SALTON SEA NATIONAL WILDLIFE REFUGE

CALIPATRIA, CALIFORNIA

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1990

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVAL

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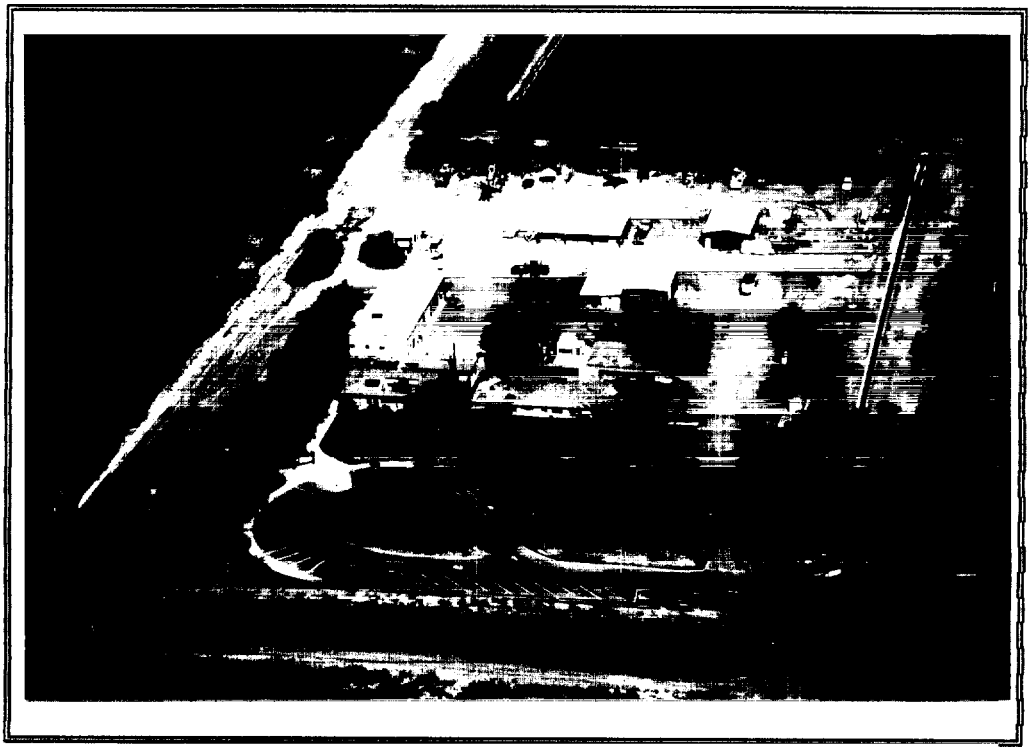
Refuge Manager — Date: 7/9/91

Refuge Supervisor Review — Date

Regional Office Approval — Date

INTRODUCTION

Salton Sea National Wildlife Refuge is located 40 miles north of the Mexican border at the southern end of the Salton Sea in California's Imperial Valley. Situated in the Pacific Flyway, Salton Sea is the only refuge located below sea level. Because of its southern latitude, -226 foot elevation, and location in the upper Colorado Zone of the Sonoran Desert, the Refuge experiences some of the highest temperatures in the nation. Daily temperatures from May to October generally exceed lOO°F with temperatures of 116°-119°F recorded yearly.



Salton Sea NWR headquarters and manager's quarters support both habitat development and visitor facilities. 2/13/91 WRR

The Refuge was established in 1930 for the protection of waterfowl and other migratory birds. Originally, it included approximately 35,000 acres, Nearly 60 percent of the original acreage was open saline lake with the balance comprised of shoreline alkali flats, freshwater wetlands, native desert scrub and upland (farm fields). Due to the inflow of agricultural effluent and a subsequent rise in the level of the Salton Sea, all of the original refuge area has been inundated. In 1947, 24,000 acres were leased from the Imperial Irrigation District and divided between three agencies: California Department of Fish and Game (CDF&G), U.S. Navy, and U.S. Fish and Wildlife Service (USFWS). Most of the current Refuge acreage of 47,827 acres has been flooded by a continued rise in the level of the Sea. At present, 2,500 acres of the Refuge is dry ground, with about 2,200 acres suitable for farming and wetland development.

Salton Sea NWR is flat with the exception of Rock Hill located near the Refuge headquarters. It is bordered by the Salton Sea on the north and intensively farmed agricultural lands on the east, south and west. The Refuge is divided into two units, eighteen miles apart. Each unit contains managed wetland habitat, agricultural fields, alkali mudflats, and desert brushlands.

The New and Alamo Rivers border the Refuge. Both provide freshwater inflow to the Sea. The New River's source is urban effluent and agricultural drainage from Baja California and the Mexican border town of Mexicali. The Alamo River's source is agricultural drainage from the Imperial Valley.

The Salton Sea basin was a prehistoric extension of the Gulf of California and is the largest saline lake in California. It forms a natural sump for the 4,500 square mile Imperial Valley and northern Baja California with its only inflow source being either rainwater or agricultural drainage, The salinity of the Sea has steadily increased. In 1950, it was 35 parts per thousand (ppt), equaling the Pacific Ocean. In 1989, it was 44 ppt, fully twenty-five percent saltier than the Pacific Ocean. With evaporation in the range of ten feet per year salinity levels will continue to increase.

Habitat management emphasis is placed on the maintenance and improvement of wintering goose and duck habitat, and the reduction of waterfowl depredations to adjacent croplands. Protection and enhancement of nesting habitat for the endangered Yuma clapper rail, maintenance of habitat for nesting and migratory populations of sensitive species and other marsh birds and shorebirds, also are major objectives.

Salton Sea NWR provides habitat for over 375 bird species, 40 mammal species, and many reptiles and amphibians. The Refuge winters up to 30,000 snow, Ross' and Canada geese, and 60,000 ducks daily from November through February. Marsh birds and shorebirds account for more than six million use-days each year. Endangered species observed on the Refuge include the southern bald eagle, peregrine falcon, California brown pelican, and Yuma clapper rail. A significant Yuma clapper rail population nests on the Refuge. Sensitive species using the Refuge include the fulvous whistling duck, wood stork, long-billed curlew, mountain plover, western snowy plover, and white-faced ibis,

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS PAGE

A. HIGHLIGHTS

Several personnel changes occurred during 1990. (Section E.l)

Biological control methods were investigated to control cutworms in refuge alfalfa fields. (Section F.lO)

Endangered desert pupfish were documented on refuge waters for the first time since 1986. (Section 6.2)

Unprecedented numbers of brown pelicans and boobies utilized the Salton Sea during summer months, raising concerns about contaminant concentrations in the fish they are eating. (Sections G.2, G.5 and H.ll)

An additional two bird species are documented on the refuge during 1990, (Section G.7)

The waterfowl feeding issue was finally resolved by court decision, clearing the way for enforcement of Federal baiting regulations. (Section H.17)

B. CLIMATIC CONDITIONS

Weather in the Imperial Valley can be characterized as having extremely hot summers and mild winters. The growing season lasts all year, with most farmers in the valley usually getting at least two crops per field per year,

With annual evaporation reaching up to 10 feet, water conservation measures will be certain to continue the trend toward a declining sea level. 9/3/90 WRR

From May 5 through September 17 (136 days) 118 days had maximum temperatures of 100°F or higher. The highest temperature for the year was 117°F on June 26. These high temperatures combined with noon-time relative humidity reaching 45% or higher can make outside working conditions health threatening unless proper precautions are taken. The lowest temperature for the year was 21°F recorded on December 23. During Christmas week thin layers of ice were seen on all ponds near the headquarters (covering as much as half of the pond surface) and on many ponds on the Hazard Tract and at Unit I; an unusual sight.

In 1990 the Imperial Valley received 1.40 inches of rain, with nearly an inch of rain falling in August during tropical thunder showers (not unusual for the time of year). However, rainfall for the year was approximately one half of the long term average of 2.87 inches per year and continued the below average trend for the fourth consecutive year. Monthly temperatures, precipitation, and humidity are summarized in the table below.

The level of the Salton Sea changed as water conservation became more of a reality to valley farmers. The Sea level decreased by 0.22 feet from 1989 sea level average (-226.98' sea level in 1989 to -227.20' below sea level in 1990). The highest sea level was recorded on May 8 at -226.62' and the lowest on December 21 at -227.78'. Total water evaporation for the year was 109 inches.

1990 SALTON SEA NWR CLIMATIC DATA*

MONTH	TEMPERATURE MAX	MIN	MEAN TEMP.	PRECIPITATION	AVERAGE REL, HUMIDITY
January	78	31	55	0.14	37%
February	86	29	58	0.02	30%
March	93	41	66	0.06	27%
April	99	53	74	0.05	26%
May	102	54	77	Trace	20%
June	117	59	87	0.00	20%
July	114	69	92	0.00	31%
August	109	67	89	0.89	32%
September	112	65	86.5	0.09	32%
October	99	50	75	0.21	28%
November	87	36	63	0.00	29%
December	77	21	51	0.00	30%
TOTAL				1.46	

*Weather data obtained from Imperial Irrigation District.

C. LAND ACQUISITION

3. Other

Current refuge lands (2500 acres) is not considered sufficient to meet the objectives for waterfowl and endangered species maintenance. Opportunities to expand land based habitat are continually sought, however, agricultural and geothermal interests have combined to place a high demand (and price) on land which could be considered available. Current market value ranges from $2500/acre for poorer soils within the irrigated agricultural district to $5000/acre for better ground or land with geothermal potential (the $5000 does not include sub-surface mineral rights).

There is a renewal of efforts to expand wetland habitat acreage in Imperial Valley as a result of the Service's (and federal court's) decision to stop the waterfowl "feeding" program on hunt clubs. It was generally felt that if hunt clubs could no longer feed to attract birds, natural foods habitat was so scarce that birds would simply continue on to Mexico.

The directive came down from the Regional Director to obtain manageable habitat (for wetlands purposes) by whatever method available - easement, cooperative agreement, or acquisiton (no funds identified). Efforts have been concentrated on areas adjacent to existing refuge or protected habitat of some sort, as we did not want to get into a program of trying to manage small, disjunct pieces of ground scattered all over - plus, creating habitat in areas of no traditional bird use would probably not be very productive, With this in mind, the following is a summary of efforts during the year:

a. Acquisition proposal submitted for Benson Tract on south end of Unit I, 120 acres fee title, low priority, willing seller basis. Mr. Benson is interested, RO is not at this time.

b. Magma Geothermal revisited and proposal submitted whereby the Service would manage approximately 360 acres of agricultural land under their ownership. If an agreement can be worked out involving property adjacent to existing refuge which would enable us to extend our farming program, existing marginal agricultural land could then be converted to wetlands. This proposal is still being negotiated.

c. Three proposals have been submitted to Imperial Irrigation District involving 300 acres of District property on the edge of Salton Sea. Approximately 220 acres is wetland and 80 acres agricultural land. Our purpose here is to secure management of the wetland sites and begin to enhance wetland values through water quality control and water level management. We are asking that IID be "partners" in this effort as there are physical improvements which need to be made to adequately manage the sites, which IID is better equipped to undertake than the refuge. The proposals have been favorably received by IID and a counter-proposal has come back to us where-in the District would like to tie these areas into a broader spectrum of drain maintenance measures that would meet with our approval. (The emphasis point here concerns

the endangered Yuma clapper rail; some of its favored haunts are well vegetated agricultural drains).

d. Under the Farm Bill program, cooperative easements have been approved involving 480 acres of wetland habitat enhancement. Funds were utilized to improve water management capabilities, thereby improving native vegetation and natural foods production on private clubs.

e. Under a separate endeavor, but in the same area of interest, the refuge stands to gain some significant benefits from California Department of Transportation (Caltrans) via mitigation resulting from Caltrans activities on the north end of Salton Sea. Caltrans will be re-aligning and expanding State Highway 86 on the west side of Salton Sea, and connecting with Interstate 8 near Indio. The proposed re-alignment route just happens to pass immediately adjacent to a 200 acre parcel of ground which the Service has a Conservation Easement (in perpetuity) on. This ground (abandoned agricultural) was historic wetland and because of associated impacts by Caltrans it must be mitigated for. Caltrans has calculated the need to mitigate for 100 acres (80 wetland and 20 native upland). It is their desire to do the actual mitigation on land of known value to insure success – as a result they propose to install 80 acres of wetland on the south end of Salton Sea within Unit I of the refuge, and to also establish a 20 acre mesquite upland site in the same area. To do this they must use refuge land that is in agriculture (green browse production for wintering geese), and to do this, Caltrans must mitigate for taking refuge agricultural land out of production. The current rate for mitigation is a 3:1 ratio, What this boils down to is Caltrans must purchase 240 acres of agricultural ground to be deeded over to the refuge (Service) as repayment. Such a tract exists (coincidentally) immediately to the east of Unit I and is owned by Southern Pacific Land Company. By the end of CY 90, Caltrans was close to closing with Southern Pacific on this property and it should come into the hands of the refuge during 1991. Habitat restoration (wetlands) by Caltrans on the refuge is scheduled to begin in the spring of 1992.

D. PLANNING

2. Management Plans

Two management plans received attention in 1990; the Fire Management Plan (FMP) and the Habitat Management Plan (HMP). Recent personnel changes highlighted the need for an updated HMP that detailed management objectives and methods. Portions of an all-new HMP were drafted in 1990, and the completed plan is expected in mid-1991. Highlights of the new plan include increased and revised management schemes to better meet the habitat needs of the endangered Yuma clapper rail, a year-round resident of emergent freshwater marshes. More “permanent” wetlands that are perpetually flooded will be maintained for resident rails and other migratory birds, in addition to seasonally flooded impoundments traditionally managed for migrating and wintering waterfowl.

A revised draft of the FMP was completed late in the year, and a final draft for signature and circulation is expected early in 1991. In addition to updating the refuge fire program, the revised edition also changes the strategies of using fire to manage rail habitat. A three to five year rotational cycle for burning portions of permanent marsh is identified to maintain the vitality and continuity of rail habitat. The need for a heavy duty one-ton 4X4 pickup truck to safely pull the 500 gallon pumper was also identified and remains unapproved.

4. Compliance with Environmental and Cultural Resource Mandates

Although not a specific function of the refuge or funded activity, and for a lack of knowing exactly where to document this in the narrative the following comments are included here for documentary purposes.

Numerous issues have been raised over the years involving water quality in Imperial Valley, specifically that associated with agricultural drainage (Salton Sea, the Alamo and New Rivers). Fish and Wildlife Enhancement, L,aguna Niguel Field Office (LNFO), has been involved in many of these issues as it is one of the functions of that office to represent the Service on endangered species issues. In recent years, either due to staffing or funding shortages, (or both) Laguna Niguel has become less and less involved. These issues have not gone away and, in fact, have accelerated as environmental concerns and water use and associated water quality issues have escalated, particularly with respect to fish, wildlife, and recreational values. The refuge and staff finds itself increasingly involved in these issues in-as-much as we are available (located in the Valley), and LNFO has become less responsive. We are continually being asked for opinions, both biological and regulatory, with respect to wildlife. In many respects we are quick to defer these requests to the appropriate FWS office. However, in another arena, some requests are simply for advice or technical assistance in developing environmentally sensitive plans. There is an opportunity for the Service to participate in planning in Imperial Valley which could have numerous positive impacts to wildlife and would help alleviate the need for regulatory efforts at later dates. The industrial component in Imperial Valley is particularly sensitive to environmental concerns and are extremely willing to accommodate these concerns and very receptive to ecologically sound planning. The problem lies in the fact that there simply is not enough of us at Salton Sea Refuge to accommodate all the requests, maintain liaisons with several projects, or follow-up on critical issues.

5. Research and Investigations

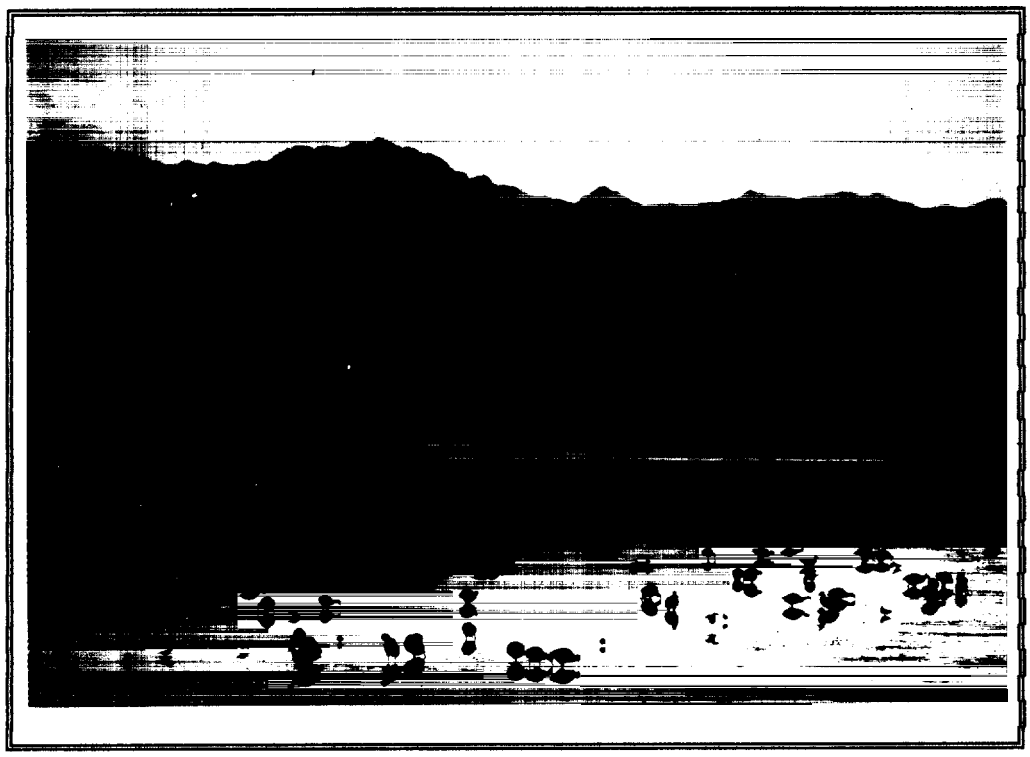
Salton Sea NR90 - "Seasonal Distribution of Northern Pintails in Southern California's Imperial Valley" (11630-9011)

Objectives of this refuge-sponsored study are to help determine and document any changes that may occur in the rate and distribution of pintail harvests in the Imperial Valley as a result of cessation of the southern California feeding programs, and to help identify important pintail migration and wintering areas in order to assist efforts to protect important habitats.

The Service proposed and enforced termination of licensed waterfowl feeding in southern California beginning with the 1990-91 hunting season. This decision reflected the objective of maintaining or increasing waterfowl populations through improved habitat. Opponents to termination of feeding are concerned that the population of wintering pintails will be displaced from the Imperial Valley from lack of food, While the actual impacts of the feeding ban were unknown, the controversial decision will generate inquiries concerning resulting pintail distribution and harvest. It was decided that a waterfowl banding program conducted on the refuge would help provide credible answers concerning distribution and harvest within both the Imperial Valley and surrounding areas. In addition, the Pacific Flyway Study Committee has identified the need to improve information about distribution and derivation of harvests of pintails, requiring an adequate banding effort. Also, the North American Waterfowl Plan's joint venture is seeking to identify and protect important habitats or mitigate losses, and a banding program will assist these efforts.

Because of funding cuts and the subsequent shortage of personnel at the station, only 221 pintail were banded during 1990 (see G.16).

Salton Sea NR90 - "Preliminary Assessment of Reclaimed Sediments for Potential Use as Fish and Wildlife Habitat" (11630-9002)



The Alamo River Delta adjacent to the Hazard Unit supports an ecotone where fresh water and saline waters mix and provide a profusion of foods for coots, waterfowl, and shorebirds. Unocal proposes to build a geothermal plant at the site. 9/21/90 WRR

This study is a cooperative effort between the Service and Unocal Geothermal Company; the Service provides technical assistance and Unocal provides funding. Objectives are to assess the chemistry of representative sediments, assess the leachability of sediments, assess the production of vegetation in leached sediments, determine and assess bioaccumulation of toxic substances from sediments, and assess environmental compatibility of different water types in terms of toxicity and bioaccumulation.

Water conservation measures being implemented in the Imperial Valley are expected to reduce the volume of agricultural drain water flowing into the Salton Sea. Inundated lands already owned by the Service or by the Imperial Irrigation District may be available for reclamation for wildlife habitat following the decline of the Salton Sea. This study will provide information needed to determine the time frame required to sufficiently reduce sediment salinity levels to within vegetation tolerance ranges and will provide baseline data relative to the potential toxicity of sediments to wildlife.

Phase-l results show that leaching salts from Salton Sea sediments can be effectively accomplished by flushing fresh water through the samples. Salinity rates for each of the ,185 cubic yards sediment samples easily reached levels tolerated by alkali bulrush after only 140 liters of leaching with water. There does not appear to be a significant difference in the leaching rates of sediments using class-l irrigation water, geothermal condensate, or a 50: 50 mix of water types.

The following table depicts salinity level analyses results from Salton Sea sediment leaching tests.

Table D.l. Salinity Level Analyses of Leached Salton Sea Sediment Samples,

AMOUNT OF WATER (L) (Cummulative)	SALINITY LEVELS (ppt) A	B	C	D	DATE
After 60L	10.2	21.5	12.0	10.0	09/20/90
After 100L	6.2	18.8	23.9	19.5	
After 140L	4.5	22.8	30.8	25.0	
After 180L	3.5	15.1	22.4	19.0	
After 220L	2.9	10.7	10.9	14.5	
After 260L	2.7	8.4	8.1	8.1	
After 300L	2.0	5.2	6.0	6.3	
After 340L	1.8	4.0	4.9	4.7	
After 380L	1.7	3.0	2.7	2.9	10/10/90

Salton Sea NR90 - "Evaluation of Contaminant Effects on Burrowing Owl Reproduction" (11630-9003)

The primary objective of this refuge-sponsored project is to determine whether contaminants are having an effect on the burrowing owl population in California's Imperial Valley, and identify these contaminants and their potential sources, Secondary objectives will include collection of baseline

information on burrowing owl ecology and population dynamics such as feeding habits, pair and nest site fidelity, productivity, population recruitment, seasonal population changes, and owl longevity.

Burrowing owl populations have generally been declining throughout California and other western states. These owls are the most common small raptor in the Imperial Valley, representing the top of a rather short food chain. A number of threats currently exist which may be having an effect on the local burrowing owl population including ditch maintenance activities, ground squirrel control programs, and pesticide and herbicide use associated with agricultural production.

Although proposed to begin in 1991, lack of support and funding for this project will likely postpone research indefinitely.

E. ADMINISTRATION

1. Personne 1

Salton Sea Staff - Part 1: (left to right) Voget, Laizure, Marquez, Schoneman, Orozco. 4/91 DRD

Salton Sea Staff - Part 2: (left to right) Dinkler, Hunter, Arnett, Radke. 2/27/91 KWV

1. Kenneth Voget - Refuge Manager GS-485-12 PFT

2. Daniel Dinkler - Primary Assistant Refuge Manager GS-485-11 PFT (EOD 3/12/90 from Kern NWRC)

3. William Radke - Wildlife Biologist GS-486-11 PFT (EOD 1/28/90 from Columbia NWR)

4. Ramon Vega - Assistant Refuge Manager GS-485-7 PFT (transferred/promoted to GS-485-9 at Sacramento River NWR 8/19/90)

5. Christian Schoneman - promoted from GS-404-5 Biological Technician to Refuge Operations Specialist GS-485-5 PFT 7/15/90

6. Kathleen Arnett - Administrative Support Assistant GS-303-6 PFT

7. Shelly Hunter - Office Automation Clerk GS-326-4 PFT

8. Lee Laizure - Heavy Equipment Mechanic WG-5803-10 PFT

9. Richard Marquez - Engineering Equipment Operator WG-5716-10 PFT

10. Marcos Orozco - Maintenance Worker WG-4749-8 PFT

11. Jeff Mackay – Wildlife Biologist (Technical Assistance) GS-486-7 TFT (ended pay status 8/26/90 to return to school)

Two new staff members were brought on board this year. Bill Radke transferred from Columbia NWR to assume the duties of the lead Wildlife Biologist for the complex on January 28 and Dan Dinkler transferred from the Kern Complex to assume the duties of the Primary Assistant on March 12.

Two staff members moved on to "greener pastures" in 1990. Technical Assistance Biologist Jeff Mackay returned to Humboldt State University for the fall term to finish requirements for a Master's Degree and Ramon Vega transferred to the new Sacramento River NWR as the first "Assistant-In-Charge" of that station, administered as part of the Sacramento Complex, and gained a promotion to the GS-9 ranks in the process.

Chris Schoneman replaced Ramon as the Manager Trainee, moving over from his Biological Technician slot and gaining permanent full time status and a 5/7/9 ladder in the process. As a result of these personnel actions, the Bio Tech and Technical Assistance Biologist slots remained empty for the remainder of the year, causing schedules and work loads among the remaining staff to tighten up considerably.

2. Youth Programs

The refuge hosted an eight week non-resident Youth Conservation Corps (YCC) program from June 18 through August 10. Applicants 16-18 years of age were solicited from local high schools in April (two high schools exist within a 20 mile radius). Five applications were randomly picked from all applications received and letters acknowledging those selections were distributed to the selected applicants. Carlos Carlon was rehired as YCC crewleader based on his experience as YCC crewleader for the past three years. The enrollee staff consisted of four males and one female, plus the crewleader. However, by the end of the fifth week two enrollees voluntarily quit their positions.

A rented van provided a means of transportation for the crew and was driven by crewleader Carlos Carlon. Carlos picked up the enrollees and delivered them home each work day.

On the first day of the program, the crew was introduced to the refuge staff, toured the refuge, watched a YCC introductory film and discussed safety while they work.

Safety was emphasized from the onset of the program to the end. Much emphasis was placed on working in the desert heat and how to avoid heat exhaustion (daily high temperatures regularly exceed 110°F during the summer months). No significant injuries resulted during this season.

Work projects completed by the 1990 YCC crew included: vegetation and soil removal from approximately 400 yards of concrete lined irrigation ditches; repaired and improved water control structures on ponds to reduce soil erosion; constructed a waterfowl hunting blind for handicapped visitors; cleaned out and prepared all hunting blinds for fall waterfowl season; cleaned

out the refuge domestic water settling reservoir; re-posted some refuge boundary signs; painted a visitor information sign; put up a new wire fence (300 yds.) at Coachella Valley NWR; and picked up trash, trimmed trees and otherwise Helped keep the Refuge headquarters area clean.

Environmental awareness activities included visits to: Anza-Borrego State Park, San Bernardino County Museum, Scripps Institute of Oceanography, Chula Vista Nature Interpretive Center, Wister State Waterfowl Area, California State Warm Water Fish Hatchery, and a geothermal power plant. Presentations by refuge personnel were also given to enhance their understanding of the local environment.

YCC financial and hourly accounting data:

Appraised value of program = $12,943.00
Paid enrollee hours = 1600
Total cost of program = $12,212.04 (Including holiday pay, environmental awareness trips, and transportation costs not included in appraised program value.)

$$\text{Cost/Benefit Ratio} = \frac{12{,}943.00}{12{,}212.04} = 1.06$$

3. Other Manpower Programs

The McCain Valley Conservation Camp, a fire fighting prison camp of California Department of Forestry, provided valuable manpower used to complete numerous work projects on the refuge. Without their help the work projects they finished would either have not been done due to lack of manpower at the refuge or would have been very costly if performed by private companies.

The prison crews began work at the refuge the first week in January (after the fire season ended) and continued through March. The crews typically consisted of 15 men plus one CDF crew captain. In 1990 they worked approximately 1500 hours for the refuge, completing numerous tasks. Projects completed by the prison crew included saltcedar removal from ponds, visitor observation tower construction, water delivery and drainage pipe installation, irrigation ditch cleaning, tree and shrub pruning at visitor facility, forming and pouring of cement heavy equipment wash rack, and other headquarters beautification activities. The refuge supplied most of the tools and materials to accomplish these projects. Diesel fuel was supplied to the Camp's truck to alleviate their transportation costs to the refuge. The program used minimal staff time and is recommended to any refuge with this type of program available to it.

4. Volunteers

The volunteer program at Salton Sea remained inactive in 1990, although there is a need and some (largely unexplored) potential to bring some wintering senior citizens or local residents on board as docents, especially to assist with public use related activities/functions between November and February, which is by far our busiest public use period. Currently , no staff is

available and the office remains closed on weekends, a situation which could be improved with the use of volunteers.

5. Funding

Funds for the complex increased from 1989 base level but in reality this represented a decrease in total funds available, as special funds (such as contaminant monitoring) disappeared in the face of inflation. Technical assistance and contaminants funds had been available for the past few years which funded two staff positions - a Biological Technician and Wildlife Biologist, TFT. In respect to the Regional Director's emphasis on continuing technical assistance with regard to the feeding/hunt club issue, these staff positions were retained although not expressly funded. We also incurred two PCS moving expenses during the year and as a consequence, fiscal assistance was necessary from ARW to see us through to the end of the year.

The following is a funding summary for FY90 with comparisons to FY's 89, 88, and 87.

ACTIVITY	FY 1987	FY 1988	FY 1989	FY 1990
1260 O&M[1]	385,900	424,200	445,600	562,500
8610	2,700	3,900	3,500	11,000
7201[2]	10,000	7,000	22,000	21,600
Total Operating Funds Available:	398,600	435,100	471,100	595,100
Fire Funds	300	700	1,000	7,200
Special one-time funds for RPRP, ARMMS, contaminant monitoring & PCS moves	221,100	139,900	140,000	50,000
TOTAL STATION FUNDS	620,000	575,700	612,100	652,300

[1] FY90 included: $343,000 1261 base, $10,000 challenge grant, $25,000 YCC, $40,000 new refuge, $124,000 1262 base, $20,590 MMS, $900 fire.

[2] Mitigation funds received from Coachella Valley fringe-toed lizard refuge and Sweetwater Marsh NWR mitigation account (1990 - $13,000). These funds can vary but in the AWP processes are (currently) to be considered as O&M.

6. Safety

An effort to revitalize the station safety program was made this year, with the scheduling of monthly safety meetings and the creation of a three person safety committee which met quarterly. Safety meetings were hosted on a

rotational basis by different refuge staff each month in an effort to keep everyone involved.

7. Technical Assistance

Following regional direction, a technical assistance program aimed at waterfowl feeding clubs in southern California was initiated in 1988. Temporary Wildlife Biologist Jeff Mackay was hired through July 1990 to assist duck hunting club owners in their efforts toward enhancing wetland habitat on private properties in anticipation of the eventual enforcement of federal baiting regulations,

A habitat restoration proposal was submitted for Rancho Dos Palmas northeast of the refuge in Riverside County, which would enhance habitat for Yuma clapper rails, desert pupfish, black rails, fulvous whistling ducks, and other wildlife, 8/10/90 WRR

Refuge biologists worked closely with private landowners to utilize FmHA funding to develop or rehabilitate wetlands in both Imperial and Riverside Counties. Although many of the private landowners were interested in the concept of costsharing to fund wetland projects, very few were willing to enter into even a short-term agreement with the Service necessary to ensure wetland protection, Refuge biologists visited over 50 hunting clubs and made management recommendations and/or wrote management plans for several clubs including the 340-acre Point Mugu Game Preserve and the 583-acre Ventura County Game Preserve, both of which were feeding clubs in Ventura County. In

spite of our technical assistance, Ventura County Game Preserve became one of five clubs which later sued the Service for attempting to enforce federal baiting regulations (see Section H.17).

A total of five clubs entered into ten-year Wildlife Extension Agreements with the Service and shared costs to improve wetland habitat through the FmHA program. A total of $16,815 Service funds and $18,315 private funds were spent to improve a total of 200 manageable acres during 1990 through this program. The following table shows a breakdown of projects funded during 1990.

Table E.2. Private Lands Costsharing Wetland Rehabilitation Projects with the Service during 1990.

PROPERTY	TOTAL ACRES	WETLAND ACRES	GOVT. COST	PRIVATE COST
Mecca Duck Club	70	30	4190.00	4190.00
Casa de los Ganzos	80	40	3500.00	5000.00
Westmorland Duck Club	80	50	3400.00	3400.00
Millionaire Duck Club	160	40	1400.00	1400.00
21 Gun Club	70	40	4325.00	4325.00
		200	16815.00	18315.00

During the end of 1990, refuge personnel submitted two FmHA proposals for costshared projects. Habitat restoration proposals for these two properties, the Shady Acres Duck Club and Rancho Dos Palmas totaled $32,000 of Service funds and would benefit a total of 110-acres of wetland restoration work with primary objectives of enhancing habitat for endangered Yuma clapper rails and desert pupfish, along with black rails, fulvous whistling ducks, and other migratory birds.

F. HABITAT MANAGEMENT

1. General

In support of the goals of the National Wildlife Refuge System, Salton Sea National Wildlife Refuge was established by executive order in 1930 "as a refuge and breeding ground for birds and wild animals." Primary objectives on the refuge include endangered species production and maintenance, sensitive species production and maintenance, wintering waterfowl maintenance, and other migratory bird maintenance. Refuge habitats are intensively managed, with ponds and agricultural fields engineered, developed, and manipulated to achieve maximum wildlife objectives.

2. Wetlands

Wetland habitat is managed to provide critical habitat for year-round populations of endangered Yuma clapper rails, and also to produce natural foods for wintering waterfowl and other wildlife. These objectives are sometimes mutually exclusive. All water used to flood refuge wetlands is class-l irrigation water, which is free of the soluble pesticides and toxic trace elements found in agricultural drain water. Moist soil management is geared toward production of alkali bulrush, Scirpus robustus, watergrass, Echinochloa crusgalli, sprangle-top grass, Leptochloa spp., swamp timothy, Heleochloa schoenoides, wigeongrass, Ruppia maritima, and other associated species. Sesbania and salt cedar remain serious weeds in moist soil units.

At Unit-l, Tracts A and B were drawn down during late March and early April, seeded by drill with a mixture of watergrass and alkali bulrush during the spring, and irrigated throughout the summer. Poor to moderate stands of vegetation were produced perhaps due to inadequate watering. Watergrass and sprangletop were the dominant species, with good stands of bulrush only at the eastern half of pond A-l. Nevertheless, these ponds provided important feeding and loafing areas for numerous wildlife species, and tremendous shorebird numbers reflected the presence of invertebrate foods.

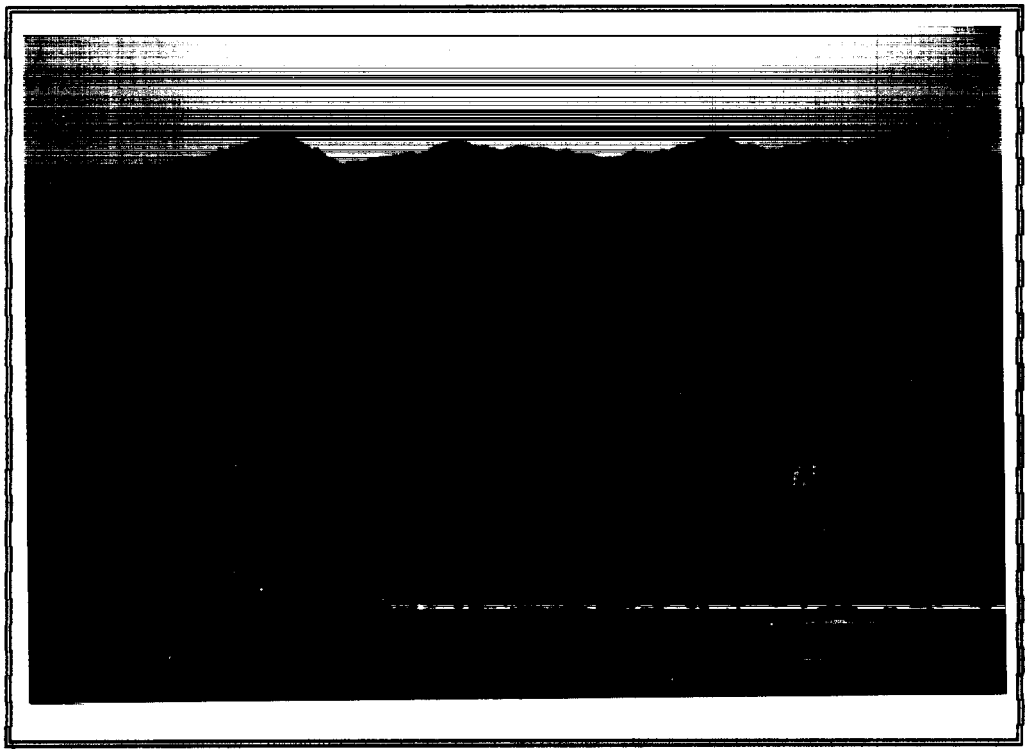
The Reidman Ponds were drawn down in early April and seeded with a watergrass/alkali bulrush mixture during July, following the completion of rehabilitation work in the ponds by equipment operator Marquez. Ponds were flooded in early fall, with ponds 3 and 4 to remain as permanent ponds to provide year-around clapper rail habitat, Watergrass and sprangletop provided the dominant vegetation in these ponds, and were used heavily by snow geese, pintail and shovelers during the fall and winter. A clapper rail was observed in pond 3 during August.

Bruchard Bay water management was altered significantly by the Imperial Irrigation District during 1990, and provided limited emergent habitat for clapper rails, night herons, shorebirds, and waterfowl. The current lack of water control does not facilitate adequate wetland management for this area, important habitat for endangered species along with black rails and the song sparrow subspecies saltonis.

At Unit-2, Hazard ponds 1, lA, 2A, and 3A have experienced poor drainage in the past, have alkaline soils, and do not produce vegetation. These ponds were shallowly flooded in September to enhance invertebrate populations as wildlife food. The large number of shorebirds and shovelers feeding in these ponds indicated an abundance of food. Hazard ponds 2 and 3 were planted with watergrass during August and provided moderate stands of food which was fed upon by snow geese upon their arrival in October.

Hazard Ponds 4, 5, 6, and 7 were managed primarily for swamp timothy production, and were drawn down during April, irrigated during early summer, and shallowly flooded beginning in September. Pond 4 was not flooded until December in order to extend the availability of waterfowl foods through the winter period. Each of these ponds yielded excellent crops of swamp timothy, while pond 7 also provided large stands of bulrush, Hazard Ponds 10, 11, and

12 were drained during April and were not irrigated in anticipation of rehabilitation work. Pond 10 provided great amounts of dwarf spikerush, while pond 11/12 provided some swamp timothy, Ponds were flooded again in September. Until water control in these ponds is improved, moist soil management remains difficult. Overall, tremendous numbers of pintails, shovelers, green-winged teal, snow geese, Canada geese, dowitchers, egrets, sandpipers, avocets, and stilts utilized the Hazard ponds for feeding and loafing.



Moist soil management at Hazard Pond 7 provided swamp timothy, alkali bulrush, watergrass, and other wetland foods which were utilized throughout the winter by waterfowl and other wildlife, 10/11/90 WRR

The Union Ponds remained shallowly flooded throughout the year to provide emergent vegetation for clapper rail habitat. Mixed stands of alkali bulrush, sprangletop, and cattail were heavily utilized by common yellowthroats, egrets, shorebirds, and waterfowl. In addition, both Yuma clapper rails and least bitterns were observed in these ponds.

Headquarters Pond 1 was planted with a mixture of watergrass, alkali bulrush, and wheat during May, irrigated throughout the summer, and yielded a moderate crop of seed. Control of sesbania and sunflower was necessary. The pond was reflooded in August and held throughout winter. Headquarters Ponds 2, 3, and 4 were drawn down temporarily in April to accommodate germination of wigeongrass. Ponds 2 and 3 were then reflooded and held full throughout the

season. Pond 4 remained largely dry, but was flooded to mudflat to provide feeding and nesting areas for stilts and avocets. Headquarters Pond 5 is a small hypersaline pond which currently receives no active management. The Headquarters Ponds provided feeding and/or loafing habitat for large numbers of shorebirds, teal, pintails, shovelers, snow geese, Ross' geese, and Canada geese. Additionally, the ponds were used by white pelicans, gulls, black skimmers, terns, gallinules, coots, and other species throughout the year.

4, Croplands

A total of 827 acres currently fall into this habitat category. Refuge croplands are primarily managed to provide green browse for wintering snow and Ross' geese. A non-dormant strain of alfalfa (CUF 101) is grown under cooperative farming agreement along with winter or spring wheat, rye and sudan grass, The north half of the Flammang field remained fallow due to complications with soil type and irrigation capability.

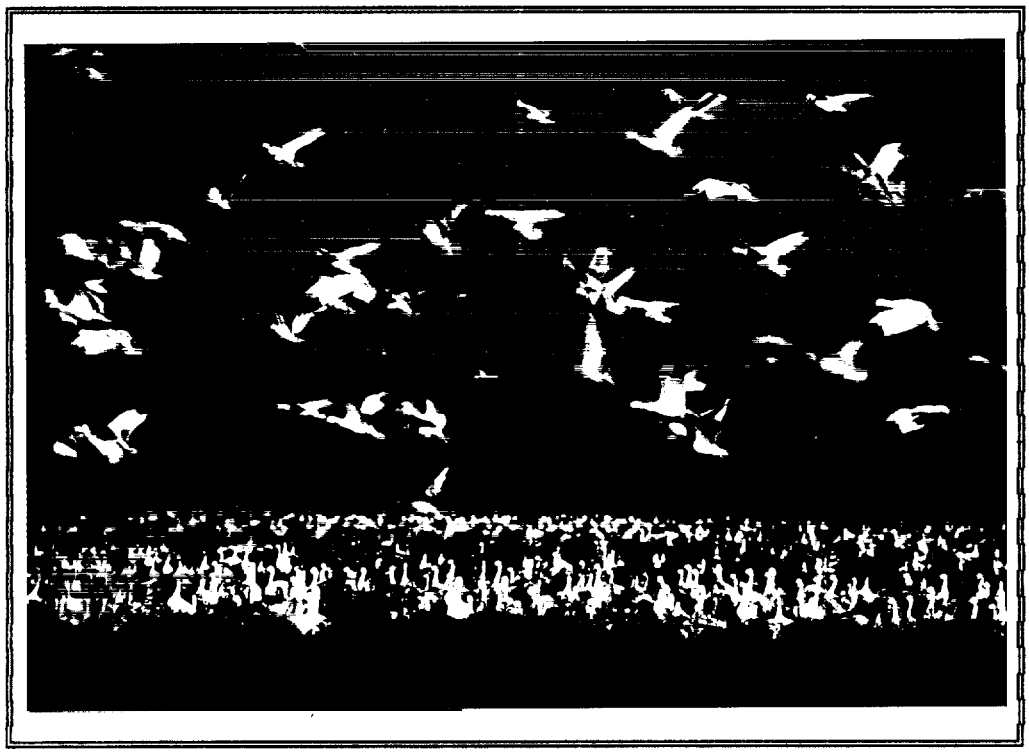
The following table summarizes refuge croplands and uses in 1990:

LOCATION	FIELD	GATE	ACRES	CROP:(SPRING/SUMMER/FALL)
Unit I	E 1/2 C	T13 257	70	alfalfa (all year)
	W 1/2 C	T13 257	70	sudan/sudan/rye (nematode infestation)
	N Johnson	T13 256	100	alfalfa (all year)
	S Johnson	T13 257	80	alfalfa (all year)
	Reidman	T16 310A	50	spring wheat(left standing)
	N Flammang	T16 310	100	fallow
	S Flammang	T16 310	82	sudan/sudan/rye
	Flammang 20	T16 304	20	alfalfa (all year)
Union	419	V4 419	60	*wheat&rye/fallow/wheat
	420	V4 420	60	alfalfa/fallow/rye
	421	V4 421	55	*wheat*rye/fallow/alfalfa
	461	V4 461	80	*wheat&rye/fallow/alfalfa

*rye planted after wheat failed due to poor quality seed used by cooperator

Refuge staffing and budget levels limit the amount of cropland management that can be accomplished on a force account basis. The labor, equipment and water costs associated with farming an adequate amount of forage to sustain up to 20,000 wintering geese on the refuge is well beyond current funding levels. Accordingly, the refuge conducts a cooperative farming program to help meet upland habitat needs in managing croplands for production of goose browse. The primary green browse crop grown is alfalfa, with the farmer taking (normally about six) cuttings between April and September and the refuge taking the remaining growth between October and March for goose forage. Wheat and rye are also grown in the crop rotation cycle in the cool season for goose browse. Sudan grass, which is put up for silage (largely for export), is

grown as a warm season cash crop by the cooperator as part of the crop rotation scheme,



Snow geese and Ross' geese consumed alfalfa faster than it could grow on the 421 field adjacent to refuge headquarters. This provided close-up views for visiting birdwatchers, and headaches for the cooperative farmer. 11/15/90 WRR

The cooperative farming program expanded to include two cooperators in late 1990 with Walt Slovak coming on board to farm the Union fields (419, 420, 421 and 461) near headquarters. Chip Corfman continued to farm portions of Unit 1. Normally, cooperators pay for water during their use season and the refuge pays for water and the cooperator provides an irrigator during the refuge use season (see Section F.ll for water use). The amount of water purchased by cooperators for watering refuge croplands totaled over $27,000 for fiscal year 1990 (not including September data). Data for other costs incurred by cooperative farmers is not available, so it is difficult to develop a comparative figure to answer the question of "how much would it cost if we did it?". However, estimates of a one time start up figure of at least $110,000 for new equipment and a continuing O&M figure of $130,000 for staff (two WG FTEs), water and other operating costs are in the range of what it would take to farm the current operation on a force account basis.

Additionally, the refuge farming program is important from the standpoint of reducing the potential for depredation complaints, especially after the

hunting season ends! Several thousand hungry geese can put a considerable dent in a field in a hurry.

6. Other Habitats

Nearly all native habitats in the Imperial Valley have been altered by agricultural practices, with only disjunct "pockets" of Colorado Desert vegetation still remaining. Refuge programs have provided treelines of mesquite, palo verde, sweet acacia, and other native vegetation along the edges of several agricultural tracts on the refuge to provide wildlife corridors.

9. Fire Management

The station fire management plan was overhauled in 1990, and should be ready for the final draft to be printed and circulated for signature soon. A major change from the previous plan is the different management approach to permanent wetlands used by Yuma clapper rails on a year-round basis, Prior management took a seasonal approach to managing rail habitat, following a management regime similar to that for seasonally flooded waterfowl habitat.

One twenty acre burn was approved and conducted. The Union leach ponds were burned to reduce cattail stands and enhance tender young growth for goose forage.

10. Pest Control

Pest control on the refuge is primarily a two-fold consideration; controlling insects and weeds in cooperatively farmed alfalfa, and controlling exotic plants such as phragmites and tamarisk along the margins of impoundments and ditches.

Problem insect species in alfalfa are the granulate and veregated cutworms, pea and blue aphids, Egyptian alfalfa weevil, beet armyworm and alfalfa caterpillar. A long growing season, high temperatures and (normally) very little frost combine to create insect infestations which can be severe and more representative of tropical conditions than those normally encountered in the United States. As a result, the use of effective insecticides can be necessary to retain the viability of a stand, not only from the economic standpoint of the co-op farmer but also from the standpoint of providing browse for thousands of hungry over-wintering geese.

The following table summarizes chemical use on the refuge for 1990:

CHEMICAL	DATE	RATE	METHOD	LOCATION	TARGET
Cygon	03/23	.8 pints/ac	aerial	El/2 C Tract & N Johnson	aphid&wevl
Ambush	03/29	.8 pints/ac	aerial	El/2 C Tract & N Johnson	cutworms
Garlon 4*	various	1 - 2%	handheld	impoundment edges	tamarisk
Balan	09/06	2.42 lbs/ac	preplant	incorporated in 461 & 421	weeds
Roundup*	12/12	2%	handheld	irr. ditch banks Ul & HQ	phragmites

* with adjuvant

Considerable time was spent and knowledge gained in trying to find solutions to cutworm infestations which developed in alfalfa at Unit 1. Al though cutworms are normally a problem in the fall, this year's problem sprang up in March. The crux of the dilemma is that the effective insecticides in controlling cutworms are pyrethrins, which are restricted use pesticides and therefore not preferable for use from a policy of environmental standpoint. However, with the lack of a viable, less toxic alternative and the threat of the infestation severely reducing the viability of the stand (and forcing out the cooperative farmer), Ambush was reluctantly approved for a one-time application.

Eric Natwick, insect pest Farm Advisor at the U.C. Cooperative Extension in Holtville, was consulted concerning cutworm control and has developed into an excellent source of information on insect pest control,

The idea of initiating a research/study to evaluate the effectiveness of using beneficial nematodes (Steinernema spp.) to control cutworms in alfalfa developed in 1990, with possible application in 1991. Obstacles to the practicality of using beneficial nematodes evolve around developing a method of applying the large quantities of material needed (in excess of 100 gallons per acre). At most, ground rigs can only apply about 20 gallons per acre and aerial applications are limited to about 5 gallons per acre, per application.

Cooperative farmer Corfman reported problems with nematodes in the sudan grass stand in the west half of "C" Tract. Dr. Frank Laemmlen, plant pathology/ nematology Farm Advisor at the U.C. Cooperative Extension in Holtville, identified four kinds of harmful nematodes from the sudan field at the following levels:

SPECIES	NUMBER OF INDIVIDUALS
Longidorus spp. (needle)	2
Trichodorus spp. (stubby)	540
Patylenchus spp. (lesion)	1,656
Tylenchorhynchus spp. (stunt)	72

Both the stubby and lesion nematode levels were high enough to decrease production in sudan or any other grass crops (i.e., wheat or rye). The needle nematode, although not at significant levels, is known to be a-potential problem to alfalfa production. Aside from using soil fumigants, the recommended course of action to reduce the nematode load in the field is summer fallow with deep chisel plowing to dry the soil.

11. Water Rights

Water is critical to the management of croplands and impoundments in meeting refuge objectives. Water is purchased from the Imperial Irrigation District (IID), which has the oldest and largest perfected water right along the lower Colorado River. The refuge does not have a "water right", per se. Rather, water is basically available to whomever can afford to purchase it from IID.

Water use records for refuge lands for fiscal years (FY) 1987 through 1990 are tabulated below. The amounts in the column labeled "FWS" refer to water purchased by the refuge (primarily for flooding seasonal impoundments). "FREE H20' pertains to additional Class 1 irrigation water obtained at no cost to the Service (estimated at 30% of the total water applied by the Service or equal to 43% of water purchased by the Service indicated by "FWS"). An estimated fair market value for the free water is shown in parentheses for reference only. "FWS SUM" refers to the estimated total of water used by the Service on the refuge (the sum of "FWS" and "FREE H20" columns). "COOP" refers to water used on refuge cooperatively farmed lands paid for by the cooperator. "REFUGE TOTAL" is the sum of "FWS SUM" and "COOP" columns, not including free water costs.

The data for the following table is summarized from IID water bills and "gate histories" obtained from IID's office in Imperial:

	COST	ACRE FEET	$/ACF	COMMENTS
FY87 FWS	7.9K	875	$9.00	minus Aug & Sept data*
FREE H_2O	(3.4K)	376	--	estimated @ 30% FWS total
FWS SUM	--	1,251	--	
CO-OP	9.6K	901	--	
REFUGE TOTAL	17.5K	2,152	--	*incomplete total
FY88 FWS	13.2K	1,318	$10.00	price increase 12/87
FREE H_2O	(5.7K)	567	--	estimated @ 30% FWS total
FWS SUM	--	1,885	--	minus Feb & May data*
CO-OP	20.6K	2,159	$10.50	price increase 8/88
REFUGE TOTAL	33.8K	4,044	--	*incomplete total
FY89 FWS	10.4K	983	$10.50	full year data
FREE H_2O	(4.5K)	423	--	estimated @ 30% FWS total
FWS SUM	--	1,406	--	
CO-OP	38.1K	3,546	$11.00	price increase l/89
REFUGE TOTAL	48.5K	4,952	--	
FY90 FWS	17.1K	1,570	$10.50	minus Sept data*
FREE H_2O	(7.5K)	675	--	estimated @ 30% FWS total
FWS SUM	--	2,245		price decrease l/90
co-OP	27.1K	2,631	$10.50	minus Sept data+
REFUGE TOTAL	44.2K	4,876	--	"incomplete data

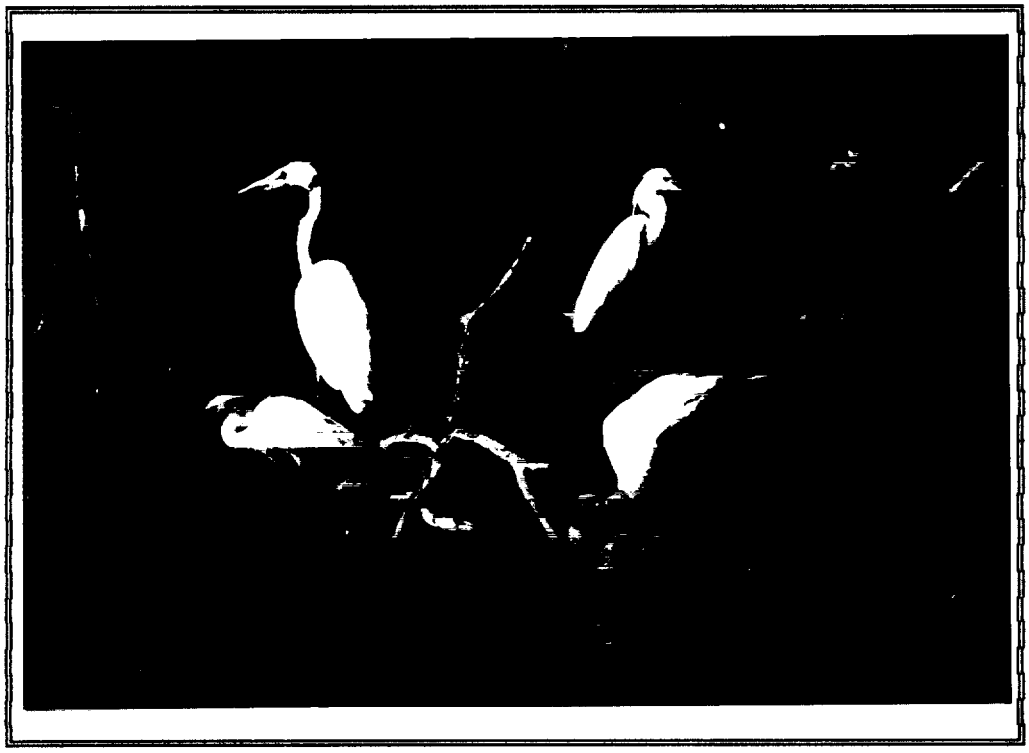
It is important to note that significant portions of the refuge have been under rehabilitation and have not recently been managed (flooded), meaning that recent water uses and associated costs for managing seasonally flooded impoundments are artificially low. An estimated additional 2,000 acre feet (and up to $21,000 at $10.50/acf costs) per year will be needed to fully utilize the newly rehabilitated impoundments in FY91 over FY90 costs, It is also anticipated that water conservation efforts will significantly reduce the amount of "free water" available to the refuge. If no free water were available, the Service's portion of refuge water costs would increase 43%. Additionally, water costs have increased from $9.00 to $10.50 an acre foot since 1987, representing a 17% increase. [Note: at the time of this writing the cost has increased to $11.50/acf.]

The following table for FY95 projects water use data assuming that an additional 240 acres of cooperatively farmed upland (at three acre-feet per year = 720 acf) and an additional 240 acres of flooded impoundments are added to the refuge (at four acre-feet per year = 960 acf), and that an increased portion of Service-managed impoundments are converted to perpetually flooded permanent wetlands for Yuma clapper rail habitat (100 acres at 10 acf/YR = 1,000 acf). Also included is an increase in cost per acf to $12.50.

	COST	ACRE FEET	$/ACF	COMMENTS
FY95 FWS	77.613	6,205	$12.50	increased habitat
FREE H_20	--	0	--	water conservation
FWS SUM	--	6,205	--	
CO-0P	41.9K	3,351	--	240 acres added
REFUGE TOTAL	119.5K	9,556	--	

The projected table for FY95 does not include water costs that will likely add to Service totals if geothermal development leads to reclamation of former seabed with associated habitat reclamation/development. We are currently looking at a full section of such lands (640 acres x four acf/yr = 2,560 acf) coming on line between the Union Tract and Red Hill.

G. WILDLIFE



A tremendous number and diversity of wildlife are present at the Salton Sea, where fish and invertebrate productivity provides foods for black-necked stilts, snowy egrets, a great egret, and a wood stork at the Hazard Unit. 7/18/90 WRR

1. Wildlife Diversity

Lower Colorado Desert lands on the refuge, although characterized by extremely low precipitation and very high temperatures, support a surprising diversity of wildlife species. Habitat diversity on refuge lands provides the needs of various resident wildlife, while many of the birds are seasonal residents or migrants. At least 376 bird species have been observed at Salton Sea NWR, and at least 93 species have nested on the refuge. In addition, 40 species of mammals, 18 species of reptiles, 4 species of amphibians, and 15 fish species have been identified on the area. Two new species, an evening grosbeak and a blue bunting, were documented on the refuge for the first time during the year (see 6.7). An additional bird, a purplish-backed jay, was documented off-refuge and is not included in the refuge total.

2. Endangered and/or Threatened Species

State and federally listed endangered species which occurred on the refuge include the desert pupfish (Cyprinodon macularius), California brown pelican, bald eagle, peregrine falcon, and the Yuma clapper rail (Rallus longirostris yumanensis). Although Aleutian Canada geese (Branta canadensis leucoparia) have been documented at the Salton Sea in the past, none were observed during 1990.

In a cooperative effort to enhance the recovery, production, maintenance, and reintroduction of endangered species, refuge personnel assisted in the capture and relocation of 590 desert pupfish to Rancho Dos Palmas from the Coachella Valley Preserve during September (See E.7).

Historically, the desert pupfish was found in the Salton Sea and associated rivers and drains. This fish has the ability to survive dramatic temperature and salinity extremes, but had not been confirmed on the refuge since 1986. During June, state fishery biologist Kim Nicol documented pupfish on the refuge in the McKindry Pond, a small impoundment created by a barnacle bar at the mouth of an agricultural drain. As the McKindry Pond has never been sampled for pupfish in the past, the history of pupfish occurrence there is unknown. However, refuge staff will continue to monitor this population on a quarterly basis.

During May, Biologists Radke and Mackay assisted Laguna Niguel Field Office personnel collecting fish from five Salton Sea sites for contaminant analysis (See D.5). During sampling, desert pupfish were documented at San Felipe Creek, Avenue 81 Drain, and Salt Creek. Previous surveys at Salton Sea have shown that desert pupfish are being displaced by other fish species through predation and competition. Our May survey showed that pupfish are still present at various drains, and represented an estimated 5% of the total fish captured through seining.

California brown pelicans are normally occasional summer visitors to the Salton Sea, reaching peaks of perhaps 50 post-breeding birds from the Sea of Cortez. However, during 1990, an unprecedented number of brown pelicans arrived at the Sea during June and stayed into September. A peak of 5,000 birds was estimated during July, with 2,000 easily visible near the mouth of

the Alamo River. This great number of birds indicated the availability of fish in the Sea, but also raises concerns over contaminant concentrations documented in Salton Sea fish and how this may effect endangered species utilizing the fish for food.

Bald eagles are occasional fall and winter residents at the Salton Sea, where they feed on waterfowl and fish. Although no bald eagles were observed during the January winter eagle survey, individual adults and subadult birds were observed throughout the winter in both the Coachella and Imperial Valleys near the Salton Sea shoreline.

Both adult and subadult peregrine falcons are occasional residents at the Salton Sea, and one or two have been observed during every month of the year. Little is known about the peregrine falcons using the Salton Sea, however, population peaks of peregrines appear to coincide with major shorebird migrations.

The Yuma clapper rail is a rare permanent resident in freshwater marshes associated with the Salton Sea. About 700 birds are estimated in the United States, with another 200 in Mexico. Saltwater inundation of wetlands, direct habitat destruction associated with wetland draining and agriculture, water conservation methods, and contaminants have all led to the demise of this species. Following recovery team instructions, refuge populations are surveyed each spring to document the minimum number of birds utilizing available refuge wetlands. Although pair counts occur each year, no production surveys have ever been attempted. Refuge surveys were conducted on April 26 and 27, resulting in a minimum total of 16 birds including six pairs. The number of pairs are determined when rails respond with a "clatter duet" to taped calls, while individual rails normally respond with a "kek" call. Although the rail population is up somewhat from last year, it is still below the long-term average. Most rail use occurred on Bruchard Bay wetlands recently threatened by Imperial Irrigation District dredging activities, and on adjacent agricultural leachfields. The following table depicts Yuma clapper rail numbers at Salton Sea NWR since 1984.

Table G.l. Minimum Numbers of Yuma Clapper Rails Responding to Taped Calls on Salton Sea NWR.

YEAR	NUMBER OF PAIRS	TOTAL NUMBER OF INDIVIDUALS,
1984	3	10
1985	5	21
1986	8	25
1987	6	20
1988	4	18
1989	1	5
1990	6	16

The north Union Pond remained shallowly flooded throughout the year to promote emergent vegetation, allowing a pair of Yuma clapper rails to establish a new refuge territory during 1990. 5/13/90 WRR

Assistant Manager Schoneman assisted SJM Biological Consultants of San Diego with a clapper rail research project located near the refuge at the Imperial Wildlife Area. Information pertaining to rail production, habitat use, seasonal abundance, and daily activity was gathered through the use of radio telemetry equipment and extensive monitoring. Results from this research will provide insight into the effectiveness of current refuge programs, and will provide tremendous assistance in developing future management planning for Yuma clapper rails.

3. Waterfowl

A primary benefit of Salton Sea NWR is to provide a sanctuary area necessary to protect wintering waterfowl in the Imperial Valley. During the year, at least 26 waterfowl species utilized the refuge, with common species including snow geese, Ross' geese, northern pintail, northern shoveler, and green-winged teal. During 1990, observations of noteworthy waterfowl included 35 fulvous whistling ducks south of Obsidian Butte during June, a blue-phase Ross' goose observed at Unit-l during October, an immature tundra swan observed at Unit-l during November, a hatch-year male oldsquaw at Bruchard Bay during December, and two white-winged scoters near Red Hill Marina during December.

Waterfowl numbers both on and off the refuge were surveyed using the same methods as in past years. Survey areas included both the Imperial and Coachella Valley wetlands most important to waterfowl, Refuge personnel conducted Salton Sea aerial surveys during January through March, November, and December. No survey was conducted during October 1990 because a contract airplane was not available. Total waterfowl numbers between November through February were estimated at 471,766 birds during 1990-91, compared to 329,978 birds during the same period last year. There were a total of 14,152,980 waterfowl use-days between November through February during the 1990-91 season, as compared to 9,899,340 use-days during 1989-90, representing a 30 percent increase. In addition to monthly surveys at the Salton Sea, a mid-winter waterfowl survey covering the south coast of California was conducted during January. During aerial surveys, the refuge contracted with Pacific Executive Aviation of Ramona. The following table depicts estimated waterfowl peaks at Salton Sea NWR, the Imperial Valley, and the Coachella Valley during 1990-91.

Table G.2. Waterfowl Peak Populations During 1990-91.

SPECIES	SALTON SEA NWR	IMPERIAL VALLEY	COACHELLA VALLEY
White Goose	19,500	27,100	0
Canada Goose	715	4,980	65
Mallard	30	395	280
Gadwall	380	2,460	80
Wigeon	1,590	6,190	585
Green-winged Teal	2,450	10,630	415
Cinnamon Teal	85	733	290
Shoveler	15,755	52,075	7,310
Pintail	7,430	27,580	4,650
Redhead	40	265	170
Canvasback	10	255	130
Scaup	25	1,006	805
Ringneck	5	105	300
Bufflehead	15	165	10
Ruddy Duck	1,125	10,985	4,650

a. Ducks

Duck use was up from a year ago, but remained below the long-term average for the Imperial Valley reflecting the continent wide trend of declining waterfowl populations. The duck population peaked at 103,733 birds, up from a peak of 92,777 birds estimated for 1989-90. Species that showed significant increases from last year included northern shovelers and pintails, while cinnamon teal and ruddy ducks showed significant population declines. Overall, the total duck population increased about 30 percent compared to 1989-90 levels, indicating that cessation of hunting club feeding stations had no affect on ducks wintering here. Fulvous whistling ducks, a sensitive species, did not nest on the refuge during 1990.

Pintails and other species readily took advantage of swamp timothy and alkali bulrush flooded in Hazard Pond 5. Even the freshwater ponds having little vegetation provided important invertebrate food for wildlife. 10/19/90 WRR

b. Geese

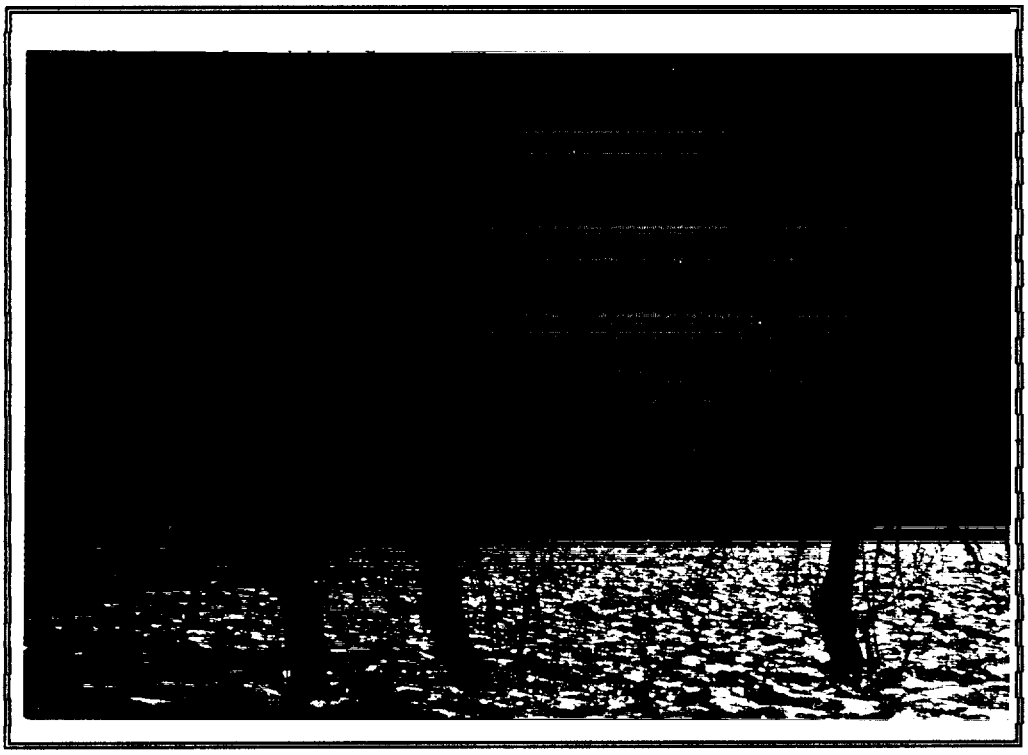
Salton Sea NWR is one of only two significant sanctuary areas within the Imperial Valley. Probably every goose wintering in the valley utilizes refuge habitat at some point. The overall refuge goose population peaked at 19,580 birds during November, representing an increase of 41 percent above the average peak goose population observed during the last five years, The last white geese departed the refuge from Unit-2 during late March, while the first white geese arrived on the refuge about October 14 at Unit-l. Unfortunant ly, staff shortages did not allow extensive time gathering important information pertaining to goose age ratios, species composition counts, or neck collar observations,

Imperial Valley goose populations increased to a surveyed high of 27,200 birds during the 1990-91 winter compared with 22,995 counted during the 1989-90 winter. Canada goose numbers in the Imperial Valley increased, with a high of 4,980 compared to 1,295 counted during the 1989-90 winter. White goose populations in the Imperial Valley increased to a high of 27,100 compared to 21,570 counted during 1989-90.

Brant are normally rare visitors to the Salton Sea. During 1990, two brant were observed at Bruchard Bay during March, and eight were present in the Headquarters Ponds until mid-April.

4. Marsh and Water Birds

A great number and diversity of marsh and water bird species were present on Salton Sea during the year. Nesting species included pied-billed grebes, least bitterns, great blue herons, great egrets, snowy egrets, cattle egrets, green-backed herons, black rails, clapper rails, common moorhens, and American coots. Noteworthy species included a little blue heron observed at Unit-2 during mid-June.



Empty nests were typical at heron and egret rookeries during 1990, as colonial bird production continues to decline at the Salton Sea. 4/10/90 WRR

Colonial nesting bird surveys were accomplished by biologists Mackay and Radke between April 21 and June 20 at traditional rookery areas along the south and southeast shores of the Salton Sea. On 4/21, a total of 15 great blue heron nests and 4 great egret nests were active. By 6/4 only four heron nests and one egret nest remained active, the remainder being abandoned. By 6/20 no nests were active, and no young were ever documented at any nest.

There is great concern that reproductive failure by egrets, herons, and cormorants is an indicator that contaminant levels may be affecting the

ecosystem at the Salton Sea. Food resource failure is not likely to be the only reason for lack of reproductive success by colonial nesters, as large numbers of forage fish are still available in the Sea and its tributaries, The following table depicts decreasing nesting activity of the survey area since 1987.

Table G.3. Active Nests of Colonial Birds at the South end of Salton Sea.

YEAR	GREAT BLUE HERON	CATTLE EGRET	SNOWY EGRET	GREAT EGRET	DOUBLE-CRESTED CORMORANT	TOTAL
1987	246	1373	9	85	63	1776
1988	208	850	3	8	57	1126
1989	0	98	80	53	0	231
1990	15	0	0	4	0	19

5. Shorebirds, Gulls, Terns, and Allied Species

Throughout 1990, at least 50 species in this category were observed on the refuge. Birds known to have nested successfully included the killdeer, black-necked stilt, American avocet, gull-billed tern, and black skimmer. No nest searches for snowy plovers, a sensitive species, were accomplished in 1990. Noteworthy sightings during the year included a sooty shearwater, both blue-footed boobies and brown boobies, a magnificent frigatebird, wood storks, a hudsonian godwit, laughing gulls, hundreds of yellow-footed gulls, a Sabine's gull, a mew gull, and two arctic terns.

Clearly, the Salton Sea supports one of the largest inland concentrations of migrating shorebirds in the Pacific Flyway. Refuge personnel assisted with both the spring and fall Salton Sea shorebird census coordinated by the Point Reyes Bird Observatory. The spring survey, conducted April 21 on refuge lands, totalled 17,745 individuals of 38 species, while the fall survey, conducted September 14 on refuge lands, totalled 56,095 individuals of 39 species. The refuge helps provide habitat for numerous shorebird species by varying water depths in freshwater ponds, and drawing down ponds during periods which coincide with shorebird migration peaks.

1990 was an exceptional invasion year for boobies at the Salton Sea. This area is one of only two places in the United States where blue-footed boobies occur with any regularity, and is the only predictable location in the western U.S. where brown boobies occur. Up to six brown boobies and at least five blue-footed boobies drew the attention of birders from all over the United States. Boobies were observed at Bombay Beach, Red Hill Marina, Salton Sea NWR, New River delta, the Navy Test Base shoreline, and at Salton City.

Wood storks were observed throughout the summer, with up to 45 roosting in the trees east of Morton Bay during June and July. Mountain plovers are normally occasional to uncommon fall and winter visitors. On December 18, an estimated 1,500 mountain plovers were observed feeding in freshly disced agricultural fields southeast of the New River delta, representing perhaps ten percent of the species total population in the United States. Three whimbrels were observed during the Christmas Bird Count. Although quite common at the Salton Sea during the fall migration, whimbrels are apparently quite rare during winter. An albino long-billed curlew was observed along with several of its normally colored friends at Morton Bay on July 2. On May 21, a Hudsonian godwit was observed and photographed by refuge personnel near Red Hill Marina just north of the refuge. This is only the second record of this species for the area. On April 25, Biologist Mackay observed a Western Sandpiper at Unit-1 which was wearing a red over white marker on its left leg and a FWS band on its right leg.

Black skimmers and gull-billed terns arrived at the refuge by April 12, Both species nested successfully on an island in Morton Bay. The colony escaped disturbance by both predators and humans, which has rarely been the case during past years. Although no production estimates were made, the number of nesting birds was estimated on July 2 to be 45 pairs of gull-billed terns and 250 pairs of skimmers.

6. Raptors

A total of 29 raptor species have been documented at Salton Sea NWR, with common species including the northern harrier, red-tailed hawk, American kestrel, common barn owl, and burrowing owl. By far the most abundant nesting raptor in the Imperial Valley is the burrowing owl (see D.5). Noteworthy raptor observations included a black-shouldered kite during late January, a screech owl during early February, ferruginous hawks and a merlin during December, and an occasional osprey throughout the fall and winter.

7. Other Migratory Birds

Voget, Radke, Ryno, and Schoneman assisted with the 91st annual Christmas Bird Count, conducted by 20 individuals at the Salton Sea on December 18. A total of 116,587 individual birds, representing 142 species was observed during the survey. Noteworthy species included a brown pelican, 3 whimbrels, a ruddy turnstone, a mew gull, 2 white-winged scoters, 6 swamp sparrows, and a white-throated sparrow. The following table lists the species from the count area, centered 2.2 miles east-southeast of the Salton Sea NWR headquarters.

Table G.4. Species Observed During December 1990 Christmas Bird Count.

SPECIES	NUMBER	SPECIES	NUMBER
Pied-billed Grebe	31	Black-bellied Plover	301
Eared Grebe	1024	Snowy Plover	5
W, Grebe	39	Semipalmated Plover	2
Clark's Grebe	3	Killdeer	1651
Am. White Pelican	48	Mountain Plover	1003
Brown Pelican	1	Black-necked Stilt	203
Double-crested Cormorant	439	Am. Avocet	487
Am. Bittern	4	Greater Yellowlegs	59
Great Blue Heron (blue form)	51	Lesser Yellowlegs	5
Great Egret	172	yellowlegs, sp.	8
Snowy Egret	137	Willet	14
Cattle Egret	1489	Spotted Sandpiper	2
Green-backed Heron	6	Whimbrel	3
Black-crowned Night Heron	193	Long-billed Curlew	2397
White-faced Ibis	58	Marbled Godwit	114
Snow Goose	8881	Ruddy Turnstone	1
Ross' Goose	2738	W. Sandpiper	714
Canada Goose	918	Least Sandpiper	977
Green-winged Teal (Am.)	1800	Dunlin	121
Mallard	67	Stilt Sandpiper	81
N. Pintail	15554	Long-billed Dowitcher	680
Cinnamon Teal	46	Corn. Snipe	14
N. Shoveler	4078	Bonaparte's Gull	22
Gadwall	31	Mew Gull	1
Am. Wigeon	1045	Ring-billed Gull	17407
Canvasback	32	California Gull	26
Redhead	47	Herring Gull	231
Ring-necked Duck	4	Yellow-footed Gull	12
Greater Scaup	39	Glaucous-winged Gull	1
Lesser Scaup	190	Caspian Tern	2
White-winged Scoter	2	Forster's Tern	60
Com. Goldeneye	6	Rock Dove	242
Bufflehead	59	Mourning Dove	124
Red-breasted Merganser	3	Com. Ground Dove	40
Ruddy Duck	2771	Greater Roadrunner	5
Turkey Vulture	22	Barn Owl	1
N. Harrier	81	Burrowing Owl	9
Sharp-shinned Hawk	6	Anna's Hummingbird	2
Cooper's Hawk	5	Belted Kingfisher	6
Red-tailed Hawk	53	N. (Red-sh.) Flicker	65
Ferruginous Hawk	1	Black Phoebe	163
Am. Kestrel	163	Say's Phoebe	74
Merlin	1	Vermilion Flycatcher	4
Peregrine Falcon	1	Horned Lark	358
Prairie Falcon	3	Tree Swallow	293
Ring-necked Pheasant	2	Com. Raven	3
Gambel's Quail	98	Verdin	108
Sora	33	Cactus Wren	22
Com. Moorhen	33	Rock Wren	1
Am. Coot	2311	Bewick's Wren	8

SPECIES	NUMBER	SPECIES	NUMBER
House Wren	13	Brewer's Sparrow	1
Marsh Wren	161	Vesper Sparrow	2
Ruby-crowned Kinglet	165	Lark Sparrow	2
Blue-gray Gnatcatcher	21	Sage Sparrow	25
Black-tailed Gnatcatcher	13	Savannah Sparrow	551
Hermit Thrush	14	Song Sparrow	121
Am. Robin	72	Lincoln's Sparrow	54
N. Mockingbird	22	Swamp Sparrow	6
Am. Pipit	2285	White-throated Sparrow	1
Cedar	20	Golden-crowned Sparrow	3
Phainopepla	8	White-crowned Sparrow	1294
Loggerhead Shrike	45	Dark-eyed Junco	8
Eur, Starling	584	Red-winged Blackbird	33377
Orange-crowned Warbler	90	Western Meadowlark	640
Yellow Warbler	1	Yellow-headed Blackbird	18
Myrtle Warbler	20	Brewer's Blackbird	724
Audubon's Warbler	2022	Great-tailed Grackel	153
Am, Redstart	5	Brown-headed Cowbird	312
Common Yellowthroat	54	House Finch	96
Rufous-sided Towhee	2	Lesser Goldfinch	18
Albert's Towhee	170	Am. Goldfinch	3
Chipping Sparrow	13	House Sparrow	281

Observations of noteworthy passerines during the year included two Mexican species; a blue bunting, Cyanocompsa parellina, observed west of the Flammang Field on 7/24 by Manager Voget, and a purplish-backed jay, Cissilopha beecheii, photographed south of the refuge near Calexico on 12/13 by Radke and Schoneman. The importance of native habitats provided on refuge lands is reflected by the diversity of bird species observed. Noteworthy birds on or near the refuge during 1990 included both blue-gray gnatcatchers and black-tailed gnatcatchers at HQ, a brown thrasher near Calexico, American redstarts south of Bruchard Bay, least flycatchers at HQ, vermillion flycatchers at Unit-l, a Swainson's thrush at HQ, black-throated gray warblers at HQ, and a black-throated sparrow at HQ. Assistant Manager Schoneman and Manager Voget observed a male evening grosbeak at headquarters on 10/17 to document a new refuge record.

10. Other Resident Wildlife,

At least 40 mammal species are present at Salton Sea NWR, Common species include the desert cottontail, raccoon, striped skunk, valley pocket gopher, deer mouse, pocket mouse, muskrat, and house mouse. Most of the rodent species exist in terrestrial habitats, where they provide important foods for raptors and other predators. During winter months, rodents become an important food for herons and egrets. Muskrats are present in freshwater tributaries where their feeding and burrowing activities help maintain marsh habitats for various other species. At least 12 types of bats utilize the Salton Sea area and ingest tremendous numbers of aerial invertebrates produced in this environment. Two western pipistrels were found at the refuge office during June following unusually high winds. Coyotes, raccoons, and striped

skunks act both as predators and scavengers transferring energy further through the food chain.

Amphibians and reptiles actually observed on the refuge during 1990 include the bullfrog, red-spotted toad, Woodhouse's toad, spiny softshell turtle, side-blotched lizard, desert spiny lizard, western whiptail lizard, gopher snake, common kingsnake, checkered garter snake, western diamondback rattlesnake, coachwhip, and western ground snake. Woodhouse's toads were identified for the first time on the refuge during 1990, though they are found throughout the Imperial Valley.

During September, Delbert A. La Rue of Riverside, California collected tiger beetles on and adjacent to the refuge. La Rue provided the following list of species, the most current for tiger beetles from the Salton Sea area.

Cicindela californica mojavi Cazier
C praetextata praetextata LeConte
C. haemorrhagica haemorrhagica LeConte
C. nigrocoerulea nigrocoerulea LeConte (new state record)
C. trifasciata sigmoidea LeConte (new distribution record)

11. Fisheries Resources

Contaminants should not be blamed for everything at Salton Sea. Annual fish die-offs such as these gulf croakers have occurred each year since the 1930's, and are the result of depleted dissolved oxygen in the Sea. 6/22/90 WRR

Because it is within a closed basin having low rainfall and high evaporation, the Salton Sea has tended to become increasingly saline. Presently the Sea has a salinity ranging up to 44 parts per thousand, which is about 25 percent saltier than the Pacific Ocean. A major ecological influence comes from solar radiation, which creates extremes between surface and bottom temperatures, and in turn effects the dissolved oxygen content of the water. During the eventual mixing which follows oxygen depletion at the Sea bottom, the dissolved oxygen concentration at the water's surface can temporarily be lowered below the minimum level necessary to maintain many forms of life in the Sea. In addition, high concentrations of sulfide and ammonia present at the bottom during the summer are mixed into surface waters. The result is annual fish kills, which serve to feed thousands of gulls, herons, raccoons, and other wildlife. Oxygen becomes increasingly less soluble in higher salinities, which influences both present and future life in the Sea.

Although the desert pupfish is the only fish native to the Salton Sea (see Section G.2), there are currently at least 15 introduced fish species which inhabit the Sea and its associated drains. The chief gamefish of the Sea is the orangemouth corvina, Cynoscion xanthulus, which has supported a substantial sport fishery in the past. This species occupies the top of the aquatic food chain, and feeds upon tilapia, longjaw mudsuckers, gulf croakers, sargo, and threadfin shad, which are all important forage species. The forage fish, in turn, feed upon fish eggs, copepods, barnacle larvae, amphipods, and especially pileworms. Pileworms are the staple food item for all but very young fish, and the most important limiting factor for some fish species in the Sea may be the scarcity of pileworms during summer and early fall. The Salton Sea is currently too salty to allow successful spawning by many of the present fish species, and recruitment probably comes from fish entering the Sea from freshwater inlets. Freshwater drains contain large numbers of tilapia, carp, mosquitofish, sailfin mollies, longjaw mudsuckers, and red shiners, which are important forage for larger fish, predatory birds, and numerous other wildlife.

While corvina, sargo, and gulf croaker eggs and fry can currently tolerate the salinity levels in the Sea, there is some indication that production of these species is declining. In addition, tilapia experience tremendous population fluctuations resulting from low winter temperatures, The reproductive potential of the Salton Sea fishery is extraordinary, however, numbers are traditionally held in check through the fish mortalities which occur each year during summer or early fall as a result of food depletion, lack of oxygen, or a combination of factors.

14. Scientific Collections

Between May 8 – 11, 1990, Salton Sea Wildlife Biologists Radke and Mackay assisted Contaminant Specialist Steve Goodbred and personnel from the Laguna Niguel Field Office in the collection of biotic samples to conclude field work for a multi-year Salton Sea Intensive Study. Samples of mosquitofish, sailfin mollies, freshwater clams, cattails, and sediments were taken from five inlets into the Sea including San Felipe Creek, Avenue 81 Drain, Johnson Drain, Salt Creek, and "Z" Drain. Samples were processed and shipped for laboratory analysis to determine contaminant levels present at the drains.

Throughout the year, wildlife specimens suitable for study skins or other scientific purposes are picked up in the Imperial Valley and held for

universities or researchers. During 1990, the following specimens were salvaged and stored in refuge freezers: common moorhen, red-winged blackbird, sanderling, killdeer, common barn owl, 2 burrowing owls, short-billed dowitcher, 2 Ross' geese, great egret, northern shoveler, Wilson's warbler, and Canada goose.

16. Marking and Banding

Three bird species, and a total of 238 individuals, were banded this year in support of approved refuge research or management studies, The bulk of these birds were northern pintails (see D.5). The refuge also conducted the banding of endangered clapper rails captured under special permit. During 1990, a total of 67 AHY-F pintail, 154 AHY-M pintail, 7 light-footed clapper rails, 8 Yuma clapper rails, and 2 American coots were banded.

17. Disease Prevention and Control

Between March 20 through April 6, several dead birds were picked up at Unit-l and adjacent private hunting club lands. Necropsied waterfowl showed spotted livers, yellow fluid in intestines, and lesions on the heart - indicative of avian cholera. Refuge staff monitored the problem and picked up dead birds to help prevent the spread of this bacterial infection. The following table itemizes the control effort.

Table G.5. Bird Carcasses removed from Refuge Lands During 1990.

SPECIES	NUMBER
Ruddy Duck	1
Northern Shoveler	5
Wigeon	1
Black-necked Stilt	4
American Avocet	1
Snowy Egret	1
TOTAL	13

During this same period, California Department of Fish and Wildlife Biologists picked up a large number of dead eared grebes and ruddy ducks along the Salton Sea shoreline, These birds were diagnosed by state personnel as having died from avian cholera.

H. PUBLIC USE

1. General

Visitation to the refuge was estimated at 40,000 for 1990, the majority of which focused on wildlife observation. Visitor facilities at the headquarters area include entrance and orientation signs, rest rooms, a contact station featuring a bird/habitat exhibit, the self-guided Rock Hill Trail with informational panels, and an elevated observation deck with adjoining picnic area.

Two noteworthy points relative to public use at headquarters should be made. First, the access to the observation deck is too steep and is substandard, The current steps have a 1:l slope and need replacing with access that is compatible with physically challenged visitors, such as a ramp with at least a 1:10 and preferably a 1:12 slope. Preliminary plans are to build a 1:12 slope ramp to an intermediate, six foot high observation level and then continue to the existing top level with stairs at a 1:3 angle. The second item is the lack of data for estimating public use at the refuge. The addition of a traffic counter combined with periodic confirmation checks would give a more accurate estimate of actual visitation, especially at the headquarters area.

No facilities have been available for visitors at Unit 1 in recent years, although the old headquarters was located there before the sea rose to prohibitive levels. To eliminate this gap in the station public use program new visitor facilities were constructed at Unit 1 this year with the addition of an elevated observation deck and orientation sign with leaflet dispenser at the end of Vendel Road. Labor was provided by the McCain Valley Conservation Camp. Much thanks and appreciation go to the efforts of the inmate crew that provided the muscle for the project.

Two glitches exist concerning the new facilities. The access was not built to be compatible with the needs of physically challenged visitors (although that access could be added on), and the location of the facilities makes regulating public use both complicated and confusing. Vendel Road cuts the one mile wide habitat at Unit 1 in half, and any public use or other human activity away from Vendel road causes significant disturbance to migratory birds there. Accordingly, no access is permitted beyond the observation deck to the north, east or west, or off of Vendel Road. The placement of the facilities north of the adjacent intersection, instead of south of the adjacent intersection, makes it much more difficult to control access by vehicles or pedestrians; eight roads instead of three must be signed to prohibit entry, and the low profile, symbolic signs used are frequently missed or ignored.

A part of the problem of controlling public access off Vendel Road is that historically visitors could walk through the impoundments all the way to the shore of the sea. Old habits are hard to break! One solution to the access question at Unit 1 may be developing an alternative interpretive trail. However, the limited habitat combined with the disturbance that would accompany the pedestrian traffic on such a trail may be contrary to refuge objectives, especially considering that duck hunting clubs and de facto public hunting are situated immediately off the east, west, and south boundaries at Unit 1.

2. Outdoor Classrooms - Students

The refuge hosts several hundred students from area schools that are traditionally recorded in this category, although in reality the student's activities are primarily those normally associated with a guided interpretive foot trail activity (as in item 4 below). Most school groups are from the ideal third to fifth grade levels. Hunt days (i.e., Wednesdays) are avoided to limit disturbance and for aesthetic reasons. As the demand for outdoor classroom activities increases, the limited staff time is stretched further.

Overall, the refuge Environmental Education Program has excellent potential. However, the program could use improvement with the development of specific

activity stations for hands-on reinforcement of the classroom curriculum in the field and direct involvement of teachers. Presently, the trip to the refuge is somewhat of a "day off" for the teachers as the groups are lead on walking tours of the Rock Hill Trail by staff members.

Ideally, the outdoor classroom program can be developed and evolve into a refuge-hosted, teacher-lead, "hands-on" group of activities that reinforce the student's curriculum, with different activities in varied locations for different grade levels, Currently (and in recent years), only one basic tour activity is offered to all grade levels; the Rock Hill Trail tour.

Four items related to the refuge Environmental Education Program are worth mentioning: rest room facilities are not adequate when two classes pair up for a visit, especially the single stall ladie's facility. Perhaps splitting the groups up and using some of the staff facilities would help; many class groups had several Spanish speaking only kids, making communication difficult; an effort was made at experimenting with different, shorter routes to the headquarters ponds for younger groups that had trouble paying attention and keeping organized while making the two mile round trip to Rock Hill, This approach also left the Rock Hill Trail unexplored for class visits in future years; keeping groups organized while ascending or descending Rock Hill proved to be a significant and consistent problem - by the end of the season groups were either not taken up the hill or were allowed to do so on their own after the refuge lead activities are completed.

3. Outdoor Classrooms - Teachers

No activity is currently taking place in this category, although conducting teacher workshops to develop a familiarity and competency level among teachers so that they can lead their own outdoor classroom activities is the ultimate answer to improving the refuge Environmental Education Program. The "multiplier effect" gained by developing teachers' abilities in conducting their own activities through participation in teacher workshops will pay great dividends. If the interest is there and the time can be found to take on the additional short-term workload it will eventually decrease the demands on refuge staff time,

4. Interpretive Foot Trails

The only facility in this category is the one mile (each way) Rock Hill Trail, which terminates at a small hill adjacent to the Salton Sea that provides a handsome vista of the refuge and surrounding area. About half of the refuge visitors that come to the headquarters area venture down at least part of the trail. Several static panels are placed along the course of the trail for visitor's information. The remainder of refuge that is located on land is closed to all entry, except for the hunting area under permit on hunt days, making the Rock Hill Trail virtually the only place on the refuge for visitors to venture about.

Some discussion has taken place about moving the goose blinds located one-quarter mile south of the trail to another location that would not conflict with other public use on the Rock Hill Trail. Complaints and negative comments about hunting are frequently received, and general avoidance of the area on hunt days is common among non-hunting visitors.

The prospect of developing some type of interpretive trail at Unit 1 has been discussed, but the enigma of trying to provide public use facilities and managing quality migratory bird habitat in the same location will be difficult to resolve, especially in light of the limited habitat available and the conflicts associated with hunting just off the refuge boundary.

6. Interpretive Exhibits/Demonstrations

The refuge contact station sports a popular diorama depicting croplands, native scrub, and wetland habitats with mounts of representative bird species. The potential also exists for the development of an additional small scale diorama featuring the endangered Yuma clapper rail. Eggs and downy chicks recovered from the depredated nest of a telemetered rail create the opportunity to depict a realistic nesting scene,

7. Other Interpretive Programs

Refuge staff presented off-site programs to organizations on request. Work was started at compiling a generic slide show (with a written narrative) for general audiences in support of off-site programs, but more refinements need to be made. Programs were presented to the area Sierra Club, two chapters of the Optimists Club and for two school groups.

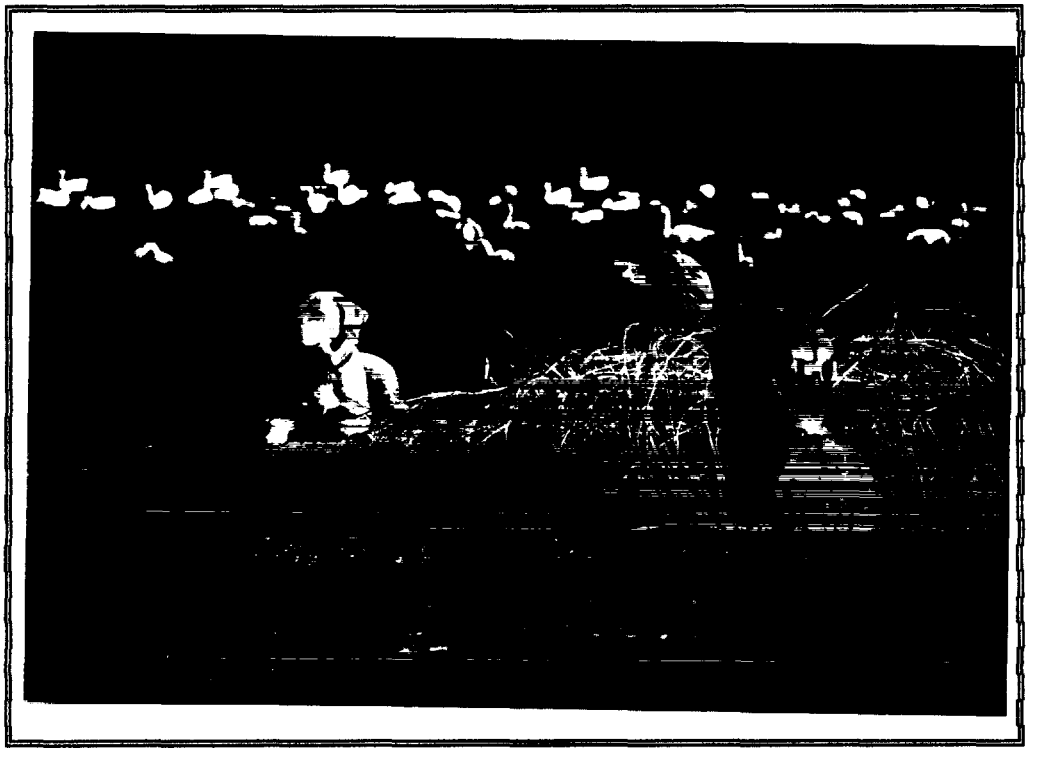
8. Hunting

The public waterfowl hunting program on the refuge is conducted on Wednesdays, Saturdays and Sundays under cooperative agreement with the California Department of Fish & Game. The refuge hunt is managed by the state as part of the public hunting program of the Imperial Wildlife Management Area. Hunters are issued permits at the Wister Wildlife Management Area check station located on State Highway 111 and Davis Road, north of the town of Niland. All hunters shooting on the refuge are assigned to a specific blind and are not permitted away from their blind, except to retrieve downed birds or while entering or exiting the area. Law enforcement/compliance checks are conducted primarily by refuge law enforcement officers with state wildlife officers also patrolling the refuge occasionally. The twenty-five shell limit and steel shot requirement are two of the most frequently encountered violations.

Hunters shooting on the refuge encountered some changes from previous years at the Hazard Tract. Although there are normally twelve blinds to shoot from, the dike rehabilitation project (see section 1.2) forced the closure of blinds 8 and 9 for the entire season. Hunters also had to adjust to hunting from the site of their assigned blind only; no roaming or extended shooting radius away from the blind was permitted. Islands which previously served as optional shooting sites were eliminated at blinds 1 through 6, decreasing the temptation for hunters to set up away from their assigned blind on the dike, reducing the need for salt cedar management, and facilitating access to the blind by both the hunters and law enforcement personnel.

Plans are in the works to eliminate the islands at Hazard blinds 8 through 12 and establish new shooting points with two new two-person pit blinds installed at each shooting point on the margin of the dikes. Due to the new spatial arrangement one or two additional blinds could be added in the area of blinds 10, 11 and 12 without sacrificing safety or quality.

Blind 7 is reserved for handicapped hunters and was moved and remodeled as one of the summer YCC projects in an effort to offer a better quality hunt to handicapped hunters. Although the new blind was successfully received, it got very little use once the state revised its criteria for what physically qualifies as a handicap. In brief, the new state policy requires that handicapped persons shall be dependent on some sort of device for getting around, which eliminated one particularly vocal sportsman with a heart condition who is not dependent on such a chair, cane, brace, etc.



Successful waterfowl hunters at blind #l in the Union Field await another wave of geese into their decoys. l/12/91 WRR

For the sake of convenience and continuity, hunter data is maintained and reported on the basis of the hunting season, which runs roughly from mid-October through the middle of the following January. The number of hunters using the refuge during the 1990-91 hunting season declined sharply from the previous season. A total of 634 hunters shot from assigned blinds this year compared to 1,250 for the 1989-90 season, a 49% decrease. The closure of blinds 8 and 9 accounts for only a seventeen per cent decrease (on strictly a percentage basis), indicating that hunter participation did decline sharply even after adjusting for the fewer blinds available.

9. Fishing

The number of visitors in this category in not well known but is thought to be decreasing significantly in response to health warnings for consuming Salton Sea fish. With roughly 35,000 acres of the original refuge flooded by several feet of water and additional near-shore areas of the refuge also flooded, a large portion of the southern half of the sea is refuge and is open to

fishing. Visitation in this category is probably in the range of 10,000 visits, and declining.

11. Wildlife Observation

The majority of refuge visits fall into this category. Although "birders" visit the refuge throughout the year, the peak period for bird watching corresponds with the peak period for wintering geese, roughly from November through February. The large variety and number of birds in the area combined with a reputation for attracting rare birds brings in bird watchers from near and far. The presence of some unusual summer "visitors" highlighted the year for birders in 1990,

Birders outnumber permitted hunters at least 5:l on refuge lands. 11/16/90 WRR

A strong summer monsoon, which corresponds with a strong low pressure system or hurricane in the Pacific Ocean off of Mexico, brought in both brown and blue-footed boobies and magnificent frigatebirds, much to the delight of hundreds of In fact, the "boobby invasion" was the cover article

in the December issue of WildBird and was featured in an article in the December issue of Birder's World. The Salton Sea does indeed have a world-wide reputation among birders, and the number of visitors with foreign accents attests to that fact.

The Salton Sea Refuge is the destination of several organized birding tours each year. The groups include each of the southern California Audubon Society chapters as well as nationally advertised tours led by "experts" for a fee.

One new item that was introduced this year was a "Noteworthy Observations" sheet posted outside in the picnic area. The sheet has become popular, although sometimes misused, and provides weekend visitors with a current reference for rare birds and "hot spots" when the office is closed.

14. Picnicking

The three refuge picnic tables under the shaded public use area receive considerable use for eating, resting and refreshment. Most school groups visiting for educational activities arrive about 9:30 a.m., wind up their field activities, and enjoy a sack lunch before heading back to school.

Various tour groups associated with county and local agencies, geothermal interests, the irrigation district and other interests have found that the refuge headquarters makes a nice "pit stop" for their tour groups. Visitors have access to refuge displays, interpretive materials, and facilities, even though the primary purpose of the refuge of the group's tour was not wildlife oriented.

17. Law Enforcement

The majority of refuge law enforcement is directed at the on-site waterfowl hunting program. Additional enforcement of the Migratory Bird Treaty Act (MBTA) is also performed in the vicinity of the refuge during waterfowl season, Three officers were on board this waterfowl season. Tours of duty were adjusted for two staff members so that a law enforcement presence was on hand for virtually all hunt days (Wednesdays, Saturdays and Sundays), representing a significant increase in law enforcement patrol hours by refuge staff over recent years.

Opening weekend of dove season is another crunch time for MBTA enforcement. Refuge officers from the complex were fortunate to attend a combined training exercise with a task force of Special Agents in Moreno Valley (near Riverside) just prior to the dove opener. Regional Director Marv Plenert also attended the training session; it was great to see that level of support for law enforcement.

A concerted effort was made to reduce aircraft disturbance from crop dusters this year. The proliferation of croplands around the refuge combined with frequent pest management activities frequently places crop dusters at odds with refuge objectives. Pilots from Farm Air, Mar Aviation and Stoker Chemical were contacted concerning wildlife disturbance in an effort to curtail the problem.

A total of 35 violation notices were issued in 1990, representing a big increase from the mere two federal violations issued the previous year.

Additionally, 15 cases were turned over to the state for prosecution. In this scenario, Refuge Officer Orozco patrols with state Wildlife Officer Sassey and all cases they make, on or off the refuge, go through the state court system. The state not only has a good track record for convictions and fines, but monies from fines are turned over to the Imperial County Game and Fish Commission for use in wildlife and recreation projects in the area, some of which benefit the refuge directly.

There are two reasons for the dramatic increase in federal violation notices issued over the previous year: more staff spent more time performing law enforcement and a much higher percentage of the total patrol hours was spent on-site without state assistance, meaning that most cases were not turned over for prosecution in state court.

The following table summarizes cases made by refuge officers at and near the Salton Sea in 1990:

VIOLATION	FEDERAL VIOLATION NOTICES	STATE COURT CASES
Vehicle Trespass	1	1
Fishing without license	1	--
Hunting without license	1	--
Taking non-game bird	2	2
Hunting without a duck stamp	2	--
Trespassing	3	--
Hunting with unplugged gun	3	--
Violation of refuge hunt regulations (all for hunting away from blind)	3	--
Possession of non-steel shot	4	4
Possession of over limit	6	6
Possession of over 25 shells	9	--
Violation of state hunt regulations	--	2
TOTALS	35	15

Some concerns sprang up about the leniency of the U. S. Magistrate in San Diego who hears the Federal wildlife cases, First time offenders without attitude problems are normally found guilty but typically have all fines suspended - they walk for free! The message this sends to violators which are

convicted may be inconsistent, and the total lack of any fine certainly does not cover the government costs involved in presenting the case.

Additional warnings were given to some hunters about the requirement of only shooting from assigned blinds, particularly at blind 10 where the shooting point was moved but the former island blind site was still intact. Plans are to move all shooting points to dike shoulders and remove all islands, which should reduce the temptation to hunt away from assigned dike blinds.

Near the end of the year a situation developed concerning hunting at Bruchard Bay that is worth noting. The refuge received complaints from adjoining duck clubs and inquiries from interested hunters about hunting in the Bruchard Bay portion of the refuge located at Unit 1 west of the Alamo River and north of the impoundments. In particular, one pair of hunters pointed out that some signs did not seem to coincide with the boundary on the refuge brochure map and that some hunting blinds were located inside the boundary. [Note: all of Unit 1 is closed to hunting, and all of the unit is closed to entry except for Vendel Road and the areas flooded by the sea are open to boating access from April 1 through September 30.]

Upon investigation it was determined that the signing in the area is substandard and needs rehabilitation, and that some old signs were located on other than the current boundary line. Hunters had indeed lined up on the old signs (and had been doing so for a number of years) and constructed several blinds within the current refuge boundary. Initially, new signs were posted along the access road on the west bank of the river for nine-tenths of a mile and hunters were contacted about the non-hunting refuge status of the area and advised about removing/relocating their blinds for next year. A good deal more boundary posting work remains to be completed before the next waterfowl hunting season if we are going to enforce refuge regulations there, and, we will need to get out on the sea - something we haven't done lately.

The long established and often controversial California program of <u>feeding</u> duck clubs which then hunted ducks is over. A United States District Court ruling, dated November 2, 1990, brought an end to this long standing disagreement between the U.S. Fish & Wildlife Service (Service) and the California Department of Fish & Game (CFG).

Beginning in 1953, CFG began issuing permits to applicants to place feed grain for waterfowl on specified acreages. This was done under the auspices of preventing depredation on crops in the vicinity of Salton Sea. (Salton Sea Refuge itself put out <u>tons</u> of grain.) The Service had no problem with this except where feeding licenses were issued to duck club owners who then in turn hunted the ducks attracted to the grain. This constituted hunting violations under Federal statutes.

In 1961 a Service baiting violation citation ended up in Federal Court which determined the California regulation to be <u>in pari materia</u> with the Federal regulation as the Federal government had not defined an area within which hunting could not occur. California had placed a restriction on hunt clubs that hunting could not occur within 250 yards of a feeding station.

In 1974, the Service concluded once again (after restructuring the definition of "baiting" in Federal regulations) that it would begin issuing citations involving violations of anti-baiting regulations. A voluntary settlement was

reached in 1975 where-by the Service would study the issue, and if after review would provide written notice of the fact that Service regulations need not be changed, to CFG and specific plaintiffs. The study contemplated was completed by Dr. Leigh Frederickson in January of 1980. CFG also undertook their own study.

In May of 1988, the Regional Director notified by letter pertinent parties to the settlement agreement that there would be no change in Federal "baiting" regulations. The letter stated "The Service will terminate the current Settlement Agreement at the beginning of the 1990-91 migratory waterfowl hunting season." As one can imagine this caused a furor in southern California which brought nation-wide attention.

In 1988 the Service began a technical assistance effort to meet with club owners and give advice and assistance on habitat restoration and management plans to help club owners begin to grow natural foods for waterfowl. Farming practices had changed enough that depredation was not the problem it was in 1950-60. If habitat was not available for waterfowl, they would more than likely continue south to Mexico, The technical assistance effort met with mixed reception; some club owners firmly believed CFG would come to their rescue once again while others were eager to begin new practices (voluntary compliance).

As the 1990-91 waterfowl hunting season approached many parties got nervous feet. CFG tried for a renewal of studies for another 5 years – this was squashed (the problem had been studied for 20 years). CFG continued to issue feeding licenses for the 1990-91 season so a letter went to all club owners to the effect that baiting regulations would be enforced. On October 10, 1990, just prior to the scheduled opening of hunting season, club owners filed for an injunction to prevent the Service from enforcing regulations. CFG also at this time delayed the state opener of waterfowl season hopeful of a court decision in their favor. As mentioned at the start of this section, a court ruling on November 2, 1990 denied the plaintiffs injunction which allowed the Service to proceed with enforcement of baiting regulations.

The point to this whole thing (i.e. the court case) was that the Service was not out to stop feeding, especially if done to prevent crop depredation, but to stop hunting on, over or near "feeding" stations. The last paragraph of the court decision stated:

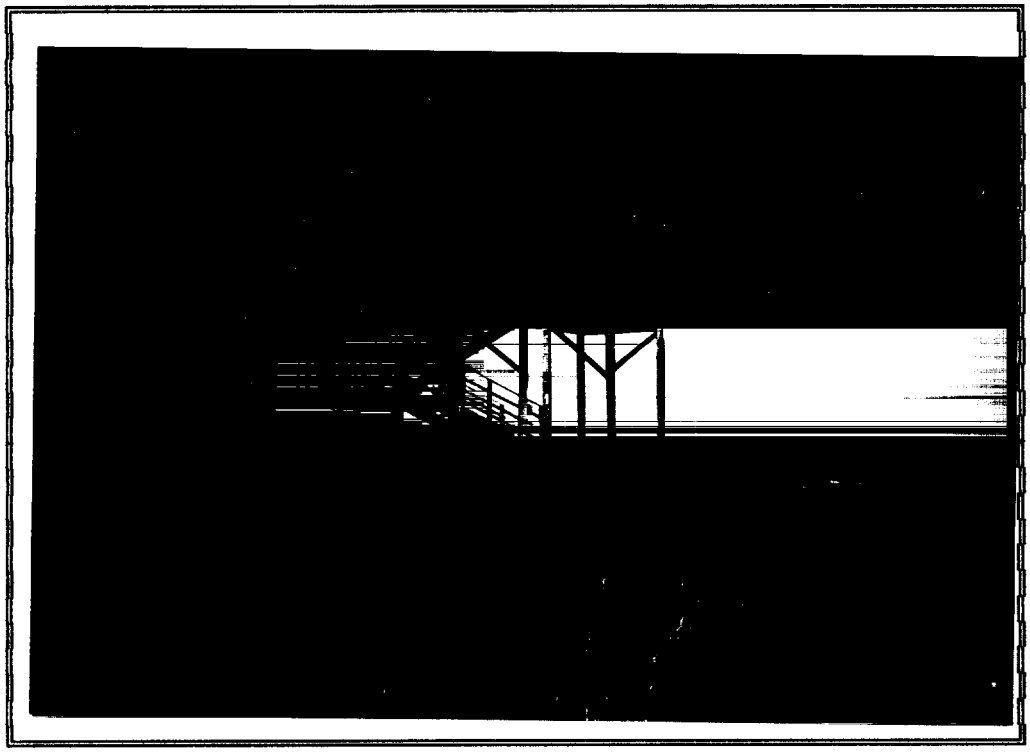
"This controversy has proceeded for thirty years, and the record shows careful consideration by the Service of a wealth of scientific studies and of the arguments made by hunters who support and oppose current baiting practices. The court finds no reason not to allow the federal government to proceed with the enforcement of anti-baiting regulations in the same fashion that they are enforced across the country."

I. EQUIPMENT AND FACILITIES

1. New Construction

Three new additions were built in 1990. The McCain Valley Conservation Crew constructed an elevated observation platform and informational sign standard at Unit 1. These new visitor facilities go a long way toward filling the gap that had existed in the pubic use program at Unit 1. The initial phase of

locating a parking area near the tower was also completed, although graveling, signing and other finishing touches remain to be done.



A new elevated platform provides excellent views of habitat and associated wildlife at Unit I, 2/23/90 RV

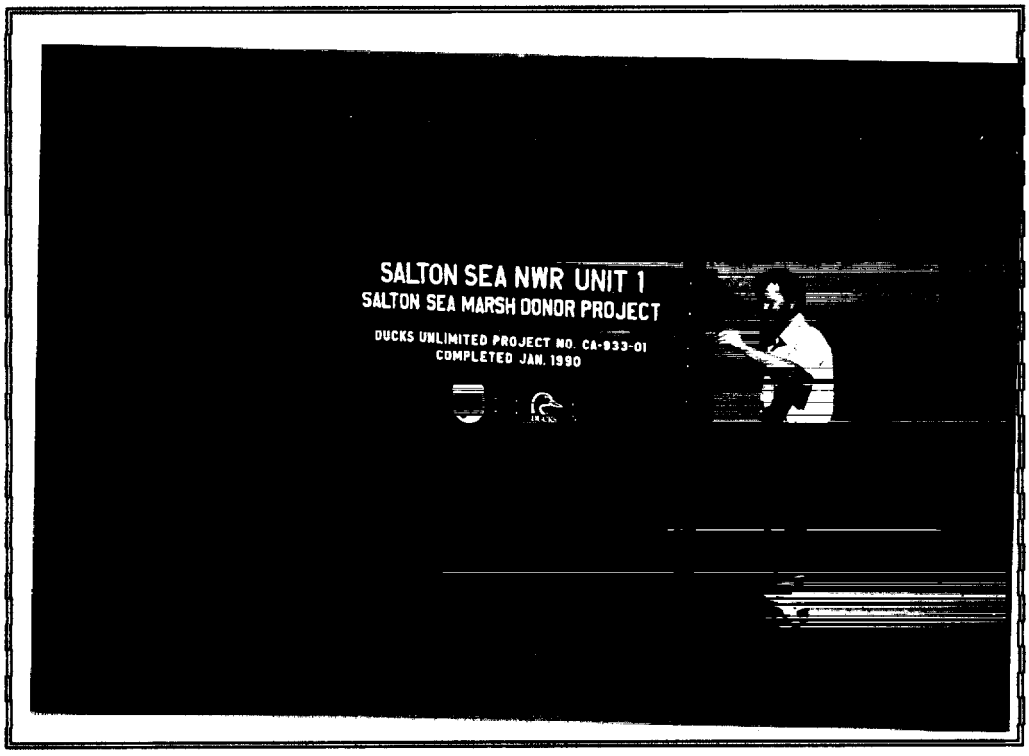
Another combined project resulted in improved drainage capabilities at the impoundments at Unit 1. A lift pump paid for by Ducks Unlimited was installed using funds granted by the Imperial County Game and Fish Commission in combination with a concrete sump provided at refuge expense. The new pump is located in the northeast corner of impoundment B4 near the sea. The ability to pump water out of the slow-draining impoundments enhances habitat management capabilities,

A new awning was built over the trailer used as a residence at headquarters under contract for $10,600. The shade structure provides welcome relief from the long, hot afternoon sun and decreases energy costs, Additional shading needs to be installed on the west side of the structure downward from the beam supporting the awning.

2. Rehabilitation

The major rehabilitation job in 1990 was the reshaping of dikes at Hazard Tract. Many staff days were spent hauling, moving, and shaping dirt to replace the steep, eroded slopes of the old dikes. Dirt was hauled from the construction site of the new Calipatria State Prison using the belly dump borrowed from Malheur NWR. The dikes of impoundments 1A, 2A, 3A, 1, 2, 3, 8 and 9 were reshaped to at least a 1:3 slope and the dikes dividing impoundments 1A and 2A and 2A and 3A were realigned to tie in with the

adjoining north/south lying dikes. The dike on the north side of impoundments lA, 2A and 3A was beefed up to offer more protection in case of flooding on the Alamo River.



Assistant Manager Chris Schoneman leveling Ducks Unlimited/USFWS cooperative venture sign at Unit I. 9/90 DRD

In other impoundment work the bottom and sides of the north Reidman Pond at Unit 1 were reshaped. The improvements offer varied depths and "niches" to migratory birds when flooded, and include a peninsula where birds can loaf. The peninsula design offers an advantage over the resting island design by allowing vehicular access for salt cedar management. In another Unit 1 project the YCC crew filled and placed numerous sandbags around water outlet structures to control erosion and allow maintenance access.

Merrill Corporation was contracted to perform concrete ditch repairs, remove two jack gates and replace another jack gate at Unit 1. A good deal more ditch and gate repair work remains to be done, including the replacement of leaking, worn out slide gates with new stainless steel gates.

Rip rap was hauled to the sea wall at the Union Tract in an ongoing project to upgrade the condition of the protective barrier. Currently, most of the headquarters area is about two feet lower than the sea, a situation that increases the value and importance of having a structurally sound sea wall.

Damaged garage doors were repaired on the shop and boat storage building, providing both improved function and appearance. More care taken in the future in backing vehicles and equipment will prevent a recurrence of the damage.

3. Major Maintenance

Maintaining the refuge fleet of equipment in operating condition keeps heavy equipment mechanic Laizure more than busy, especially due to the military surplus origin of most of our equipment. In addition to the routine "fix it" jobs performed on an ongoing basis, a few repairs are noteworthy,

The fire pumper received a new engine. However, the repairs took much longer than expected and we experienced problems with the belt drive to the pump once we got it back.

The borrowed Kern NWR dozer received hydraulic hoses and a new hydraulic valve was machined to replace the leaking existing valve. More work remains to be completed before the dozer is ready to be returned to Kern.

The BG pump was replaced on the D-7 Dozer after the original was damaged trying to get another dozer unstuck. The heavy clay soils around here frequently mire our equipment, resulting in costly down time and rescue operations to pull the equipment out of the mud. The option is to stay on dry ground, but then we wouldn't get much done in the impoundments. All the more reason to have the capability to dewater impoundments quickly!

4. Equipment Utilization and Replacement

Heavy Equipment Mechanic Laizure screens surplus military equipment at bases in the region in search of serviceable equipment to meet the needs of Salton Sea and other refuges in the region. This year we picked up three GMC dump trucks, one of which went to the Southeast Idaho Complex and one of which will replace another dump we will transfer to Ruby Lake in 1991. We also picked up a Caterpillar Model 130G motor grader, which will stay here, a trailer and steel cable went to Sheldon, and a lowboy trailer went to Bear Lake.

A complication developed this year concerning the screening process at some military bases. The Defense Logistics Agency (DLA) has identified some "impacted" bases where they feel that surplus equipment is not moving fast enough, including some of the bases where we screen. In an effort to relieve congestion at these bases, DLA has implemented "expedited" screening procedures whereby any screener from any agency can freeze an item on a first-come, first-served basis and that agency then has forty-eight hours to pick up the item, otherwise it goes back on the available list. In an effort to address this change it has become necessary to have presigned SF-122s available (on a controlled document basis) to facilitate our ability to pick up equipment at an impacted base,

Other equipment management activities included the acquisition of a retrofitted Unimog loader/backhoe unit, our old grader was transferred to Ruby Lake, and Ruby transferred a John Deer 30lC loader/backhoe to us. We also picked up two reconditioned diesel engines in hopes of utilizing one to replace the undersized engine in our truck-tractor. However, the engines turned out to be something other than what we had in mind, and will need to be transferred somewhere with a need for a stationary generator or similar use.

5. Communication Systems

A new Motorola Spectra radio system was purchased this year. Four vehicle-mounted mobile units, five hand-held units, and a base station were acquired. The Spectra system features multiple programmable channels, although frequencies are not field programmable. Plans are to install CLEMARS, BLM, CF&G car-to-car, and FWS frequencies in 1991.

7. Energy Conservation

Summertime cooling needs can consume a large amount of energy with concomitant costs, even though the office is maintained in the range of 80°F during office hours. In the interest of conserving energy on evenings and weekends regional computer guru Doug Robertson was queried about "how hot is too hot for the computer disks"? The answer indicated that, although you do not want to operate a disk in the 100°F range, our overnight thermostat setting could be increased a bit to save some energy and money,

J. OTHER ITEMS

3. Credits

This Narrative Report was written as a combined effort by the Salton Sea staff, with the following staff members taking the lead for the sections listed: Ken Voget wrote sections C, D4, F5 and F8, J2 and K; Dan Dinkler wrote sections D2 and D3, El, E4 and E6, F4, F9, FlO and Fll, H, J3 and K; Bill Radke wrote sections D5, E7, Fl, F2 and F6, and G; Chris Schoneman wrote sections B, E2 and E3. Shelly Hunter applied her word processing skills in reproducing hand-written portions of the text and in organizing, editing and compiling other portions of the text processed by other staff members. Additional editing was provided by Voget and Dinkler.

Photographs are credited in the text using the initials of the photographer.

K. FEEDBACK

If managing habitat is the key to managing wildlife, then having the equipment to perform those management operations is the key to the success of this refuge in meeting habitat management objectives. Accordingly, equipment needs are one of the top priorities related to habitat management here. The lack of management capability and down time for repair caused by operating a fleet of military surplus equipment is a continuing problem that needs solving with funding adequate to purchase new heavy equipment.

COACHELLA VALLEY NATIONAL WILDLIFE REFUGE

THOUSAND PALMS, CALIFORNIA

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1990

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVAL

COACHELLA VALLEY NATIONAL WILDLIFE REFUGE

THOUSAND PALMS, CALIFORNIA

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1990

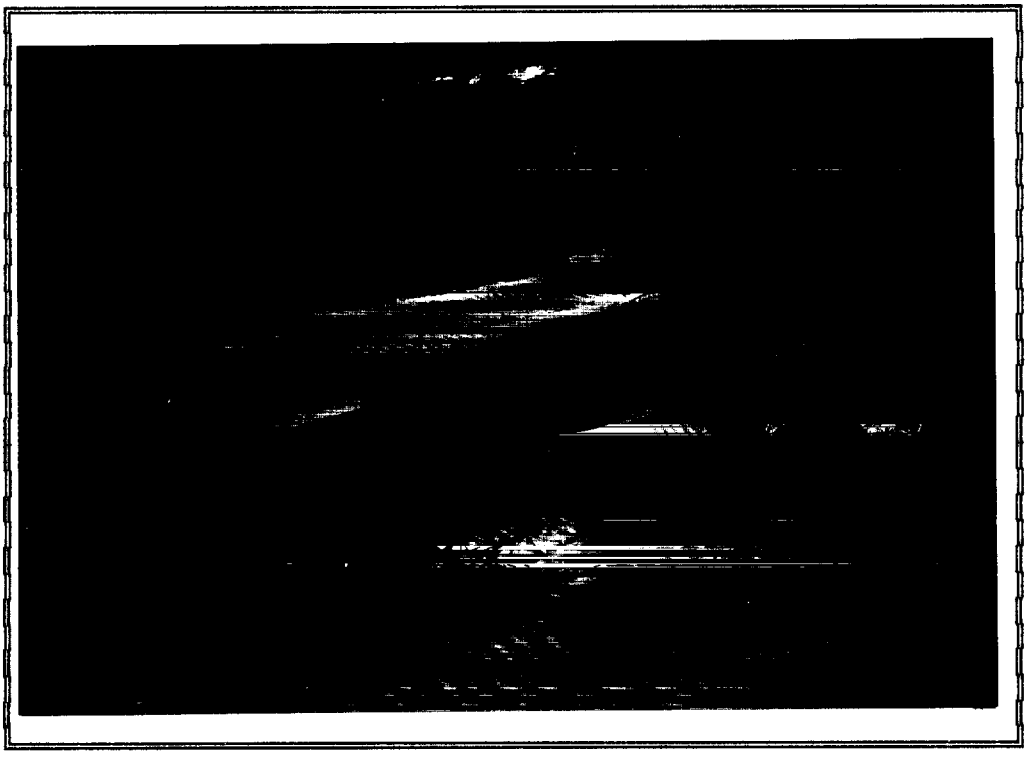
Refuge Manager	Date	Refuge Supervisor Review	Date

Regional Office Approval	Date

INTRODUCTION

The 2,589-acre Coachella Valley National Wildlife Refuge is located about ten miles east of Palm Springs in the heart of Southern California's rapidly developing Coachella Valley. Established in 1985 as part of the 13,000-acre Coachella Valley Preserve, the refuge protects critical habitat vital to the survival of the federally threatened Coachella Valley fringe-toed lizard, (Uma inornata), an animal having an extremely restricted geographic range.

The Preserve is jointly managed by the U.S. Fish and Wildlife Service, Bureau of Land Management, California Department of Fish and Game, California Department of Parks and Recreation, and The Nature Conservancy (TNC), with each of these organizations owning various parts of the Preserve. The day-to-day management of the area is performed by a Preserve Director funded by TNC, with management directions provided by a Management Committee made up of representatives from each of the agencies mentioned. Policies governing a given part of the Preserve are ultimately the responsibility of the agency or association owning that parcel of land.

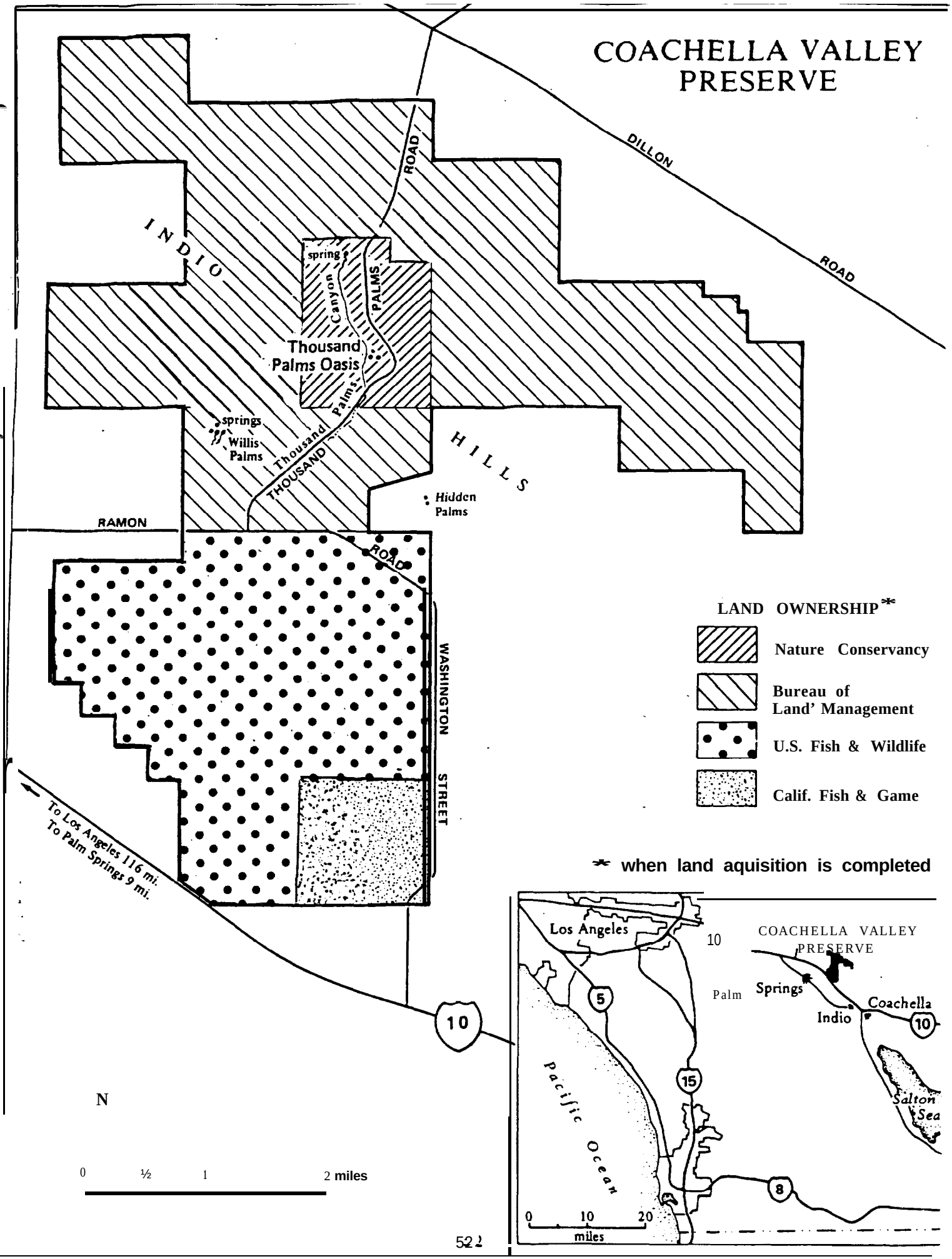


The snow-capped San Jacinto Mountains provide a ll,OOO-foot granite backdrop to Coachella Valley NWR's aeolian sand ecosystem inhabited by fringe-toed lizards and other desert wildlife. l/14/91 WRR

Because of the expanding human population in the valley, the Preserve is essential in protecting an array of desert ecosystems threatened by human development. The Preserve's ecosystems include native palm oasis woodlands, perennial desert pools and streams, and wind-blown sand dunes, The numerous palm oases are sustained by water made available through fractures in the

bedrock along the San Andreas Fault, which bisects the Preserve. Impervious clay layers hold some of this water on the desert surface, providing habitat for federally endangered desert pupfish (Cyprinodon macularius) and numerous other species. Periodic flash floods from the Little San Bernardino Mountains provide waterborne sediments which are then sorted by the wind to create an extensive system of sand dunes. It is these isolated dunes which are necessary for the survival of the fringe-toed lizard. In addition to the Coachella Valley fringe-toed lizard and the desert pupfish, the Preserve provides habitat for several federal candidate species and a wide array of plant and wildlife species.

Although legally protected, Preserve lands remain threatened by flood control issues and illegal activities such as off-road vehicle use, equestrian use, indiscriminate shooting, and dumping. As one of the few desert "open areas" remaining in the Coachella Valley, the Preserve attracts significant visitor use, some of which is not compatible with refuge objectives. There are many recreational opportunities in the Preserve, however, because the Preserve encompasses lands under the jurisdiction of several agencies, rules and regulations concerning recreational and other activities vary from one area to the next. Therefore, activities allowed in one part of the Preserve may not be allowed on refuge lands.


COACHELLA VALLEY
PRESERVE
DILLON ROAD
ROAD
INDIO
spring
Canyon
PALMS
Thousand
Palms Oasis
springs
Willis
Palms
Thousand Palms
THOUSAND
HILLS
Hidden
Palms
RAMON ROAD
WASHINGTON STREET
To Los Angeles 116 mi.
To Palm Springs 9 mi.
10
N
0 ½ 1 2 miles
LAND OWNERSHIP*
Nature Conservancy
Bureau of
Land' Management
U.S. Fish & Wildlife
Calif. Fish & Game
* when land aquisition is completed
Los Angeles
10
COACHELLA VALLEY
PRESERVE
Palm
Springs
Coachella
Indio
5
15
10
Pacific Ocean
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8
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PAGE

INTRODUCTION

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS PAGE

A. HIGHLIGHTS

California Department of Parks and Recreation becomes part of the Preserve management committee, increasing Preserve acreage from 13,000 acres to 15,206 acres, and increasing the management committee to five members. (Section C.3)

Research is initiated to determine the survival and recruitment of hatchling fringe-toed lizards on the Preserve. (Section D.5)

The California Department of Fish and Game downlists the Coachella Valley fringe-toed lizard from state endangered to state threatened because they feel that current management actions appear suitable to prevent the animal from becoming extinct. (Section G.l)

Development adjacent to the Preserve results in the bulldozing of debris onto refuge lands into critical habitat, leading to extensive negotiations between Ivey Ranch Country Club, the Service, the U.S. Solicitor, and finally the U.S. Attorney. (Section H.17)

In defiance to the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan and the established Endangered Species Act 10(a) Permit, real estate broker and part-time jojoba farmer Jerry Segall clears and levels his private land within the Preserve boundary. (Section H.17)

B. CLIMATIC CONDITIONS

Weather conditions in the Coachella Valley are typical of the southern interior desert with mild winters and extremely hot summer temperatures normally exceeding 110°F. The area averages less than five inches of annual precipitation with January through March usually being the wettest months, The following table depicts the weather summary for the year. The warmest day of the year occurred on June 26, while the coldest day occurred December 23.

Weather Summary 1990*

MONTH	PRECIPITATION (inches)	TEMPERATURE (°F) Max	Min
January	.17	80	29
February	.02	86	25
March	.00	97	38
April	.02	101	53
May	.00	103	45
June	.00	120	60
July	.00	116	68
August	.00	110	63
September	.00	117	63
October	.00	99	48
November	.00	92	31
December	.00	83	19

"Weather data taken at Indio City Fire Department Headquarters.

C. LAND ACQUISITION

1. Fee Title

Refuge fee title lands remained at 2,588.73 acres through 1990, though a large number of lands are being held by The Nature Conservancy awaiting transfer to the Service early next year. In addition, a complicated land trade with North Star, an adjacent developer, remains tied up in congressional subcommittee through the end of the calendar year. This trade will eliminate the stair step effect of the southwest Preserve boundary and align the boundary with prevailing winds to secure wind-blown sand transport, The action, which will help restore fringe-toed lizard habitat to about 160 acres of refuge land, is recognized by everyone involved as a positive move toward enhancing habitat quality. The trade, which has been before Congress since 1988, promises to be resolved during the coming year.

3. Other

In September, the Coachella Valley Preserve Management Committee agreed to include California Department of Parks and Recreation as an equal member of the committee. The decision will add strength to the habitat viability of the Preserve through addition of the 2,206-acre Indio Hills Palm State Park, which lies adjacent to existing Preserve lands. A Memorandum of Understanding to incorporate this change is currently making the rounds between each committee agency for signature and approval.

D. PLANNING

2. Management Plan

All management activities on the refuge are guided by a number of documents including the Coachella Valley National Wildlife Refuge Environmental Assessment (April 1985), the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan and Implementing Agreement (June 19851, the Coachella Valley Fringe-toed Lizard Recovery Plan (September 1985), and the Coachella Valley Preserve System Management Plan (July 1986).

The Habitat Conservation Plan (HCP) sets aside the Preserve as a "permanently reserved habitat" for the preservation of the Coachella Valley fringe-toed lizard, This was done as a condition of rallying local Coachella Valley governments to carry out or to approve actions that could result in the "incidental taking" of fringe-toed lizards outside of the Preserve areas, Three preserve areas were set aside, of which the Coachella Valley Preserve is the largest and only one incorporating refuge lands. The preserves represent a compromise between the conservation of the fringe-toed lizard and its habitat (federally mandated under the Endangered Species Act) and the development of the Coachella Valley. As directed by the HCP, the main goal of the Preserve is preservation of the fringe-toed lizard and its habitat to assure that this species does not become extinct.

The Coachella Valley Preserve Management Plan establishes guidelines for management actions to "insure protection of resources contained within the Preserve." The ten long-term goals identified in the plan are as follows:

1) Maintain and enhance the natural condition of all lands within the Coachella Valley Preserve System.

2) Restrict vehicle access within the Coachella Valley Preserve System to the minimum number of routes needed to service authorized right-of-ways and private land.

3) Remove all exotic plant and animal species where and when feasible to the benefit of native species.

4) Restrict the use of firearms on all lands within the Coachella Valley Preserve System.

5) Remove abandoned buildings, vehicles, and debris.

6) Establish hiking and equestrian trails systems through the major habitats of the Coachella Valley preserve System, and locate equestrian trails outside sensitive habitats such as palm oases and sand dunes.

7) Provide the public with information on the resources, origin, and cooperative nature of the Coachella Valley Preserve System.

8) Monitor the sensitive biological components contained within the Coachella Valley Preserve System.

9) Make the Coachella Valley Preserve System available for use by researchers.

10) Provide refugia for endangered species of native plants and animals which occur in similar habitats.

Management meetings with representatives from each agency were held five times during the year to coordinate activities on the Preserve. The chairmanship of the Management Committee rotates among all the agencies, with The Nature Conservancy representative acting as chairman during 1990.

4. Compliance with Environmental and Cultural Resource Mandates

In 1986 the habitat Conservation Plan was signed by the USFWS, BLM, CDFG, TNC, the County of Riverside, and the cities of Desert Hot Springs, Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella. The signing of this HCP cleared the way for issuing an Endangered Species Act Section 10(a) permit, which allows the incidental take of fringe-toed lizards and development of fringe-toed lizard habitat outside the Preserve boundaries. As a stipulation of the permit, developers are required to pay a $600 per acre mitigation fee which goes into an endowment fund for the Preserve. Unfortunately, compliance with this stipulation is

suspected of not occurring properly, and the Service is still struggling with the most appropriate means of auditing the situation.

Work began last year on a Section-7 Consultation to allow equestrian access through the southern part of the Preserve. A draft Biological Opinion was completed in February 1990 which would restrict horse trails to the western perimeter of refuge lands. A final Biological Opinion was issued in June 1990, but has yet to be implemented and enforced.

During November, refuge personnel initiated a Section-7 Consultation with Laguna Niguel Field Station biologists to allow construction of a block wall on the common boundary between refuge lands and Ivey Ranch Country Club lands. The Consultation resulted from a request by Ivey Ranch to straddle the boundary with equipment in order to dig a footing for the wall.

Although cultural resource mandates were met during 1990 on Preserve lands owned by other agencies, cultural resource concerns are not likely to occur on refuge lands. Intermittent seasonal gathering of mesquite beans by Cahuilla Indians is likely to have occurred in the refuge area, but because the area is subjected to intermittent flooding and heavy wind-blown sand transport, it is unlikely that Native Americans using the area for gathering would have erected any permanent shelter there. No indication that such settlement would have occurred has been found to date on refuge lands.

5. Research and Investigations

Coachella Valley NR90 – "Survival and Population Recruitment of Hatchling Coachella Valley Fringe-toed Lizards on Coachella Valley NWR" (11632-9001)

The Coachella Valley Preserve System Management Plan identifies a need to determine fringe-toed lizard habitat needs, reproductive needs, reproductive success, causes for population fluctuations, and population status. To help investigate these questions, Wildlife Biologist Radke and TNC Southern California Area Manager Cameron Barrows initiated a research project to further identify the population dynamics of the Coachella Valley fringe-toed lizard. Objectives are to: 1) evaluate CVFTL population dynamics and viability, 2) determine survival and recruitment of hatchling fringe-toed lizards and identify predation pressures or other mortality causes, and 3) determine population dynamics in various habitat types,

Methods involved counting lizards on two refuge transects surveyed six times each between October 2 – 10. The ratio of adults/hatchlings during autumn will be compared with next year's springtime ratio to determine hatchling recruitment. Vegetation surveys on the two transects were conducted October 15 and correlated with lizard densities to help identify and delineate the best remaining habitat. A better knowledge of fringe-toed lizard population densities and appropriate carrying capacities of various habitats will be useful in managing refuge lands for this species.

Table 3. Number of Individual Plants Within Refuge Transects During 1990.

TRANSECT	L. tridentata	A. polycarpa	A. canescens	T. canescens
CVP #2	16	1	114	0
CVP #4	44	0	9	11

E. ADMINISTRATION

1. Personnel

As a satellite to Salton Sea NWR, Coachella Valley Refuge is operated as a collateral responsibility by personnel working in Calipatria. During 1990, Salton Sea Refuge personnel visited Coachella Valley NWR primarily for biological surveys, research activities, maintenance, and law enforcement,

2. Youth Programs

The Salton Sea YCC crew spent only two days at Coachella Valley NWR during 1990 repairing refuge fences and re-posting the boundary, Hot summer working conditions coupled with a long commute make the YCC cost/benefit ratio less rewarding than might be anticipated.

4. Volunteer Program

Marine biologist David Hopper volunteered over 40 hours during October assisting with fringe-toed lizard surveys and removing overgrown emergent vegetation from Preserve pupfish impoundments, In April, a local Scout troop donated eight hours cleaning up debris and litter on Preserve lands as an Earth Day project,

5. Funding

Salton Sea NWR receives funds for management of the Coachella Valley NWR from a management endowment fund managed by The Nature Conservancy for the Preserve (See Section D.4). Once the full endowment fund is established at about 2.5 million, the annual budget of the Preserve will be limited to interest yields from the endowment, By the end of 1990, mitigation fees remained below anticipated projections with most of the collected fees going toward land acquisition.

The refuge received $7,000 during FY90 for saltcedar removal and maintenance activities, law enforcement and research activities, biological monitoring and contaminant surveys, and to off-set administrative costs. Obviously, the funding does not meet overall refuge funds needed to meet Service commitments on the Preserve. Refuge funding exercises identified a funding level need of about $50,000 to meet current operational and maintenance needs.

7. Technical Assistance

Biologist Radke assisted personnel from The Nature Conservancy and California Department of Fish and Game with a pupfish relocation project, During September, nearly 600 desert pupfish were trapped from Coachella Valley Preserve impoundments and transported 40 miles to suitable habitat at Rancho DOS Palmas, a preserve near the Salton Sea recently purchased by The Nature Conservancy. No fish mortality resulted from this relocation, which was accomplished under the state's permit.

F. HABITAT MANAGEMENT

1. General

The Coachella Valley Preserve contains two major biological features: the large native fan palm (Washingtonia filifera) oasis and a large portion of the major blowsand ecosystem. Portions have been disturbed by human activities, but both of these communities are viable and biologically productive. Some of the disturbed areas may be gradually restored through management actions. The southern portion of the Preserve contains about 4,120 acres of occupiable habitat for the fringe-toed lizard, which are currently readily observed on about 2,600 Preserve acres.

Within the Preserve, national wildlife refuge lands provide approximately 90% of the designated critical habitat for the lizard, Nearly all public use is precluded from refuge lands, with permitted activities restricted to research and investigation. Three major soil types with associated vegetative cover have been identified on refuge lands, these include sand dunes, sand hummocks, and sandy plains. These aeolian habitat types are present on the refuge in roughly the same proportion **as** they once occurred in the Coachella Valley,

Sand texture of sand dunes is fine, and wind transport is active, resulting in a very dynamic system of sand dunes shifting position over time depending on wind direction. Dune heights reach 30 feet, and have sparse vegetative cover (5-15%). Common vegetation includes honey mesquite (Prosopis glandulosa), creosote (Larrea tridentata), burrobush (Ambrosia dumosa), sandmat (Euphorbia polycarpa) wingscale (Atriplex canescens), dune primrose (Oenothera deltoides), and others. The sand dune soil/habitat type covers about 10% of the refuge.

Blowsand results from a process of geological weathering in which the wind plays a major role. In the Coachella Valley strong winds blow steadily from the northwest. The low rainfall supports only sparse vegetation, exposing the surface of the land to the erosive potential of the wind. 8/8/90 WRR

Sand texture in sand hummocks is varied, and wind transport is less active, with sand deposition and stabilization occurring in oblong "hummocks" associated with shrubs. These hummocks are usually from 2 to 5 feet high, 5 to 10 feed wide, and 10 to 20 feet long. Dominant plants include creosote, saltbush (Atriplex polycarpa burrobush, cheesebush (Hymenoclea salsola), coldenia (Tequila canescens), wingscale, and others. This soil/habitat type covers about 40% of the refuge.

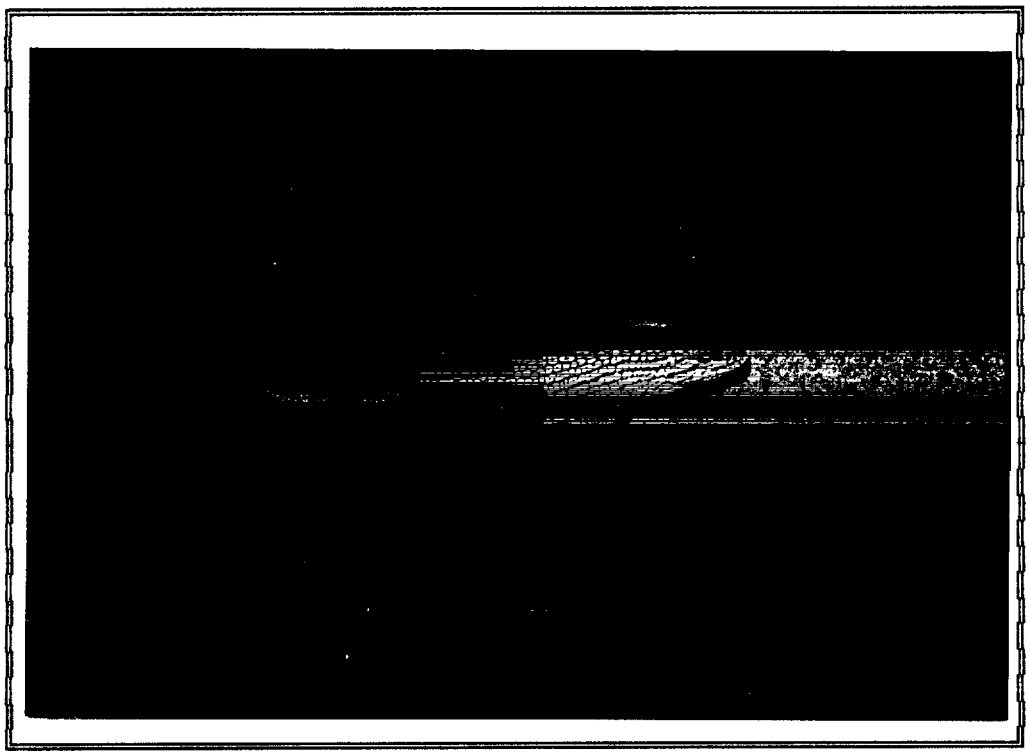
Sand texture of sandy plains is coarse and wind transport is minor. Relief is small and plant cover is high. Common plants of sandy plains include coldenia, creosote, croton (Croton californicus), dalea (Dalea mollis), sand verbena (Abronia villosa) Coachella milkvetch (Astragalus lentiginosus coachellae), and others. This soil/habitat type covers roughly 50% of the refuge.

Plant species of special concern which may occur on refuge lands include Wiggin's croton (Croton wigginsii), flat-seeded spurge (Euphorbia platysperma and Coachella milkvetch.

G. WILDLIFE

1. Wildlife Diversity

Desert lands protected by the Coachella Valley Preserve support a surprising diversity of wildlife species. Many of the wildlife species are closely associated with unique habitats on the Preserve, while others are migrants taking temporary advantage of shade and perennial water associated with native palm oases. At least 180 bird species have been documented on the area, with at least 30 of these nesting here. In addition, at least 25 species of mammals, 23 species of reptiles, 4 species of amphibians, and 2 species of fish utilize the Preserve. A number of unique invertebrates also occur on Preserve lands.



Coachella Valley fringe-toed lizards have developed a great number of adaptions which allow them to inhabit the dynamic and severe environment of blowsand ecosystems. Habitat destruction now threatens them with extinction. 5/18/90 WRR

2. Endangered and/or Threatened Species

State and federally endangered and/or threatened wildlife which occur on the Preserve include the Coachella Valley fringe-toed lizard (Uma inornata), the desert tortoise (Gopherus agassizi) and the desert pupfish (Cyprinodon macularius). Federal candidate species include the flat-tailed horned lizard (Phrynosoma mcallii). Species of special concern include the Coachella Valley

round-tailed ground squirrel (Spermophilus tereticaulus chlorus), giant red velvet mite (Dinothrombium pandorae) and desert cockroach ~~(Arenivaga~~ investigata~~)~~ all of which are sand dwelling species restricted to the Coachella Valley and found on refuge lands. The giant palm-boring beetle (Dinapate wrightii) occurs only in palm groves.

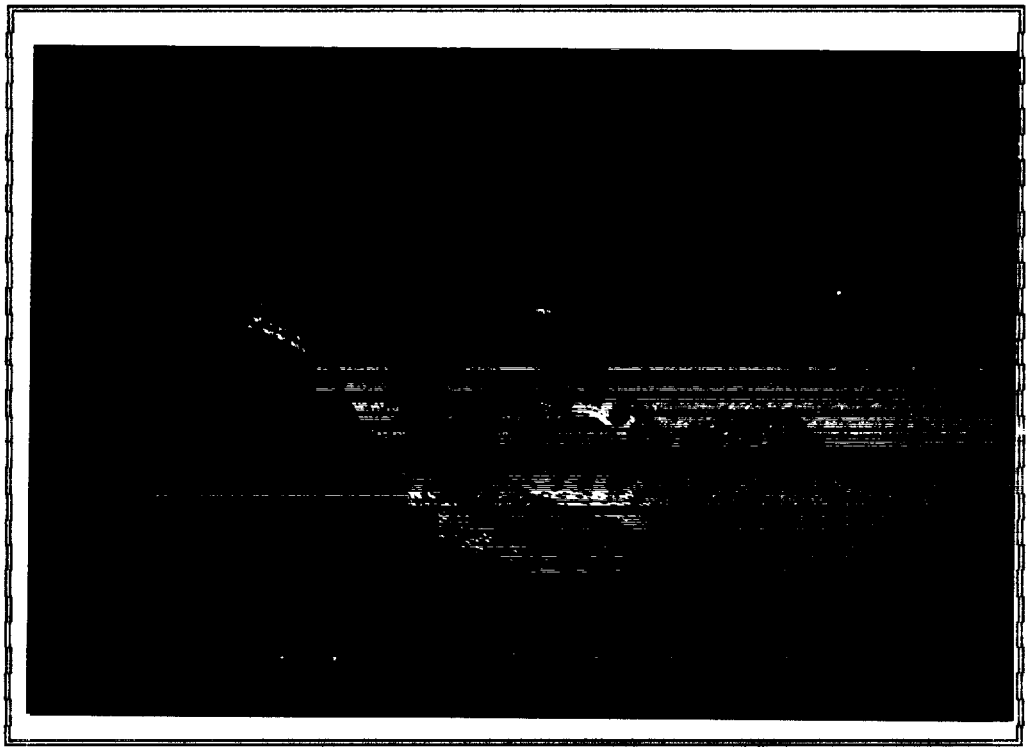
Historically, the range of the Coachella Valley fringe-toed lizard was nearly all of the valley floor from San Gorgonio Pass to the Salton Sea and extended northeast to include a portion of the Indio Hills. Some 270 square miles once served as fringe-toed lizard habitat, but increasing development has drastically reduced the range of this species. Without immediate protection, it was reasoned that this species would become extinct within 50 years. As a result , the Coachella Valley fringe-toed lizard was federally listed as threatened on September 25, 1980 (Federal Register 45:188). In a parallel action, the state of California initially designated this lizard as endangered (but downlisted the species to "threatened" during 1990). Currently, only about 4% of the original habitat suitable for the species occurrence exists in the Coachella Valley in the form of three preserves. The perpetuation of this highly specialized animal is dependent upon the continuing renewal of windblown sand, Wind shielding by development or tree rows stabilizes dunes and eventually prevents renewal of habitat, eventually eliminating the fringe-toed lizard population. Other threats to habitat include off-road vehicles, flood control projects, and invasive exotic vegetation.

The Coachella Valley fringe-toed lizard is a medium sized species averaging about 6 to 9 inches in total length, with the tail normally comprising over half of the animal's total length. Females are slightly smaller than males. This is one of five species of fringe-toed lizard in the world, three of which are found in the United States. The Coachella Valley species can be distinguished from the other four species on the basis of coloration and other traits. The Coachella Valley fringe-toed lizard is whitish or sand colored on both its back and belly surfaces with a pattern of eye-like markings forming longitudinal stripes over the shoulders and back. Small black dots may be present along its sides and diffuse black lines are present beneath the lower jaw. There is a lack of side markings beneath the shoulder.

Adaptations to living among the dunes include the ability to run across the sand surface at high speed, dive into the sand, and move short distances below the sand surface. This activity is facilitated by the small, rounded scales on the lizard's skin, reducing the friction of its body against the sand. The lizard's toes have a row of enlarged comb-like scales which the lizard uses to improve its traction when pushing against the sand as it moves. Other adaptations function to protect the animal's body from abrasion and to keep sand particles out of body openings. These include the ability to partially close its nostrils and to blow sand out of its U-shaped nasal passages, allowing a completely buried lizard to breath the air between sand grains. The nose is wedge-shaped, and is thought to spread the sand as the lizard dives, The lower jaw is shorter than the upper, preventing sand from entering the lizard's mouth when it dives. The species has fringed eyelids, with two sets of membranes covering the eye in opposite directions, Any sand entering the eye accumulates at the front corner where it is encased in mucus and

expelled. There is a flap of skin covering the ears, preventing sand grains from entering the ears during burrowing.

Fringe-toed lizards use burrows of other animals for escape and thermoregulation. The lizard is active when its body temperature is between 26° and 45°C, with a mean of 38°C (100°F). It attains these temperatures by basking both on the sand surface or just below the surface. When external temperatures are too hot, the lizards spend most of the day below the surface and become active only in the early morning and late afternoon, Coachella Valley fringe-toed lizards normally hibernate from November through February when temperatures are usually below the species' activity range, however, they can become active for short periods during any month of the year if temperatures become favorable.



While humans can face severe penalties for killing Coachella Valley fringe-toed lizards, the coachwhip, Masticophis flagellum, regularly takes lizards and eats them without. fear of criminal prosecution.
10/2/90 WRR

Individual fringe-toed lizards live for about five years. They attain sexual maturity based on size rather than age, but are normally capable of breeding after two years. One clutch of eggs is normally laid during spring, but multiple clutches of eggs may be laid during a favorable season, with hatchlings appearing from late June to early September. Tt is probable that the amount of winter rainfall influences reproduction of this species.. In years of low rainfall, annual plants may fail to germinate, in turn reducing

the normal insect population on which fringe-toed lizards feed. In response to the short food supply, reproduction of lizards may be depressed. Coachella Valley fringe-toed lizards are omnivorous, but, in response to drought conditions during the 1990 field season, were observed feeding almost exclusively on harvester ants. Natural predators of fringe-toed lizards include leopard lizards, whiptail lizards, sidewinders, coachwhips, roadrunners, loggerhead shrikes, kestrels, ravens, and coyotes. Fringe-toed lizards themselves are also at times cannibalistic,

While the taxonomy, adaptations, behavior, and physiology of the fringe-toed lizard are relatively well known, the population and ecology of the species has been little studied. Information pertaining to the population density throughout the valley, population size and reproduction from year to year, movement of individuals, barriers to movement, and contiguity of subpopulations throughout the valley remain largely undocumented.

In order to determine existing populations of fringe-toed lizards on the refuge, a monitoring program was initiated in May 1986. The methods for conducting the monitoring program are established in the Coachella Valley Freserve System Management Plan. Currently, four transects are each censused six times to establish trend information. Refuge transects were operated between May 17 and June 01 during the spring of 1990. Also, for the first time, two transects were operated during autumn between October 02 and 10 to help determine survival and recruitment of hatchling fringe-toed lizards (See Section D.5). Results of the spring monitoring efforts are depicted in the following three tables.

Table 4. CVFTL Cummulative Totals Observed on Preserve Transects During 1990.

TRANSECT	ADULTS	JUVENILES
CVP #1	7	0
CVP #2	19	5
CVF #3	3	0
CVP #4	18	2
TOTALS	47	7

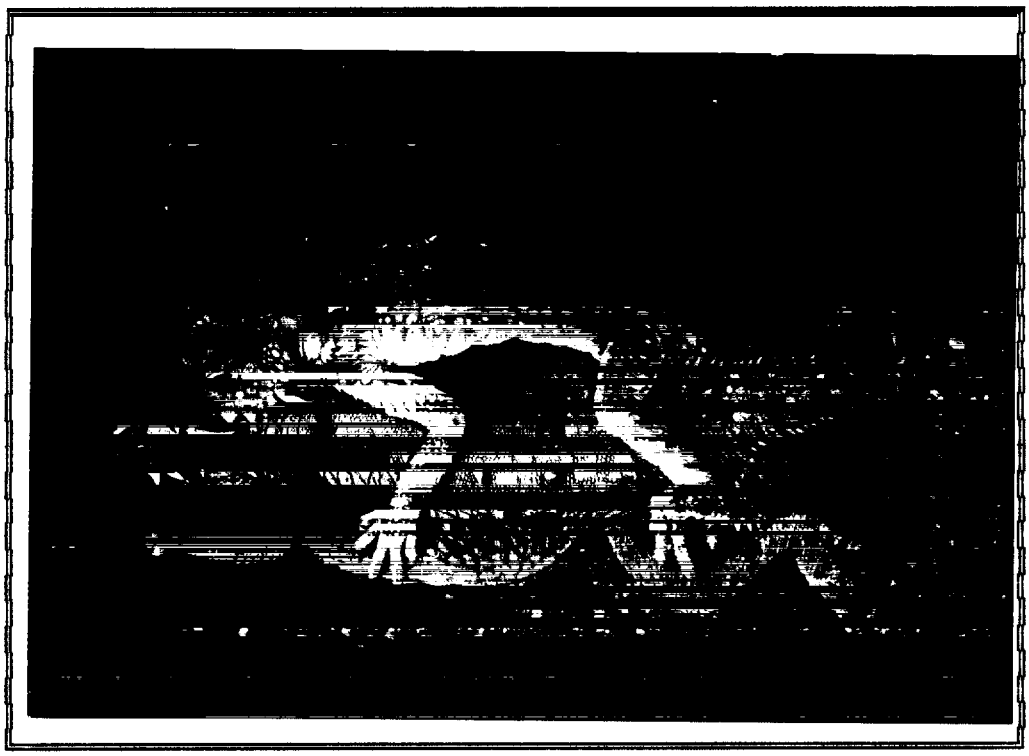
Table 5. Average Number of CVFTL Per Census 1986 - 1990.

TRANSECT	1986	1987	1988	1989	1990
CVF #1	3.7	2.0	1.0	1.3	1.2
CVP #2	2.8	4.3	2.0	5.2	4.0
CVP #3	2.0	1.7	0.5	3.2	0.5
CVP #4	- -	- -	- -	- -	3.3

Table 6. CVFTL Adult/Juvenile Ratio 1986 - 1990.

TRANSECT	1986	1987	1988	1989	1990
CVP #1	0	1.4/1	0	1.0/1	0
CVP #2	1.8/1	0.6/1	0	1.4/1	3.8/1
CVP #3	11.0/1	0.4/1	0	0.9/1	0
CVP #4	--	--	--	--	9.0/1

California Department of Fish and Game officials downlisted the Coachella Valley fringe-toed lizard from state endangered to state threatened in July 1990, Justification for this action is that this species was at serious risk of becoming extinct when it was originally state listed in 1980. Presently, habitat has been set aside and is being enhanced when appropriate, biological studies are underway, regular monitoring occurs, and agencies as well as private entities are cooperating to manage the species and its habitat. The state feels that it is not appropriate to delist the species because human impacts and catastrophic natural events still threaten the lizard's continued existence. Under the California Endangered Species Act, threatened reptiles receive legal protection identical to that afforded endangered ones; the distinction between threatened and endangered status is a biological one (see Fish and Game Code Section 2052, 2053, 2062, and 2067).



A pair of flat-tailed horned lizards, a Candidate-2 species, doing their part to stay off California's growing list of threatened and endangered species. 6/29/90 WRR

The flat-tailed horned lizard is a level-2 candidate species for federal listing. Already having the smallest geographic range of any species of United States horned lizard, this animal has experienced rapid population declines in recent years, Presumably it has become another victim to habitat destruction or alteration through both urban and agricultural development, off-road vehicle uses, and sand or gravel mining activities. The continued expansion of human activities in Imperial and Riverside County deserts will unavoidably continue to destroy or degrade the habitat for this species.

Flat-tailed horned lizards are present in unknown numbers on the Coachella Valley Preserve, This species is generally considered difficult to find because of its cryptic coloration and behavior of remaining perfectly still or suddenly darting into a rodent burrow. During the 1990 spring monitoring efforts, no horned lizards were observed on refuge transects. However, an adult female and a hatchling were observed during autumn monitoring, indicating that some reproduction is taking place on the refuge.

H. PUBLIC USE

Thousand Palms Oasis is the most easily accessible stand of native palms on the Preserve, providing shade and water for visitors and a multitude of wildlife including endangered desert pupfish.

l/23/91 WRR

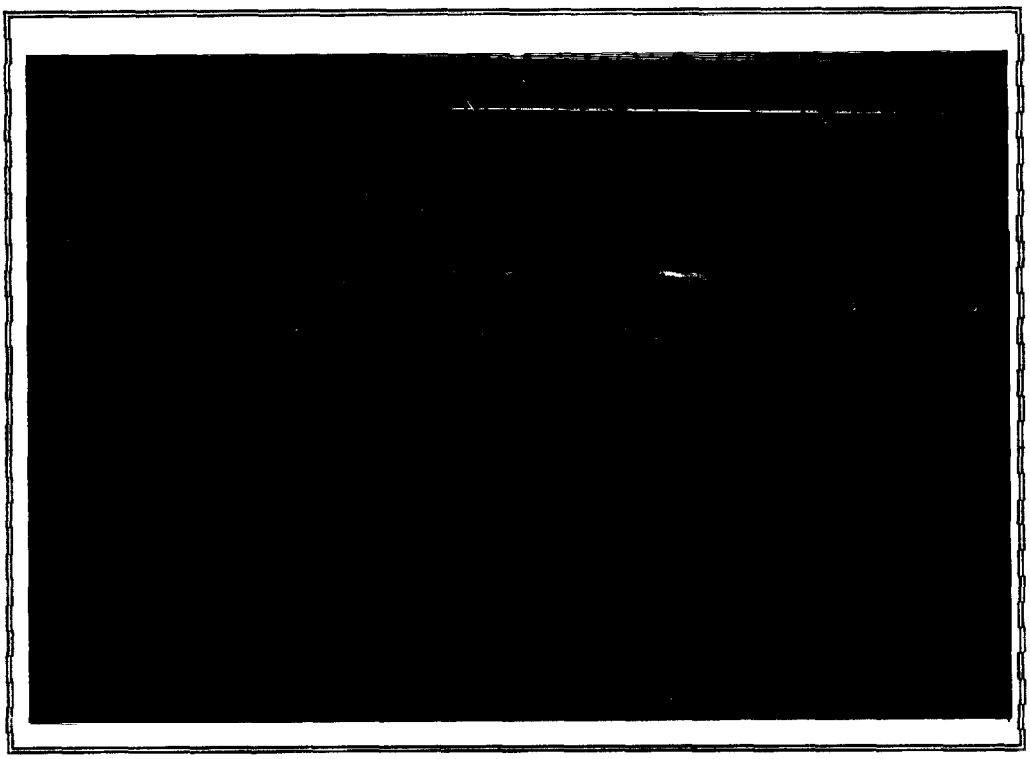
1. General

The Coachella Valley Preserve receives about 10,000 visitors each year. Most visitation occurs between November through April, with a high proportion of visitors wintering here from other states. The Nature Conservancy owns and operates a rustic visitor center/office at the Thousand Palms Oasis which is open to the public sporadically and operated primarily by volunteers. Popular activities on the Preserve include hiking, birding, and photography. Because the Preserve encompasses lands under the jurisdiction of five different agencies, rules regulating public use vary dramatically from one area to another, This is extremely confusing to the public, and also to agency law enforcement officers. For example, horseback riding, a traditional activity in the area, has grown in popularity and presents serious problems to refuge lands which are designated as critical habitat for a threatened species. A biological opinion issued by FWE, which will act as an amendment to the management plan and will preclude equestrian use from all but the perimeter of designated critical habitat, has yet to be implemented and enforced.

17. Law Enforcement

The Bureau of Land Management receives Preserve endowment funds totalling $16,000 which help fund a law enforcement position for the area, As a result, BLM rangers Edward Patrovsky and Mark Chandler had the primary responsibility of patrolling the Preserve, including refuge lands. Most violation notices are issued by BLM rangers because of their broader authority under CFR 43 to enforce laws on all public lands, and because the rangers have state authority granted them by the California Department of Fish and Game. Refuge officers enforce laws incidental to other duties on the refuge, and have taken the lead on enforcing Endangered Species Act violations. BLM Ranger Patrovsky has reported an overall decline in violations perhaps due to increased patrol work and improved identification and fencing of the Preserve boundary.

On July 2, an off-duty BLM employee and his wife observed habitat destruction to refuge lands caused by a developer at Ivey Ranch bulldozing huge piles of debris onto Coachella Valley NWR into designated critical habitat. Refuge Officer Radke responded, and contacted Riverside County Engineering Technicians who were responding to the same complaint. The damage is located in the northwest quarter of Section 27, immediately adjacent to Ivey Ranch/Champagne Partners subdivision development. Approximately one-acre of refuge land was covered with debris composed of logs, wood, wire, concrete, metal drums, and other assorted trash piled up to six feet high. An additional two acres of land were severely damaged by bulldozer activity.



Aerial view of the Ivey Ranch trespass and destruction of critical habitat on refuge lands. Debris was trucked to the edge of the refuge, then bulldozed past boundary signs into occupied fringe-toed lizard habitat. 7/16/90 WRR

The section of the refuge which was impacted is designated as critical habitat for the Coachella Valley fringe-toed lizard, a federally threatened species. Some of the highest density of fringe-toed lizards on the refuge occurs along the west boundary, and fringe-toed lizard tracks were evident within about 120 feet of the damaged area. It was clear that fringe-toed lizard habitat was affected, and it is probable that fringe-toed lizards and other wildlife were destroyed through the action.

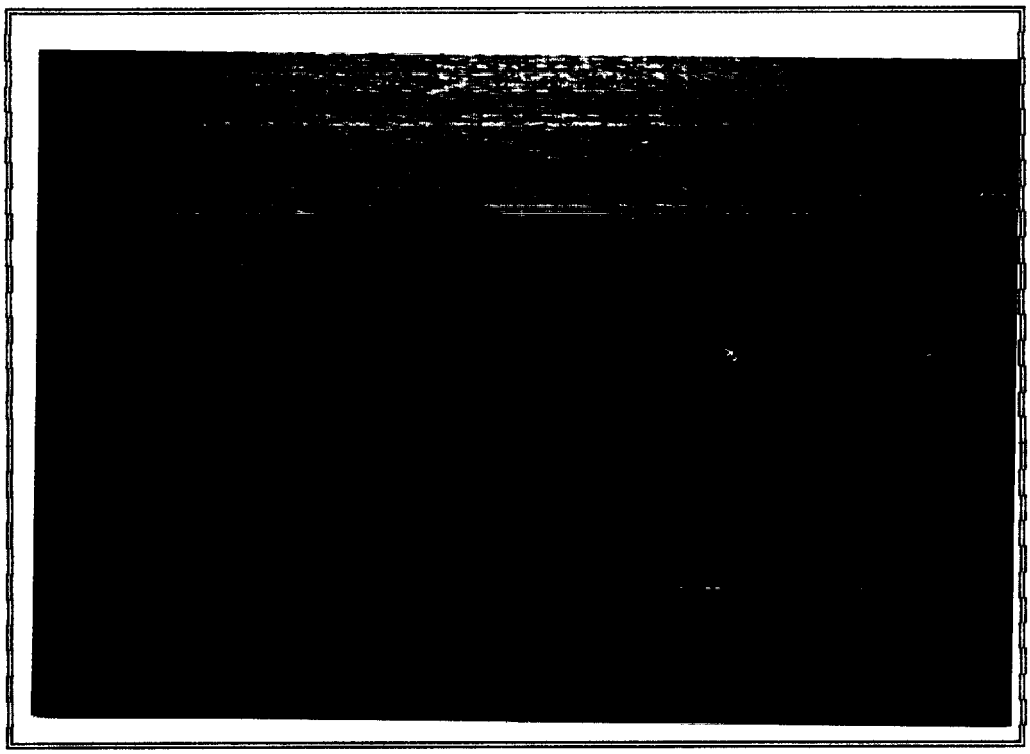
On July 6 SRA Larry Farrington, accompanied by refuge personnel, met with Ivey Ranch Project Manager Jim Montgomery, who admitted knowledge of the debris disposal, stating that he understood the impacted site was eventually going to contain a flood control channel. The remainder of the investigation was handled by Special Agent Mel Holt, who worked with refuge officers and U.S. Solicitor Ralph Mihan toward a settlement. Although the case was well documented, the work load in the Solicitor's office prevented any action. In December, Assistant U.S. Attorney Peter Hsiao took a serious interest in the case after speaking with California Associate Manager Robert Fields.

TNC employees David Mathews and Carol Jacobsen inspect a portion of the debris bulldozed onto refuge land by Ivey Ranch Country Club. Debris, composed primarily of trees, concrete, and rubber tires, covered about two acres and was piled up to six-feet deep.
7/2/90 WRR

In lieu of monetary damages for the trespass and civil penalties ($25,000 per violation) and criminal penalties ($25,000 and $50,000 per count) for violations of the Endangered Species Act, the Service suggested a detailed settlement agreement which would enhance endangered species habitat on the refuge, If Ivey Ranch agrees to the settlement, it will restore refuge lands damaged through the action and further mitigate for damage done to the area. By the end of 1990, the settlement between the Service and Ivey Ranch remained unresolved.

On October 5, while conducting research activities, Refuge officer Radke observed a tractor and scraper clearing and leveling about two acres of private land within the Coachella Valley Preserve boundary. The operator had been hired by landowner Jerry Segall who was planning to expand his jojoba farm. Segall, a real estate broker, was informed about his possible violation of the Endangered Species Act, and has been asked to refrain from further action on the property until he is contacted by enhancement personnel or by Service Special Agents. Although development outside the Preserve boundary is permitted by a Section 10(a) Permit, impacting lands within the Preserve boundary is not permitted by the Habitat Conservation Plan. By the end of

1990, Segall had fenced the cleared area and began the installation of an irrigation dripline.



Habitat destruction continues even within "protected" areas. Apparent unauthorized expansion of this jojoba farm resulted in clearing and leveling of about two acres of habitat inhabited by fringe-toed lizards and other wildlife within the designated boundary of the Coachella Valley Preserve. 12/13/90 WRR

More routine violations on Preserve lands include off-road vehicle use, dumping, vandalism, and use of firearms (including a CHP officer firing into the Preserve from his vehicle on an adjacent county road). During the year, three stolen vehicles were recovered on the area, and two arrests were made, one for a fugitive warrant and one for an individual attempting to flee on an ATV. Law enforcement on the area has been largely a hit-or-miss situation, and most violators are never apprehended. The following table depicts incidents investigated by BLM rangers during 1990,

Table 7. Incidents Investigated on Preserve Lands by BLM During 1990.

VIOLATION	NUMBER OF CASES
Trespass	14
Littering	2
Resource Collection	1
Removing Vegetation	2
Possession of Narcotics	1
Dumping	2
Vehicle Code Violations	1
Discharge of Firearm	1
TOTAL	24

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

During February, heavy equipment operator Marquez spent considerable time eradicating saltcedar from the intermittent streambed between Thousand Palms Oasis and McCallum Palm Oasis, Saltcedar has invaded nearly every moist area throughout the Preserve, outcompeting native vegetation by taking space and vital water and exuding salt onto the ground which inhibits germination of other species, Marquez' skill with a dozer resulted in nearly complete removal of exotic vegetation while carefully leaving native palms and transect stakes marking water table research sites.

J. OTHER ITEMS

1. Cooperative Programs

Coachella Valley NWR is part of the Coachella Valley Preserve which is managed cooperatively between the U.S. Fish and Wildlife Service, the Bureau of Land Management, California Department of Fish and Game, California Department of Parks and Recreation, and The Nature Conservancy. Although managed following the general guidelines of the Preserve's Management Plan, Service lands remain a part of the National Wildlife Refuge System and must often be managed independently to meet Service objectives. However, the check-and-balance system of cooperative management toward attaining a common goal has generally been positive for all agencies involved,

4. Credits

This narrative report was written by Wildlife Biologist Radke, edited by Refuge Manager Voget, and typed and assembled by Clerk-Typist Shelly Hunter. Photographs are credited by initials.

K. FEEDBACK

Morale and productivity at this refuge complex are generally very high, adding credibility to the statement that "morale is a reflection of how well an office is being managed, and how often the personnel are provided opportunities to make decisions." It is nice being part of a staff again that are genuinely pleased to come to work each day.

Wildlife

of Salton Sea National Wildlife Refuge

California

U.S. Fish and Wildlife Service

Department of the Interior

RF11630 June 1987

Enjoying the Refuge's Wildlife

The study of wild animals in their natural habitat has become increasingly popular. Viewing of wildlife can be greatly enhanced by a pair of binoculars or spotting scope and a good wildlife/birding guide.

Wildlife species in this brochure have been grouped into four categories: Birds, Mammals, Reptiles and Amphibians, and Fish.

Birds

Bird populations vary greatly in numbers and species according to seasons. Heavy migrations of waterfowl, marsh and shorebirds occur during spring and fall. Throughout the mild winter and spring a wide variety of smaller birds and birds of prey are present. They are attracted to the freshwater marshes and riparian habitat along the New and Alamo Rivers. The best opportunity to observe the greatest diversity of bird life is from November to May.

The following list of birds contains 371 species that have been recorded on Salton Sea NWR and the adjacent Imperial Valley. The nominclature and taxonomic order used in this list follows that appearing in the 6th edition of the American Ornithologists' Union Check-List of North ***American Birds*** published in 1983. Salton Sea NWR holds the distinction of having the most diverse array of bird species found on any of the over 400 National Wildlife Refuges.

When looking at a bird, pay close attention to characteristics such as color, size, shape, and wing and head markings. Always observe first and then refer to your identification book because the bird may not remain where it can be readily observed for a long period of time. This is especially true of perching birds.

Legend

sp — Spring, April through May
s — Summer, June through August
F — Fall, September through October
w — Winter, November through March

Spring — Some species migrate much earlier than others, appearing in the area of Salton Sea during March, but are none-the-less spring migrants rather than winter visitors. Their status at this time of the year is indicated under Spring rather than Winter.

Summer — Status indicated under this heading indicates the relative abundance of summering birds. Observers must remember late spring migrants can be found into early June, and that early fall migrants can occur as early as late June, but these are not summering birds. Their status as migrants is indicated under Spring and Fall rather than Summer.

Fall — Since some species, particularly shorebirds, migrate quite early in the fall, appearing in the area of the Salton Sea in July or earlier. Their status as fall migrants in July and August is indicated under Fall rather than Summer.

Winter — As indicated above, some early spring migrants may be present during March or earlier, as with the swallows. Likewise, some late fall migrants linger in November. However, these occurrences are omitted from the winter column so as to clearly indicate the status of each species as a winter visitor.

Notes — Information over and above the relative abundance shown for each season to clarify the status of some species in the area.

Abundance Codes

c — Common to Abundant, easily found in suitable habitat.
u — Uncommon to Fairly Common, found where looked for in suitable habitat, but can be missed.
r — Rare to Very Uncommon, more often missed than seen, even when looked for in suitable habitat.
o — Occasional, normally less than five individuals per season during any given year, but to be looked for.
a — Accidental, less than ten records for the entire area, and not to be expected.

Threatened/Endangered Species

Habitat Codes

o-Open Water - Restricted to the open water of the Salton Sea and larger lakes in the Imperial Valley.

b - Beach and Mudflat - Basically the shore line of the Salton Sea, but expanded to include flooded fields and other such areas of shallow water and mud.

m -Marshes - Cattail marshes and other such areas found at various locations around the Salton Sea, along the rivers and canals, and at shallow lakes.

f - Farmland - Agricultural land found extensively throughout the Imperial Valley south of the Salton Sea, including planted and unplanted fields alike.

s - Shrubland - Mesquite thickets and other brushy areas. Some shrubland contains scattered trees.

r - Riparian Vegetation - Limited to areas of salt cedar and willows along waterways, and at some points along the shore of the Salton Sea.

a -Aerial - Use limited to those strong flying species most often seen in the air.

h - Houses and Towns - Immediate area of ranch houses and the residential areas of such towns as Niland and Calipatria. It is in these areas that most of the larger trees can be found and where ornamental planting supports a variety of landbirds.

Abbreviation Listed Under Notes

b - Species regularly breeds in the area.

b+- Species has bred in the area, and may continue to breed sporadically in the area, but is not expected to become a regular nesting species.

l - Species occurs only locally within the area.

e - An erratic species, occurring in numbers some years, and being very scarce or even absent in others.

x - Species formerly occurred in the area, but is now extripated, occurring only as an accidental straggler if at all.

xb - An extripated breeder formerly nesting in the area, but with no recent breeding records.

p - A post-breeding visitor to the area from the south, being most numerous in the area between July and September.

I-9 - Actual number of recorded occurrences for those species listed as accidentals in the area.

Common Name	Habitat	S	W	Notes
LOONS				
Red-throated Loon			a	
Pacific Loon	0	a	a	
Common Loon	0	a	a	
GREBES				
Pied-billed Grebe	m	u	u	
Horned Grebe	0	a	o	
Eared Grebe	0	u	c	
Western Grebe	0	u	u	
Clark's Grebe	0	u	u	
ALBATROSS				
Laysan Albatross		a		
FULMARS, PETRELS AND SHEARWATERS				
Cook's Petrel		a		
Buller's Shearwater		a		
Sooty Shearwater		a		
STORM-PETRELS				
Leach's Storm-Petrel		a		
Black Storm-Petrel				
Least Storm-Petrel				
BOOBIES AND GANNETS				
Blue-footed Booby	0			
Brown Booby				
PELICANS AND CORMORANTS				
American White Pelican	oa	u	u	
Brown Pelican	0	r	o	
Double-crested Cormorant	o	c	c	
Olivaceous Cormorant		a	a	
FRIGATEBIRDS				
Magnificent Frigatebird	a	o	a	
BITTERNS. HERONS AND EGRETS				
American Bittern	m	o	u	
Least Bittern	m	u	o	
Great Blue Heron	bm	c	c	
Great Egret	bm	c	c	
Snowy Egret	bm	c	c	
Little Blue Heron	m	o	a	
Tricolored Heron	bm	o	a	
Reddish Egret		a		
Cattle Egret	fm	c	c	
Green-backed Heron	m	u	u	
Black-crowned Night-Heron	m	c	c	
IBIS AND SPOONBILLS				
White Ibis		a		
White-faced Ibis	mf	u	c	
Roseate Spoonbill	bm	o	a	
STORK				
Wood Stork	bm	c	a	
WATERFOWL				
Fulvous Whistling-Duck	m	r	a	
Black-bellied Whistling-Duck		a		
Tundra Swan	om		o	
Greater White-fronted Goose	fm	a	r	

Common Name	Habitat	Sp	S	F	W	Notes
Snow Goose	fm	o	o		c	
Ross' Goose	fm				c	
Brant	om		o		a	
Canada Goose	fm		o		c	
Wood Duck	om		a		o	
Green-winged Teal	om		r		c	
Baikal Teal					a	
American Black Duck					a	
Mallard	om		o		u	
Northern Pintail	om		r		c	
Blue-winged Teal	om		o		o	
Cinnamon Teal	om		u		r	
Northern Shoveler	om		r		c	
Gadwall	om		r		u	
Eurasian Wigeon	om				o	
American Wigeon	om		o		c	
Canvasback	o		o		c	
Redhead	o		u		u	
Ring-necked Duck	o		a		r	
Tufted Duck					a	
Greater Scaup	o		a		r	
Lesser Scaup	o		o		c	
Oldsquaw	o		a		o	
Black Scoter			a		o	
Surf Scoter	o		o		o	
White-winged Scoter	o		o		o	
Common Goldeneye	o		o		u	
Barrow's Goldeneye					a	
Bufflehead	o		o		u	
Hooded Merganser	o				o	
Common Merganser	o		a		r	
Red-breasted Merganser	o		r		r	
Ruddy Duck	om		c		c	
VULTURES						
Turkey Vulture	af		r		r	
OSPREY, KITES, EAGLES AND HAWKS						
Osprey	ao		r		r	
Black-shouldered Kite			o		o	
Bald Eagle					o	
Northern Harrier	afm		o		c	
Sharp-shinned Hawk	ars				u	
Cooper's Hawk	ars				u	
Harris' Hawk						
Red-shouldered Hawk					o	
Broad-winged Hawk					a	
Swainson's Hawk	af					
Zone-tailed Hawk						
Red-tailed Hawk	af		r		u	
Ferruginous Hawk	af				r	
Rough-legged Hawk	af				o	
Golden Eagle					a	
FALCONS						
American Kestrel	afh		u		c	
Merlin	af				r	
Peregrine Falcon	am		o		o	
Prairie Falcon	af		o		r	
GALLINACEOUS BIRDS						
Ring-necked Pheasant	f		r		r	
Gambel's Quail	S		u		u	

Common Name	Habitat	Sp	S	F	W	Notes
RAILS						
Black Rail	m		o		o	
Clapper Rail	m		r		r	
Virginia Rail	m		r		u	
Sora	m				c	
Common Moorhen	m		u		u	
American Coot	om		c		c	
CRANES						
Sandhill Crane	f				u	
PLOVERS						
Black-bellied Plover	bf		u		c	
Lesser Golden-Plover	bf				a	
Snowy Plover	b		u		r	
Wilson's Plover			a			
Semipalmated Plover	b		o		r	
Killdeer	fb		c		c	
Mountain Plover	f				u	
OYSTERCATCHERS						
American Oystercatcher						
STILTS AND AVOCETS						
Black-necked Stilt	mf		c		c	
American Avocet	m		c		c	
SHOREBIRDS						
Greater Yellowlegs	mf		o		c	
Lesser Yellowlegs	mf				r	
Spotted Redshank						
Solitary Sandpiper	mf				a	
Willet	mf		u		c	
Wandering Tattler	m					
Spotted Sandpiper	m				u	
Whimbrel	mf		o			
Long-billed Curlew	mf		u		c	
Hudsonian Godwit						
Marbled Godwit	b		u		u	
Ruddy Turnstone	b				a	
Black Turnstone	b					
Surfbird	b		a			
Red Knot	b		a		o	
Sanderling	b				o	
Semipalmated Sandpiper	b					
Western Sandpiper	b		o		c	
Little Stint						
Least Sandpiper	b		o		c	
White-rumped Sandpiper						
Baird's Sandpiper	b					
Pectoral Sandpiper	b				a	
Dunlin	b		o		u	
Curlew Sandpiper						
Stilt Sandpiper	b				r	
Ruff					a	
Short-billed Dowitcher	b		o			
Long-billed Dowitcher	b		o		c	
SNIPE						
Common Snipe	m				r	
PHALAROPES						
Wilson's Phalarope	bo		o		a	
Red-necked Phalarope	bo		o		a	
Red Phalarope	o		a			

Common Name	Habitat	Sp	S	Sm	W	Nov
JAEGERS						
Pomarine Jaeger			a			
Parasitic Jaeger	o		a			
Long-tailed Jaeger						
GULLS AND TERNS						
Laughing Gull	ob		c		o	
Franklin's Gull	ob		o			
Little Gull					a	
Bonaparte's Gull	ob		r		o	
Heermann's Gull	ob		o		a	
Mew Gull	ob		a		o	
Ring-billed Gull	obf		u		c	
California Gull	obf		c		u	
Herring Gull	obf		o		c	
Thayer's Gull	ob		a		r	
Lesser Black-backed Gull					a	
Yellow-footed Gull	ob		c		r	
Western Gull	ob				o	
Glaucous-winged Gull	ob		o		r	
Glaucous Gull	ob		a		o	
Black-legged Kittiwake			a			
Sabine's Gull	o					
Gull-billed Tern	bf		u		a	
Caspian Tern	ob		c		u	
Elegant Tern			a			
Common Tern	ob		r			
Arctic Tern						
Forster's Tern	ob		c		u	
Least Tern	ob		o			
Black Tern	bf		c		a	
SKIMMERS						
Black Skimmer	b		u		a	
SEABIRDS						
Ancient Murrelet			a			
DOVES						
Rock Dove	h		c		c	
Band-tailed Pigeon						
Spotted Dove						
White-winged Dove	sh		u		a	
Mourning Dove	fsh		c		c	
Inca Dove	h		r		r	
Common Ground-Dove	sh		u		u	
CUCKOOS						
Yellow-billed Cuckoo			a			
Greater Roadrunner	sf		c		c	
Groove-billed Ani						
OWLS						
Common Barn-Owl	sh		r		r	
Flammulated Owl						
Western Screech-Owl	sh		r		r	
Great Horned Owl	sh				o	
Burrowing Owl	f		c		c	
Long-eared Owl	r				o	
Short-eared Owl	f				r	
Northern Saw-whet Owl					a	

Common Name	Habitat	Sp	Sm	W	Nov
GOATSUCKERS					
Lesser Nighthawk	fs			a	
Common Poorwill	s				
Whip-poor-will					
SWIFTS					
Black Swift					
Vaux's Swift	a				
White-throated Swift	a			r	
HUMMINGBIRDS					
Black-chinned Hummingbird	h				
Anna's Hummingbird	h			u	
Costa's Hummingbird	hs			u	
Calliope Hummingbird	hs				
Rufous Hummingbird	hs				
Allen's Hummingbird	h				
KINGFISHERS					
Belted Kingfisher	rm			u	
WOODPECKERS					
Lewis' Woodpecker	h			o	
Red-headed Woodpecker					
Acorn Woodpecker					
Gila Woodpecker	h			r	
Yellow-bellied Sapsucker				a	
Red-naped Sapsucker	h			r	
Red-breasted Sapsucker	h			o	
Ladder-backed Woodpecker	sh			u	
Nuttall's Woodpecker					
Northern Flicker	hs			c	
FLYCATCHERS					
Olive-sided Flycatcher	hs				
Greater Pewee					
Western Wood-Pewee	hs				
Willow Flycatcher	hs				
Least Flycatcher	hs			a	
Hammond's Flycatcher	hs				
Dusky Flycatcher	hs				
Gray Flycatcher	hs			a	
Western Flycatcher	hs				
Black Phoebe	hm			c	
Eastern Phoebe				a	
Say's Phoebe	f			c	
Vermilion Flycatcher	h			r	
Ash-throated Flycatcher	sh				
Tropical Kingbird					
Cassin's Kingbird	h			a	
Western Kingbird	fh			a	
Eastern Kingbird					
Scissor-tailed Flycatcher					
LARKS					
Horned Lark	f			c	
SWALLOWS					
Purple Martin	a				
Tree Swallow	a			c	
Violet-green Swallow	a			a	
Northern Rough-winged Swallow	a			u	
Bank Swallow	a			a	
Cliff Swallow	a				
Barn Swallow	a	c	r	c	o b

Common Name	Habitat	Sp	S	F	W	Notes
JAYS, MAGPIES AND CROWS						
Scrub Jay	hs				o	2
American Crow	f			o	r	e
Common Raven	af		r		r	
CHICKADEES AND TITMICE						
Mountain Chickadee						1
VERDIN						
Verdin	s		c		c	b
NUTHATCHES						
Red-breasted Nuthatch	h				o	e
White-breasted Nuthatch						2
CREEPERS						
Brown Creeper	h				o	
WRENS						
Cactus Wren	s		c		c	
Rock Wren	s				r	
Bewick's Wren	s				r	
House Wren	sr		r		u	
Winter Wren					a	4
Marsh Wren	m		c		c	b
KINGLETS, BLUEBIRDS AND THRUSHES						
Golden-crowned Kinglet	rh				o	
Ruby-crowned Kinglet	rsh				c	
Blue-gray Gnatcatcher	rs				u	
Black-tailed Gnatcatcher	s		u		u	b
Western Bluebird	sh				o	
Mountain Bluebird	f				u	e
Townsend's Solitaire	s				o	
Swainson's Thrush	rsh					
Hermit Thrush	rsh				u	
American Robin	h				u	e
Varied Thrush					a	3
MOCKINGBIRDS AND THRASHERS						
Northern Mockingbird	sh		c		c	b
Sage Thrasher	s				o	
Brown Thrasher					a	2
Bendire's Thrasher				a	a	2
Curve-billed Thrasher					a	4
Crissal Thrasher	s		r		r	b
Le Conte's Thrasher						xb
WAGTAILS AND PIPITS						
Water Pipit	F				c	
Sprague's Pipit				a		1
WAXWINGS						
Cedar Waxwing	h				u	e
PHAINOPEPLA						
Phainopepla	s				u	b
SHRIKES						
Northern Shrike					a	1
Loggerhead Shrike	sf		u		u	b
STARLINGS AND MYNAS						
European Starling	hf		c		c	b

Common Name	Habitat	Sp	S	F	W	Notes
VIREOS						
Bell's Vireo					a	2
Solitary Vireo	sh				o	
Warbling Vireo	sh				a	
Red-eyed Vireo						1
WARBLERS						
Tennessee Warbler						3
Orange-crowned Warbler	r				c	
Nashville Warbler	rs				a	
Virginia's Warbler	s					
Lucy's Warbler						2
Northern Parula					a	3
Yellow Warbler	rh				r	
Chestnut-sided Warbler					a	3
Magnolia Warbler						2
Cape May Warbler					a	2
Black-throated Blue Warbler						2
Yellow-rumped Warbler	rsh				c	
Black-throated Gray Warbler	sh				o	
Townsend's Warbler	sh				o	
Hermit Warbler	sh					
Prairie Warbler						1
Palm Warbler					a	3
Bay-breasted Warbler						1
Cerulean Warbler						1
Black-and-white Warbler	hr				o	
American Redstart	rh				r	
Ovenbird						2
Northern Waterthrush	r		o			
MacGillivray's Warbler	rs					
Common Yellowthroat	mr		u		u	b
Wilson's Warbler	rs				o	
Yellow-breasted Chat	r		o			b
TANAGERS						
Summer Tanager	h				a	
Western Tanager	hs				o	
GROSBEAKS AND BUNTINGS						
Pyrrhuloxia			a		a	
Rose-breasted Grosbeak						2
Black-headed Grosbeak	hs					
Blue Grosbeak	rs		u		a	
Lazuli Bunting	rs					2
Indigo Bunting						1
Dickcissel						1
TOWHEES AND SPARROWS						
Green-tailed Towhee	s				r	
Rufous-sided Towhee	s				r	
Abert's Towhee	s		c		c	b
American Tree Sparrow					a	
Chipping Sparrow	h				r	
Brewer's Sparrow	fs				u	
Black-chinned Sparrow						2
Vesper Sparrow	f				u	
Lark Sparrow	fs				r	
Black-throated Sparrow	s					
Sage Sparrow	fs				u	
Lark Bunting	fs				o	
Savannah Sparrow	f		o		c	
Grasshopper Sparrow			a		a	2
Fox Sparrow	rs				o	

Common Name	Habitat	Sp	S	W	Notes
Song Sparrow	rm		r	u	
Lincoln's Sparrow	rf			c	
Swamp Sparrow	m			o	
White-throated Sparrow	rsf			o	
Golden-crowned Sparrow	rsf			o	
White-crowned Sparrow	rsf			c	
Harris' Sparrow	sf			o	
Dark-eyed Junco	sf			u	
McCown's Longspur	f			o	
Lapland Longspur	f			o	
Chestnut-collared Longspur	f			o	
Bobolink			a		
BLACKBIRDS, MEADOWLARKS AND ORIOLES					
Red-winged Blackbird	fm		c	c	
Tricolored Blackbird				a	
Western Meadowlark	f		u	c	
Yellow-headed Blackbird	mf		c	u	
Brewer's Blackbird	fh		o	c	
Great-tailed Grackle	mf		u	u	
Bronzed Cowbird	h		r		
Brown-headed Cowbird	fhs		u	c	
Orchard Oriole				a	
Hooded Oriole	h		u	o	
Northern Oriole	hrs		r	a	
Scott's Oriole				a	
FINCHES					
Purple Finch	rh			o	
Cassin's Finch	rh			o	
House Finch	hs		c	c	
Red Crossbill	hs			o	
Pine Siskin	rsh			r	
Lesser Goldfinch	s		r	u	
Lawrence's Goldfinch	s			r	
American Goldfinch	s			r	
WEAVER FINCHES					
House Sparrow	h		c	c	

Mammals

All mammals listed are considered resident species with the exception of the bats which migrate on a seasonal basis like many of the birds. Families follow that of *A* Field *Guide to the Mammals* by Burt and Grossenheider.

Shrews
Desert Shrew

Cats
Bobcat

Dogs
Coyote
Desert Kit Fox
Gray Fox

Leafnose Bats
California Leafnose Bat

Plainnose Bats
California Myotis
Western Pipistrel
Big Brown Bat
Spotted Bat
Hoary Bat
Western Yellow Bat
Pallid Bat
Long-tongued Bat

Freetail Bats
Mexican Freetail Bat
Pocketed Freetail Bat
Big Freetail Bat

Rabbits/Hares
Desert Cottontail
Blacktail Jackrabbit

Raccoons
Raccoon

Squirrels/Chipmunks
Roundtail Ground Squirrel
Antelope Ground Squirrel

Weasels, Skunks, Badgers
Striped Skunk
Spotted Skunk
Badger

Pocket Gophers
Valley Pocket Gopher

White Footed Mice
Cactus Mouse
Deer Mouse

Pocket/Kangaroo Mice and Kangaroo Rats
Desert Pocket Mouse
Little Pocket Mouse
Desert Kangaroo Rat
Spiny Pocket Mouse
Merriam Kangaroo Rat
Longtail Pocket Mouse

Woodrats
Desert Woodrat
Whitethroated Woodrat

Voles and Muskrats
Muskrat

Old World Rats and Mice
House Mouse
Black Rat
Norway Rat

Amphibians and Reptiles

Reptiles are found in brushy areas on the refuge and surrounding desert habitats while amphibians are found in or near freshwater. Names used follow that found in *A* Field Guide to Western *Reptiles and Amphibians* by Stebbins.

Amphibians
Bullfrog
Leopard Frog
Red-spotted Toad
Spiny Softshell Turtle

Lizards
Side-blotched Lizard
Leopard Lizard
Long-tailed Brush Lizard
Desert Horned Lizard
Flat-tailed Horned Lizard
Desert Spiny Lizard
Western Whiptail Lizard

Snakes
Gopher Snake
Common Kingsnake
Checkered Garter Snake
Western Rattlesnake
Western Blind Snake
Red Racer
Western Patch-nosed Snake
Desert Glossy Snake
Western Ground Snake

Fish

Very few fish can tolerate the **high** salinity of the Salton Sea. In 1950 attempts were made to introduce several marine fish. These attempts resulted in the largest inland fishery in California. The introduced saltwater species are underlined, Freshwater species are found in rivers, canals and some marsh areas.

Orangemouth Corvina
Sargo
Gulf Croaker
Threadfin Shad
Sailfin Molly
Desert Pupfish
Longjaw Mudsucker
Mosquitofish
Red Shiner
California Killifish
• Tilapia
Largemouth Bass
White Catfish
Channel Catfish

• found in both fresh *and* saltwater

For additional information contact:

Refuge Manager
Salton Sea NWR
PO Box 120
Calipatria, CA 92233
Telephone (619) 348-5278

Notes

Date _____ No. Species _____
Time Afield _____
Observers _____
Weather _____
Remarks _____

Salton Sea

National Wildlife Refuge

CALIFORNIA

UNITED S ATES
DEPARTM NT OF THE INTERIOR
Fish and ildlife Service
Salton Sea ational Wildlife Refuge
P.O. Box 120
Calipatria, CA 92233

OFFICIAL BUSINESS
Penalty for Private Use, $300

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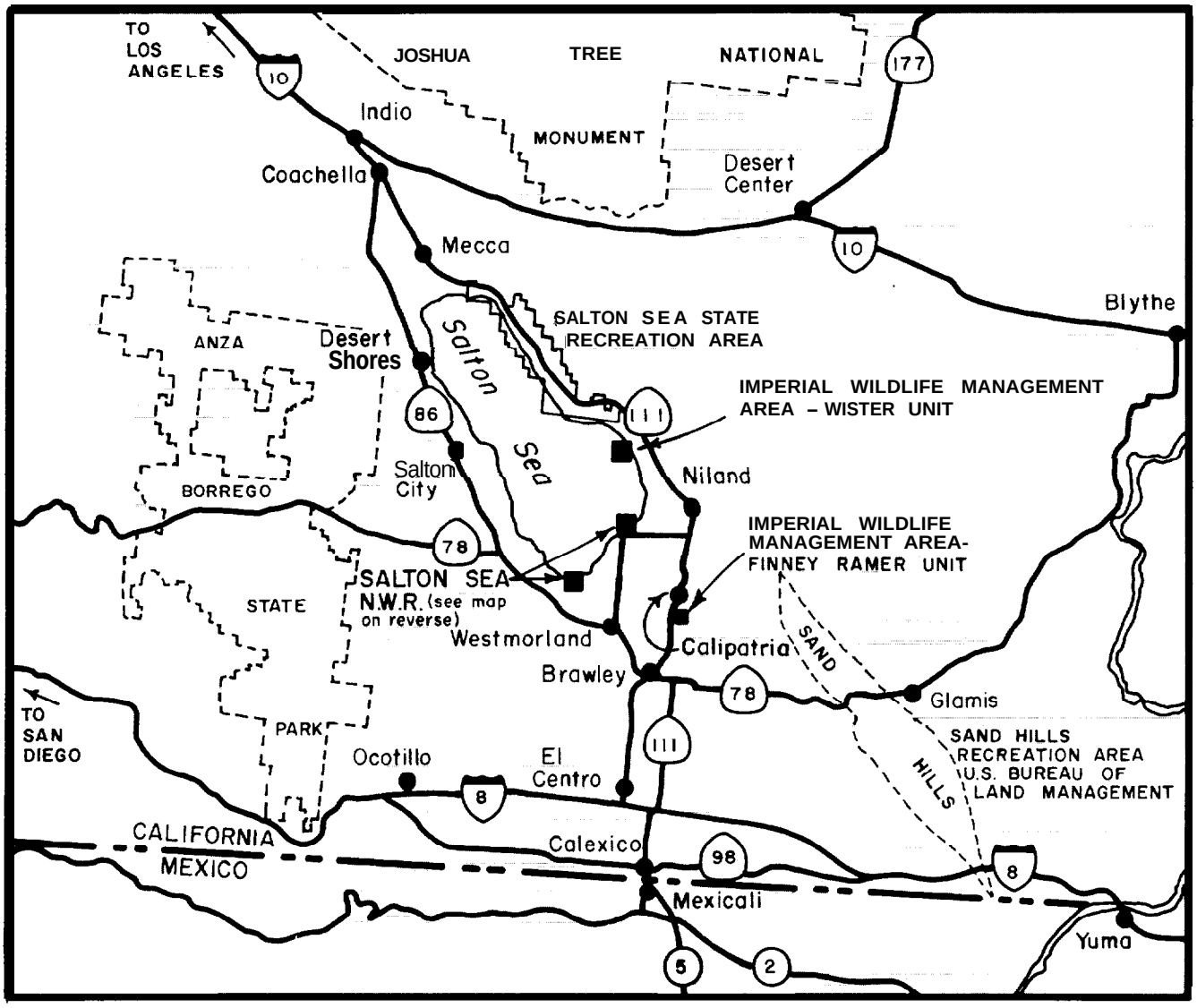

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SCALE IN MILES

SERVICES AVAILABLE NEARBY

Motels are available in Brawley (20 miles), Niland (10 miles), Imperial (28 miles) and El Centro (33 miles). Restaurants, gasoline and other supplies are available in Brawley, Calipatria, El Centro, Imperial, Niland and Westmorland.

Camping is permitted at the Wister and Finney Ramer units of the Imperial Wildlife Area and Salton Sea State Recreation Area.

RF11630 •U.S. GOVERNMENT PRINTING OFFICE: 1988-0-591-032/80002 May 1988

WILDLIFE AND A CHANGING SEA

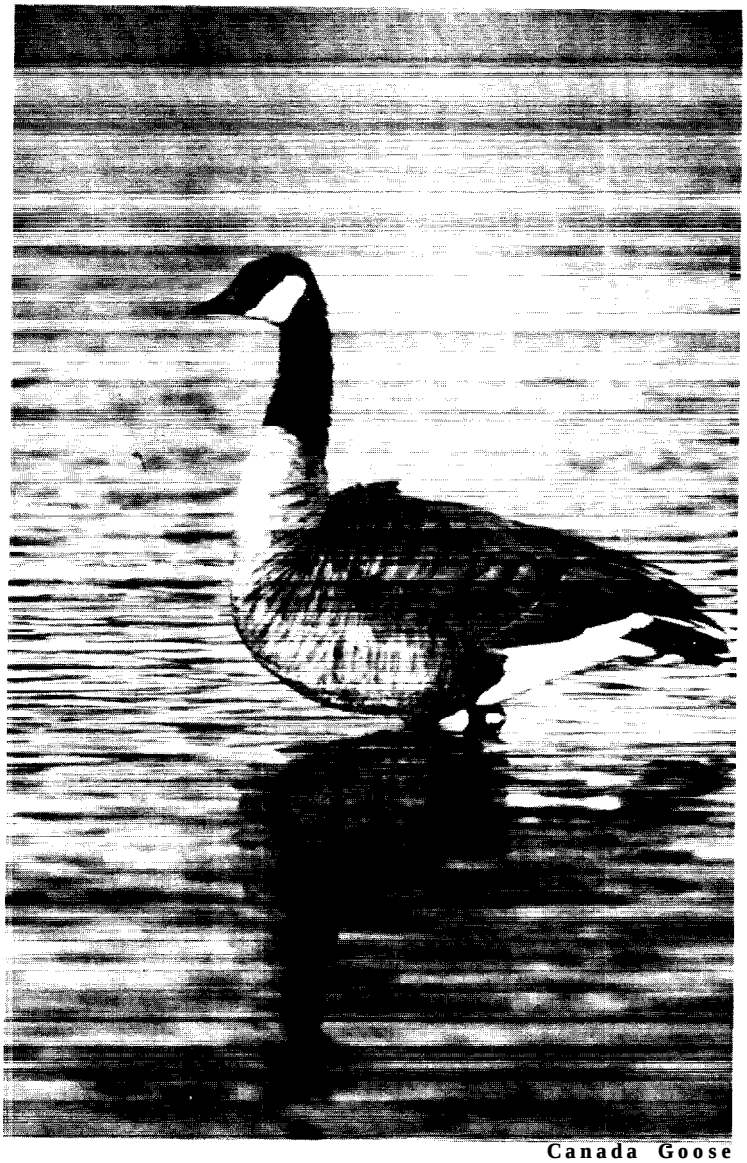
Snow Geese

The Salton Sea National Wildlife Refuge has shrunk-The Salton Sea National Wildlife Refuge was established in 1930 by a Presidential Proclamation. It is the southernmost refuge of the Pacific Flyway and is located in the Imperial Valley of California. Originally the refuge consisted of approximately 35,000 acres. Now, because of flooding by the Salton Sea, only about 2,200 manageable acres remain. Dikes are expected to keep the sea from further expansion on the refuge.

From Gulf to ancient sea to desert-At one time the Gulf of California extended into what is now known as the Imperial and Coachella Valleys. A natural dam was then formed through silt deposits from the Colorado River. This deposit blocked off the Gulf and resulted in the formation of an ancient sea. Through time, the sea evaporated and formed a dry alkaline basin. In the early 1900s only dry desert shrubs were present where the refuge and lake shore is today.

Sea re-created **in 1905 from break** in irrigation canal-In 1901, Colorado River waters were diverted from Yuma, Arizona into Mexico and back into the Salton Sea basin for agricultural development. In 1905, failure of a diversion structure caused the Colorado to flow unchecked into the Imperial Valley between 1905-1907, thus creating the present Salton Sea. Agricultural drainage and run-off from the surrounding mountains now supply the Salton Sea. There is no outlet from the Sea and water is removed only by evaporation.

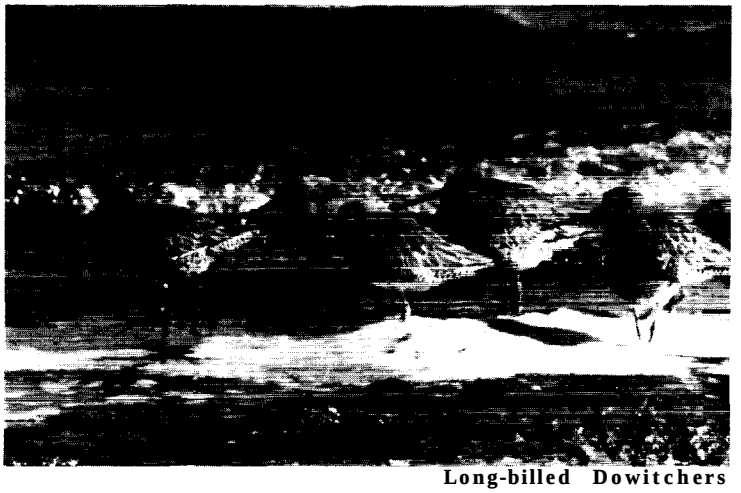
Over 200 feet below sea level-The Salton Sea presently covers over 380 square miles. Its width varies from 9-15 miles and it is 35 miles long with about 115 miles of shoreline. Salton Sea is 40 feet deep and the current level is 227 feet below sea level.



Canada Goose

Waterfowl have adapted to changing habits and foods in Imperial and Mexicali Valleys-Before Salton Sea was formed waterfowl were only found along the marshes and delta of the Colorado River (primarily in Mexico). During the 1920's, as more water was diverted from the Colorado River for agriculture, marshes were inadvertently created. These marshes, at the edges of the then smaller Salton Sea, resulted from agricultural water runoff. Waterfowl were attracted to the marshes from their former winter home in the drying Colorado River Delta. As farming intensified in the 1940's and the Salton Sea expanded, marshland once again shrunk and waterfowl turned to farmers' crops for food. Today, crops are grown on the refuge to feed wintering waterfowl and to keep the birds from eating farmers' crops.

Increasing sea salt stresses fish transplants - As the salinity of the Salton Sea began to rise as the result of evaporation, many of the native freshwater fish species began to die out. In the 1950s the salinity of the Salton Sea was nearly that of the Pacific Ocean (35,000 parts per million). Attempts were made to introduce several marine fish. These attempts resulted in the establishment of the Orange-mouth Corvina, Sargo and Gulf Croaker (Bairdiella), all transplanted from the Gulf of California. Later tilapia, an African species, were introduced into canals surrounding the Salton Sea. They are now well established in the Sea. Unfortunately the fishery is threatened by increasing salinity. In 1988 the salinity of the Salton Sea was about 40,000 parts per million or roughly ten percent more salty than the Pacific Ocean.



Long-billed Dowitchers

Other animals introduced into the Salton Sea, accidently or intentionally, include barnacles, pile **worms** and copepods. These animals play a very important part in providing food for the fishery. The relationship between the fish and their food is so close that if one were to disappear the entire system would be significantly affected.

Numerous wildlife now conserved on the refuge - Thousands of waterfowl and other birds spend the winter at the refuge. Canada geese, snow geese, American avocets, black-necked stilts, pintails, green-winged teal, eared grebes and a wide variety of other species are commonly seen during the winter.

The primary purpose of the refuge is to provide winter habitat for migrating waterfowl. The refuge is also important in providing a home and resting area for a large number of shorebirds and in supporting a diversity of wildlife species throughout the year.

White Pelicans

Endangered species at the refuge-The Yuma clapper rail breeds in marshes along the Colorado River from the Nevada/California border south to the Colorado Delta region of Mexico. It is also found in marsh habitat around the southeastern portion of the Salton Sea. The preferred habitat is mature cattail-bulrush stands in shallow water disected by narrow channels of flowing water. A small breeding population can be found in refuge marshes from April to July.

Other endangered/threatened species occasionally observed on the refuge include the bald eagle, California brown pelican and peregrine falcon.

Yuma Clapper Rail

ENJOYING THE SALTON SEA NATIONAL WILDLIFE REFUGE

REFUGE HOURS-Refuge open sunrise to sunset. Office hours 7:00 am to 4:30 pm Monday-Friday.

WILDLIFE OBSERVATION AND PHOTOGRAPHY-These activities are encourged from designated trails. Self-guided interpretive exhibits are available near the office. A wildlife list is available.

DESIGNATED TRAILS-Walking and hiking are enjoyed on designated trails. Most refuge roads and trails are closed to vehicles.

WATERFOWL HUNTING-Waterfowl hunting is permitted on areas shown on map under State and Federal Regulations. Write the Refuge Manager for hunting regulations leaflet.

FISHING-Boat fishing only is permitted, except where posted as closed. From April 1 to September 30, areas on the Sea between the buoys and shoreline are open to boat fishing. These areas are closed to all entry at other times of the year. No bank fishing.

PETS-Pets must be on a leash at all times. Hunting dogs on the public hunting areas must be under effective control.

LITTERING-Please help us save your tax money for clean-up. Don't litter.

CAMPING-No camping is allowed on the Refuge.

FOR MORE INFORMATION CONTACT:

Refuge Manager
Salton Sea National Wildlife Refuge
P.O. Box 120
Calipatria, CA 92233
Phone (619) 348-5278

Information on other nearby recreation land can be obtained from:

Salton Sea State Recreation Area
P.O. Box 3166
North Shore, CA 92254
Phone (619) 393-3052

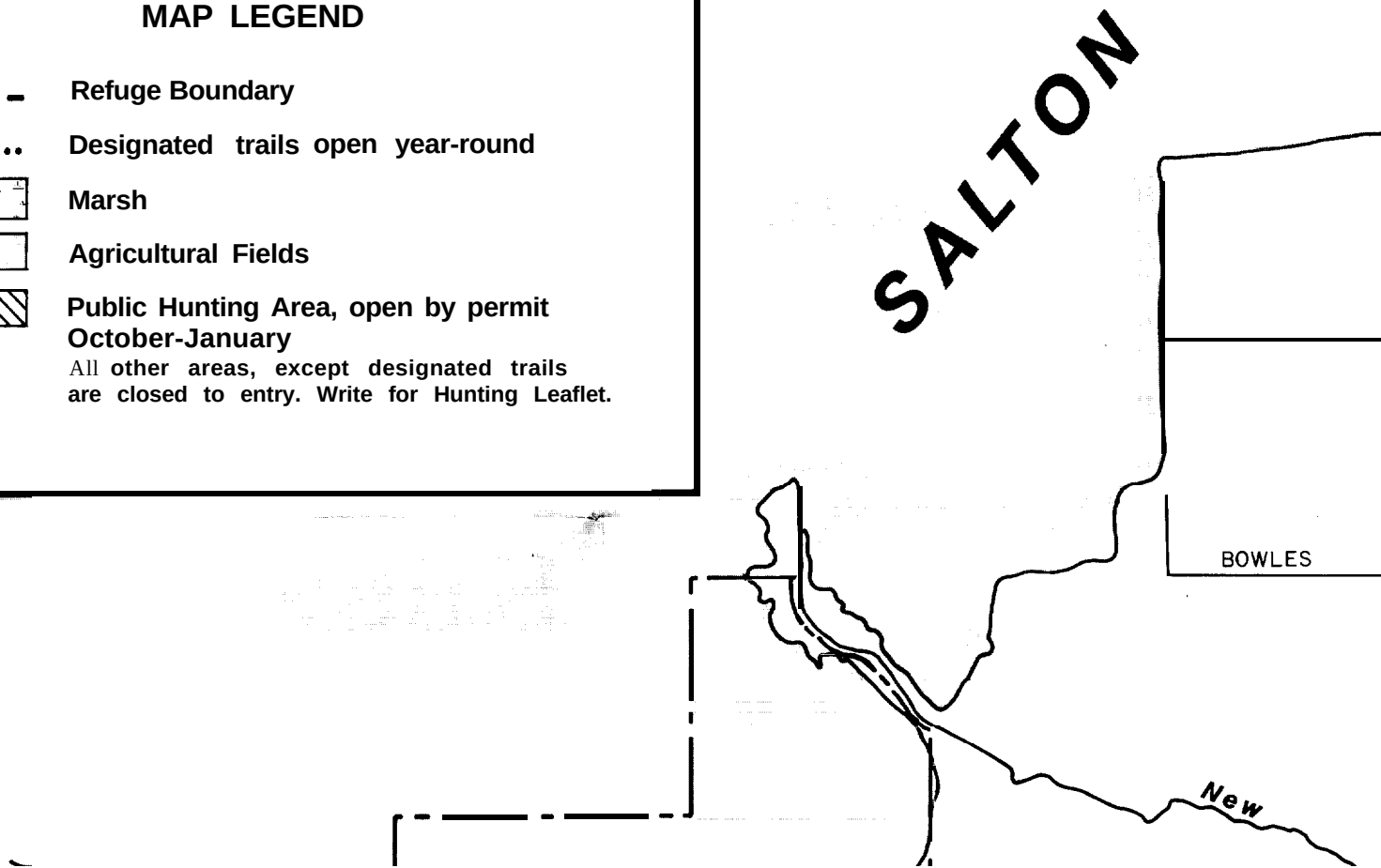
Bureau of Land Management
U.S. Department of the Interior
333 South Waterman Avenue
El Centro, CA 92243
Phone (619) 352-5842

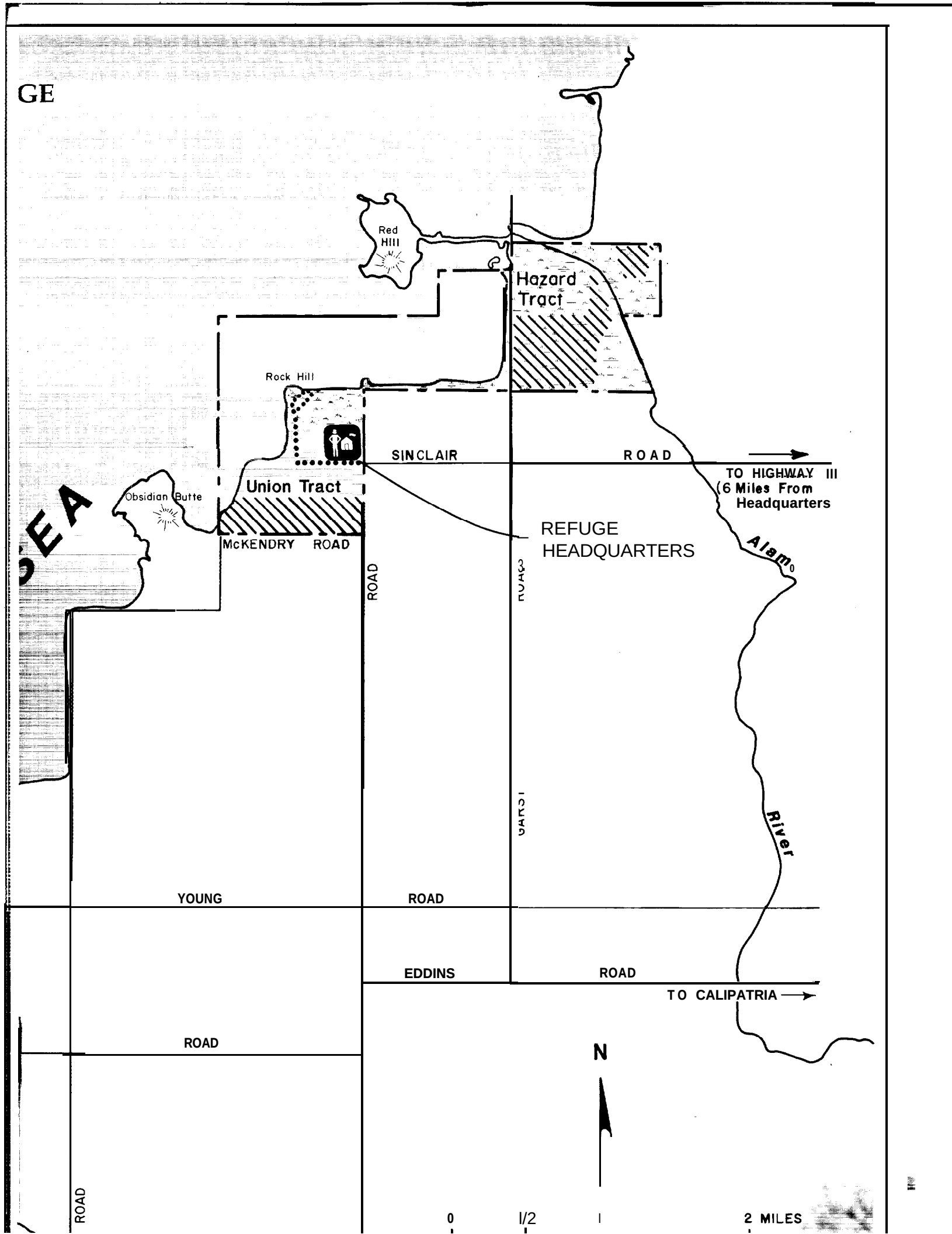
California Department **of** Fish and Game
8700 Davis Rd.
Niland, CA 92257
Phone (619) 348-0577

MAP LEGEND

- **Refuge Boundary**
- **Designated trails open year-round**
- **Marsh**
- **Agricultural Fields**
- **Public Hunting Area, open by permit October-January**

All **other areas, except designated trails are closed to entry. Write for Hunting Leaflet.**

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Red Hill
Hazard Tract
Rock Hill
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TO HIGHWAY III
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Union Tract
Obsidian Butte
McKENDRY ROAD
REFUGE HEADQUARTERS
ROAD
ROAD
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YOUNG ROAD
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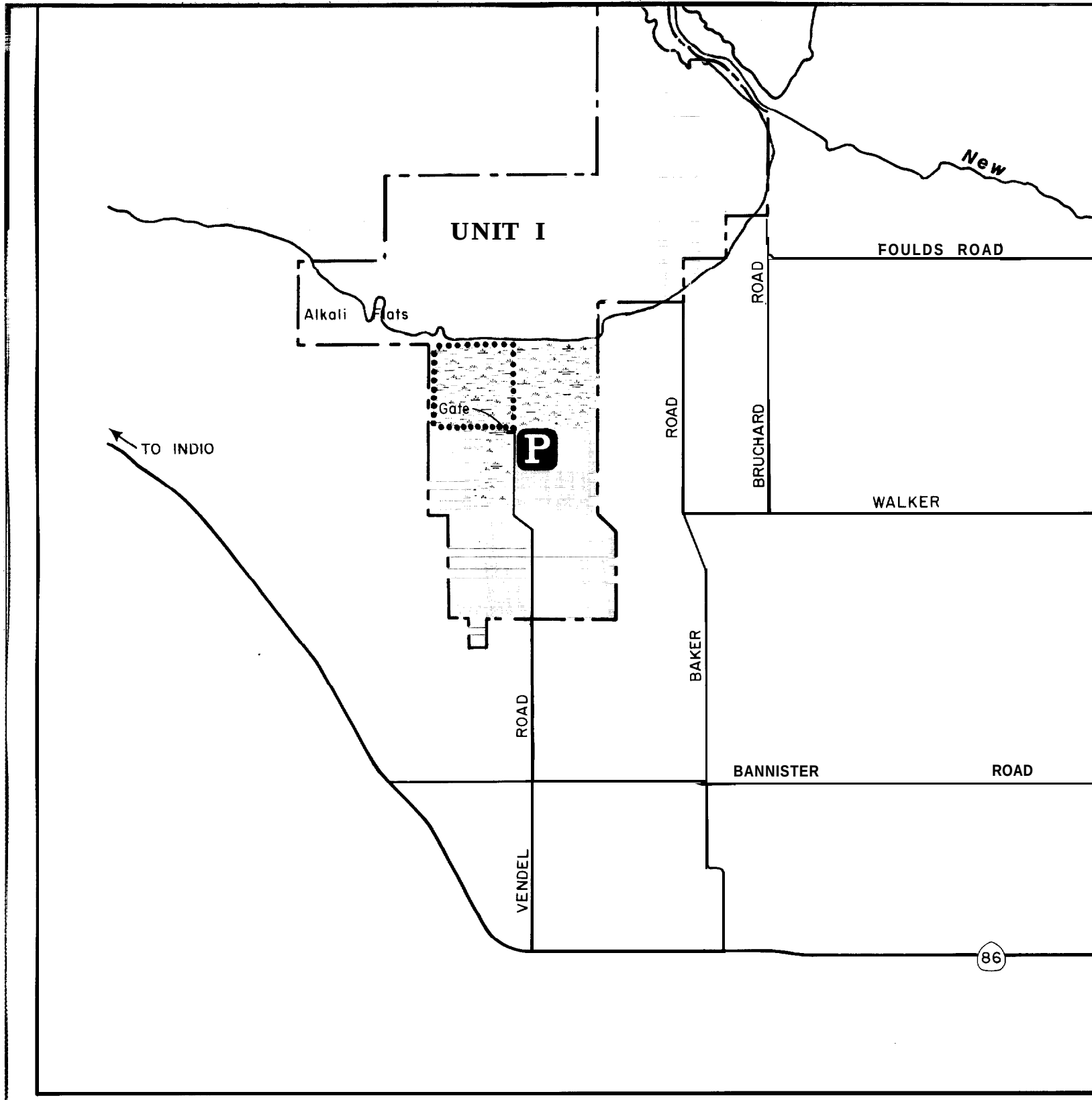
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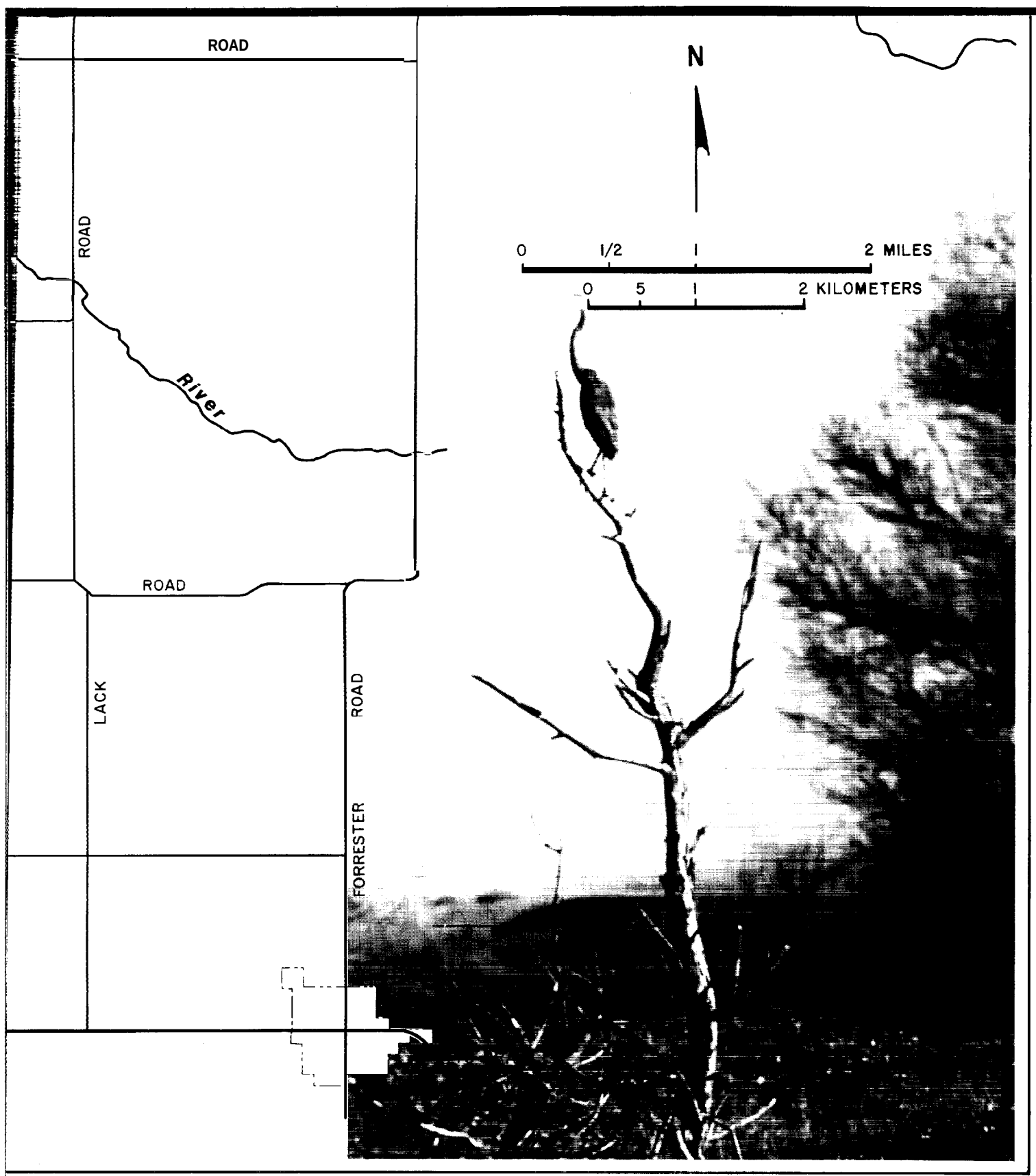
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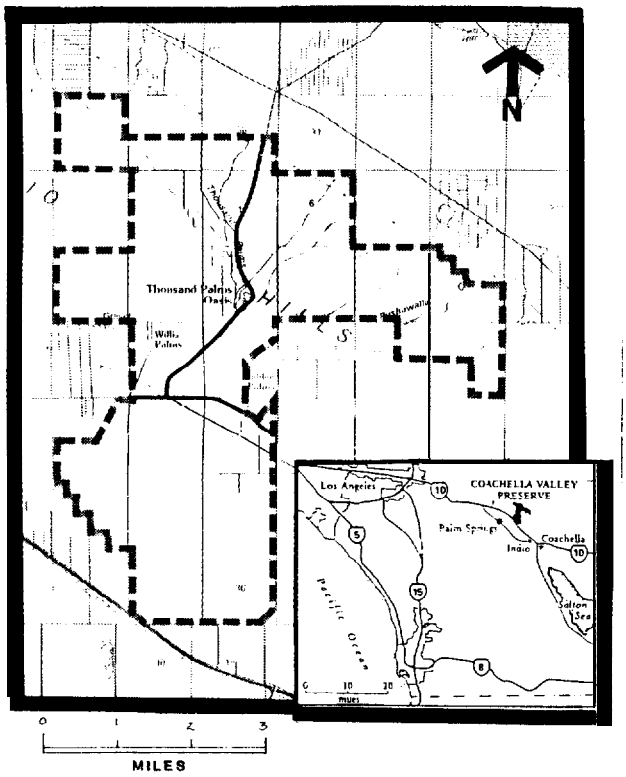
COACHELLA VALLEY PRESERVE



Coachella Valley Preserve

U.S. Fish and Wildlife Service
Lloyd 500 Building, Suite 1692
500 N.E. Multnomah Street
Portland, Oregon 97232

U.S. Bureau of Land Management
Indio Resource Area
1900 E. Tahquitz-McCallum Way, Suite B-l
Palm Springs, California 92262
619/323-4421

California Department **of Fish and Game**
245 West Broadway, Suite 350
Long Beach, California 90802
213/590-5151

The Nature Conservancy
1600 North Kent Street
Arlington, Virginia 22209

California **Nature Conservancy**
785 Market Street
San Francisco, California 94103

HISTORY

Human history in the Coachella Valley dates back at least a thousand years ago to the Malpais or Stone Mesa culture. The most recent tribe to live in the valley was the Cahuilla, a great Indian nation which spread west from the Colorado River to the Pacific Ocean and encompassed much of Riverside and San Bernardino counties. The various Cahuilla tribes gathered and traded food from the upper and lower deserts. They hunted sheep, deer and pronghorn in the mountains, and rodents, rabbits and reptiles on the desert floor. Edibles from mesquite, agave and yucca were gathered to provide enough food to last throughout the year. In winter months the excess was stored in ollas and basket granaries. Some of the Cahuilla Indians still live near Palm Springs.

In 1906 Louis Wilhelm traded two mules and a wagon for 80 acres of Thousand Palms Canyon. In the 1940s the rapid development of the Coachella Valley resulted in the eventual destruction of major corridors of wildlife habitat. In 1980 the federal government listed the Coachella Valley fringe-toed lizard as threatened, an indication of how drastically the desert ecosystems were changing. In April 1984, the California Nature Conservancy purchased 1,920 acres of the proposed site, including Thousand Palms Oasis, one of the largest groves of California fan palms in the state. This acquisition marked the beginning of a process in which the State Department of Fish and Game, the U.S. Fish and Wildlife Service, the U.S. Bureau of Land Management, and the Nature Conservancy purchased the land which is now the Coachella Valley Preserve.

WELCOME TO THE COACHELLA VALLEY PRESERVE

Crystal clear springs sheltered by lush greenery; endless sand dunes that fall away from ochre-colored bluffs and mesas of the Indio Hills-this is the Coachella Valley Preserve.

The 13,000-acre site lies 10 miles east of Palm Springs in the Colorado Desert. It is the last undisturbed watershed in the Coachella Valley.

At the heart of the Preserve is the spectacular Thousand Palms Oasis fed by continuously flowing waters seeping along the San Andreas Fault. Also within the Preserve are Willis and Indian Palms – habitats unequaled **in beauty and vitality. The oases support** a remarkable concentration – over 1,200 – of native California fan palms.

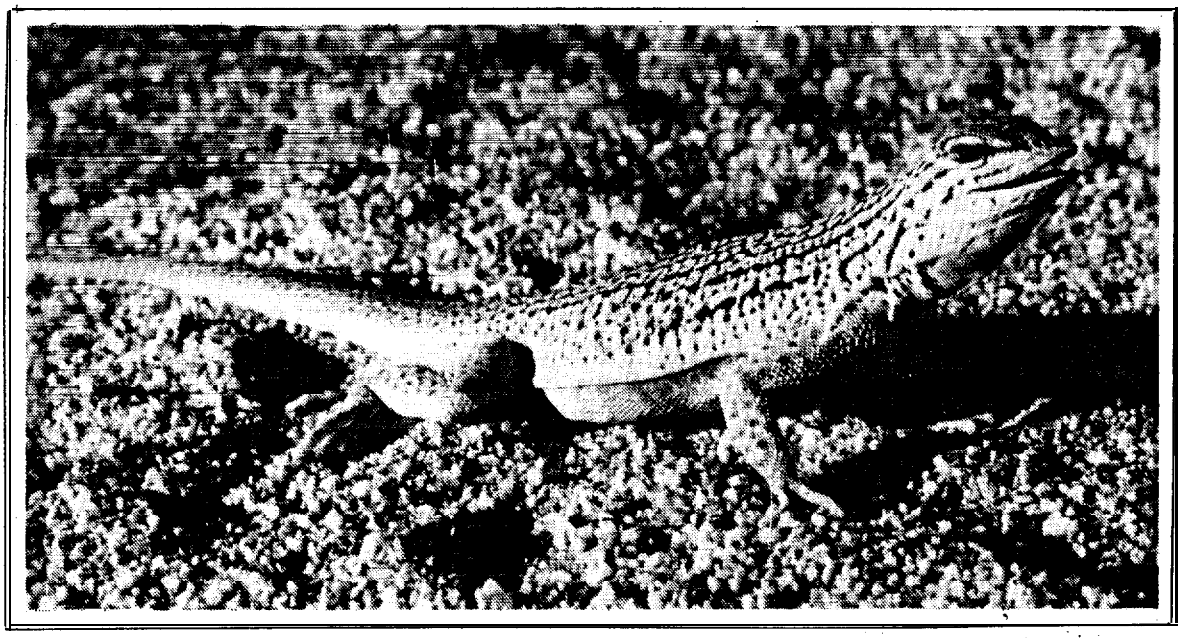
In sharp contrast is the surrounding desert. For ages torrential **rains have washed sand and gravel down the sides of the Little** San Bernardino Mountains and the Indio Hills, spreading the granite particles into broad alluvial fans. As strong winds blow across the valley floor, the sand is swept into everchanging dunes. This cycle of moving and blowing sand continually regenerates the desert system, providing habitat for an extraordinary diversity of life.

GEOGRAPHY

The Preserve is located in the heart of the 300-square-mile Coachella Valley, situated north of the Santa Rosa and San Jacinto mountains and south of the Little San Bernardino Mountains. The Preserve straddles the Indio Hills and the San Andreas Fault. From the hills to the desert floor, it encompasses alluvial fans and isolated terraces of desert pavement dissected by wash areas in the north and extensive blowing sand fields and dunes in the south. Elevation ranges from 100 to 1,000 feet above sea level**The largest alluvial fan begins at the southern** end of the Indio Hills, at the mouth of Thousand Palms Canyon. Here, rocks and sand eroded from the Little San Bernardino Mountains create a coarse, sandy cobblestone surface that is broken by a network of narrow, sandy washes. The persistent westerly winds in the Coachella Valley move the finer particles and sand from the southern portion of this fan into the ever-changing blow-sand fields.

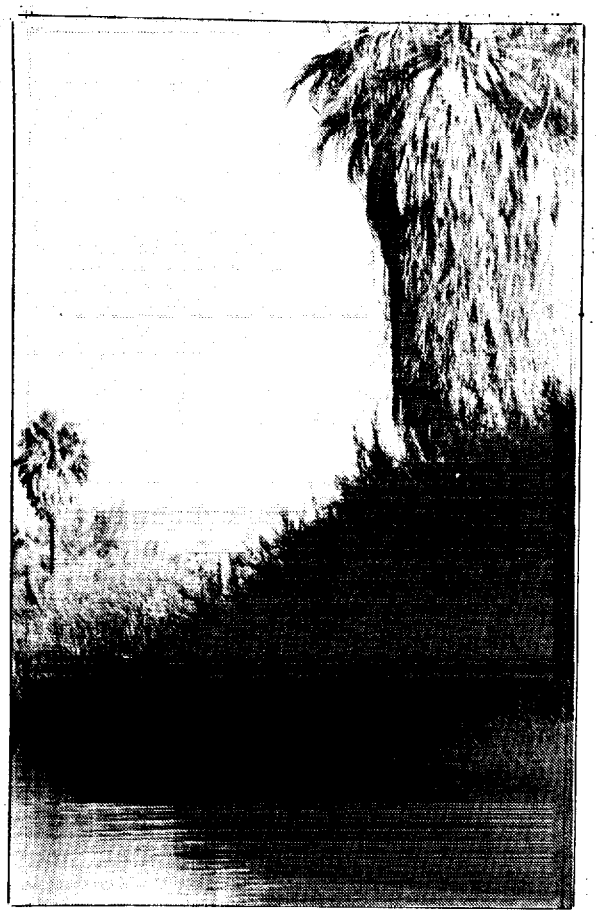
FLORA AND HABITAT

The Coachella Valley contains two rare habitat types. The first, palm oasis woodland, is found in numerous groves within the Preserve, including Thousand Palms Oasis, in the center of the Preserve. The palm oases are sustained primarily by water made available through faulting and fracturing of underlying bedrock. Water flowing underground from a higher elevation is stopped **by** an intersecting fault block and risesto ground level, creating a unique aquatic environment. The second area, blow-sand fields, is created by a combination of surface water and wind transport processes. The sand fields are dependent upon periodic flooding that funnels sand originating in the northern half of the watershed through Thousand Palms Canyon. Sandy wash, rocky slopes, alluvial plains and other habitats are protected in the Coachella Valley Preserve. Creosote bush, encelia, burrobush, smoke tree, and desert lavender are the dominant shrubs in these areas



VALLEY **FRINGE-TOED LIZARD**

(Uma Inornata)



FAUNA

Wildlife of the Coachella Valley Preserve is varied and abundant; 180 animal species inhabit the Preserve including a large population of resident and migratory birds. There are five rare animals occurring in the valley. One species, the Coachella Valley fringe-toed lizard (*Uma inornata*) is a threatened species inhabiting the blowing sand dunes. Leading biologists maintain that the Preserve is one of the few locations in the Coachella Valley still capable of sustaining a population of these lizards.

Other rare species include the flat-tailed horned lizard, the Coachella round-tailed ground squirrel, the giant red velvet mite and the giant palm-borlng beetle. Birds found on the Preserve include the cactus wren, hooded oriole, northern oriole, phainopepla. Gambel's quail, black-throated sparrow, American kestrel, greater roadrunner, verdin, black-tailed gnatcatcher, Say's and black phoebes, common yellowthroat, burrowing owl, great horned owl, long-eared owl, barn owl, screech owl, poorwill, lesser nighthawk, common raven, western bluebird, cedar waxwing, northern mockingbird, LeConte's thrasher and house finch.

MANAGEMENT

The Coachella Valley Preserve is jointly owned and managed by the Bureau of Land Management, the U.S. Fish and Wildlife Servlce, the California Department of Fish and Game and The Nature Conservancy. The Conservancy hires a full-time Preserve director. This unique cooperation of public and private agencies to protect a threatened ecosystem is a model for future conservation efforts.

ACCESS

The Preserve is open every day from sunrise to sunset. Individuals and groups are welcome to visit the Preserve. For tours and information contact:

Coachella Valley Preserve
P.O. Box 188
Thousand Palms, CA 92276
(619) 343-1234