

PHYSICAL  
SCI. LIB.

TC

824

C2

A2

NO. 117:21

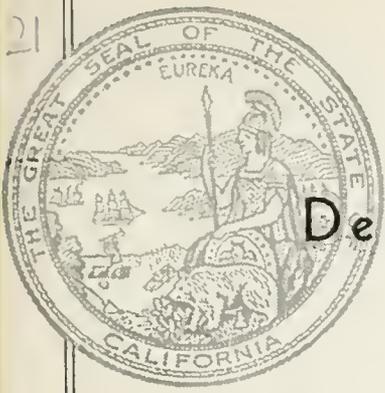
CALIFORNIA. DEPT. OF WATER RESOURCES.  
BULLETIN.

**U.C.D. LIBRARY**

**1921**

JUL 16 1974

21



STATE OF CALIFORNIA  
The Resources Agency

Department of Water Resources

BULLETIN No. 117-21

WILDLIFE HABITAT ENHANCEMENT PLAN  
MOJAVE DIVISION - CALIFORNIA AQUEDUCT  
SOUTHERN CALIFORNIA

UNIVERSITY OF CALIFORNIA  
DAVIS  
APR 29 1974  
GOVT. DOCUMENTS

**U.C. LIBRARY**

MARCH 1974

NORMAN B. LIVERMORE, JR.  
Secretary for Resources  
The Resources Agency

RONALD REAGAN  
Governor  
State of California

JOHN R. TEERINK  
Director  
Department of Water Resources



STATE OF CALIFORNIA  
The Resources Agency  
Department of Water Resources

BULLETIN No. 117-21

WILDLIFE HABITAT ENHANCEMENT PLAN  
MOJAVE DIVISION - CALIFORNIA AQUEDUCT  
SOUTHERN CALIFORNIA

Copies of this bulletin at \$1.00 each may be ordered from:

State of California  
DEPARTMENT OF WATER RESOURCES  
P.O. Box 388  
Sacramento, California 95802

Make checks payable to DEPARTMENT OF WATER RESOURCES  
(California residents add 5 percent sales tax)

MARCH 1974

NORMAN B. LIVERMORE, JR.  
*Secretary for Resources*  
The Resources Agency

RONALD REAGAN  
*Governor*  
State of California

JOHN R. TEERINK  
*Director*  
Department of Water Resources



## FOREWORD

The benefits to Californians from construction of the State Water Project are expected to continue to multiply as the years go by. Not only will it meet their needs for adequate supplies of good quality water and for essential flood protection, but it will also provide them with a convenient location for a variety of recreational activities--the list of which is still growing.

In recognition of this added benefit, the California Legislature, under provisions of the Davis-Dolwig Act (Water Code Sections 11900-11925), gave the Department of Water Resources the responsibility for acquiring land and planning for recreation and fish and wildlife habitat enhancement features in connection with the State Water Project. In planning for the enhancement of fish and wildlife habitats, the Department has been assisted by the California Department of Fish and Game.

This Bulletin is based on an office report, "Wildlife Preservation and Enhancement Plan for California Aqueduct - Mojave Division" dated February 1973, prepared by the Department of Fish and Game.

The capital improvements described in this report are to be developed by the Department of Fish and Game. Management of the wildlife habitat area enhanced by this proposal and enforcement of game laws will also be handled by the Department of Fish and Game.



John R. Teerink, Director  
Department of Water Resources  
The Resources Agency  
State of California  
March 15, 1974

CONTENTS

	<u>Page</u>
FOREWORD . . . . .	3
ABSTRACT . . . . .	6
RECOMMENDATION . . . . .	6
INTRODUCTION . . . . .	7
PROJECTED DEMAND AND USE . . . . .	7
WILDLIFE HABITAT ENHANCEMENT PLAN . . . . .	7
LAND ACQUISITION . . . . .	12
OPERATION PLAN . . . . .	13
BENEFITS AND COSTS . . . . .	13

COORDINATION

Coordination was maintained with the agencies shown below throughout the preparation of the plan:

State of California

Department of Fish and Game

Department of Parks and Recreation

Wildlife Conservation Board

County of Los Angeles

Agricultural Commission

Department of Forester and Fire Warden

County of San Bernardino

Agricultural Commission

State of California  
The Resources Agency  
DEPARTMENT OF WATER RESOURCES

RONALD REAGAN, Governor  
NORMAN B. LIVERMORE, JR., Secretary for Resources  
JOHN R. TEERINK, Director, Department of Water Resources  
ROBERT G. EILAND, Deputy Director  
ROBERT B. JANSEN, Deputy Director

SOUTHERN DISTRICT

Jack J. Coe . . . . . District Engineer  
Richard E. Angelos . . . . . Chief, Water Resources  
Implementation Section

This report was prepared under the direction of  
Harold H. Murata . . . . . Recreation Program Manager

-by-

Alan W. Manee . . . . . Environmental Specialist II

With the assistance of  
Phyllis Yates . . . . . Research Writer

Basic enhancement plan was prepared by

DEPARTMENT OF FISH AND GAME  
CONTRACT SERVICES SECTION

Peter W. Gelfand . . . . . Junior Wildlife Manager Biologist

With the assistance of  
John D. Massie, Harold C. Cribbs, Kenneth D. Aasen

Under the supervision of  
Richard H. Davidson . . . . . Wildlife Management Supervisor

## ABSTRACT

This bulletin presents plans for wildlife habitat enhancement and associated recreation features in the Mojave Division of the California Aqueduct. This Division of the Aqueduct extends for approximately 100 miles from Aqueduct Bifurcation in northwestern Los Angeles County, southeasterly across the southern border of Antelope Valley, to the inlet of Silverwood Lake in southwestern San Bernardino County. These plans will provide opportunities for hiking, nature studies, photography, hunting, and sightseeing.

The proposed development will consist of a tree and shrub planting program on 1,500 acres within the fenced Aqueduct right of way and 330 acres of adjoining State Water Project lands. A 25-acre wetland marsh and parking lot will be created within the Aqueduct right of way. Also, four 15-car parking lots will be developed at selected locations along the right of way. The features, which will require five years to develop, will be completed in 1979. The estimated costs for the proposed features are \$159,000; funds for this program will be provided by the Recreation and Fish and Wildlife Enhancement Bond Act of 1970 (Proposition 20). These enhancements will serve about 14,000 recreation days annually by 1980.

## RECOMMENDATION

In accordance with the Davis-Dolwig Act, it is recommended that the Legislature appropriate funds as requested in future budgets of the Department of Fish and Game to develop the improvements described in this report.

## INTRODUCTION

The Mojave Division of the California Aqueduct extends for approximately 100 miles from the Aqueduct Bifurcation in northwestern Los Angeles County, south-easterly across the southern border of Antelope Valley, to Silverwood Lake in the San Bernardino National Forest in southwestern San Bernardino County. (See Figure 1.) In this reach, three major biotic communities (Mojave Desert, California Coastal Mountains, and Great Basin) are crossed.

Because lands within the Mojave Division are potential wildlife habitat areas, a plan for their enhancement has been developed. It involves 1,830 acres and will require 5 years to carry out. This bulletin sets forth details of the plan.

The purpose of the plan is to identify specific programs which will be carried out to ensure the enhancement of potential wildlife areas in the Mojave Division of the California Aqueduct.

## PROJECTED DEMAND AND USE

Essential to development of the plan was an evaluation of the demand and use potential for such a recreation area. The principal factors used in analyzing the demand along the Mojave Division of the Aqueduct are: (1) the proximity of the Aqueduct to communities experiencing rapid growth, and (2) the heavy use now being made of similar recreation facilities in the general area. These factors indicate that substantial long-term use would be experienced.

An additional factor contributing to this sustained use is the ease of access along the Aqueduct. Numerous state and county roads, including Interstate Highways 5 and 15, will provide adequate

access along the 100-mile reach of the Aqueduct.

Completion of the five-year enhancement project is scheduled for 1979. The initial recreational use of the first phase development is expected to be light. Use will increase steadily until the last phase enhancements are completed and the trees and shrubs mature. Estimates are that, by 1980, accommodations will provide for 14,100 recreation-days of annual use.

## WILDLIFE HABITAT ENHANCEMENT PLAN

Within the right of way of the Aqueduct, 1,500 acres will be developed as part of the enhancement plan. In addition, excess land parcels, totaling about 330 acres, are recommended to be retained for the development of both wildlife habitat and parking area facilities that will provide public access to Project lands (Figure 1). These lands have high potential for wildlife development and furnish, by their addition to existing Aqueduct lands, the essential parcel size required for effective wildlife management.

The Ritter Canyon and Hesperia Aquatic Recreation Areas, both of which adjoin the California Aqueduct, will further complement the proposed enhancement. The patrol service road of the Aqueduct will serve as the California Aqueduct Bikeway. Bicyclists as well as fishermen and other users will have the opportunity to observe the improved habitat and its inhabitants. In contrast to the predominantly dry desert-like surroundings, the roadside vegetative growth will provide a pleasing visual effect. The combined effects of existing and proposed enhancement along the Aqueduct will substantially improve

LEGEND

- ▬ LANDS WITHIN FENCED RIGHT-OF-WAY FOR WILDLIFE ENHANCEMENT
- LANDS OUTSIDE FENCED RIGHT-OF-WAY FOR WILDLIFE ENHANCEMENT
- PARKING AREAS (4)
- ▲ WETLAND MARSH AREA (1)

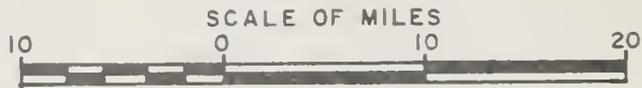
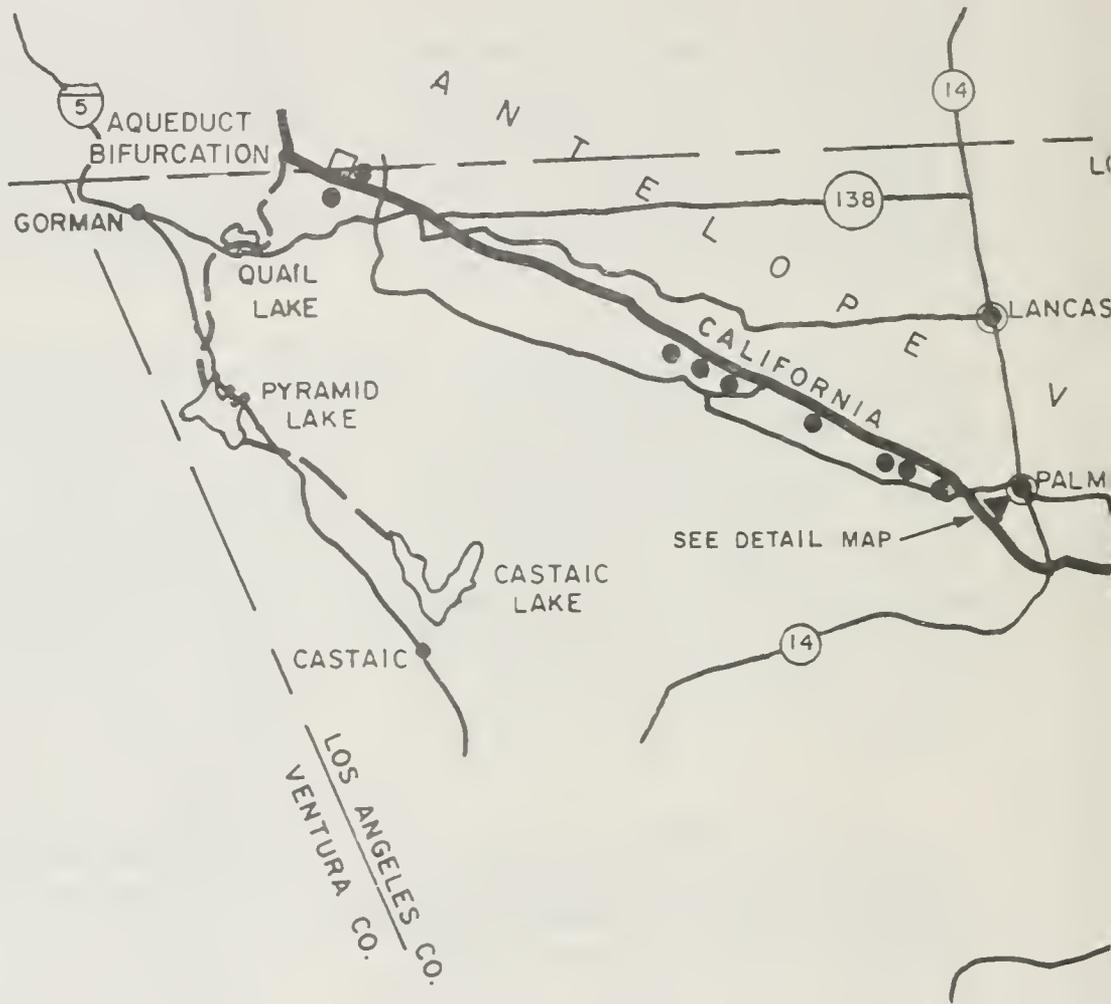


FIGURE I - CALIFORNIA AQUEDUCT - MOJAVE



CO.  
LES CO.

LOS ANGELES CO.  
SAN BERNARDINO CO.

L E Y

PEARBLOSSOM

395

15

VICTORVILLE

AQUEDUCT

138

CAJON

SILVERWOOD LAKE

LAKE ARROWHEAD

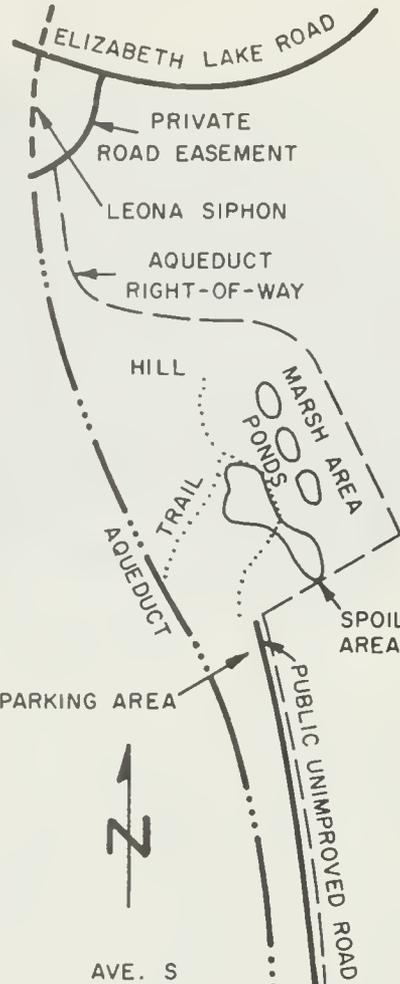
BIG BEAR LAKE

18

66

10

SAN BERNARDINO



WETLAND MARSH DETAIL MAP



BEFORE PLANTING--Canalside habitat along much of the Mojave Division of the Aqueduct looks like this. Within these areas, between the fence line and the Aqueduct, most of the enhancement will take place.

the esthetic quality of the Aqueduct and all adjacent areas.

#### Tree and Shrub Planting

The 1,830 acres of land will be developed with trees and shrubs over a 5-year period. A plan of this scope requires the selection of plant species that (1) are easily established, (2) require a minimum of annual maintenance, (3) are of known value as a food and/or cover source for wildlife, (4) may be established and maintained with a minimum of irrigation, and (5) are adapted to soil conditions at the planting site. Species that meet these biological requirements and that are approved by the Agricultural Commissions of both Los Angeles and San Bernardino Counties, the Department of Water Resources, and the Department of Fish and Game will be planted. The trees and shrubs will be irrigated at their time of planting and once again during the summer of their first year.

The limited vegetation now growing alongside the Mojave Division of the Aqueduct is of little value to wildlife. Further, present operation and maintenance practice calls for periodic removal because some of the plants are nuisance varieties. Over 1,500 acres

of wildlife habitat will be planted with suitable trees and shrubs.

This enhancement will be beneficial in (1) providing food and cover for wildlife; (2) increasing the onsite and, to a lesser degree, the offsite wildlife carrying capacity; (3) enhancing the esthetic quality of the area; (4) reducing the deleterious effects of winds across the State Water Project area and the rates of windblown sediments deposited in the Aqueduct; (5) controlling weeds; (6) improving soil stabilization; and (7) increasing the recreational value of State Water Project lands.

Similar programs in the San Joaquin Valley have met with much success. During the fall of 1972 the Department of Fish and Game counted 167 pheasants in a 1/2-mile stretch of the enhanced area where formerly none had been found.

These canalside plantings are providing an opportunity for a variety of recreation activities, in addition to controlling erosion, providing tumbleweed barriers, and enhancing the esthetic quality of the area.

Recreationists will be provided with enhancement at onsite and offsite areas



AFTER PLANTING along the Aqueduct in the San Joaquin Division, habitat useful for birds and other wildlife has been established. At right is an experimental planting of mesquite, atriplex, and bladderpod.

for sightseeing, photography, hiking, nature studies, and hunting where permitted. The enhancement areas will serve also as shelter and rest areas for unscheduled and emergency stops by bicyclists and other recreationists.

#### Wetland Marsh Area

A 25-acre wetland marsh will be developed in an area of permanent seepage along Anaverde Creek between Elizabeth Lake Road and Avenue "S" on the northeast side of the Aqueduct (Figure 1). The area will be formed by developing a series of elongated ponds with an overall surface area of approximately 20 acres. Slope of the ponds will be on 3:1 horizontal to vertical to ensure maximum germination of the alkali bulrush on the periphery of the ponds. The excavated material from the pond construction will be placed on the south side of the marsh and planted with trees and shrubs to provide food and cover for wildlife. Freshwater wetland and marsh habitats are in critical supply in California, and their development is of great importance in providing a greater habitat base for the associated flora and fauna. This development will provide a resting and feeding area for waterfowl of the Pacific Flyway and should result in a substantial increase in waterfowl values for hunters and nonhunters.

At the site of the future marsh area adjacent to Avenue "S", the cattails now there will be removed, and small ponds will be formed. The shoreline will be planted with suitable species such as watergrass and alkali bulrush to provide food for the migrating waterfowl of the Pacific Flyway.

Recreationists will be provided with a unique setting for a range of recreation activities, including waterfowl hunting. A dirt foot trail throughout the marsh area will allow for its full utilization.

#### Access Facilities

The marsh will be entirely within the Aqueduct right of way. Access to the area will be from Avenue "S" via the existing dirt road which is within state lands. A small, 15-car parking lot adjacent to the access road will be provided.

Parking lots, each accommodating 15 cars, will be developed along the Aqueduct at 290th Street West, 131st Street East, 213th Street East, and Las Flores Road. Each area, containing approximately 4,500 square feet, will be graded and gravel surfaced. Entrances for the Aqueduct bikers and fishermen will also serve as access to the enhancement areas.



SITE OF PROPOSED wetland marsh  
as it looks today



WETLAND MARSH that has been  
developed under a similar  
program in the Delta area.

#### Hunting

Hunting will be permitted on the wildlife enhancement areas under the following criteria:

1. Applicable federal, state, and county ordinances, laws, rules, and regulations must be observed.
2. Applicable Department of Water Resources operations and maintenance policies must be observed. Current policies restrict the discharge of

firearms within 150 yards of any building, check structure, or designated recreation area.

3. Firearms may not be discharged from, over, or toward the Aqueduct or its maintenance roads.
4. Waterfowl hunting may be permitted only within the marsh area.
5. Methods of take are restricted to shotguns.

#### Other Facilities

Consideration of nature trails with interpretive signs in selected adjoining enhancement areas, coupled with information signs along the Aqueduct, will be encouraged in any future recreation development for this area.

#### LAND ACQUISITION

Along the Aqueduct in the Mojave Division more than 250 separate land parcels totaling about 1,200 acres were examined for their recreation, fish and wildlife enhancement potential. These parcels, which lie outside the fenced right-of-way, range in size from only a few square feet to more than 70 acres.

Fifty-two of these parcels, totaling approximately 330 acres, with an estimated current value of about \$110,000, were determined as having recreation and fish and wildlife enhancement values. The criteria used to determine which land parcels warranted retention as part of this enhancement are (1) potential for wildlife habitat with and without improvements; (2) availability and potential for access to the parcel; and (3) costs of enhancing a parcel.

Because all these excess land parcels are owned by the State, the proposal will not require a land acquisition program. The Department of Water Resources will transfer to the Department of Fish and Game rights to use those lands retained

for the development and management of the habitat for wildlife enhancement benefits.

These lands will be retained specifically for recreation, fish and wildlife enhancement purposes. Reimbursement for the costs related to the acquisition of these lands will be made through the provisions of the Davis-Dolwig Act.

#### OPERATION PLAN

The Department of Water Resources and the Department of Fish and Game will enter into an agreement which will define the responsibilities for the management of the project areas.

Responsibility for planting and for maintaining the planted areas will lie solely with the Department of Fish and Game. Included will be any required control of weeds, rodents, and other pests.

Fish and Game will also assume administration of wildlife development on all lands outlined in this report.

Water Resources will provide water from the California Aqueduct for irrigation of enhancement areas along the Aqueduct right of way. Water for the marsh area will come from a permanent seepage of Anaverde Creek.

In dry years it may be necessary to supplement the pond with Aqueduct water. Fish and Game will coordinate pumping operations with Water Resources, and portable pumps will be used. Up to 1,000 acre-feet of Aqueduct water will be made available for irrigation of trees and shrubs during the first 5 years.

#### BENEFITS AND COSTS

The methods of establishing benefits in dollars for the proposed activities were based on "The Interim Benefit Value

TABLE I  
ESTIMATED ANNUAL USE  
AND BENEFITS

Activity and Annual Use	Unit Benefit Value	Annual Benefit
General recreation use at 5,000 recreation-days	\$1.50	\$7,500
Nature photography at 2,000 recreation-days	3.25	6,500
Fishermen use at 5,000 recreation-days	1.75	8,750
Hunting at 2,100 recreation-days	4.00	8,400
Total use at 14,100 recreation-days		\$31,150

Guidelines for Specialized Recreation", dated July 25, 1968, which were adopted by the Departments of Water Resources and Fish and Game.

About a third of the total use will be general sightseeing and wildlife observation by individuals, educational groups, bird clubs, etc. Another third of the total use is attributed to Aqueduct fishermen use of the parking lots adjacent to wildlife habitat enhancement areas. The remaining third of the total use is derived from such uses as nature photography, upland game hunting, and waterfowl hunting on the marsh area.

Additional indirect benefits of the enhancement plan such as weed control, slope stabilization, enhanced esthetic qualities, etc., although not converted to dollar values, will eventually add to the overall benefits derived from the proposal.

Under conditions of full development, the project enhancement will offer a variety of opportunities and is expected to generate the benefits as shown in Table 1.

The capital cost of all habitat enhancement and recreation facilities is estimated to be approximately \$159,000, of which \$155,000 will be allocated to tree and shrub planting, \$2,000 to the development of parking lots, and \$2,000 to the development of the wetland marsh area.

Funds for the implementation of this plan would be provided by the Recreation and Fish and Wildlife Enhancement Bond Act of 1970 (Proposition 20).

Because the habitat enhancements are planned to be made along the Aqueduct Bikeway, the annual user operation

and maintenance costs will be minimal and, based on a unit assignment of \$0.05 per user-day, were estimated to be \$700. Tree and shrub plantings are expected to be self-sustaining; however, the annual replacement costs, based on one-half percent of the development costs, were estimated to be \$800. The average water use during the 5-year nurturing period was estimated to be 350 acre-feet at a cost of \$7,350. Thereafter, the yearly water use would be 5 acre-feet at a cost of \$105.

All identifiable recreation and wildlife enhancement benefits and costs have been converted to the present worth value in 1973. Based on a 50-year analysis at 5 percent interest, the estimated total present worth benefit is \$523,000 and the present worth cost is \$310,000. The resulting benefit cost ratio is 1.7 to 1.0.







THIS BOOK IS DUE ON THE LAST DATE  
STAMPED BELOW

927 58

BOOKS REQUESTED BY ANOTHER BORROWER  
ARE SUBJECT TO RECALL AFTER ONE WEEK.  
RENEWED BOOKS ARE SUBJECT TO  
IMMEDIATE RECALL

LIBRARY, UNIVERSITY OF CALIFORNIA, DAVIS

D4613 (12/76)



3 1175 00574 6220

