depth to ground water was about 73 feet in September 1974. The depth to ground water in 50 years without protective and regulatory pumping is estimated to be about 99 feet and with protective and regulatory pumping is estimated to be about 132 feet. The increase in the depth to ground water will increase pumping costs and, depending on the depth of existing wells, may require that some wells be replaced.

The drawdown in the vicinity of Mexico's wells that will be increased if additional wells are constructed on the south Yuma Mesa will eventually cause ground-water flow from the southern portion of Yuma Valley toward the southeast. This may increase the salinity of the Fortuna Water Company wells because the ground water in Yuma Valley is generally of poorer quality. The time required for a significant change in quality of water from the Fortuna Water Company wells will probably be quite long because of the slow rate of movement of underground water and the large volume of water involved. It is not possible without extensive tests with tracers and more ground-water quality data in Yuma Valley to estimate the quality of water from the Fortuna Water Company wells at some future date.

Comment:

-2. Fortuna Water Company asserts that it has a prior right to the underground water in the area of the proposed project for the benefit of the present and future residents of the area, that action taken in connection with the proposed project should not be allowed to jeopardize these rights and the rights of all residents should be jealously guarded by the Government in considering the project.

-3. As a farmer in the area, Mr. Barkley objected to taking the underground water that belongs to the people of Yuma County and delivering it to Mexico. He recommends more consideration before action is taken to start mining the water out of the United States and giving it to Mexico.

Reply:

See replies to comments made by Byrne and Ellsworth Law Offices in its letter of October 3, 1974.

14. Mr. Wade Peterson, Farmer, Wellton, Arizona

Comment:

-1. Mr. Peterson protested the fact that his 80 acres of land have been tagged as a possible piece of ground to be included in the reduction of acreage in the overall proposal.

Reply:

About 20,000 acres of land have been identified from which 10,000 acres will be retired from irrigable status. Of the 20,000 acres that have been identified, about 4,000 acres are already in Federal ownership. Therefore, about 6,000 acres of State and private land will be acquired or retired from irrigable status by other appropriate means. The land that Mr. Peterson owns has been identified for retirement, but this does not mean that it will be retired. The 20,000 acres identified are merely a base or starting point in the acreage reduction process. It is intended that the land retired will be acquired from willing sellers or from those who are willing to participate through other arrangements whereby their land will be removed from irrigable status.

Comment:

-2. In addition to his personal losses, he expressed concern for the reduction in the tax base of the county, the loss of other revenue, jobs and food production stemming from the agriculture of the area.

Reply:

Presently there are about 65,000 acres in irrigation rotation in the Wellton-Mohawk Division, Gila Project. The Wellton-Mohawk Division was authorized to include an area comprising approximately 75,000 irrigable acres of land, or such number of irrigable acres as can be adequately irrigated by the beneficial consumptive use of no more than 300,000 acre-feet of water diverted annually from the Colorado River. The acreage reduction program will limit development to the approximate acreage now in irrigation rotation in the Wellton-Mohawk Division. Therefore, there will not be a significant reduction in the tax base of the county, loss of other revenue, or loss of jobs and food production stemming from the agriculture of the area.

Comment:

-3. Mr. Peterson urged the Bureau of Reclamation consider the other alternatives to the project (Sec. F., page 211, Items 1 and 2).

Reply:

The draft statement was prepared in support of H.R. 12834 and S. 3094, later enacted into law wherein certain specific measures were authorized to meet the objectives of that law. For this statement to expand upon alternative measures not specifically called for in the legislation would exceed the authorization of that law.

Chapter VIII of this statement discusses the alternatives of eliminating or bypassing flows, considered before and during legislation processes, to the degree that they are pertinent to the legislated project. Again this statement is geared to specific projects authorized by specific legislation precluding implementation of studied alternatives.

The Final Environmental Impact Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico is available at the Lower Colorado Regional Office in Boulder City, Nevada, for review, wherein alternatives for constructing seawater distillation plants are discussed.

15. Mr. Jack Currie, Farmer, Tacna, Arizona (Wellton-Mohawk Area)

Comment:

-1. Mr. Currie objected to the present proposal that was designated in the hearing. He expressed concern for the possible loss of lands that he had recently made the final payment on, and which within the past 2 years had been put into production and for the loss of tax base for the Junior College, other schools and entities.

Reply:

About 20,000 acres of land have been identified from which 10,000 acres will be retired from irrigable status. Of the 20,000 acres that have been identified, about 4,000 acres are already in Federal ownership. Therefore, about 6,000 acres of State and private land will be acquired or retired from irrigable status by other appropriate means. The land Mr. Currie owns has been identified for retirement, but this does not mean that it will be retired. The 20,000 acres identified are merely a base or starting point in the acreage reduction process. It is intended that the land retired will be acquired from willing sellers or from those who are willing to participate through other arrangements whereby their land will be removed from irrigable status.

16. Mr. Jim Barkley, Farmer, Somerton, Arizona

Comment:

-1. Mr. Barkley stated that the problem stems from the neighbor to the south (Mexico), failure to implement all the practices necessary to maintain a favorable salt balance. He could see no justification for having an environmental impact of such a plan improve on this community or this country for the purpose of solving a problem of another nation which has not seen fit to resolve, itself, for reasons beyond our control.

Reply:

The works authorized under Public Law 93-320 are to allow the United States to meet its obligation under Minute No. 242 and to conserve the Colorado River Basin's water supply. Minute No. 242 climaxed an intensive effort by the United States to examine all alternatives to enable a negotiated resolution of the international problem of the salinity of the Colorado River waters.

17. Mr. Thomas M. Smith, Farmer and Vice President of the Yuma County Water Users' Association, Yuma Arizona

Comment:

-1. Mr. Smith stated that the water table in the Yuma Valley was down to a level where it's safe to farm in a beneficial manner. The future reduction of the water table would necessitate the additional application of water for the farmers to raise the same crops they are raising today.

Reply:

It has been postulated that some deep-rooted crops will use ground water from the capillary fringe associated with the water table. However, the amount of ground water used by the crops grown in the Yuma Valley has not been established. It is believed to be an insignificant amount compared to the amount of irrigation water applied.

Comment:

-2. In our water contract we have with the Bureau of Reclamation, U.S. Government, a statement in there that says we are entitled to beneficial use of water for our lands, and that word has never been interpreted to mean how much water we are actually entitled to. We have the second oldest water right on the Colorado River, and we, at the present time, do not know how much water we are entitled to.

We have a limitation on water on our lands of five-acre-feet without paying access water. Some of our farmers are paying quite a bit of access water at the present time.

I think first, we should be guaranteed how much our perpetual right is before we agree to these wells, and second, I am not in favor.

Reply:

The water right for land within the Yuma County Water Users' Association boundaries is that water required for beneficial consumptive use but there is no specific limit on total water usage. The priority date of the Association water rights is early enough that there would have to be an extreme water shortage before the water users would be restricted to less than consumptive use. It is surmised that Mr. Smith's use of "perpetual right" refers to present perfected right. The quantity and priority date of present perfected rights, as defined in the Supreme Court decree in Arizona v. California, have not yet been decreed by the Supreme Court.

Comment:

-3. We have an obligation to our county, to our farmers, to our city, to our citizens, and to our taxpayers, to maintain an operation here that is beneficial and sound business, and I think it is very unfair to the whole community to jeopardize our underground water, our domestic water, our farming operation, and leave our land bare desert and spend a tremendous amount of money to pump this water, and deliver it to Mexico.

Reply:

The present pumping is already affecting underground water levels and, in addition, is jeopardizing surface diversion rights from the Colorado River for other entities in Arizona with a lesser diversion right than the Association. Should actual damage to domestic water systems or farming operations result from the installation and operations of this project the United States would be subject to compensatory measures.

APPENDIX D

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICOMexico, D.F.
August 30, 1973MINUTE NO. 242PERMANENT AND DEFINITIVE SOLUTION TO THE
INTERNATIONAL PROBLEM OF THE SALINITY OF THE COLORADO RIVER

The Commission met at the Secretariat of Foreign Relations, at Mexico, D.F., at 5:00 p.m. on August 30, 1973, pursuant to the instructions received by the two Commissioners from their respective Governments, in order to incorporate in a Minute of the Commission the joint recommendations which were made to their respective Presidents by the Special Representative of President Richard Nixon, Ambassador Herbert Brownell, and the Secretary of Foreign Relations of Mexico, Lic. Emilio O. Rabasa, and which have been approved by the Presidents, for a permanent and definitive solution of the international problem of the salinity of the Colorado River, resulting from the negotiations which they, and their technical and juridical advisers, held in June, July and August of 1973, in compliance with the references to this matter contained in the Joint Communique of Presidents Richard Nixon and Luis Echeverría of June 17, 1972.

Accordingly, the Commission submits for the approval of the two Governments the following

RESOLUTION:

1. Referring to the annual volume of Colorado River waters guaranteed to Mexico under the Treaty of 1944, of 1,500,000 acre-feet (1,850,234,000 cubic meters):
 - a) The United States shall adopt measures to assure that not earlier than January 1, 1974, and no later than July 1, 1974, the approximately 1,360,000 acre-feet (1,677,545,000 cubic meters) delivered to Mexico upstream of Morelos Dam, have an annual average salinity of no more than 115 p.p.m. \pm 30 p.p.m. U.S. count (121 p.p.m. \pm 30 p.p.m. Mexican count) over the annual average salinity of Colorado River waters which arrive at Imperial Dam, with the understanding that any waters that may be delivered to Mexico under the Treaty of 1944 by means of the All American Canal shall be considered as having been delivered upstream of Morelos Dam for the purpose of computing this salinity.
 - b) The United States will continue to deliver to Mexico on the land boundary at San Luis and in the limitrophe section of the Colorado

River downstream from Morelos Dam approximately 140,000 acre-feet (172,689,000 cubic meters) annually with a salinity substantially the same as that of the waters customarily delivered there.

- c) Any decrease in deliveries under point 1(b) will be made up by an equal increase in deliveries under point 1(a).
 - d) Any other substantial changes in the aforementioned volumes of water at the stated locations must be agreed to by the Commission.
 - e) Implementation of the measures referred to in point 1(a) above is subject to the requirement in point 10 of the authorization of the necessary works.
2. The life of Minute No. 241 shall be terminated upon approval of the present Minute. From September 1, 1973, until the provisions of point 1(a) become effective, the United States shall discharge to the Colorado River downstream from Morelos Dam volumes of drainage waters from the Wellton-Mohawk District at the annual rate of 118,000 acre-feet (145,551,000 cubic meters) and substitute therefor an equal volume of other waters to be discharged to the Colorado River above Morelos Dam; and, pursuant to the decision of President Echeverría expressed in the Joint Communique of June 17, 1972, the United States shall discharge to the Colorado River downstream from Morelos Dam the drainage waters of the Wellton-Mohawk District that do not form a part of the volumes of drainage waters referred to above, with the understanding that this remaining volume will not be replaced by substitution waters. The Commission shall continue to account for the drainage waters discharged below Morelos Dam as part of those described in the provisions of Article 10 of the Water Treaty of February 3, 1944.
 3. As a part of the measures referred to in point 1(a), the United States shall extend in its territory the concrete-lined Wellton-Mohawk bypass drain from Morelos Dam to the Arizona-Sonora international boundary, and operate and maintain the portions of the Wellton-Mohawk bypass drain located in the United States.
 4. To complete the drain referred to in point 3, Mexico, through the Commission and at the expense of the United States, shall construct, operate and maintain an extension of the concrete-lined bypass drain from the Arizona-Sonora international boundary to the Santa Clara Slough of a capacity of 353 cubic feet (10 cubic meters) per second. Mexico shall permit the United States to discharge through this drain to the Santa Clara Slough all or a portion of the Wellton-Mohawk drainage waters, the volumes of brine from such desalting operations in the United States as are carried out to

implement the Resolution of this Minute, and any other volumes of brine which Mexico may agree to accept. It is understood that no radioactive material or nuclear wastes shall be discharged through this drain, and that the United States shall acquire no right to navigation, servitude or easement by reason of the existence of the drain, nor other legal rights, except as expressly provided in this point.

5. Pending the conclusion by the Governments of the United States and Mexico of a comprehensive agreement on groundwater in the border areas, each country shall limit pumping of groundwaters in its territory within five miles (eight kilometers) of the Arizona-Sonora boundary near San Luis to 160,000 acre-feet (197,358,000 cubic meters) annually.
6. With the objective of avoiding future problems, the United States and Mexico shall consult with each other prior to undertaking any new development of either the surface or the groundwater resources, or undertaking substantial modifications of present developments, in its own territory in the border area that might adversely affect the other country.
7. The United States will support efforts by Mexico to obtain appropriate financing on favorable terms for the improvement and rehabilitation of the Mexicali Valley. The United States will also provide non-reimbursable assistance on a basis mutually acceptable to both countries exclusively for those aspects of the Mexican rehabilitation program of the Mexicali Valley relating to the salinity problem, including tile drainage. In order to comply with the above-mentioned purposes, both countries will undertake negotiations as soon as possible.
8. The United States and Mexico shall recognize the undertakings and understandings contained in this Resolution as constituting the permanent and definitive solution of the salinity problem referred to in the Joint Communique of President Richard Nixon and President Luis Echeverría dated June 17, 1972.
9. The measures required to implement this Resolution shall be undertaken and completed at the earliest practical date.
10. This Minute is subject to the express approval of both Governments by exchange of Notes. It shall enter into force upon such approval; provided, however, that the provisions which are dependent for their implementation on the construction of works or on other measures which require expenditure of funds by the United States, shall become effective upon the notification by the United States to Mexico of the authorization by the United States Congress of said funds, which will be sought promptly.

Thereupon, the meeting adjourned.

(signed) J. F. Friedkin
Commissioner of the United States

(signed) D. Herrera J.
Commissioner of Mexico

(signed) F. H. Sacksteder, Jr.
Secretary of the United States
Section

(signed) Fernando Rivas S.
Secretary of the Mexican Section



Public Law 93-320
 93rd Congress, H. R. 12165
 June 24, 1974

An Act

88 STAT. 266

To authorize the construction, operation, and maintenance of certain works in the Colorado River Basin to control the salinity of water delivered to users in the United States and Mexico.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Colorado River Basin Salinity Control Act".

Colorado River
 Basin Salinity
 Control Act.
 43 USC 1571
 note.

TITLE I—PROGRAMS DOWNSTREAM FROM IMPERIAL DAM

Sec. 101. (a) The Secretary of the Interior, hereinafter referred to as the "Secretary", is authorized and directed to proceed with a program of works of improvement for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and the Republic of Mexico, and to enable the United States to comply with its obligations under the agreement with Mexico of August 30, 1973 (Minute No. 242 of the International Boundary and Water Commission, United States and Mexico), concluded pursuant to the Treaty of February 3, 1944 (TS 994), in accordance with the provisions of this Act.

U.S. and
 Mexico, water
 quality improve-
 ment.
 43 USC 1571.

TIAS 7708.
 59 Stat. 1219.

(b)(1) The Secretary is authorized to construct, operate, and maintain a desalting complex, including (1) a desalting plant to reduce the salinity of drain water from the Wellton-Mohawk division of the Gila project, Arizona (hereinafter referred to as the division), including a pretreatment plant for settling, softening, and filtration of the drain water to be desalted; (2) the necessary appurtenant works including the intake pumping plant system, product waterline, power transmission facilities, and permanent operating facilities; (3) the necessary extension in the United States and Mexico of the existing bypass drain to carry the reject stream from the desalting plant and other drainage waters to the Santa Clara Slough in Mexico, with the part in Mexico, subject to arrangements made pursuant to section 101(d); (4) replacement of the metal flume in the existing main outlet drain extension with a concrete siphon; (5) reduction of the quantity of irrigation return flows through acquisition of lands to reduce the size of the division, and irrigation efficiency improvements to minimize return flows; (6) acquire on behalf of the United States such lands or interest in lands in the Painted Rock Reservoir as may be necessary to operate the project in accordance with the obligations of Minute No. 242, and (7) all associated facilities including roads, railroad spur, and transmission lines.

Desalting com-
 plexes, con-
 struction and
 maintenance.

(2) The desalting plant shall be designed to treat approximately one hundred and twenty-nine million gallons a day of drain water using advanced technology commercially available. The plant shall effect recovery initially of not less than 70 per centum of the drain water as product water, and shall effect reduction of not less than 90 per centum of the dissolved solids in the feed water. The Secretary shall use sources of electric power supply for the desalting complex that will not diminish the supply of power to preference customers from Federal power systems operated by the Secretary. All costs associated with the desalting plant shall be nonreimbursable.

Desalting
 plants, treat-
 ment capacity.

Nonreimbursable

88 STAT. 267
Replacement
water, stud-
ies.

59 Stat. 1219.

82 Stat. 887.
43 USC 1512.

U.S. section,
IBWC, funds,
advance.
TIAS 7708.

Desalted water
exchange.

Return flow
reduction.

Irrigable
acreage reduc-
tion.

43 USC 613,
Limitation.

Acquired lands,
disposal.

System improve-
ments, instal-
lation assist-
ance.

(c) Replacement of the reject stream from the desalting plant and of any Wellton-Mohawk drainage water bypassed to the Santa Clara Slough to accomplish essential operation except at such times when there exists surplus water of the Colorado River under the terms of the Mexican Water Treaty of 1944, is recognized as a national obligation as provided in section 202 of the Colorado River Basin Project Act (82 Stat. 895). Studies to identify feasible measures to provide adequate replacement water shall be completed not later than June 30, 1980. Said studies shall be limited to potential sources within the States of Arizona, California, Colorado, New Mexico, and those portions of Nevada, Utah, and Wyoming which are within the natural drainage basin of the Colorado River. Measures found necessary to replace the reject stream from the desalting plant and any Wellton-Mohawk drainage bypassed to the Santa Clara Slough to accomplish essential operations may be undertaken independently of the national obligation set forth in section 202 of the Colorado River Basin Project Act.

(d) The Secretary is hereby authorized to advance funds to the United States section, International Boundary and Water Commission (IBWC), for construction, operation, and maintenance by Mexico pursuant to Minute No. 242 of that portion of the bypass drain within Mexico. Such funds shall be transferred to an appropriate Mexican agency, under arrangements to be concluded by the IBWC providing for the construction, operation, and maintenance of such facility by Mexico.

(e) Any desalted water not needed for the purposes of this title may be exchanged at prices and under terms and conditions satisfactory to the Secretary and the proceeds therefrom shall be deposited in the General Fund of the Treasury. The city of Yuma, Arizona, shall have first right of refusal to any such water.

(f) For the purpose of reducing the return flows from the division to one hundred and seventy-five thousand acre-feet or less, annually, the Secretary is authorized to:

(1) Accelerate the cooperative program of Irrigation Management Services with the Wellton-Mohawk Irrigation and Drainage District, hereinafter referred to as the district, for the purpose of improving irrigation efficiency. The district shall bear its share of the cost of such program as determined by the Secretary.

(2) Acquire, by purchase or through eminent domain or exchange, to the extent determined by him to be appropriate, lands or interests in lands to reduce the existing seventy-five thousand developed and undeveloped irrigable acres authorized by the Act of July 30, 1947 (61 Stat. 628), known as the Gila Reauthorization Act. The initial reduction in irrigable acreage shall be limited to approximately ten thousand acres. If the Secretary determines that the irrigable acreage of the division must be reduced below sixty-five thousand acres of irrigable lands to carry out the purpose of this section, the Secretary is authorized, with the consent of the district, to acquire additional lands, as may be deemed by him to be appropriate.

(g) The Secretary is authorized to dispose of the acquired lands and interests therein on terms and conditions satisfactory to him and meeting the objective of this Act.

(h) The Secretary is authorized, either in conjunction with or in lieu of land acquisition, to assist water users in the division in installing system improvements, such as ditch lining, change of field layouts, automatic equipment, sprinkler systems and bubbler systems, as a means of increasing irrigation efficiencies: *Provided, however,* That

all costs associated with the improvements authorized herein and allocated to the water users on the basis of benefits received, as determined by the Secretary, shall be reimbursed to the United States in amounts and on terms and conditions satisfactory to the Secretary.

(i) The Secretary is authorized to amend the contract between the United States and the district dated March 4, 1952, as amended, to provide that—

(1) the portion of the existing repayment obligation owing to the United States allocable to irrigable acreage eliminated from the division for the purposes of this title, as determined by the Secretary, shall be nonreimbursable; and

(2) if deemed appropriate by the Secretary, the district shall be given credit against its outstanding repayment obligation to offset any increase in operation and maintenance assessments per acre which may result from the district's decreased operation and maintenance base, all as determined by the Secretary.

(j) The Secretary is authorized to acquire through the Corps of Engineers fee title to, or other necessary interests in, additional lands above the Painted Rock Dam in Arizona that are required for the temporary storage capacity needed to permit operation of the dam and reservoir in times of serious flooding in accordance with the obligations of the United States under Minute No. 242. No funds shall be expended for acquisition of land or interests therein until it is finally determined by a Federal court of competent jurisdiction that the Corps of Engineers presently lacks legal authority to use said lands for this purpose. Nothing contained in this title nor any action taken pursuant to it shall be deemed to be a recognition or admission of any obligation to the owners of such land on the part of the United States or a limitation or deficiency in the rights or powers of the United States with respect to such lands or the operation of the reservoir.

(k) To the extent desirable to carry out sections 101(f)(1) and 101(h), the Secretary may transfer funds to the Secretary of Agriculture as may be required for technical assistance to farmers, conduct of research and demonstrations, and such related investigations as are required to achieve higher on-farm irrigation efficiencies.

(l) All cost associated with the desalting complex shall be nonreimbursable except as provided in sections 101(f) and 101(h).

SEC. 102. (a) To assist in meeting salinity control objectives of Minute No. 242 during an interim period, the Secretary is authorized to construct a new concrete-lined canal or, to line the presently unlined portion of the Coachella Canal of the Boulder Canyon project, California, from station 2 plus 26 to the beginning of siphon numbered 7, a length of approximately forty-nine miles. The United States shall be entitled to temporary use of a quantity of water, for the purpose of meeting the salinity control objectives of Minute No. 242, during an interim period, equal to the quantity of water conserved by constructing or lining the said canal. The interim period shall commence on completion of construction or lining said canal and shall end the first year that the Secretary delivers main stream Colorado River water to California in an amount less than the sum of the quantities requested by (1) the California agencies under contracts made pursuant to section 5 of the Boulder Canyon Project Act (45 Stat. 1057), and (2) Federal establishments to meet their water rights acquired in California in accordance with the Supreme Court decree in Arizona against California (376 U.S. 340).

(b) The charges for total construction shall be repayable without interest in equal annual installments over a period of forty years beginning in the year following completion of construction: *Provided,*

88 STAT. 268

Costs, reimbursement to U.S.

Contract amendment.

Land acquisition for storage.

TIAS 7708.

Transfer of funds.

Nonreimbursable costs.

Canal or canal lining, construction.
43 USC 1572.

43 USC 617d.

Repayment.

88 STAT. 269

Repayment con-
tract.

That, repayment shall be prorated between the United States and the Coachella Valley County Water District, and the Secretary is authorized to enter into a repayment contract with Coachella Valley County Water District for that purpose. Such contract shall provide that annual repayment installments shall be nonreimbursable during the interim period, defined in section 102(a) of this title and shall provide that after the interim period, said annual repayment installments or portions thereof, shall be paid by Coachella Valley County Water District.

Private lands,
acquisition.

(c) The Secretary is authorized to acquire by purchase, eminent domain, or exchange private lands or interests therein, as may be determined by him to be appropriate, within the Imperial Irrigation District on the Imperial East Mesa which receive, or which have been granted rights to receive, water from Imperial Irrigation District's capacity in the Coachella Canal. Costs of such acquisitions shall be nonreimbursable and the Secretary shall return such lands to the public domain. The United States shall not acquire any water rights by reason of this land acquisition.

Imperial Irriga-
tion District,
construction
charges, credit.

(d) The Secretary is authorized to credit Imperial Irrigation District against its final payments for certain outstanding construction charges payable to the United States on account of capacity to be relinquished in the Coachella Canal as a result of the canal lining program, all as determined by the Secretary: *Provided*, That, relinquishment of capacity shall not affect the established basis for allocating operation and maintenance costs of the main All-American Canal to existing contractors.

Cocopah Tribe of
Indians, trans-
fer of lands by
U.S.

(e) The Secretary is authorized and directed to cede the following land to the Cocopah Tribe of Indians, subject to rights-of-way for existing levees, to be held in trust by the United States for the Cocopah Tribe of Indians:

Township 9 south, range 25 west of the Gila and Salt River meridian, Arizona;

Section 25: Lots 18, 19, 20, 21, 22, and 23;

Section 26: Lots 1, 12, 13, 14, and 15;

Section 27: Lot 3; and all accretion to the above described lands.

Bridges, con-
struction.

The Secretary is authorized and directed to construct three bridges, one of which shall be capable of accommodating heavy vehicular traffic, over the portion of the bypass drain which crosses the reservation of the Cocopah Tribe of Indians. The transfer of lands to the Cocopah Indian Reservation and the construction of bridges across the bypass drain shall constitute full and complete payment to said tribe for the rights-of-way required for construction of the bypass drain and electrical transmission lines for works authorized by this title.

43 USC 1573.

Well fields,
construction and
maintenance.
TIAS 7708.

SEC. 103. (a) The Secretary is authorized to:

(1) Construct, operate, and maintain, consistent with Minute No. 242, well fields capable of furnishing approximately one hundred and sixty thousand acre-feet of water per year for use in the United States and for delivery to Mexico in satisfaction of the 1944 Mexican Water Treaty.

59 Stat. 1219.

Land acquisition.

(2) Acquire by purchase, eminent domain, or exchange, to the extent determined by him to be appropriate, approximately twenty-three thousand five hundred acres of lands or interests therein within approximately five miles of the Mexican border on the Yuma Mesa: *Provided, however*, That any such lands which are presently owned by the State of Arizona may be acquired or exchanged for Federal lands.

(3) Any lands removed from the jurisdiction of the Yuma Mesa Irrigation and Drainage District pursuant to clause (2) of this subsection which were available for use under the Gila Reauthorization Act (61 Stat. 628), shall be replaced with like lands within or adjacent to the Yuma Mesa division of the project. In the development of these substituted lands or any other lands within the Gila project, the Secretary may provide for full utilization of the Gila Gravity Main Canal in addition to contracted capacities.

88 STAT. 270
Land replacement.
45 Stat. 1057.
43 USC 617d.

(b) The cost of work provided for in this section, including delivery of water to Mexico, shall be nonreimbursable; except to the extent that the waters furnished are used in the United States.

Nonreimbursable costs.

SEC. 104. The Secretary is authorized to provide for modifications of the projects authorized by this title to the extent he determines appropriate for purposes of meeting the international settlement objective of this title at the lowest overall cost to the United States. No funds for any such modification shall be expended until the expiration of sixty days after the proposed modification has been submitted to the appropriate committees of the Congress, unless the Congress approves an earlier date by concurrent resolution. The Secretary shall notify the Governors of the Colorado River Basin States of such modifications.

Project modification.
43 USC 1574.

SEC. 105. The Secretary is hereby authorized to enter into contracts that he deems necessary to carry out the provisions of this title in advance of the appropriation of funds therefor.

Contract authority.
43 USC 1575.

SEC. 106. In carrying out the provisions of this title, the Secretary shall consult and cooperate with the Secretary of State, the Administrator of the Environmental Protection Agency, the Secretary of Agriculture, and other affected Federal, State, and local agencies.

Interagency cooperation.
43 USC 1576.

SEC. 107. Nothing in this Act shall be deemed to modify the National Environmental Policy Act of 1969, the Federal Water Pollution Control Act, as amended, or, except as expressly stated herein, the provisions of any other Federal law.

43 USC 1577.
83 Stat. 852.
42 USC 4321
note.

SEC. 108. There is hereby authorized to be appropriated the sum of \$121,500,000 for the construction of the works and accomplishment of the purposes authorized in sections 101 and 102, and \$34,000,000 to accomplish the purposes of section 103, based on April 1973 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuations in construction costs involved therein, and such sums as may be required to operate and maintain such works and to provide for such modifications as may be made pursuant to section 104. There is further authorized to be appropriated such sums as may be necessary to pay condemnation awards in excess of appraised values and to cover costs required in connection with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 90-646).

86 Stat. 816.
33 USC 1251
note.
Appropriation.
43 USC 1578.

84 Stat. 1894.
42 USC 4601
note.

TITLE II—MEASURES UPSTREAM FROM IMPERIAL DAM

SEC. 201. (a) The Secretary of the Interior shall implement the salinity control policy adopted for the Colorado River in the "Conclusions and Recommendations" published in the Proceedings of the Reconvened Seventh Session of the Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries in the States of California, Colorado, Utah, Arizona, Nevada, New Mexico, and Wyoming, held in Denver, Colorado, on April 26-27, 1972, under the authority of section 10 of the Federal Water Pollution Control Act (33 U.S.C. 1160), and approved by the Administrator of the Environmental Protection Agency on June 9, 1972.

43 USC 1591.

70 Stat. 506;
80 Stat. 1250.

88 STAT. 271

(b) The Secretary is hereby directed to expedite the investigation, planning, and implementation of the salinity control program generally as described in chapter VI of the Secretary's report entitled, "Colorado River Water Quality Improvement Program, February 1972".

Interagency cooperation.

(c) In conformity with section 201 (a) of this title and the authority of the Environmental Protection Agency under Federal laws, the Secretary, the Administrator of the Environmental Protection Agency, and the Secretary of Agriculture are directed to cooperate and coordinate their activities effectively to carry out the objective of this title.

Salinity control units, construction and maintenance. 43 USC 1592.

Sec. 202. The Secretary is authorized to construct, operate, and maintain the following salinity control units as the initial stage of the Colorado River Basin salinity control program.

(1) The Paradox Valley unit, Montrose County, Colorado, consisting of facilities for collection and disposition of saline ground water of Paradox Valley, including wells, pumps, pipelines, solar evaporation ponds, and all necessary appurtenant and associated works such as roads, fences, dikes, power transmission facilities, and permanent operating facilities.

(2) The Grand Valley unit, Colorado, consisting of measures and all necessary appurtenant and associated works to reduce the seepage of irrigation water from the irrigated lands of Grand Valley into the ground water and thence into the Colorado River. Measures shall include lining of canals and laterals, and the combining of existing canals and laterals into fewer and more efficient facilities. Prior to initiation of construction of the Grand Valley unit the Secretary shall enter into contracts through which the agencies owning, operating, and maintaining the water distribution systems in Grand Valley, singly or in concert, will assume all obligations relating to the continued operation and maintenance of the unit's facilities to the end that the maximum reduction of salinity inflow to the Colorado River will be achieved. The Secretary is also authorized to provide, as an element of the Grand Valley unit, for a technical staff to provide information and assistance to water users on means and measures for limiting excess water applications to irrigated lands: *Provided*, That such assistance shall not exceed a period of five years after funds first become available under this title. The Secretary will enter into agreements with the Secretary of Agriculture to develop a unified control plan for the Grand Valley unit. The Secretary of Agriculture is directed to cooperate in the planning and construction of on-farm system measures under programs available to that Department.

(3) The Crystal Geyser unit, Utah, consisting of facilities for collection and disposition of saline geyser discharges; including dikes, pipelines, solar evaporation ponds, and all necessary appurtenant works including operating facilities.

(4) The Las Vegas Wash unit, Nevada, consisting of facilities for collection and disposition of saline ground water of Las Vegas Wash, including infiltration galleries, pumps, desalter, pipelines, solar evaporation facilities, and all appurtenant works including but not limited to roads, fences, power transmission facilities, and operating facilities.

Sec. 203. (a) The Secretary is authorized and directed to—

43 USC 1593. Planning reports.

(1) Expedite completion of the planning reports on the following units, described in the Secretary's report, "Colorado River Water Quality Improvement Program, February 1972":

- (i) Irrigation source control:
 - Lower Gunnison
 - Uintah Basin
 - Colorado River Indian Reservation
 - Palo Verde Irrigation District
- (ii) Point source control:
 - LaVerkin Springs
 - Littlefield Springs
 - Glenwood-Dotsero Springs
- (iii) Diffuse source control:
 - Price River
 - San Rafael River
 - Dirty Devil River
 - McElmo Creek
 - Big Sandy River

(2) Submit each planning report on the units named in section 203(a)(1) of this title promptly to the Colorado River Basin States and to such other parties as the Secretary deems appropriate for their review and comments. After receipt of comments on a unit and careful consideration thereof, the Secretary shall submit each final report with his recommendations, simultaneously, to the President, other concerned Federal departments and agencies, the Congress, and the Colorado River Basin States.

Reports.
 Submittal to President and Congress.

(b) The Secretary is directed—

(1) in the investigation, planning, construction, and implementation of any salinity control unit involving control of salinity from irrigation sources, to cooperate with the Secretary of Agriculture in carrying out research and demonstration projects and in implementing on-the-farm improvements and farm management practices and programs which will further the objective of this title;

Research and demonstration projects.

(2) to undertake research on additional methods for accomplishing the objective of this title, utilizing to the fullest extent practicable the capabilities and resources of other Federal departments and agencies, interstate institutions, States, and private organizations.

SEC. 204. (a) There is hereby created the Colorado River Basin Salinity Control Advisory Council composed of no more than three members from each State appointed by the Governor of each of the Colorado River Basin States.

Colorado River Basin Salinity Control Advisory Council.

(b) The Council shall be advisory only and shall—

43 USC 1594. Establishment. Duties.

(1) act as liaison between both the Secretaries of Interior and Agriculture and the Administrator of the Environmental Protection Agency and the States in accomplishing the purposes of this title;

(2) receive reports from the Secretary on the progress of the salinity control program and review and comment on said reports; and

(3) recommend to both the Secretary and the Administrator of the Environmental Protection Agency appropriate studies of further projects, techniques, or methods for accomplishing the purposes of this title.

SEC. 205. (a) The Secretary shall allocate the total costs of each unit or separable feature thereof authorized by section 202 of this title, as follows:

Costs, allocation. 43 USC 1595.

88 STAT. 273

(1) In recognition of Federal responsibility for the Colorado River as an interstate stream and for international comity with Mexico, Federal ownership of the lands of the Colorado River Basin from which most of the dissolved salts originate, and the policy embodied in the Federal Water Pollution Control Act Amendments of 1972 (86 Stat. 816), 75 per centum of the total costs of construction, operation, maintenance, and replacement of each unit or separable feature thereof shall be nonreimbursable.

33 USC 1251
note.

(2) Twenty-five per centum of the total costs shall be allocated between the Upper Colorado River Basin Fund established by section 5(a) of the Colorado River Storage Project Act (70 Stat. 107) and the Lower Colorado River Basin Development Fund established by section 403(a) of the Colorado River Basin Project Act (82 Stat. 895), after consultation with the Advisory Council created in section 204(a) of this title and consideration of the following items:

43 USC 620d.

43 USC 1543.

(i) benefits to be derived in each basin from the use of water of improved quality and the use of works for improved water management;

(ii) causes of salinity; and

(iii) availability of revenues in the Lower Colorado River Basin Development Fund and increased revenues to the Upper Colorado River Basin Fund made available under section 205(d) of this title: *Provided*, That costs allocated to the Upper Colorado River Basin Fund under section 205(a)(2) of this title shall not exceed 15 per centum of the costs allocated to the Upper Colorado River Basin Fund and the Lower Colorado River Basin Development Fund.

Costs, limita-
tion.

Construction
costs, repay-
ment.

(3) Costs of construction of each unit or separable feature thereof allocated to the upper basin and to the lower basin under section 205(a)(2) of this title shall be repaid within a fifty-year period without interest from the date such unit or separable feature thereof is determined by the Secretary to be in operation.

(b)(1) Costs of construction, operation, maintenance, and replacement of each unit or separable feature thereof allocated for repayment by the lower basin under section 205(a)(2) of this title shall be paid in accordance with subsection 205(b)(2) of this title, from the Lower Colorado River Basin Development Fund.

43 USC 1543.

(2) Section 403(g) of the Colorado River Basin Project Act (82 Stat. 896) is hereby amended as follows: strike the word "and" after the word "Act," in line 8; insert after the word "Act," the following "(2) for repayment to the general fund of the Treasury the costs of each salinity control unit or separable feature thereof payable from the Lower Colorado River Basin Development Fund in accordance with sections 205(a)(2), 205(a)(3), and 205(b)(1) of the Colorado River Salinity Control Act and"; change paragraph (2) to paragraph (3).

(c) Costs of construction, operation, maintenance, and replacement of each unit or separable feature thereof allocated for repayment by the upper basin under section 205(a)(2) of this title shall be paid in accordance with section 205(d) of this title from the Upper Colorado River Basin Fund within the limit of the funds made available under section 205(e) of this title.

43 USC 620d.

(d) Section 5(d) of the Colorado River Storage Project Act (70 Stat. 108) is hereby amended as follows: strike the word "and" at the end of paragraph (3); strike the period after the word "years" at the end of paragraph (4) and insert a semicolon in lieu thereof followed by the word "and"; add a new paragraph (5) reading:

"(5) the costs of each salinity control unit or separable feature thereof payable from the Upper Colorado River Basin Fund in accordance with sections 205(a)(2), 205(a)(3), and 205(c) of the Colorado River Salinity Control Act."

(e) The Secretary is authorized to make upward adjustments in rates charged for electrical energy under all contracts administered by the Secretary under the Colorado River Storage Project Act (70 Stat. 105, 43 U.S.C. 620) as soon as practicable and to the extent necessary to cover the costs of construction, operation, maintenance, and replacement of units allocated under section 205(a)(2) and in conformity with section 205(a)(3) of this title: *Provided*, That revenues derived from said rate adjustments shall be available solely for the construction, operation, maintenance, and replacement of salinity control units in the Colorado River Basin herein authorized.

Electrical
energy rates,
adjustments.

SEC. 206. Commencing on January 1, 1975, and every two years thereafter, the Secretary shall submit, simultaneously, to the President, the Congress, and the Advisory Council created in section 204(a) of this title, a report on the Colorado River salinity control program authorized by this title covering the progress of investigations, planning, and construction of salinity control units for the previous fiscal year, the effectiveness of such units, anticipated work needed to be accomplished in the future to meet the objectives of this title, with emphasis on the needs during the five years immediately following the date of each report, and any special problems that may be impeding progress in attaining an effective salinity control program. Said report may be included in the biennial report on the quality of water of the Colorado River Basin prepared by the Secretary pursuant to section 15 of the Colorado River Storage Project Act (70 Stat. 111; 43 U.S.C. 602n), section 15 of the Navajo Indian irrigation project, and the initial stage of the San Juan Chama Project Act (76 Stat. 102), and section 6 of the Fryingpan-Arkansas Project Act (76 Stat. 393).

Report to Presi-
dent, Congress
and Advisory
Council.
43 USC 1596.

SEC. 207. Except as provided in section 205(b) and 205(d) of this title, with respect to the Colorado River Basin Project Act and the Colorado River Storage Project Act, respectively, nothing in this title shall be construed to alter, amend, repeal, modify, interpret, or be in conflict with 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 against California and others (376 U.S. 340), the Boulder Canyon Project Act (45 Stat. 1057), Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a), section 15 of the Colorado River Storage Project Act (70 Stat. 111; 43 U.S.C. 620n), the Colorado River Basin Project Act (82 Stat. 885), section 6 of the Fryingpan-Arkansas Project Act (76 Stat. 393), section 15 of the Navajo Indian irrigation project and initial stage of the San Juan-Chama Project Act (76 Stat. 102), the National Environmental Policy Act of 1969, and the Federal Water Pollution Control Act, as amended.

43 USC 620n.
43 USC 615ww.
43 USC 616c.
43 USC 1597.

SEC. 208. (a) The Secretary is authorized to provide for modifications of the projects authorized by this title as determined to be appropriate for purposes of meeting the objective of this title. No funds for any such modification shall be expended until the expiration of sixty days after the proposed modification has been submitted to appropriate committees of the Congress, and not then if disapproved by said com-

43 USC 1501
note.

83 Stat. 852.
42 USC 4321
note.
86 Stat. 816.
33 USC 1251
note.
Project modifi-
cations.
Funds, expendi-
ture.
43 USC 1598.

Contract
authority.
Appropriation.

mittees, except that funds may be expended prior to the expiration of such sixty days in any case in which the Congress approves an earlier date by concurrent resolution. The Governors of the Colorado River Basin States shall be notified of these changes.

(b) The Secretary is hereby authorized to enter into contracts that he deems necessary to carry out the provisions of this title, in advance of the appropriation of funds therefor. There is hereby authorized to be appropriated the sum of \$125,100,000 for the construction of the works and for other purposes authorized in section 202 of this title, based on April 1973 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuations in costs involved therein, and such sums as may be required to operate and maintain such works. There is further authorized to be appropriated such sums as may be necessary to pay condemnation awards in excess of appraised values and to cover costs required in connection with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 90-646).

84 Stat. 1894.
42 USC 4601
note.

43 USC 1599.

"Colorado River Basin States."

Sec. 209. As used in this title—

(a) all terms that are defined in the Colorado River Compact shall have the meanings therein defined;

(b) "Colorado River Basin States" means the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming.

Approved June 24, 1974.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 93-1057 (Comm. on Interior and Insular Affairs).

SENATE REPORT No. 93-906 accompanying S. 2940 (Comm. on Interior and Insular Affairs).

CONGRESSIONAL RECORD, Vol. 120 (1974):

June 11, considered and passed House.

June 12, considered and passed Senate, amended, in lieu of S. 2940.

June 13, House concurred in Senate amendment.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 10, No. 26:

June 24, Presidential statement.

APPENDIX E

COLORADO RIVER BASIN SALINITY CONTROL PROJECT
(TITLE I)
Species Check List

BIRDS

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		*Sp	Su	F	W
	<u>Known to Occur</u>	<u>Observed During Inventory</u>	<u>Known to Occur</u>	<u>Observed During Inventory</u>				
<u>Loons : Caviidae</u>								
Common Loon (<u>Gavia immer</u>)	x				r		r	
<u>Grebes : Podicipedidae</u>								
Eared Grebe (<u>Podiceps caspicus</u>)	x	x	x		u	o	u	u
Western Grebe (<u>Aechmophorus occidentalis</u>)	x		x		u	r	u	u
Pied-billed Grebe (<u>Podilymbus podiceps</u>)	x	x	x		u	u	u	u
<u>Pelicans : Pelecanidae</u>								
White Pelican (<u>Pelecanus erythrorhynchos</u>)	x				r		r	
Brown Pelican (<u>Pelecanus occidentalis</u>)	x		x			r	r	
<u>Boobies : Sulidae</u>								
Brown Booby (<u>Sula leucogaster</u>)	x					r	r	
Blue-footed Booby (<u>Sula nebouxii</u>)	x					r	r	
<u>Cormorants : Phalacrocoracidae</u>								
Double-crested Cormorant (<u>Phalacrocorax auritus</u>)	x	x	x		o	o	o	o

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Hérons and Bitterns : Ardeidae</u>								
Great Blue Heron (<u>Ardea herodias</u>)	x	x	x		c	c	c	c
Green Heron (<u>Butorides virescens</u>)	x	x	x	x	u	u	u	u
Cattle Egret (<u>Bubulcus ibis</u>)	x	x			u	u	u	u
Common Egret (<u>Casmerodius albus</u>)	x	x	x		u	o	o	u
Snowy Egret (<u>Leucophoyx thula</u>)	x	x	x		u	u	u	u
Black-crowned Night Heron (<u>Nycticorax nycticorax</u>)	x	x	x		u	u	u	u
Least Bittern (<u>Ixobrychus exilis</u>)	x		x		u	u	u	o
American Bittern (<u>Botaurus lentiginosus</u>)	x	x	x		o	r	o	u
<u>Storks : Ciconiidae</u>								
Wood Stork (<u>Mycteria americana</u>)	x					r	r	
<u>Ibises : Threskiornithidae</u>								
Wood-Ibis (<u>Mycteria americana</u>)			x			o		
White-faced Ibis (<u>Plegadis chihi</u>)	x				r	r	r	r
Roseate Spoonbill (<u>Ajaia ajaja</u>)	x		x			r	r	
<u>Swans, Geese and Ducks : Anatidae</u>								
Whistling Swan (<u>Olor columbianus</u>)	x							r
Canada Goose (<u>Branta canadensis</u>)	x		x		r		r	o
White-fronted Goose (<u>Anser albifrons</u>)	x	x			o		o	o
Snow Goose (<u>Chen hyperborea</u>)	x				o		o	o
Mallard (<u>Anas platyrhynchos</u>)	x	x	x		o		o	u

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
Gadwall (<u>Anas strepera</u>)	X		X		o		o	o
Pintail (<u>Anas acuta</u>)	X	X	X		u	r	u	c
Green-winged Teal (<u>Anas carolinensis</u>)	X	X	X		c	r	c	c
Blue-winged Teal (<u>Anas discors</u>)	X		X		r		r	r
Cinnamon Teal (<u>Anas cyanoptera</u>)	X	X	X		c	u	c	u
American Widgeon (<u>Mareca americana</u>)	X		X		u		u	c
Shoveler (<u>Spatula clypeata</u>)	X	X	X		u	r	u	c
Wood Duck (<u>Aix sponsa</u>)	X							r
Redhead (<u>Aythya americana</u>)	X		X		o	r	o	o
Ring-necked Duck (<u>Aythya collaris</u>)	X		X		r		r	r
Canvasback (<u>Aythya valisineria</u>)	X		X		o		o	u
Lesser Scaup (<u>Aythya affinis</u>)	X		X		o		o	u
Common Goldeneye (<u>Bucephala clangula</u>)	X				o		o	o
Bufflehead (<u>Bucephala albeola</u>)	X		X		o		o	o
Ruddy Duck (<u>Oxyura jamaicensis</u>)	X	X	X		c	o	u	c
Hooded Merganser (<u>Lophodytes cucullatus</u>)	X							r
Common Merganser (<u>Mergus merganser</u>)	X				r		r	r
Red-breasted Merganser (<u>Mergus serrator</u>)	X				r		r	r
Fulvous Tree Duck (<u>Dendrocygna bicolor</u>)	X		X		u	u	u	r
Black-bellied Tree Duck (<u>Dendrocygna autumnalis</u>)	X				r	r	r	
<u>Vultures : Cathartidae</u>								
Turkey Vulture (<u>Cathartes aura</u>)	X	X	X		c	c	c	c

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Hawks, Harriers and Eagles : Accipitridae</u>								
E-4								
Sharp-shinned Hawk (<u>Accipiter striatus</u>)	x		x				o	o
Cooper's Hawk (<u>Accipiter cooperii</u>)	x	x	x		o		o	u
Red-tailed Hawk (<u>Buteo jamaicensis</u>)	x	x	x		u	u	u	u
Swainson's Hawk (<u>Buteo swainsoni</u>)	x	x	x	x	o		r	
Ferruginous Hawk (<u>Buteo regalis</u>)	x	x					o	o
Golden Eagle (<u>Aquila chrysaetos</u>)	x	x	x				r	r
Bald Eagle (<u>Haliaeetus leucocephalus</u>)	x		x				r	r
Marsh Hawk (<u>Circus cyaneus</u>)	x	x	x	x	u		u	u
Rough-legged Hawk (<u>Buteo lagopus</u>)	x	x						r
<u>Ospreys : Pandionidae</u>								
Osprey (<u>Pandion haliaetus</u>)	x	x	x	x	r		r	r
<u>Falcons : Falconidae</u>								
Prairie Falcon (<u>Falco mexicanus</u>)	x	x	x		o	r	u	u
Peregrine Falcon (<u>Falco peregrinus</u>)	x				r		r	r
Merlin (<u>Falco columbarius</u>)	x				r		o	o
American Kestrel (<u>Falco sparverius</u>)	x	x	x		c	u	c	c
<u>Quail : Phasianidae</u>								
Gambel's Quail (<u>Lophortyx gambelii</u>)	x	x	x	x	u	u	u	u

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (Continued)

	<u>Coachella Canal</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Cranes : Gruidae</u>								
Sandhill Crane (<u>Grus canadensis</u>)	x							u
<u>Rails, Gallinules, and Coots : Rallidae</u>								
Yuma Clapper Rail (<u>Rallus longirostris yumanensis</u>)	x	x	x	x	o	o	o	r
Virginia Rail (<u>Rallus limicola</u>)	x	x	x		u	o	u	u
Sora rail (<u>Porzana carolina</u>)	x	x	x		c	u	c	c
California Black Rail (<u>Laterallus jamaicensis coturniculus</u>)	x	x			u	u	u	u
Common Gallinule (<u>Gallinula chloropus</u>)	x	x	x		u	o	u	u
American Coot (<u>Fulica americana</u>)	x	x	x	x	a	c	a	a
<u>Plovers, Turnstones and Surfbirds : Charadriidae</u>								
Semipalmated Plover (<u>Charadrius semipalmatus</u>)	x				u		o	r
Snowy Plover (<u>Charadrius alexandrinus</u>)	x				r		r	r
Killdeer (<u>Charadrius vociferus</u>)	x	x	x		c		c	c
Mountain Plover (<u>Eupoda montana</u>)	x				o		u	u
Black-bellied Plover (<u>Squatarola squatarola</u>)	x				o		o	o
<u>Snipe, Sandpipers, Etc. : Scolopacidae</u>								
Common Snipe (<u>Capella gallinago</u>)	x	x	x				u	u
Long-billed Curlew (<u>Numenius americanus</u>)	x		x	x	u	r	c	u
Whimbrel (<u>Numenius phaeopus</u>)	x				o		r	r

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (Continued)

	<u>Coachella Canal</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Snipe, Sandpipers, Etc. : Scolopacidae (continued)</u>								
	x	x	x		u		u	u
Spotted Sandpiper (<u>Actitis macularia</u>)	x				r		o	o
Solitary Sandpiper (<u>Tringa solitaria</u>)	x		x		u	r	u	o
Willet (<u>Gatoptrophorus semipalmatus</u>)	x	x			u	r	u	o
Greater Yellowlegs (<u>Totanus melanoleucus</u>)	x				u		u	o
Lesser Yellowlegs (<u>Totanus falvipes</u>)	x				r		r	
Pectoral Sandpiper (<u>Erolia melanotos</u>)	x				r		r	
Baird's Sandpiper (<u>Erolia bairdii</u>)	x				c	r	c	u
Least Sandpiper (<u>Erolia minutilla</u>)	x		x		u	r	u	u
Dunlin (<u>Erolia alpina</u>)	x		x		u	r	u	u
Long-billed Dowitcher (<u>Limnodromus scolopaceus</u>)	x		x		c	r	c	c
Western Sandpiper (<u>Ereunetes mauri</u>)	x	x	x		u	r	u	u
Marbled Godwit (<u>limosa fedoa</u>)	x				r		r	
Sanderling (<u>Groethia alba</u>)	x							
<u>Avocets and Stilts : Recurvirostridae</u>								
American Avocet (<u>Recurvirostra americana</u>)	x		x		u	u	u	u
Black-necked Stilt (<u>Himantopus mexicanus</u>)	x		x		u	u	o	r
<u>Phalaropes : Phalaropodidae</u>								
Red Phalarope (<u>Phalaropus fulicarius</u>)	x				r		r	
Wilson's Phalarope (<u>Steganopus tricolor</u>)		x		u	u			
Northern Phalarope (<u>Lobipes lobatus</u>)	x				u		u	r

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

E-7

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Gulls and Terns : Laridae</u>								
Laughing Gull (<u>Larus atricilla</u>)	x				r	o	r	
Herring Gull (<u>Larus argentatus</u>)	x				u	r	u	o
California Gull (<u>Larus californicus</u>)	x				u	r	u	o
Ring-billed Gull (<u>Larus delawarensis</u>)	x		x		c	o	c	u
Franklin's Gull (<u>Larus pipixcan</u>)	x				r	r	r	
Bonaparte's Gull (<u>Larus philadelphia</u>)	x				o	r	o	r
Gull-billed Tern (<u>Gelochelidon nilotica</u>)	x				r	r		
Forster's Tern (<u>Sterna forsteri</u>)	x				u	o	u	u
Common Tern (<u>Sterna hirundo</u>)	x					r	r	
Caspian Tern (<u>Hydroprogne caspia</u>)	x	x			u	o	u	r
Black Tern (<u>Chlidonias niger</u>)	x				u	o	u	
Least Tern (<u>Sterna albitrons</u>)			x			r		
<u>Pigeons and Doves : Columbidae</u>								
Inca Dove (<u>Scardafella inca</u>)	x	x			r	r	r	r
White-winged Dove (<u>Zenaida asiatica</u>)	x	x	x	x	c	a	o	r
Mourning Dove (<u>Zenaidura macroura</u>)	x	x	x	x	a	a	a	a
Ground Dove (<u>Columbigallina passerina</u>)	x	x	x	x	u	u	u	u
Rock Dove (<u>Columba livia</u>)	x	x	x		u	u	u	u
<u>Cuckoos and Roadrunners : Cuculidae</u>								
Yellow-billed Cuckoo (<u>Coccyzus americanus</u>)	x		x		r	o		
Roadrunner (<u>Geococcyx californianus</u>)	x	x	x	x	c	c	c	c

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Owls : Tytonidae</u>								
Barn Owl (<u>Tyto alba</u>)	x	x			u	u	u	u
<u>Owls : Strigidae</u>								
Flammulated Owl (<u>Otus flammeolus</u>)	x				r		r	
Screech Owl (<u>Otus asio</u>)	x	x	x		o	o	o	o
Great Horned Owl (<u>Bubo virginianus</u>)	x	x	x		o	o	o	o
Elf Owl (<u>Micrathene whitneyi</u>)	x				r	r		
Burrowing Owl (<u>Speotyto cunicularia</u>)	x	x	x	x	o	o	o	o
Long-eared Owl (<u>Asio otus</u>)	x							r
Short-eared Owl (<u>Asio flammeus</u>)	x	x					o	o
<u>Goatsuckers : Caprimulgidae</u>								
Poor-Will (<u>Phalaenoptilus nuttallii</u>)	x	x			o	r	o	
Lesser Nighthawk (<u>Chordeiles acutipennis</u>)	x	x			c	c	o	
Common Nighthawk (<u>Chordeiles minor</u>)	x		x		r		r	
<u>Swifts : Apodidae</u>								
Black Swift (<u>Cypseloides niger</u>)	x				r		r	
Vaux's Swift (<u>Chactura vauxi</u>)	x				u		u	
White-throated Swift (<u>Aeronautes saxatalis</u>)	x				o		o	u

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

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	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Hummingbirds : Trochilidae</u>								
Black-chinned Hummingbird (<u>Archilochus alexandri</u>)	x	x	x		u	o	o	
Costa's Hummingbird (<u>Calypte costae</u>)	x		x		c	c	u	
Rufous Hummingbird (<u>Selasphorus rufus</u>)	x				u		o	
<u>Kingfishers : Alcedinidae</u>								
Belted Kingfisher (<u>Megaceryle alcyon</u>)	x	x	x		u	u	u	u
<u>Woodpeckers : Picidae</u>								
Red-shafted Flicker (<u>Colaptes cafer</u>)	x		x		c	c	c	c
Yellow-bellied Sapsucker (<u>Sphyrapicus varius</u>)	x	x	x		o		o	o
Ladder-backed Woodpecker (<u>Dendrocopos scalaris</u>)	x	x	x	x	u	u	u	u
Gila Woodpecker (<u>Centurus uropygialis</u>)	x		x		u	u	u	u
<u>Tyrant Flycatchers : Tyrannidae</u>								
Western Kingbird (<u>Tyrannus verticalis</u>)	x	x	x	x	c	c	o	
Cassin's Kingbird (<u>Tyrannus vociferans</u>)	x				r		r	
Ash-throated Flycatcher (<u>Myiarchus cinerascens</u>)	x	x	x	x	u	u	u	
Black Phoebe (<u>Sayornis nigricans</u>)	x	x	x		u	u	u	c
Say's Phoebe (<u>Sayornis saya</u>)	x	x	x	x	c	o	c	c

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Tyrant Flycatchers: Tyrannidae (continued)</u>								
Empidonax Flycatcher (<u>Empidonax Spp.</u>)	x		x	x	o		o	
Western Wood Peewee (<u>Contopus sordidulus</u>)	x	x			c		u	
Olive-sided Flycatcher (<u>Nuttallornis borealis</u>)	x		x	x	u		o	
Vermillion Flycatcher (<u>Pyrocephalus rubinus</u>)	x		x		o	o	r	r
<u>Larks : Alaudidae</u>								
Horned Lark (<u>Eremophila alpestris</u>)	x	x			u	u	o	a
<u>Swallows : Hirundinidae</u>								
Violet Green Swallow (<u>Tachycinota thalassina</u>)	x	x	x		c		u	r
Tree Swallow (<u>Iridoprocne bicolor</u>)	x	x	x		u		o	c
Bank Swallow (<u>Riparia riparia</u>)	x				u		u	
Rough-winged Swallow (<u>Stelgidopteryx ruficollis</u>)	x	x	x		c	u	c	r
Barn Swallow (<u>Hirundo rustica</u>)	x	x	x		c	u	a	r
Cliff Swallow (<u>Petrochelidon pyrrhonota</u>)	x	x	x		c	c	c	
Purple Martin (<u>Progne subis</u>)	x		x		o			
<u>Jays, Magpies, and Crows : Corvidae</u>								
Scrub Jay (<u>Aphelocoma coerulescens</u>)	x						r	r
Common Raven (<u>Corvus corax</u>)	x		x		o	o	o	o

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COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Verdins : Paridae</u>								
Verdin (<u>Auriparus flaviceps</u>)	x	x	x	x	c	c	c	c
<u>Wrens : Troglodytidae</u>								
House Wren (<u>Troglodytes aedon</u>)	x	x			u		u	u
Bewick's Wren (<u>Thryomanes bewickii</u>)	x	x	x	x	u		u	u
Cactus Wren (<u>Campylorhynchus brunneicapillus</u>)	x	x	x	x	u	u	u	u
Long-billed Marsh Wren (<u>Telmatodytes palustris</u>)	x	x	x		c	c	c	c
Rock Wren (<u>Salpinctes obsoletus</u>)	x	x			u	o	u	u
<u>Mockingbirds and Thrashers : Mimidae</u>								
Mockingbird (<u>Mimus polyglottos</u>)	x	x	x	x	u	u	u	u
Bendire's Thrasher (<u>Toxostoma bendirei</u>)	x				r		r	
Le Conte's Thrasher (<u>Toxostoma lecontei</u>)	x	x			u	u	u	u
Crissal Thrasher (<u>Toxostoma dorsale</u>)	x	x	x	x	u	u	u	u
Sage Thrasher (<u>Orcoscoptes montanus</u>)	x		x		o		o	o
<u>Thrushes, Bluebirds, Solitaires : Turdidae</u>								
Robin (<u>Turdus migratorius</u>)	x		x		u	u	u	u
Hermit Thrush (<u>Hylocichla guttata</u>)	x	x			u		u	u
Swainson's Thrush (<u>Hylocichla ustulata</u>)	x	x			u		o	

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Valley and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Thrushes, Bluebirds, Solitaires : Turdidae (continued)</u>								
Western Bluebird (<u>Sialia mexicana</u>)	x				o		o	o
Mountain Bluebird (<u>Sialia currucoides</u>)	x				u		u	c
Townsend's Solitaire (<u>Myadestes townsendi</u>)	x	x			r		r	r
<u>Gnatcatchers, and Kinglets : Sylviidae</u>								
Blue-gray Gnatcatcher (<u>Polioptila caerulea</u>)	x	x			u		u	u
Black-tailed Gnatcatcher (<u>Polioptila melanura</u>)	x	x	x	x	o	c	c	c
Ruby-crowned Kinglet (<u>Regulus calendula</u>)	x	x	x		c		c	c
<u>Pipits : Motacillidae</u>								
Water Pipit (<u>Anthus spinoletta</u>)	x	x			o		o	o
<u>Waxwings : Bombycillidae</u>								
Cedar Waxwing (<u>Bombycilla cedrorum</u>)	x				o		o	o
<u>Silky Flycatchers : Ptilogonatidae</u>								
Phainopepla (<u>Phainopepla nitens</u>)	x	x	x		c		c	c
<u>Shrikes : Laniidae</u>								
Loggerhead Shrike (<u>Lanius ludovicianus</u>)	x	x	x	x	c	c	c	c

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Valley</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Starlings : Sturnidae</u>								
Starling (<u>Sturnus vulgaris</u>)	x	x	x	x	o	o	o	o
<u>Vireos : Vireonidae</u>								
Bell's Vireo (<u>Vireo bellii</u>)	x	x	x		o		r	
Gray Vireo (<u>Vireo vicinior</u>)	x	x			o		o	
Solitary Vireo (<u>Vireo solitarius</u>)	x				u		o	
Warbling Vireo (<u>Vireo gilvus</u>)	x	x			c		u	
<u>Wood Warblers : Parulidae</u>								
Audubon's Warbler (<u>Dendroica auduboni</u>)			x					c
Black-and-white Warbler (<u>Mniotilta varia</u>)	x						r	r
Orange-crowned Warbler (<u>Vermivora celata</u>)	x	x	x	x	c		c	c
Nashville Warbler (<u>Vermivora ruficapilla</u>)	x				u		o	r
Lucy's Warbler (<u>Vermivora luciae</u>)	x		x		r	r		
Yellow Warbler (<u>Dendroica petecnia</u>)	x				c		u	r
Yellow-rumped Warbler (<u>Dendroica coronata</u>)	x	x			a		a	a
Black-throated Gray Warbler (<u>Dendroica nigrescens</u>)	x	x			u		o	r
Townsend's Warbler (<u>Dendroica townsendi</u>)	x		x	x	u		o	r
Hermit Warbler (<u>Dendroica occidentalis</u>)	x				u		o	r
MacGillivray's Warbler (<u>Oporornis tolmiei</u>)	x	x			u		o	
Common Yellowthroat (<u>Geothlypis trichus</u>)	x	x	x		c	c	c	c
Yellow-breasted Chat (<u>Icteria Virens</u>)	x	x	x		u	u		

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Valley</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Wood Warblers : Parulidae (continued)</u>								
Wilson's Warbler (<u>Wilsonia pusilla</u>)	x	x	x	x	r		o	o
American Redstart (<u>Setophaga ruticilla</u>)	x				o		o	r
<u>Weaver Finches : Ploceidae</u>								
E-14 House Sparrow (<u>Passer domesticus</u>)	x	x	x		c	c	c	c
<u>Meadowlarks, Blackbirds, and Orioles : Icteridae</u>								
Western Meadowlark (<u>Sturnella neglecta</u>)	x	x			u	u	u	u
Yellow-headed Blackbird (<u>Xanthocephalus xanthocephalus</u>)	x	x	x		c	c	u	u
Red-winged Blackbird (<u>Agelaius phoeniceus</u>)	x	x	x		a	a	a	a
Hooded Oriole (<u>Icterus cucullatus</u>)	x				o	o		
Scott's Oriole (<u>Icterus parisorum</u>)	x				o		o	
Northern Oriole (<u>Icterus galbula</u>)	x	x	x		c	c	o	
Brewer's Blackbird (<u>Euphagus cyanocephalus</u>)	x		x		c		c	c
Boat-tailed Grackle (<u>Cassidix mexicanus</u>)	x		x		r	r	r	r
Brown-headed Cowbird (<u>Molothrus ater</u>)	x	x	x	x	c	u	c	c
<u>Tanagers : Thraupidae</u>								
Western Tanager (<u>Piranga ludoviciana</u>)	x	x			c		u	
Summer Tanager (<u>Piranga rubra</u>)	x				r		r	

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Valley</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Grosbeaks, Finches, Sparrows, and Buntings :</u>								
<u>Fringillidae</u>								
	X				r	r	r	r
Black-headed Grosbeak (<u>Pheucticus melanocephalus</u>)	X				u	o	o	
Blue Grosbeak (<u>Guiraca caerulea</u>)	X	X			u	u		
Lazuli Bunting (<u>Passerina amoena</u>)	X				u			o
House Finch (<u>Carpodacus mexicanus</u>)	X	X	X	X	c	c	c	c
American Goldfinch (<u>Spinus tristis</u>)	X				u		u	u
Lesser Goldfinch (<u>Spinus psaltria</u>)	X	X	X		u		u	u
Lawrence's Goldfinch (<u>Spinus Lawrencei</u>)	X	X			o		r	r
Green-tailed Towhee (<u>Chlorura chlorura</u>)	X		X		o		o	o
Rufous-sided Towhee (<u>Pipilo erythrophthalmus</u>)	X				o		o	o
Abert's Towhee (<u>Pipilo aberti</u>)	X	X	X	X	u	u	u	u
Lark Bunting (<u>Calamospiza melanocorys</u>)	X						r	
Savannah Sparrow (<u>Passerculus sandwichensis</u>)	X	X			c	o	c	a
Grasshopper Sparrow (<u>Ammodramus savannarum</u>)	X						r	
Vesper Sparrow (<u>Poocetes gramineus</u>)	X				u		u	u
Lark Sparrow (<u>Chondestes grammacus</u>)	X				u		u	u
Black-throated Sparrow (<u>Amphispiza bilineata</u>)	X	X			c	c	c	c
Sage Sparrow (<u>Amphispiza belli</u>)	X	X					o	o
Slate-colored Junco (<u>Junco hyemalis</u>)	X				u		u	u
Gray-headed Junco (<u>Junco caniceps</u>)	X						r	r
Chipping Sparrow (<u>Spizella passerina</u>)	X				u		u	r

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COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Birds (continued)

	<u>Coachella Valley</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		Sp	Su	F	W
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory				
<u>Grosbeaks, Finches, Sparrows, and Buntings :</u>								
<u>Fringillidae (continued)</u>								
Brewer's Sparrow (<u>Spizella breweri</u>)	x		x	x	o		u	u
Black-chinned Sparrow (<u>Spizella atrogularis</u>)	x				r		r	
White-crowned Sparrow (<u>Zonotrichia leucophrys</u>)	x	x	x		c		a	a
Fox Sparrow (<u>Passerella iliaca</u>)	x	x			o		u	u
Lincoln's Sparrow (<u>Melospiza lincolni</u>)	x				u		c	c
Song Sparrow (<u>Melospiza melodia</u>)	x		x		c	u	c	c
Chestnut-collared Longspur (<u>Calcarius ornatus</u>)	x						r	r

COLORADO RIVER SALINITY CONTROL PROJECT
(TITLE I)
Species Check List

BIRDS

CODE KEY:

The relative abundance and time of occurrence for each species is indicated as follows:

Sp - Spring	a - abundant
Su - Summer	c - common
F - Fall	u - uncommon
W - Winter	o - occasional
	r - rare

X - denotes those species known to occur or observed in the study area.

Definition of terms indicating relative abundance are listed below. Each term is relative to the habitat requirements and behavior of each species:

abundant	- many seen or heard daily
common	- one or more seen or heard daily
uncommon	- one or more seen or heard weekly
occasional	- may occur monthly
rare	- may occur yearly

COLORADO RIVER BASIN SALINITY CONTROL PROJECT
(TITLE I)
Species Check List

MAMMALS

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		* C	MP	M
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory			
<u>Order Marsupialia</u>							
<u>Opossums : Didelphiidae</u>							
Common Opossum (<u>Didelphis virginiana</u>)	x					x	x
<u>Order Chiroptera</u>							
<u>Leaf-nosed Bats : Phyllostomatidae</u>							
California Leaf-nosed Bat (<u>Macrotus californicus</u>)	x				x	x	x
Hognose Bat (<u>Choeronycteris mexicana</u>)	x				x	x	x
<u>Evening Bats : Vespertilionidae</u>							
California Myotis (<u>Myotis californicus</u>)	x		x		x	x	x
Yuma Myotis (<u>Myotis yumanensis</u>)	x		x		x	x	x
Fringed Myotis (<u>Myotis thysanodes</u>)	x		x		x	x	x
Red Bat (<u>Lasiurus borealis</u>)	x				x	x	x
Hoary Bat (<u>Lasiurus cinereus</u>)	x				x	x	x
Western Pipistrelle (<u>Pipistrellus hesperus</u>)	x		x		x	x	x
Spotted Bat (<u>Euderma maculata</u>)	x				x	x	x
Pallid Bat (<u>Antrozous pallidus</u>)	x		x		x	x	x

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COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Mammals (continued)

	<u>Coachella Canal and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		* C	MP	M
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory			
<u>Evening Bats : Vespertilionidae (continued)</u>							
Western Yellow Bat (<u>Dasypterus ega</u>)	x		x		x	x	x
Big Brown Bat (<u>Eptesicus fuscus</u>)	x		x		x	x	x
<u>Free-tailed Bats : Molossidae</u>							
Mexican Free-tailed bat (<u>Tadarida mexicana</u>)	x				x	x	x
E-19 Brazilian Free-tailed Bat (<u>Tadarida brasiliensis</u>)	x		x		x	x	x
Pocketed Free-tailed Bat (<u>Tadarida femorosacca</u>)	x				x	x	x
Big Free-tailed Bat (<u>Tadarida macrotis</u>)	x				x	x	x
Western Mastiff Bat (<u>Eumops perotis</u>)	x				x	x	x
<u>Order Lagomorpha</u>							
<u>Hares and Rabbits : Leporidae</u>							
Black-tailed jackrabbit (<u>Lepus californicus</u>)	x	x	x	x	x		x
Desert Cottontail (<u>Sylvilagus auduboni</u>)	x	x	x	x	x		x
<u>Order Rodentia</u>							
<u>Squirrels and Chipmunks : Sciuridae</u>							
Whitetail Antelope Squirrel (<u>Ammospermophilus leucurus</u>)	x	x			x		

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Mammals (continued)

	<u>Coachella Valley</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		* C	MP	M
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory			
<u>Squirrels and Chipmunks : Sciuridae (continued)</u>							
Round-tailed Ground Squirrel (<u>Spermophilus</u> <u>tereticaudus</u>)	x	x	x		x	x	
Harris Antelope Squirrel (<u>Ammospermophilus</u> <u>harrisi</u>)			x		x		
<u>Beaver : Castoridae</u>							
E-20 Beaver (<u>Castor canadensis</u>)			x			x	x
<u>Pocket Gophers : Geomyidae</u>							
Valley Pocket Gopher (<u>Thomomys bottae</u>)	x		x		x	x	
<u>Pocket Mice and Kangaroo Rats : Heteromyidae</u>							
Rock Pocket Mouse (<u>Perognathus intermedius</u>)			x		x		
Little Pocket Mouse (<u>Perognathus longinembris</u>)	x		x		x		
Spiny Pocket Mouse (<u>Perognathus spinatus</u>)	x	x			x	x	
Desert Pocket Mouse (<u>Perognathus penicillatus</u>)	x	x	x	x	x	x	x
Merriam's Kangaroo Rat (<u>Dipodomys merriami</u>)	x	x	x	x	x	x	x
Desert Kangaroo Rat (<u>Dipodomys deserti</u>)	x	x	x		x		

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Mammals (continued)

	<u>Coachella Valley and Vicinity</u>		<u>Yuma Valley and Vicinity</u>		* C	MP	M
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory			
<u>Cricetine Mice and Rats : Cricetidae</u>							
Western Harvest Mouse (<u>Reithrodontomys megalotis</u>)			X				
Cactus Mouse (<u>Peromyscus eremicus</u>)	X	X	X	X	X	X	X
Deer Mouse (<u>Peromyscus maniculatus</u>)	X	X	X	X	X	X	X
Southern Grasshopper Mouse (<u>Onychomys torridus</u>)	X		X	X	X	X	
Hispid Cotton Rat (<u>Sigmodon hispidus</u>)	X	X	X			X	X
White-throated Wood Rat (<u>Neotoma albigula</u>)	X	X	X	X	X	X	
Desert Wood Rat (<u>Neotoma lepida</u>)	X				X		
Muskrat (<u>Ondatra zibethica</u>)	X	X	X				X
<u>Old World Rats and Mice : Muridae</u>							
Norway Rat (<u>Rattus norvegicus</u>)	X					X	
House Mouse (<u>Mus musculus</u>)	X	X	X	X		X	
<u>Order Carnivora</u>							
<u>Foxes, Wolves and Coyotes : Canidae</u>							
Kit Fox (<u>Vulpes macrotis</u>)	X	X	X		X	X	
Gray Fox (<u>Urocyon cinereoargenteus</u>)	X	X	X	X	X	X	X
Coyote (<u>Canis latrans</u>)	X	X	X	X	X	X	X

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Mammals (continued)

	<u>Coachella Valley</u> <u>and Vicinity</u>		<u>Yuma Valley</u> <u>and Vicinity</u>		* C	MP	M
	Known to Occur	Observed During Inventory	Known to Occur	Observed During Inventory			
<u>Raccoons : Procyonidae</u>							
Raccoon (<u>Procyon lotor</u>)	x	x	x	x	x	x	x
Ringtail Cat (<u>Bassariscus astutus</u>)	x		x		x	x	x
<u>Weasels, Skunks and Badgers : Mustelidae</u>							
E-22 Badger (<u>Taxidea taxus</u>)	x	x	x	x	x	x	x
Striped Skunk (<u>Mephitis mephitis</u>)	x	x	x	x	x	x	x
Spotted Skunk (<u>Spilogale putorius</u>)	x	x	x		x	x	x
<u>Cats : Felidae</u>							
Bobcat (<u>Lynx rufus</u>)	x	x	x	x	x	x	x
Feral House Cat (<u>Felis domestica</u>)	x	x			x	x	x
<u>Order Perissodactyla</u>							
<u>Horses and Burros : Equidae</u>							
Wild Burro (<u>Equus assinus</u>)	x	x	x		x	x	
<u>Order Artiodactyla</u>							
<u>Deer : Cervidae</u>							
Mule Deer (<u>Odocoileus hemionus</u>)	x	x	x		x	x	

COLORADO RIVER BASIN SALINITY CONTROL PROJECT
TITLE I
Species Check List

MAMMALS

* CODE KEY FOR HABITAT USED BY EACH SPECIES:

- C - creosote scrub
- MP - mixed phreatophytes
- M - Marsh

COLORADO RIVER BASIN SALINITY CONTROL PROJECT
TITLE I
Species Check List

REPTILES AND AMPHIBIANS

Scientific Name	Common Name	Coachella Canal and Vicinity	Yuma Valley and Vicinity
<u>Callisaurus draconoides</u>	Zebra-tailed lizard	X	X
<u>Uta stansburiana stejnegeri</u>	Desert side-blotched lizard	X	X
<u>Urosaurus graciosus graciosus</u>	Western brush lizard	X	X
<u>Sceloporus magister magister</u>	Desert spiny lizard	X	X
<u>Cnemidophorus tigris tigris</u>	Great Basin whiptail lizard	X	X
<u>Coleonyx variegatus</u>	Desert banded gecko	X	X
<u>Dipsosaurus dorsalis</u>	Desert iguana	X	X
<u>Crotaphytus wislizenii wislizenii</u>	Long-nosed leopard lizard	X	X
<u>Phrynosoma m' calli</u>	Flat-tailed horned lizard	X	X
<u>Uma notata notata</u>	Colorado Desert fringe-toed lizard	X	X
<u>Phrynosoma platyrhinus calidiarum</u>	Southern desert horned lizard	X	X
<u>Urosaurus ornatus</u>	Tree lizard	X	X
<u>Gopherus agassizi</u>	Desert tortoise	X	X
<u>Trionyx spiniferus</u>	Spiny Softshell turtle	X	X
<u>Hasticophis flagellum piceus</u>	Red racer	X	X
<u>Chionactis occipitalis</u>	Colorado Desert shovel-nosed snake	X	X
<u>Crotalus atrox</u>	Western diamondback rattlesnake	X	X
<u>Crotalus cerastes laterorepens</u>	Mojave Desert sidewinder	X	X
<u>Crotalus cerastes laterorepens</u>	Colorado Desert sidewinder	X	X
<u>Phyllorhynchus decurtatus</u>	Western leaf-nosed snake	X	X
<u>Pituophis melanoleucus affinis</u>	Sonora gopher snake	X	X
<u>Arizona elegans eburnata</u>	Desert glossy snake	X	X
<u>Salavadora hexalepis hexalepis</u>	Desert patch-nosed snake	X	X

COLORADO RIVER BASIN SALINITY CONTROL PROJECT (TITLE I) - Species Check List - Reptiles and Amphibians
(continued)

Scientific Name	Common Name	Coachella Canal and Vicinity	Yuma Valley and Vicinity
<u>Lampropeltis getulus</u>	Common kingsnake	X	X
<u>Rhinocheilus lecontei lecontei</u>	Western long-nosed snake	X	X
<u>Leptotyphlops humilis</u>	Western blind snake	X	X
<u>Lichanura trivirgata gracia</u>	Desert rosy boa	X	
<u>Thamnophis marciatus</u>	Checkered garter snake	X	X
<u>Sonora semiannulata</u>	Western ground snake	X	X
<u>Hypsiglena torquata deserticola</u>	Desert night snake	X	X
<u>Hypsiglena torquata ochrorhyncha</u>	Spotted night snake		X
<u>Trimorphodon lambda</u>	Sonora lyre snake	X	X
<u>Crotalus scutulatus</u>	Mojave rattlesnake	X	X
<u>Crotalus mitchelli pyrrhus</u>	Southwestern speckled rattlesnake	X	X
<u>Ambystoma tigrinum</u>	Tiger salamander		X
<u>Bufo woodhousei</u>	Woodhouse's toad	X	X
<u>Bufo cognatus</u>	Great Plains toad	X	X
<u>Scaphiopus couchi</u>	Couch's spadefoot toad	X	X
<u>Rana catesbeiana</u>	Bullfrog	X	X
<u>Bufo punctatus</u>	Red-spotted toad	X	X
<u>Bufo alvarius</u>	Colorado River toad		X
<u>Rana pipiens</u>	Leopard frog	X	X

COLORADO RIVER BASIN SALINITY CONTROL PROJECT
TITLE I
Species Check List

FISH

	Colorado River Mainstream	Colorado River Backwaters	Yuma Valley Canals	Yuma Valley Major Drains	Yuma Valley Lateral Drains and Canals	Coachella Canal	Coachella Canal Seepage Ponds	Santa Clara Slough
<u>Dorosoma petenense</u> threadfin shad	X	X	X	X				
<u>Notropis lutrensis</u> red shiner	X	X	X	X	X			X
<u>Cyprinus carpio</u> carp	X	X	X	X	X	X		X
<u>Carassius auratus</u> goldfish		X						
<u>Ictalurus natalis</u> yellow bullhead	X	X	X	X	X	X	X	
<u>Ictalurus punctatus</u> channel catfish	X	X	X	X	X	X		
<u>Mugil caphalus</u> striped mullet	X	X						
<u>Lepomis macrochirus</u> bluegill	X	X	X	X	X	X		
<u>Lepomis microlophus</u> redeer sunfish	X	X		X		X		

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COLORADO RIVER BASIN SALINITY CONTROL PROJECT
 TITLE I
 Species Check List

FISH

	Colorado River Mainstream	Colorado River Backwaters	Yuma Valley Canals	Yuma Valley Major Drains	Yuma Valley Lateral Drains and Canals	Coachella Canal	Coachella Canal Seepage Ponds	Santa Clara Slough
<u>Chaenobryttus cyanelus</u> green sunfish	X	X	X		X	X		
<u>Chaenobryttus gulosus</u> warmouth	X	X				X		
<u>Micropterus salmoides</u> largemouth bass	X	X	X	X	X	X		
E-27 <u>Pomoxis nigromaculatus</u> black crappie		X						
<u>Tilapia spp.</u> tilapia	X	X	X	X	X			
<u>Gambusia affinis</u> mosquitofish	X	X	X	X	X	X	X	X
<u>Poecilia spp.</u> mollies	X	X	X	X	X			X
<u>Pilodictis olivaris</u> flathead catfish	X			X		X		
<u>Cyprinodon macularius</u> desert pupfish								X
<u>Notemigonus crysoleucus</u> golden shiner						X		

APPENDIX F

**LITERATURE
CITED**

LITERATURE CITED

1. "Arizona Native Plant Law," Arizona Revised Statutes, Chapter 7, Article 1, Section 3-901.
2. "Article 10," Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande: Treaty Between the United States of America and Mexico, Treaty Series 994; 59 Stat. 1219 (U.S. Government Printing Office 1946).
3. Bureau of Reclamation, Report on Lower Colorado River Groundwater Recovery and River Regulation: Colorado River Front Work and Levee System, Arizona-California (Region 3: Boulder City, Nevada; July 1964).
4. Bureau of Reclamation, Final Environmental Impact Statement: Colorado River Basin Pilot Project, Colorado, FES 71-6 (Engineering and Research Center: Denver, Colorado; July 16, 1971).
5. Bureau of Reclamation, Colorado River Water Quality Improvement Program (February 1972).
6. Bureau of Reclamation, Final Environmental Impact Statement: Proposed Concrete Lining of Main Outlet Drain, South Gila Valley, Colorado River Front Work and Levee System, Arizona, FES 72-25 (Lower Colorado Regional Office: Boulder City, Nevada; August 3, 1972).
7. Bureau of Reclamation, Initial Environmental Analysis of the Colorado River Water Quality Improvement Program (Engineering and Research Center: Denver, Colorado; June 1973).
8. Bureau of Sport Fisheries and Wildlife, Threatened Wildlife of the United States, Resource Publication 114 (U.S. Government Printing Office, March 1973).
9. International Boundary and Water Commission, "Recommendations on the Colorado River Salinity Problem," Minute No. 218 (March 22, 1965).
10. International Boundary and Water Commission, "Recommendations to Improve Immediately the Quality of Colorado River Waters Going to Mexico," Minute No. 241 (July 14, 1972).
11. International Boundary and Water Commission, "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River," Minute No. 242 (August 30, 1973).

12. Memorandum from the Regional Director, Bureau of Sport Fisheries and Wildlife, "Coachella Division, All-American Canal System Water Salvage, Boulder Canyon Project, California" (Portland, Oregon; December 15, 1971).
13. Memorandum from the Regional Director, Bureau of Sport Fisheries and Wildlife, "Limitrophe Division, Colorado River Front Work and Levee System - Arizona-Gadsden Lakes (Hunter's Hole)." (Albuquerque, New Mexico; February 10, 1972).
14. National Register of Historic Places, Federal Register, Vol. 38, No. 39 (Wednesday, February 28, 1973), pp. 5386-5444.
15. National Registry of Natural Landmarks, Federal Register, Vol. 38, No. 171 (Wednesday, September 5, 1973), pp. 23982-23985.
16. Note No. 4012, Embassy of Mexico (November 9, 1961).
17. U.S. Department of State, Final Environmental Impact Statement: Possible Options for Reducing the Salinity of the Colorado River Waters Flowing to Mexico (U.S. Government Printing Office).
18. "United States List of Endangered Native Fish and Wildlife," Federal Register, Vol. 35, No. 199 (Tuesday, October 13, 1970), pp. 16047-16048.
19. Dennis D. Wigal, A Survey of the Nesting Habitats of the White-Winged Dove in Arizona, Special Report No. 2 (Arizona Game and Fish Department: Phoenix, Arizona; June 1973).
20. Memorandum from the Regional Director, Lower Colorado Region, "Caution Regarding Commitments Made in Environmental Statements" (March 1972).
21. Arizona Bureau of Mines, Maps of Known Metallic and Nonmetallic Occurrences of Arizona, 1961.
22. Bureau of Mines, "The Mineral Industry of California," Bureau of Mines Minerals Yearbook, 1965.
23. Memorandum from the Acting Chief, Arizona Archeological Center, National Park Service, "Archeological Survey Report Desalting Complex Features." (Tucson, Arizona; February 19, 1974).
24. Bureau of Reclamation, Preliminary Report of Ground-water Hydrology of Coachella Canal Area, (LC Region, Boulder City, Nevada, Yuma Projects Office, Yuma, Arizona; November 1974). Prepared for Fish and Wildlife Ad Hoc Committee for Coachella Canal Unit.

25. Bureau of Reclamation, Vegetation Inventory, Coachella Canal Unit, California, Colorado River Basin Salinity Control Projects, Title I, (LC Region, Boulder City, Nevada, Yuma Projects Office, Yuma, Arizona; November 1974). Prepared for Fish and Wildlife Ad Hoc Committee for Coachella Canal Unit.
26. California Department of Fish and Game, Inventory of the Fish and Wildlife Resources, Recreational Consumptive Use, and Habitat In and Adjacent to the Upper 49 Miles and Poned Areas of the Coachella Canal, (Sacramento, California; November 15, 1974). Prepared under contract for the Bureau of Reclamation.
27. R. Ayala and J. E. Harmon, Preliminary Inventory of Recreational Usage In and Adjacent to the Upper 49 Miles of the Coachella Canal, Including Adjacent Seep Areas, (San Diego State University, Calexico, California; November 1974). Prepared under contract for the Bureau of Reclamation.
28. W. L. Minckley, Inventory of Aquatic Habitats and Fishes of the Yuma Valley, Arizona. (Arizona State University, Tempe, Arizona; November 1974). Prepared under contract for Bureau of Reclamation.
29. W. L. Minckley, Fishes of Hunter's Hole, Yuma County, Arizona, (Arizona State University, Tempe, Arizona; April 1974). Prepared under contract for Bureau of Reclamation.
30. Robert D. Ohmart, Wildlife Use and Density Inventory and Vegetation Along the Colorado River from Morelos Dam to the Southerly International Boundary, (Arizona State University, Tempe, Arizona; November 1974). Prepared under contract for Bureau of Reclamation.
31. G. W. Greey and J. C. Jaten, A Special Report on: The Recreational Use of Areas Along the Lower Colorado River Valley; Limithrophe and Neighboring Areas, (Arizona State University, Tempe, Arizona; November 1974). Prepared under contract for Bureau of Reclamation.

APPENDIX G

**LIST
OF REFERENCES**

LIST OF REFERENCES

1. L. Benson and R. Darrow, The Trees and Shrubs of the Southwestern Deserts (University of Arizona Press: Tucson, Arizona, 1954).
2. Bureau of Reclamation, Special Studies: Delivery of Water to Mexico (Region 3: Boulder City, Nevada; February 1963).
3. Bureau of Reclamation, Pacific Southwest Water Plan: Supplemental Informational Report on Water Salvage, Lower Colorado River (Region 3: Boulder City, Nevada; January 1964).
4. Bureau of Reclamation, Coachella Canal Lining: Special Report (Lower Colorado Region: Boulder City, Nevada; August 1973).
5. William Henry Burt and Richard Philip Grossenheider, A Field Guide to the Mammals, 2nd edition (Houghton Mifflin Co.: Boston, Massachusetts, 1964).
6. Colorado River Board of California, Need for Controlling Salinity of the Colorado River (The Resources Agency, State of California: August 1970).
7. Department of the Interior, Federal Reclamation and Related Laws Annotated, 3 volumes (Washington: U.S. Government Printing Office, 1972).
8. Samuel Eddy, Ph.D., How to Know the Freshwater Fishes (Wm. C. Brown Co.: Dubuque, Iowa, 1957).
9. Environmental Protection Agency, The Mineral Quality Problem in the Colorado River Basin (U.S. Government Printing Office, 1971).
10. Frank W. Gould, Grasses of the Southwestern United States (University of Arizona Press: Tucson, Arizona, 1951).
11. Raymond E. Hall and Keith R. Kelson, Mammals of North America, 2nd volume (Ronald Press Co.: New York, 1959).
12. T. H. Kearney and R. H. Peebles, Arizona Flora (University of California Press: Berkeley, California, 1960).

13. Howard S. Latham and James M. Verzuh, Reducing Hazards to People and Animals on Reclamation Canals: Open and Closed Conduit Systems Program (Bureau of Reclamation: September 1971).
14. Elbert L. Little, Jr., Forest Service, Southwestern Trees: A Guide to the Native Species of New Mexico and Arizona (Washington: U.S. Government Printing Office, August 1968).
15. The Vertebrates of Arizona, editor C. H. Lowe (University of Arizona Press: Tucson, Arizona, 1964).
16. Lower Colorado Region State-Federal Interagency Group, Water Resources Council, Lower Colorado Region Comprehensive Framework Study, Appendices I-XV, XVIII (June 1971).
17. W. L. Minckley, "Key to Families of Bony Fishes of Inland North America, and Species from Arizona" (Department of Zoology, Arizona State University: Tempe, Arizona, January 1969).
18. A. A. Nichol, The Natural Vegetation of Arizona, Technical Bulletin No. 127, University of Arizona Agricultural Experimental Station (University of Arizona Press: Tucson, Arizona, 1952).
19. Office of Saline Water and Bureau of Reclamation, Desalting Handbook for Planners (Department of the Interior: May 1972).
20. Roger Tory Peterson, A Field Guide to Western Birds (Houghton Mifflin Co.: Boston, Massachusetts, 1961).
21. A. R. Phillips, J. Marshall, and G. Monson, Birds of Arizona (University of Arizona Press: Tucson, Arizona, 1964).
22. Chandler S. Robbins, Bertel Bruun, and Herbert S. Zein, Birds of North America: A Guide to Field Identification (Golden Press: New York, 1966).
23. R. C. Stebbins, A Field Guide to Western Reptiles and Amphibians (Houghton Mifflin Co.: Boston, Massachusetts, 1966).
24. Upper Colorado Region State-Federal Inter-Agency Group, Water Resources Council, Upper Colorado Region Comprehensive Framework Study (June 1971).

25. T. H. Watkins, et al., The Grand Colorado: The Story of a River and its Canyons (American West Publishing Co., 1969).

APPENDIX H

APPENDIX H

Appendix H contains the letters of recommendation for mitigation from the Chairman, Ad Hoc Committee for Fish and Wildlife, Desalting Complex and Protective and Regulatory Ground-Water Pumping Features; and the Chairman, Ad Hoc Committee for Fish and Wildlife, Coachella Canal Unit. It also contains the letters of acceptance to the two Ad Hoc Committees from the Regional Director, Bureau of Reclamation, Lower Colorado Region.

LC-150/565.

Regional Director

March 14, 1975

Chairman, Fish and Wildlife Ad Hoc Committee—Desalting Complex and Protective and Regulatory Ground-Water Pumping Features—Colorado River Basin Salinity Control Projects, Title I Recommendations for Fish and Wildlife Mitigation Concepts for Impacts Incurred from the Desalting Complex and the Protective and Regulatory Ground-Water Pumping Features of the Colorado River Basin Salinity Control Projects, Title I

The subject Ad Hoc Committee for Fish and Wildlife met on February 4, 1975, in Boulder City, Nevada. The following recommendations for mitigation were adopted for consideration by the Bureau of Reclamation. The Committee Chairman was instructed to transmit this recommendation to you for approval in whole or in part on behalf of the Bureau of Reclamation.

Recommendations

This Fish and Wildlife Committee for the Desalting Complex, Colorado River Basin Salinity Control Projects, Title I, recommends that the four concepts: (1) Hunter's Hole, (2) Borrow Area No. 2, Main Outlet Drain, (3) Redondo Pit, and (4) Fish Rearing Facilities, be developed and implemented to the degree that their values mitigate the fish and wildlife losses to be incurred as a result of aforesaid features of the project from Morelos Dam to the Southerly International Boundary on the Colorado River.

Details of these recommendations are included on page 2 of the enclosed notes on the February 4, 1975 meeting.

F. PHILLIP SHARPE

F. Phillip Sharpe

Enclosure

Noted: E. A. LUNDBERG
Regional Director

Date: MAR 14 1975



United States Department of the Interior
BUREAU OF RECLAMATION

LOWER COLORADO REGIONAL OFFICE

P.O. BOX 427

BOULDER CITY, NEVADA 89005

APR 18 1975

IN REPLY
REFER TO: LC-150
565.

Memorandum

To: Members, Fish and Wildlife Ad Hoc Committee - Desalting Complex and Protective and Regulatory Ground-Water Pumping Features - Colorado River Basin Salinity Control Project, Title I

Attention: Mr. F. Phillip Sharpe, Chairman

From: Regional Director

Subject: Consideration of Recommendations for Fish, Wildlife and Recreation Mitigation Measure Concepts for the Desalting Complex and Protective and Regulatory Ground-Water Pumping Features, Colorado River Basin Salinity Control Project, Title I

The Bureau of Reclamation appreciates receiving recommendations for mitigation concepts on the subject correspondence as listed in the Chairman's memorandum of March 14, 1975. We are cognizant of the dedication and long hours of negotiations that were necessary to develop these recommendations. As you know, consideration of your recommendations must be made subject to several constraints. A primary concern is that an approved fish and wildlife plan was not included as part of the authorizing legislation, Public Law 93-320. Consequently, funds to develop the mitigation concepts recommended are not now available. The total expenditures required to implement mitigation measures will, of necessity, have to be defined and must receive approval from Congress prior to appropriation of funds. It is also important to recognize that any requests to Congress for funds to be used for mitigation measures must be supported by an analysis of the impacts that result from the project and an evaluation of the benefits that would be derived from mitigation measures. An additional constraint regarding the location of the wildlife management area concept is the April 1, 1975 resolution by the Wellton-Mohawk Irrigation and Drainage District opposing the location of the site within the Dome Narrows on the Gila River. Notwithstanding, the wildlife management area concept itself is still valid.

Within these constraints the Bureau of Reclamation favorably receives the concepts of mitigation measures indicated in the Chairman's memorandum of March 14, 1975 with the following modifications:



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Let's Clean Up America For Our 200th Birthday

1. The concept of maintaining the water level in Hunter's Hole Pond complex is accepted as recommended. It must be clearly defined that infringement on water rights will not occur and there is a possibility that, due to unexpected percolation rates, the pumped ground water may not maintain the water level in perpetuity. Operation and maintenance costs will be the responsibility of the Arizona Game and Fish Department. Replacement of the pump will be the responsibility of the Bureau of Reclamation.
2. In view of your March 21, 1975 meeting, we recommend consolidation of mitigation concepts concerning Borrow Area No. 2, Redondo Pit, and the Fish Rearing Facility into a single wildlife management area concept. The exact location of the wildlife management area concept may be resolved by the member agencies of the Ad Hoc Committee. Our recommendation is as follows:

Combine the above three mitigation measure concepts in one location and include measures compensatory for impacts of protective and regulatory ground-water pumping. Such an area as outlined below would support a fish and wildlife use area, marsh and riparian wildlife habitat, wildlife crops, a pumped source of ground water, and a site for a fish rearing facility.

An adequate number of acres of land can be acquired by Reclamation and assigned to Arizona Game and Fish Department for designation as a Recreation and Wildlife Management Area. In addition to the area being considered in the Dome Narrows of the Gila River in the Wellton-Mohawk Irrigation and Drainage District, an alternative site may be located near the Colorado River in the vicinity of Mittry Lake. Presently within the Dome Narrows area there are developed farmlands, Gila River flood plain with riparian and marsh habitat with wetted areas, and undisturbed desert land, irrigation and drainage facilities, Highway 95, and various access roads. These lands are located adjacent to Yuma County's Adair Park, irrigated farmlands, the Wellton-Mohawk Main Conveyance Channel, the Wellton-Mohawk Canal, and the Southern Pacific Railroad. The lands are within the narrows created by the Laguna Mountains on the north and the Gila Mountains on the south.

The lands that are acquired will be designated as a management area but would not have rights to receive Colorado River water. They could, however, be supplied by pumped ground water. In selecting the management area the Committee should

consider location of farmlands that could be used for wildlife feed crops and the feasibility of developing new lands.

Riparian and other natural habitat within the area selected could be preserved. If the area along the Gila River is selected consideration will be given to selective dredging and to Gila River flood control criteria. Within this concept additional hydrophytic vegetation could be provided with a cooperatively developed plan to dredge a pond or backwater area with 8 to 12 acres of surface water for fish, wildlife and recreational use.

Several suitable sites for constructing and operating a fish rearing facility are available within either of the areas previously mentioned. The facility, located within a controlled management area could be afforded security, a suitable and ample water supply, some protection from herbicide and pesticide aerial drift, and a ready access to a main thoroughfare and power source.

Cost estimates have not been completed at this time. In preparing the estimates, costs will be relative to land exchange, sizing of a fish rearing facility, capacities of ground-water wells, dredged pond surface acres, and other appurtenant features, such as power transmission lines, access roads, and protective works. Responsibility for operation and maintenance will be outlined in a cooperatively developed management agreement.

We believe the above modification and expansion of your concepts will result in a workable solution and resolve mitigation of project impacts on fish and wildlife. As you know, mitigation cost will be nonreimbursable and will require detailed analysis and justification in order to receive favorable consideration by Congress for funding. Details of the concepts will be the responsibility of the Ad Hoc Committee with the assistance of a fish and wildlife coordinator. The final selection of a site for the location of the mitigation concept for a wildlife management area, either on the Gila River, Mittry Lake or at some other location will of necessity be resolved through agreement of the Bureau of Reclamation, Arizona Game and Fish Department, Wellton-Mohawk Irrigation and Drainage District, the Fish and Wildlife Service and other members of the Ad Hoc Committee.

Within the parameters of these constraints, the above recommended concepts, as modified, are accepted by the Bureau of Reclamation as mitigating the losses that will be incurred by the Desalting Complex and the

Protective and Regulatory Ground-Water Pumping features of the Colorado River Basin Salinity Control Project, Title I.

We look forward to your prompt response to the Bureau's level of accepting your recommendation and to cooperating with you in implementing the mitigation measures.

E. A. Lundberg

Copies of this memorandum sent to those on the enclosed mailing list.

MAILING LIST
AD HOC COMMITTEE MEETING FOR FISH AND WILDLIFE
FOR THE
DESALTING COMPLEX, TITLE I, PUBLIC LAW 93-320

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United States Department of the Interior ^{RECEIVED}
BUREAU OF RECLAMATION

LOWER COLORADO REGIONAL OFFICE
P.O. BOX 427

BOULDER CITY, NEVADA 89005

IN REPLY
REFER TO: LC-780
520.

March 4, 1975

To: Regional Director

From: Fish and Wildlife Ad Hoc Committee, Coachella Canal Unit,
CRBSCP, Title I

Subject: Recommended Fish and Wildlife Mitigation Measures Concepts
for Coachella Canal Unit

The Coachella Canal Unit Fish and Wildlife Ad Hoc Committee meeting in Coachella on February 7, 1975, adopted the following recommendation to the Bureau of Reclamation. The Committee Chairman was instructed to transmit this recommendation to you for your approval, in whole or in part, on behalf of the Bureau of Reclamation.

Recommendation: This Fish and Wildlife Ad Hoc Committee for the Coachella Canal Unit, CRBSCP, Title I, recommends to the Bureau of Reclamation that the listed mitigation measures concepts be adopted and implemented to the extent that their values mitigate fish and wildlife losses to be incurred by lining the first 49 miles of the Coachella Canal. Concepts recommended are (not in order of priority):

1. Select Habitat. Maintaining a select habitat for clapper and black rails is given the highest priority by the Fish and Wildlife Service and California Department of Fish and Game. Areas given special significance in the Department of Fish and Game report, "Inventory of the Fish and Wildlife Resources, Recreational Consumptive Use, and Habitat in and Adjacent to the Upper 49 Miles and Pondered Areas of the Coachella Canal," were noted as A-14C and HA-11, which would probably involve drilling one or more wells and installation of electric pumps to provide a water source. An alternative concept is to set aside as a Wildlife Management Area approximately 1,200 acres of Federal lands with select existing habitat expected to remain in reasonably good condition, without wells, after construction of the proposed lined canal.

2. Water Devices. Watering devices (guzzlers) for wildlife would be installed along the canal and between the Coachella and East Highline Canals, probably spaced no more than one mile apart, in areas now supplied by water from surface seeps. The number of units required is not yet determined. These devices could be supplied with



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water by large aprons to catch and divert rainwater into a catchment, or by hauling water to them when rainwater is insufficient. The Coachella Valley County Water District has strongly indicated it will not permit water to be diverted from the Coachella Canal to maintain these watering devices.

3. Canal Freeboard Roughening. The canal lining above the normal waterline would be roughened during construction--by brooming, raking, or other suitable methods--to permit small animals to drink from the canal without falling in or, if they fall into the canal, to extricate themselves.

4. Lake Concept. A lake or pond of about two acres in surface area would be constructed on a selected site in the Coachella Valley and stocked with fish (probably catfish) as needed to assure an active year-round fishery for the life of the project. An adequate water supply for the lake or pond might be provided by pumped ground water, high water table, irrigation drainage water, treated effluent, etc. An alternative concept would be to line the Coachella Valley County Water District's existing equalizing reservoir, stock it with game fish, and maintain a year-round multiple-use recreation facility consistent with the District's operational and maintenance programs. Either concept might be implemented as a cooperative venture with the Riverside County Parks Department.

5. Finney-Ramer Unit. Reestablish 700 to 800 acres of marsh habitat in the Finney-Ramer Unit of the State of California's Imperial Wildlife Area. By the use of explosives or other suitable methods, selected areas of this marsh habitat would be deepened to inhibit the growth of cattails, which is presently excessive.

6. Salton Sea National Wildlife Refuge. An additional 600 acres of land would be purchased for the Salton Sea National Wildlife Refuge, and approximately 400 acres of the total refuge area would be used to establish ponds and marsh habitat. A source of water supply to implement this concept is presently unknown.



A. O. Peck
Chairman

cc:
See attached list

cc:

- Mr. Lowell O. Weeks, General Manager, Coachella Valley County Water District, P.O. Box 1058, Coachella, California 92236
- Mr. Edward E. Littrell, Associate Wildlife Manager Biologist, California Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814
- Mr. Robert Folker, Division of River Basin Studies, Fish and Wildlife Service, 2855 East Coast Highway, Room 232, Corona del Mar, California 92625
- Mr. Robert F. Carter, General Manager, Imperial Irrigation District, P.O. Box 937, Imperial, California 92251
- Mr. Ronald E. Powell, Associate Wildlife Manager Biologist, California Department of Fish and Game, 141 South Broadway, Blythe, California 92225
- Mr. Vernon E. Valantine, Assistant Chief Engineer, Colorado River Board of California, 107 South Broadway, Room 8103, Los Angeles, California 90012
- Mr. R. Kahler Martinson, Regional Director, Fish and Wildlife Service, P.O. Box 3737, Portland, Oregon 97208
- Mr. E. C. Fullerton, Acting Director, California Department of Fish and Game, 1416 Ninth Street, Sacramento, California 94814
- Mr. Robert Montgomery, Regional Manager, Region 5, California Department of Fish and Game, 350 Golden Shore Avenue, Long Beach, California 90802
- *Mr. F. Phillip Sharpe, Environmental Specialist, Lower Colorado Region, Boulder City, Nevada
- *Mr. T. H. Moser, Project Manager, Yuma, Arizona
- *Mrs. Mildred J. Elkins, Environmental Office, Yuma Projects Office, Yuma, Arizona

*Bureau of Reclamation members of the Ad Hoc Committee 1



United States Department of the Interior

BUREAU OF RECLAMATION

LOWER COLORADO REGIONAL OFFICE

P.O. BOX 427

BOULDER CITY, NEVADA 89005

APR 11 1975

IN REPLY
REFER TO: LC-150
120.1

Mr. Lowell O. Weeks
General Manager
Coachella Valley County Water
District
P.O. Box 1058
Coachella, California 92236

Mr. Edward E. Littrell
Associate Wildlife Manager
Biologist
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Mr. Ronald E. Powell
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141 South Broadway
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Mr. Vernon E. Valantine
Assistant Chief Engineer
Colorado River Board of
California
107 South Broadway, Room 8103
Los Angeles, California 90012

Attention: Mr. Andros Peck, Chairman

Gentlemen:

The Bureau of Reclamation has received for consideration of approval the Fish and Wildlife Ad Hoc Committee's recommendations for mitigation measures concepts for the Coachella Canal Unit, Colorado River Basin Salinity Control Project, Title I, in California. Reclamation appreciates and commends the Committee for its action in performing the necessary fieldwork and intense coordination and cooperation necessary to formulate the recommendations. The full cooperation and participation of your various organizations are also appreciated. It is of considerable value to the project that the recommendations have been received in a most timely manner. The continued efforts of the Committee through implementation of mitigation measures will prove no less valuable to the project.

In the decisionmaking process to approve and accept mitigation measures concepts for development and implementation, Reclamation, within project authority and objectives, must comply with certain conditions and be in



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harmony with the Coachella Valley County Water District. Support documents for project authorization include a sum of \$300,000 for fish and wildlife features with no accompanying approved plan of development. By that same documentation a large part of this amount will be repaid by the Coachella Valley County Water District and will be defined by feature and cost in a District repayment contract with the Federal Government. This amount appears to be insufficient to provide compensatory measures to the extent that the recommended measures will mitigate fish and wildlife losses to be incurred by lining the first 49 miles of the Coachella Canal. However, the legislation provides for funding of project modifications that are authorized by the Secretary of the Interior subject to submittal to the appropriate committees of Congress.

Therefore, in consideration of the above, Reclamation will prepare and present for Secretarial approval, a request for project modification that will include authorization for up to \$486,000 in addition to the \$300,000 for fish and wildlife mitigation concepts. The request must be supported by an analysis of the impacts that will result from the project and an evaluation of the benefits that will be derived from additional mitigation funding.

It is within these constraints the Bureau of Reclamation accepts mitigation concepts recommended in the Fish and Wildlife Ad Hoc Committee's letter dated March 4, 1975, with modifications substantially as discussed at the Ad Hoc Committee meeting April 2, 1975. These concepts are outlined in the following paragraphs:

A. Measures Which Will Be Associated with Coachella Valley County Water District Repayment Contract

1. Combine select habitat with watering devices in the following manner. -- Better quality wildlife habitat within major washes adjacent to the Coachella Canal will be defined and designated as permanent management areas if the selected area is now under unencumbered Federal ownership. Within the selected acreage the game and fish agencies will designate sites for approximately 10 wildlife watering devices equipped with 1,200 gallon tanks with overflow spill blocks. Water for the tanks will be provided by ground water pumped from wells equipped with mechanical windmills. Following a specified period of time to assure proper operation of the facilities, the California Department of Fish and Game will assume the responsibility for periodic operation and maintenance of these facilities. Cost estimates for these facilities are \$4,000 per unit, for a total of approximately \$40,000.
2. Lake concept as modified and discussed at the April 2, 1975, meeting. -- Lease about 280 acres of land at the northwesterly

end of the Salton Sea which are to be designated a management area. Construct a 10- to 20-acre freshwater recreation and fishing lake within the area. Recreational use facilities and fish and wildlife improvements may be a part of the plan of development. Ground water or irrigation drainage water will be utilized for the lake. A water right is not stipulated. The location, configuration and size of the lake within the 280-acre area will be coordinated through the Ad Hoc Committee. Fish stocking and fish and wildlife management will be the responsibility of the California Department of Fish and Game. Operation and maintenance will be the responsibility of the managing agency. Expenditures for this concept will not exceed \$260,000. The magnitude of development of individual segments of this concept will be related to a master plan concurred upon by the Ad Hoc Committee.

B. Measures Not Associated with Coachella Valley County Water District Repayment Contract

1. Finney-Ramer Unit modified as discussed at the April 2, 1975, meeting. -- In lieu of blasting open water areas, utilize Reclamation's dredge to open an area approximately 70 feet wide for a distance of 2 miles to a depth of 8 to 12 feet or equivalent. The configuration and location of the cleared area will be developed by the California Department of Fish and Game and the Ad Hoc Committee. The open area will be irregular in shape and the spoil will be used for the development of sloping banks, low dikes for marshes and the creation of minimum slope islands for enhancement of vegetation suitable to wading and shore birds, particularly the Yuma clapper rail. Operation and maintenance of the area will remain the responsibility of the California Department of Fish and Game. The cost for this concept is estimated to be approximately \$209,000.
2. Salton Sea National Wildlife Refuge -- Acquire part or all of 364 acres of land that have been identified and selected for expansion of the Salton Sea National Wildlife Refuge. This acreage can be obtained in two separate parcels, or a single parcel, as may be indicated by the level of additional mitigation required.
 - a. A 162-acre parcel will be obtained for approximately \$105,000. The acquisition will increase the acreage for mitigation of suitable rail habitat within an area under wildlife management.
 - b. A 202-acre parcel may be purchased for approximately \$172,000. Acquisition of this parcel will provide

additional area for ponds and marsh habitat. Water for this purpose could be purchased from the Imperial Irrigation District and/or by the use of agricultural drain flows.

3. Canal freeboard roughening -- As discussed by the Ad Hoc Committee at its April 2, 1975 meeting, this concept will not provide tangible benefit to wildlife and was dropped from further consideration.

The following is a recapitulation of the foregoing concepts:

A. Mitigation Concepts Associated with District Repayment Contract

1.	10 watering devices at \$4,000 per unit	\$ 40,000
2.	280 acres of land and construction of a 10- to 20-acre lake	<u>\$260,000</u>
	Subtotal	\$300,000

B. Mitigation Concepts Not Associated With District Repayment Contract

1.	2 miles of channel or equivalent in Finney-Ramer Unit	\$209,000
2.	Salton Sea National Wildlife Refuge	
	(a) 162-acre parcel	\$105,000
	(b) 202-acre parcel	<u>\$172,000</u>
	Subtotal	\$486,000
	TOTAL	<u>\$786,000</u>

We look forward to your prompt response to the Bureau's level of accepting your recommendations and to cooperating with you in implementing the agreed-upon mitigation measures.

Sincerely,

MANUEL LOPEZ, Jr.
Acting For
E. A. Lundberg
Regional Director

cc:

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