COACHELLA VALLEY NATIONAL WILDLIFE REFUGE

THOUSAND PALMS, CALIFORNIA

ANNUAL NARRATIVE REPORT

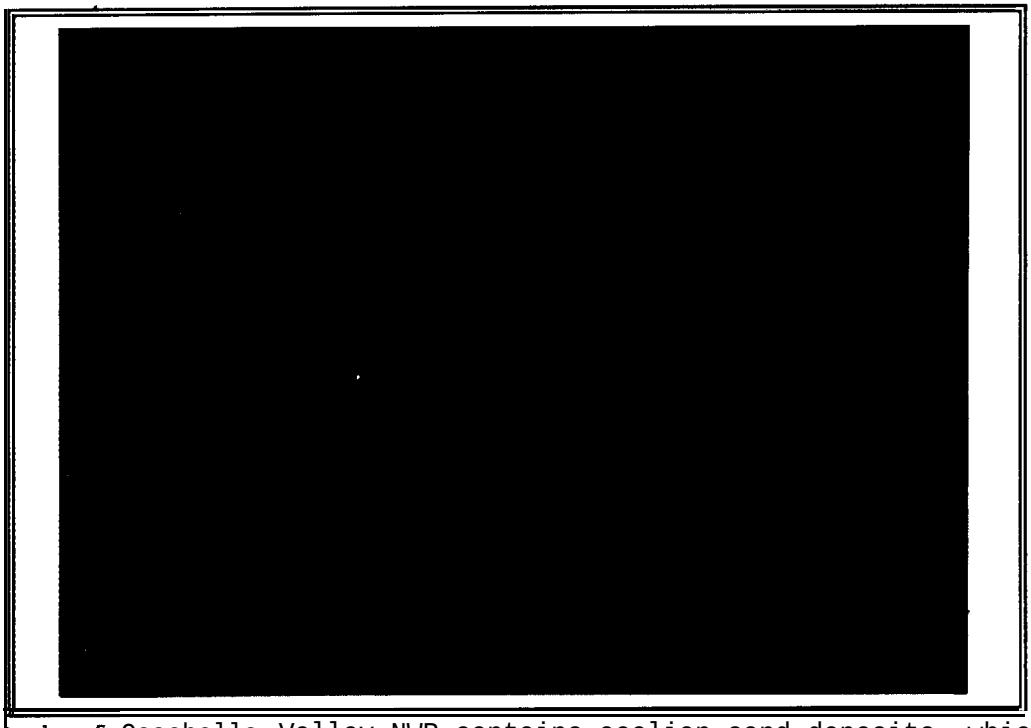
CALENDAR YEAR 1993

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

INTRODUCTION

The 3,709-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. In passing the Endangered Species Act of 1973, Congress recognized that threatened and endangered plants and wildlife have educational, scientific, recreational, historical, and aesthetic values and should be preserved as part of the nation's natural heritage. Established in 1985 as part of the 19,000-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. Much of 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.



Much of Coachella Valley NWR contains aeolian sand deposits, which are essential for survival of Coachella Valley fringe-toed lizards.
cv-1439, 04/04/90, 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. As a result, activities allowed in other parts of the Preserve may not be allowed on refuge lands.

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H. PUBLIC USE

I. EQUIPMENT AN-D FACILITIES

J. OTHER ITEMS

A. HIGHLIGHTS

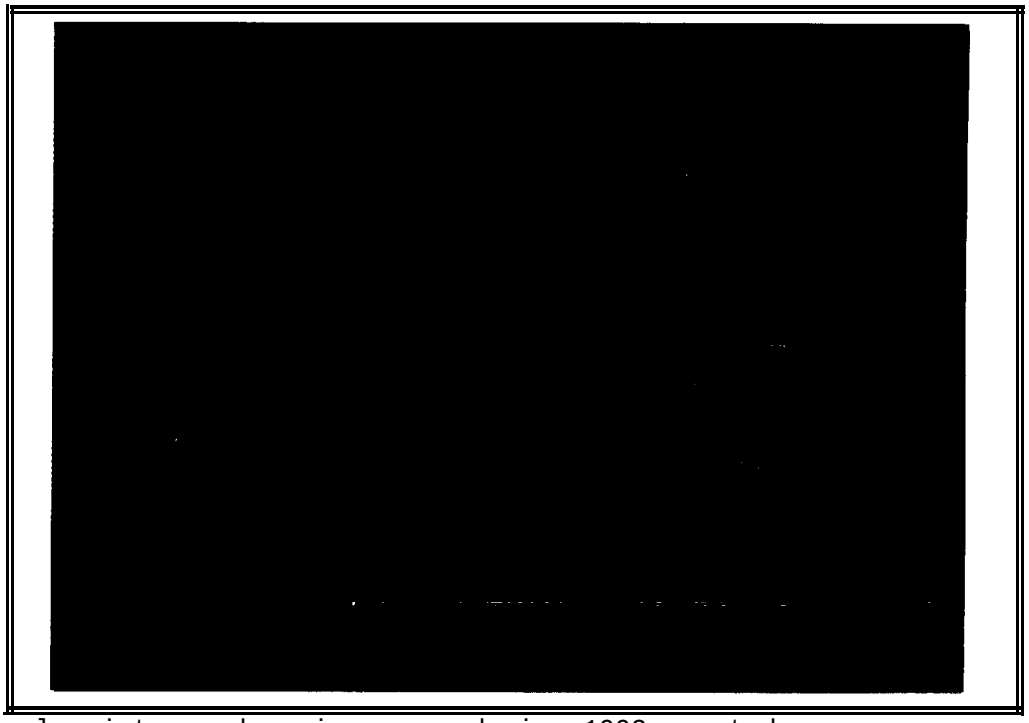
One land acquisition and 5 transfers completed. (Section C.1), page 2.

Sand source studies completed. (Section D.5), page 9.

Audit begins on collection of mitigation fees. (Section D.6), page 15.

Tamarisk and vineyard removal initiated. (Sections F.6, F.10), page 23.

B. CLIMATIC CONDITIONS



Ample winter and spring rains during 1993 created favorable conditions for many desert animals and plants, such as sand verbena (purple) and brittlebush (yellow). CV-683, 4/08/93, WRR

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 hottest temperature of the year was 120°F on August 1 and the coldest temperature was 24°F on January 4. Rainfall for the year totalled 6.41 inches, a full 163% greater than the 33 year long term average of 3.94 inches per year. December through March are usually the wettest months in the Coachella Valley. The table on next page summarizes weather data for the year.

Table 1. Coachella Valley NWR Weather Summary 1993*

MONTH	PRECIPITATION (inches)	TEMPERATURE (°F) Max	Min
January	4.18	80	24
February	2.01	80	37
March	Trace	94	40
April	.00	104	49
May	.00	102	55
June	.00	115	57
July	.00	113	67
August	.00	120	68
September	.00	117	60
October	Trace	106	53
November	.22	89	33
December	.00	83	31

*Weather data taken at Indio City Fire Department Headquarters.

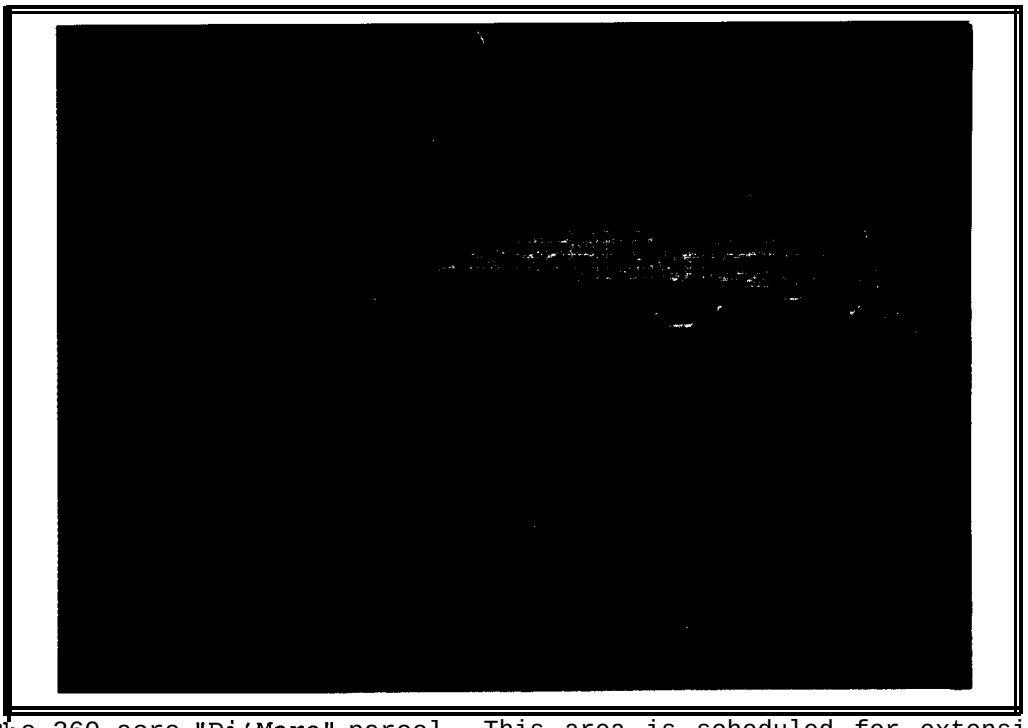
C. LAND ACQUISITION

1. Fee Title

Refuge fee-title acres increased to 3,536 during 1993. The Service and TNC hastened the process of active acquisition of properties within the approved refuge boundary. Acquisition funds have not kept pace with the continued rise of land prices in the Coachella Valley, and the Preserve Management Committee decided to establish acquisition priorities and escalate action to pick up lands on a willing seller basis before prices rise even higher. One parcel was purchased and 5 were transferred from TNC.

The 10 acre Kaykendall property was purchased for $40,000. This tract represents one of several small inholdings and is comprised of sandy plains. It is located within the wind corridor that transports sand from Thousand Palms canyon to the northern dune system on the refuge.

TNC transferred 5 parcels (445 acres) to the FWS. Four parcels are located near the southern boundary of the refuge and represents additional sand dune habitat critical to the survival of CVFTL's. The fifth parcel (Di'Mare property, 260 acres) is located near the eastern boundary and consists of 80 acres of grape vineyard, 10 acres of citrus, one dwelling, and 170 acres of altered desert habitat. This area will require extensive habitat restoration.



The 260 acre "Di'Mare" parcel. This area is scheduled for extensive work to restore native habitat. CV-1732, 02/16/93, WRR

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 1985), the Coachella Valley Fringe-toed Lizard Recovery Plan (1984), and the Coachella Valley Preserve System Management Plan (July 1986).

The **Coachella** Valley Fringe-toed Lizard Recovery Plan was published by the Service in 1984. The primary objective of the plan is to minimize further decline of the species and habitat degradation by securing areas that maintain viable, self-sustaining populations. The recovery plan identifies the following actions needed to preserve the Coachella Valley fringe-toed lizard and its habitat: 1) Secure habitat for preservation of the species. 2) Study the biological requirements of the animal. 3) Monitor the fringe-toed lizard population to determine trends. 4) Study the effects of habitat modifications on fringe-toed lizards. 5) Study the feasibility of restoration of the animal's habitat through rehabilitation. 6) Develop and provide public information and education programs to further awareness and support for preserving fringe-toed lizards. 7) Enforce existing laws and regulations protecting these animals and their habitat.

The Coachella Valley Preserve Management Plan establishes guidelines for management actions to "insure protection of resources contained within the Preserve." When drafted by TNC and BLM personnel, this plan was supported by the other members of the preserve management committee, and 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 trail 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.

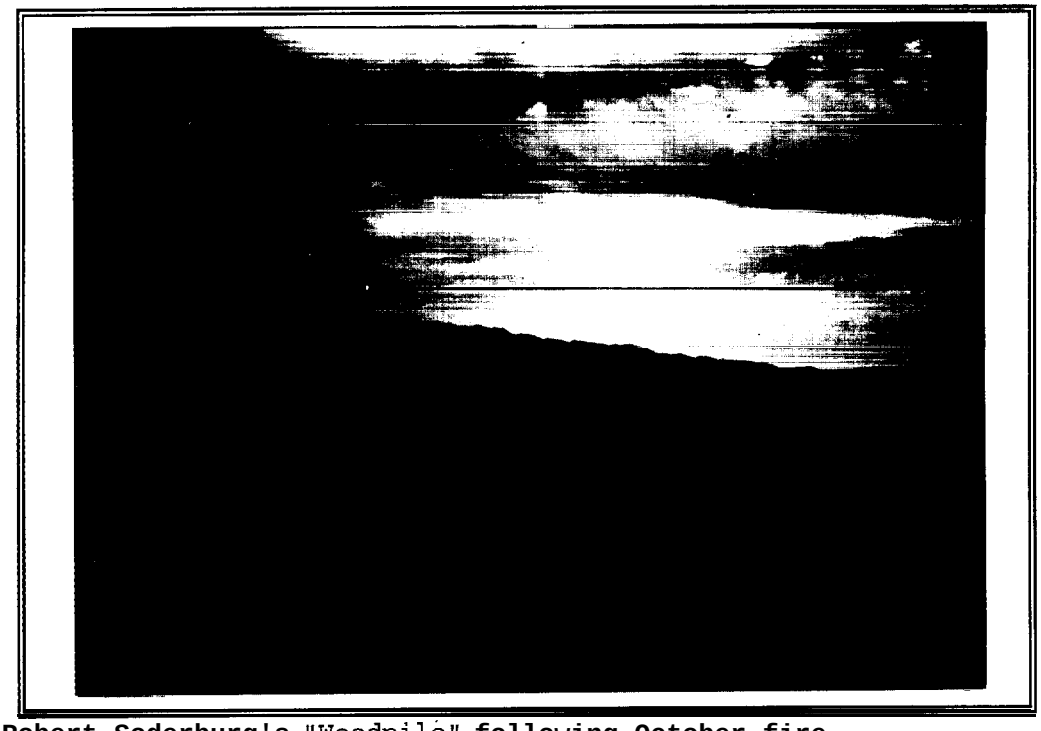
Management meetings with representatives from each agency were held four times during the year to coordinate activities on the preserve. The chairmanship of the Management Committee rotates among all the agencies, with a California Department of Fish and Game representative acting as chairman during 1993.

4. Compliance with Environmental and Cultural Resource Mandates

The Woodpile Conditional Use Permit

During August of 1992, Robert Soderburg applied to Riverside County to operate a "proposed" wood products enterprise (CUP 3161/EA 36326), **which has actually been in operation since June 1991. The project site is located next to the Pegasus Riding Academy oii the western boundary and upwind of the refuge. The Service's concerns with the** "proposed" **project related primarily to Habitat Conservation Plan requirements, potential run-off, deposition of debris, and continuing trespass which has yet to be acted upon by Soderburg. In addition, the proposed project is a potential fire hazard immediately adjacent to Critical Habitat for a threatened species. If fire were to spread from the proposed project onto the refuge and resulted in the** "take" **of threatened wildlife, those responsible for the fire could be held liable for Endangered Species Act violations.**

The concern of fire threats to the refuge was realized this year when the "Wood Pile" **caught fire and burned for several days in October. Fortunately, fire did not spread onto the refuge. Since Soderburg had'not received CUP approval, he was fined for having an illegal dump. In addition, he had to pay all fire suppression costs which reached several thousands of dollars.**

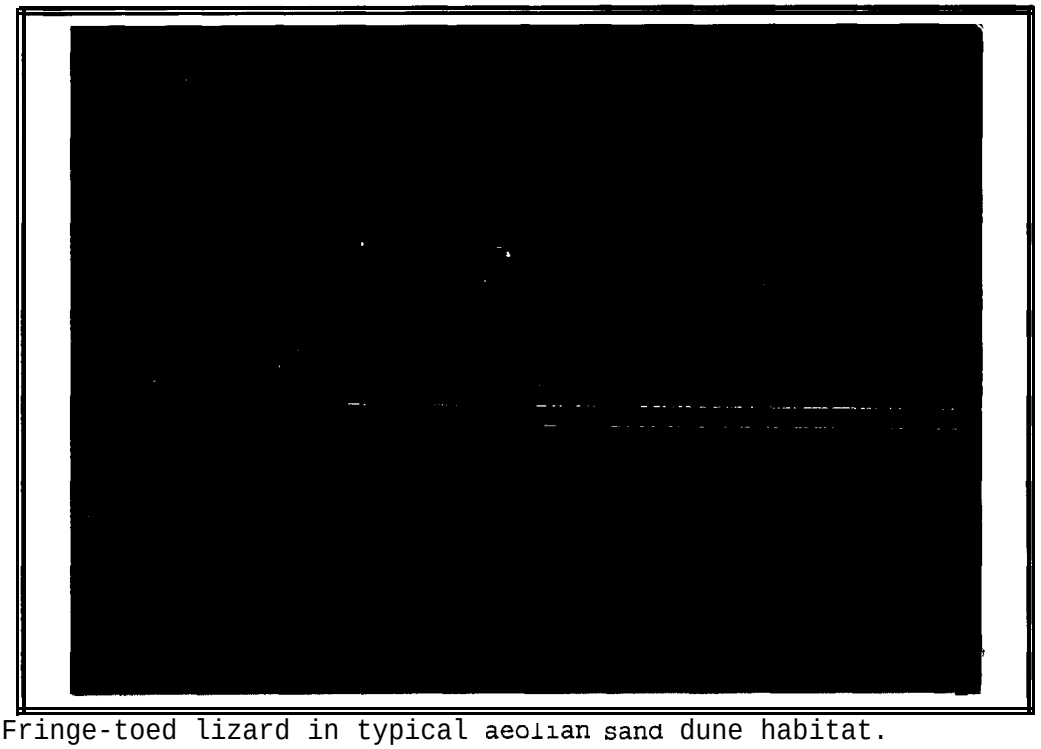


Robert Soderburg's "Woodpile" **following October fire.**
CV-1943,03/24/94, **KJD**

5. Research and Investigations

During 1992, members of the Preserve Management Committee formed a subcommittee to identify and list research needs and priorities which can be provided to universities and other researchers in an effort to enlist outside assistance to the preserve system. The top priority research need is for additional studies to better understand the dynamics of the sand delivery system in the Coachella Valley and its effect on the long-term management of the preserve system and the fringe-toed lizard. Other research needs include: 1) a better knowledge of habitat parameters of the fringe-toed lizard and other endemic sand dependent species, 2) inventories of sensitive plant and animal species, 3) hydrological data for the preserves, 4) habitat enhancement and rehabilitation techniques, and 5) development of plant and animal reintroduction techniques in suitable areas.

Several research projects were completed during 1993: (a) Various agency staff conducted CVFTL surveys during spring and fall. (b) Refuge staff began research on small mammal populations. (c) A sand source study was completed by California State and Arizona State Universities. (d) Geomorphic evolution and sediment transport dynamics of eolian terrains in the Coachella Valley Preserve by the Quaternary Sciences Center. (e) Biology and ecology of subterranean termites by University of California, Riverside.



Fringe-toed lizard in typical aeolian sand dune habitat.
CV-1812, 06/02/93, WRR

(a) 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 W. Radke and TNC Southern California Area Manager Cameron Barrows initiated a research project in 1990 to further identify the population dynamics of the Coachella Valley fringe-toed lizard. Objectives are to: 1) evaluate fringe-toed lizard 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 and one transect at the Willow Hole Preserve, each surveyed six times between 9/25 - 10/12. The ratio of adults/hatchlings during autumn will be compared with next year's springtime ratio to determine hatchling recruitment. 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.

The fall 1993 censuses revealed an increase in hatchlings per adults on transects CVP #2 and CVP #4 with a slight decrease observed at Willow Hole. Above normal rainfall occurred during January and February, which provided soil moisture conditions favorable for egg incubation. In addition, abundant vegetation growth resulted, which provided ample forage for adults and stimulated reproduction. The low number of adults observed during the fall census may have been due to estivation since no rainfall occurred during the summer months to maintain forage. The slight decrease at Willow Hole is unexplainable. Since there are many factors involved in population ecology of CVFTL's, there could have been other causes for the decrease. The following two tables depict the results of autumn population surveys conducted since 1990.

Table 2. Total Number of CVFTL Adults/Hatchlings During Autumn 1993.

TRANSECT	ADULTS	HATCHLINGS
Willow Hole	28	12
CVP #2	26	145
CVP #4	47	93
TOTALS	101	250

Table 3. Average Adults/Hatchlings Comparison

TRANSECT	1990 Adult/Hatch	1991 Adult/Hatch	1992 Adult/Hatch	1993 Adult/Hatch
Willow Hole	0	5.4/8.6	2.2/2.4	4.0/2.0
CVP #2	1.3/4.2	5.8/28.6	12.5/10.6	4.0/26.0
CVP #4	4.1/1.5	3.8/12.2	6.0/11.8	8.0/15.0

(b) Population Dynamics of Small Mammals in Desert Habitat and Vineyards at Coachella Valley NWR (11632-9301.

Small mammal trapping was conducted on the refuge during March to obtain baseline data for comparing species composition and density in native desert habitat and vineyards. Eighty Sherman live traps were set on two 2.43 ha (six acres) plots in each habitat type for two nights (320 trap nights). Data recorded for each species included sex, weight, length of hind foot, tail length and total length. All species captured the first night were toe clipped and marked with a blue marking pen on the underside for easy recapture identification. Species captured the second day were weighed and sexed before release. SCA volunteer Ken Sturm completed the project in addition to numerous other tasks. This project will be conducted for several years and include fall trapping. Data gathered from the study will be used for planning and evaluating habitat restoration efforts following removal of the vineyards. The following two tables depict the trapping results.

Table 4. Number and species composition of small mammals captured in two plots of native desert habitat on Coachella Valley NWR: March 26 & 27, 1993.

Species	Number Captured	Percent Composition
Peromyscus maniculatus	14	22
Perognathus longimembris	14	22
Dipodomys merriami	36	56

Table 5. Number and species composition of small mammals captured in two plots of vineyard on Coachella Valley NWR: March 14 & 15, 1993.

Species	Number Captured	Percent Composition
Peromyscus maniculatus	90	92
Perognathus longimembris	4	4
Mus musculus	4	4

(c) Sand Sources of The Coachella Valley Fringe-toed Lizard Habitat

A study was conducted by Norman Meek (California State University) and Thad Wasklewicz (Arizona State University) to examine the sand sources and transport corridors for the Coachella Valley Preserve. This information is required to assess the effects of development in wind corridors on sand deposition and movement within the three preserve areas. Reconnaissance mapping and several analytical techniques including sand texture (sieving), scanning electron microscopy, mineral identification, grain coating examinations, trace element analysis of quartz grains and ultra trace-element analysis of bulk sand minerals were used to examine potential source areas of the preserve sands. The study was completed in September and yielded very important information. Results indicated that the Indio Hills are the principal source of some aeolian sand in the main preserve area (MPA) (refuge location). The principal sand supply for the dunes on the refuge are the alluvial fans that drain south from the Indio Hills, and to a lesser extent a preexisting ancient aeolian deposit. Some sand has also appeared to have accumulated as a result of human disruption of upwind areas.

In the past, Thousand Palms canyon was believed to be the primary sand source for this area and was included in the MPA. This new information raises several concerns of potential developmental impacts on the preserve. Development is occurring within the wind corridor (Corridor 2, depicted on Fig. 1) that transports sand to the MPA. In addition, flood protection for these developments may deprive the MPA of all drainage areas and sediments west and northwest of developments. The future of the blowsand ecosystem and CVFTL on the preserve and refuge is uncertain. Hopefully the preserve management committee will be able to work with the county and developers to help resolve these problems and ensure the survival of the CVFTL.

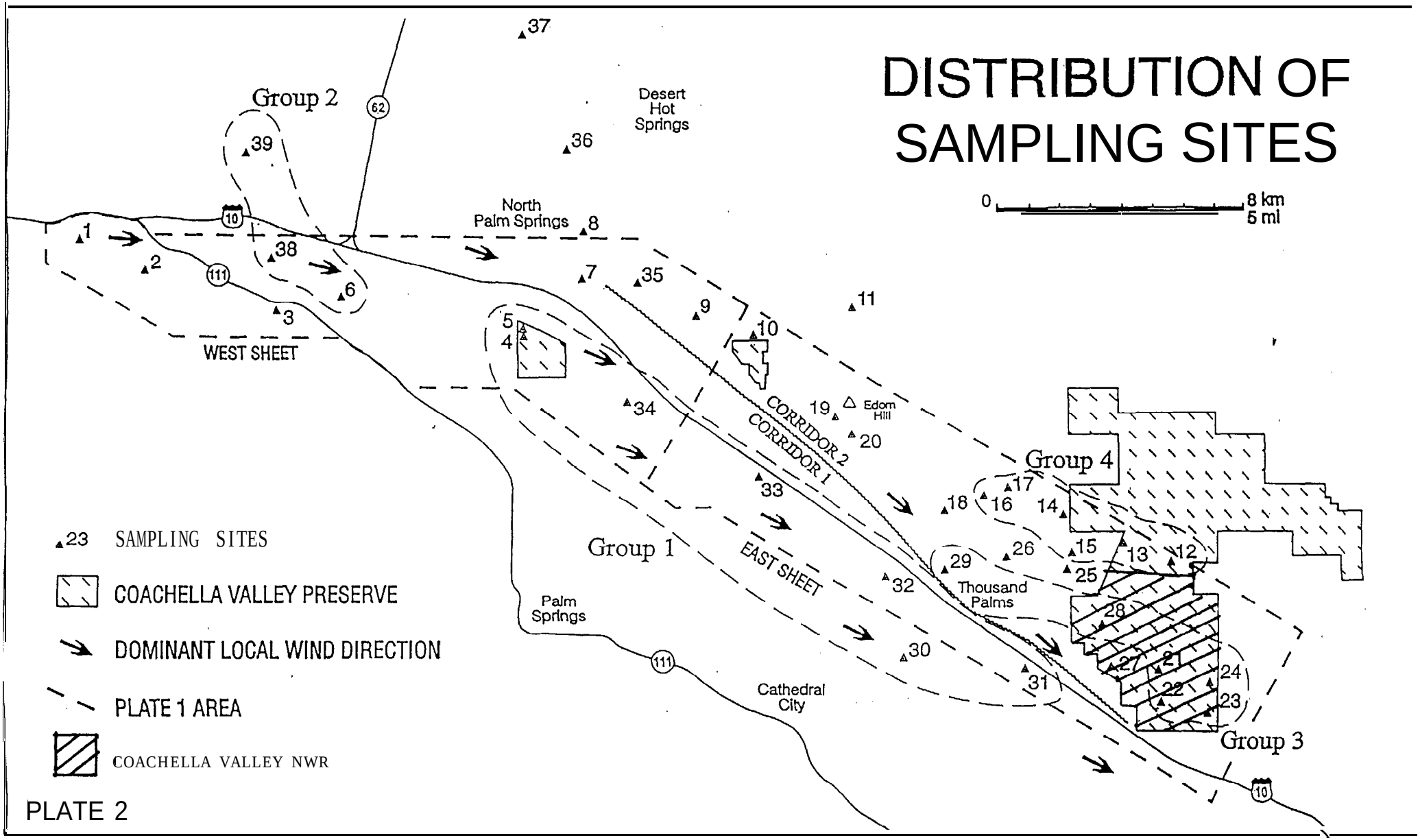

DISTRIBUTION OF SAMPLING SITES
0
8 km
5 mi
Group 2
Desert Hot Springs
North Palm Springs
WEST SHEET
CORRIDOR 2
CORRIDOR 1
Edom Hill
Group 4
Group 1
EAST SHEET
Thousand Palms
Palm Springs
Cathedral City
Group 3
23 SAMPLING SITES
COACHELLA VALLEY PRESERVE
DOMINANT LOCAL WIND DIRECTION
PLATE 1 AREA
COACHELLA VALLEY NWR
PLATE 2

Figure 1

The Indio hills located northwest of the refuge provide the majority of blowsand for the dune system located on the refuge.
CV-1817, 04/90, WRR

(d) Geomorphic Evolution and Sediment Transport Dynamics of Eolian Terrains in The Coachella Valley Preserve System

This study was completed by Nicholas Lancaster, Jerry Miller and Lynn Zonge of the Quaternary Sciences Center, Desert Research Institute, Reno, Nevada. The purpose was to study eolian sand source areas, transport corridors and depositional sinks at selected sites in the Coachella Valley to determine changes in eolian sand areas on the main preserve area (refuge) over the past 50 years. This would address concerns that the dune system was degrading and migrating off the refuge. Analysis involved mapping and comparing eolian sand dunes on aerial photographs from 1939, 1953, 1972 and 1992. Climatic data was also analyzed to determine effects on sand movement and deposition. Results indicate that the leading margins of the dunes are extending southeastward, dune migration during 1972 - 1992 has been affected by windbreaks, dune migration rates have decreased, and there has been a decrease in area covered by dunes, sand sheets and mesquite groves since 1953 (see Fig. 2 and 3). Overall, there has been net loss of eolian sand and stabilization of dunes during the past few decades. It appears that initial dune formation (sand deposition) occurs at the base of alluvial fans during catastrophic flood events every 2 to 3 thousand years. Sand deposits and sand-sheets then migrate, modify and degrade over time. The degradation of the dune system on the refuge will likely continue unless there is a significant change in the hydrology of the Indio Hills watershed. Hopefully, the next flooding event will occur before all dunes have migrated off the refuge.

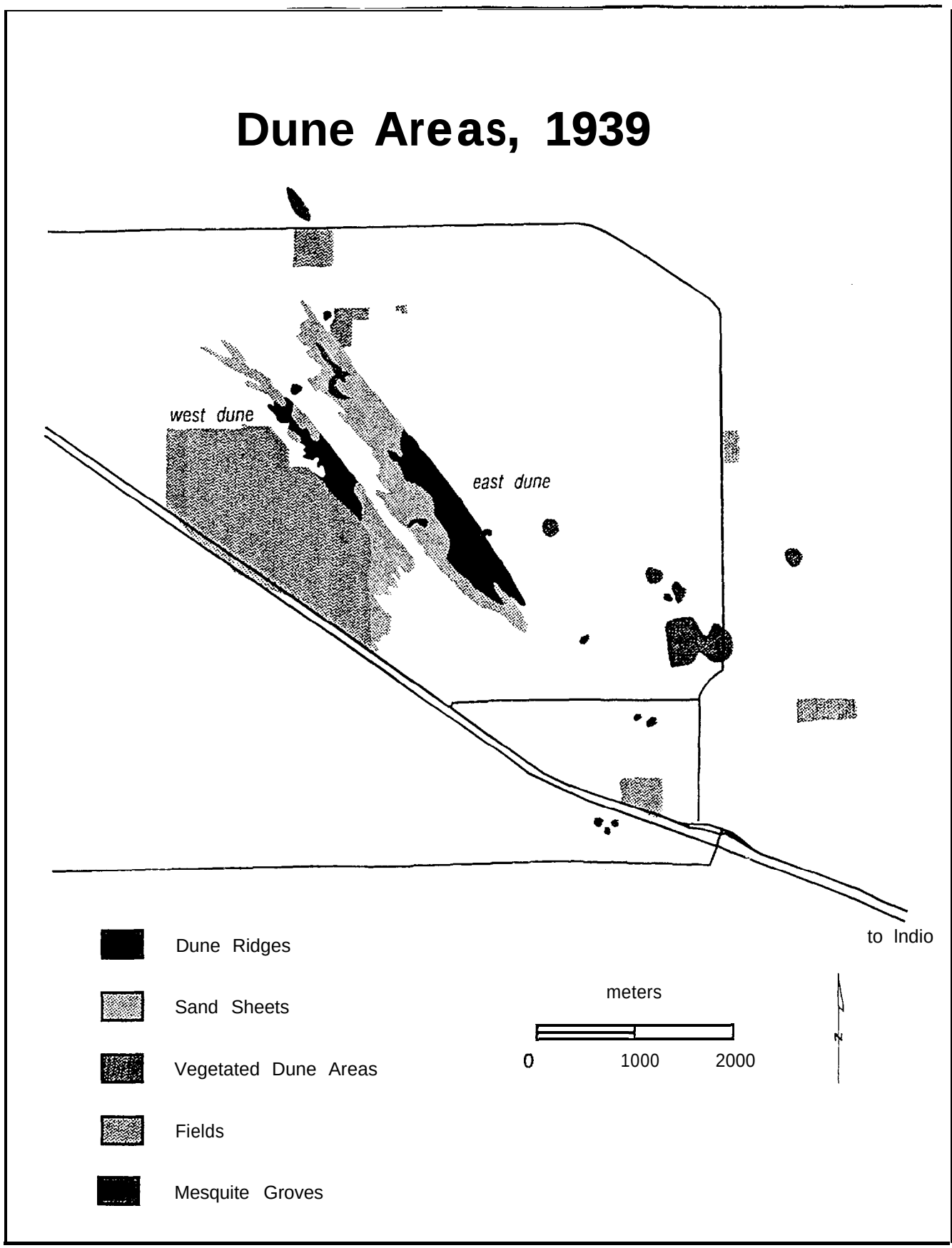

Dune Areas, 1939
west dune
east dune
to Indio
Dune Ridges
Sand Sheets
Vegetated Dune Areas
Fields
Mesquite Groves
meters
0
1000
2000
N

Figure 2.

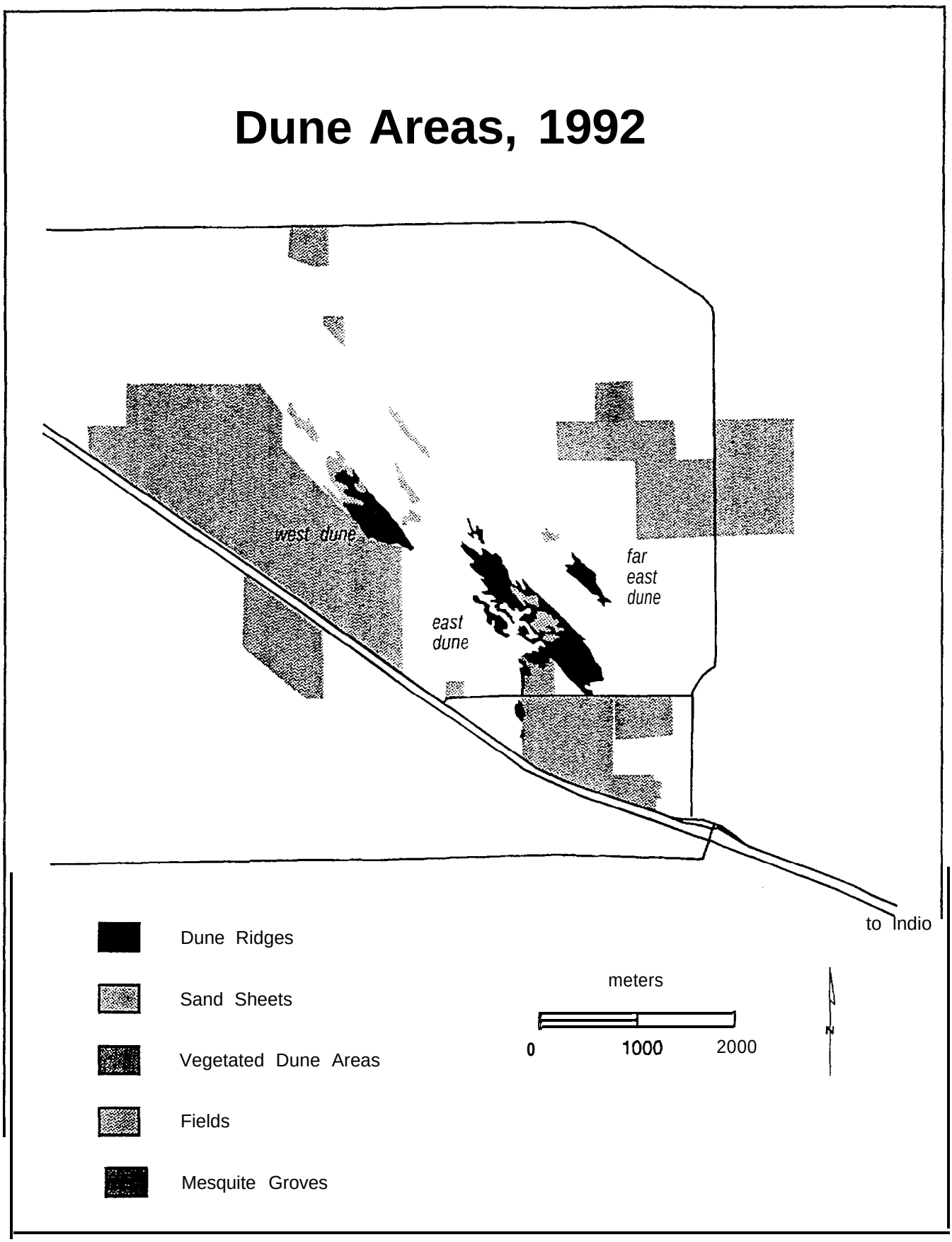

Dune Areas, 1992
west dune
east dune
far east dune
to Indio
Dune Ridges
Sand Sheets
Vegetated Dune Areas
Fields
Mesquite Groves
meters
0
1000
2000
N

Figure 3.

(e) Ecology and Biology of The Desert Subterranean Termite (Heterotennes *aureus)*

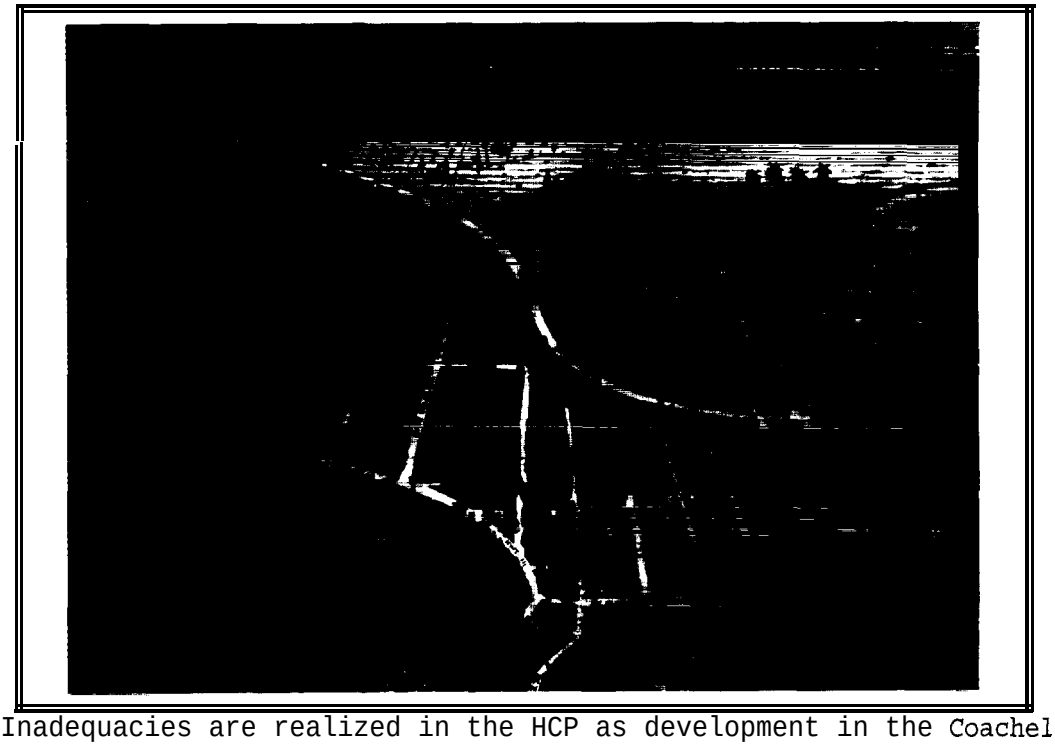
A special use permit was given to Dr. Thomas Atkinson of University of California, Riverside to conduct termite research on the refuge. Dr. Atkinson had been conducting research along a Eucalyptus-Oleander windbreak located on the Washington Farms tract prior to USFWS acquisition. This location was used because this species of termite does not occur in the immediate vicinity of Riverside. Several bait stations consisting of 1' long sections of large-diameter perforated PVC pipe have been established. The pipes are buried vertically and the inside baited with paper or rolled cardboard. Mark-release-recapture will be conducted to determine foraging territories and population estimates. Mark-recapture involves removing termites from bait stations, feeding them dyed substrate (dye is retained in the body), recording numbers and releasing. The project will last 2-4 years and will yield information concerning foraging behavior, territoriality and moisture relationships of the desert subterranean termite.

6. Other

Coachella Valley Fringe-toed Lizard Habitat Conservation Plan

On September 25 1980 (Federal Register 45:188), the Service listed the lizard as threatened under the Endangered Species Act. In a similar action, the California Department of Fish and Game (CDFG) listed the lizard as endangered in June of 1980 but has since proposed downlisting the species to threatened - perhaps prematurely. The federal Endangered Species Act prohibits "taking" of threatened and endangered species. "Take" means to pursue, hunt, shoot, wound, kill, trap, capture, collect, harass, or harm; or attempt any of these activities. Because the lizard is intimately associated with its habitat, virtually any activity which disturbs or destroys habitat will almost certainly destroy individual lizards. Such protection resulted in a conflict between Endangered Species Act objectives and local land use controls.

In 1983, a joint committee of federal, state, and local agencies was formed to work with developers and environmental groups to develop a strategy for addressing the problem. The Nature Conservancy (TNC) took the lead in bringing together all interested parties and developing a Coachella Valley Habitat Conservation Plan (HCP). The purpose of the HCP was to provide a comprehensive plan for the conservation of the fringe-toed lizard and establish conditions under which the local governments in the Coachella Valley could exercise traditional land use controls, yet remain in compliance with the Endangered Species Act. In essence, the Plan divided the Coachella Valley into areas to be preserved for the fringe-toed lizard and remaining areas which can be developed. Acreage for three preserves was identified, of which an estimated 7,838-acres is occupiable habitat.



Inadequacies are realized in the HCP as development in the Coachella Valley continues at a rapid pace. CV-1814

Perhaps most serious is the lack of an adequate audit system to ensure payment of mitigation fees. Local land use authorities were supposed to demonstrate compliance with the terms of the permit by confirming that appropriate fees are paid, and in regulated areas, that actual land uses are in accordance with zoning. This information was to be provided through an annual report to the Service, however, it was recently determined that about half of these reports were apparently never done. This raises the question whether mitigation fees were ever actually paid for much of the recent development in the Coachella Valley. Another technique apparently used by some developers which may not have been adequately enforced by local governments was to pay a fee only for portions of a project which received structures. For example, mitigation fees may not have been paid for acreage formed into golf fairways, parks, or other "open" areas even though these areas removed lizard habitat from the valley. Lands have also been cleared and graded for supposedly agricultural purposes which are really nothing more than mitigation-free land speculation. All these activities have resulted in inadequate funding being made available soon enough to purchase lands within the three preserve boundaries. Coachella Valley land prices have continued to rise, and because there was no mitigation fee inflator, lands become too expensive to purchase as part of the intended preserve. It is now abundantly clear that mitigation fees will not cover the purchase of remaining preserve lands, and unless other funding sources become available, total acquisition must be pursued through an HCP amendment process or some lands initially identified for preserve acquisition will need to be sacrificed to development.

Because fringe-toed lizards are restricted to aeolian sand deposits, environmental changes to this ecosystem could be extremely damaging to the species. It was recognized by the HCP authors that a less than adequate area was being established through direct land acquisition to perpetuate the blowsand ecosystem on the preserves, and that the integrity of preserve lands must be protected through zoning. Zoning sets forth permitted uses, restricting the range of activities that can be lawfully conducted. Local cities established zoning categories which were to regulate land use to achieve the goals of the HCP, and Riverside County General Plan designations were also to regulate land use in ways that coincidentally achieved the goals of the plan. Zoning was to provide interim control of habitat which was within the designated preserve boundaries, but remained to be acquired. The General Plan was also to regulate portions of the blowsand ecosystem which are necessary to sustain the natural function of a reserve by assuring an open corridor for wind and sand movement. However, county zoning and land use designation inconsistencies in reality do little to protect wind corridors, and it appears that the county may not have acted in good faith to achieve the goals stated in the HCP. Very low density residential development was promised in areas to prevent shielding of sand source, however, some zone classifications have since been changed to allow extensive development even within designated critical habitat. The continuing reception of new sand is an indispensable ecological process as far as survival of fringe-toed lizards is concerned. It is clear that an unobstructed sand source upwind from preserve lands has been jeopardized through both city and county zoning failures.

Perhaps the easiest way for the Service to regain control over the HCP is through the 1986 Implementing Agreement. This agreement acts as a contract between the government agencies, other parties, and the Service to make provisions of the HCP explicit and enforceable. This agreement 1) establishes mitigation fees as a funding source to acquire, maintain, and manage preserve lands, 2) sets the amount and term of the mitigation fees stipulated in the HCP, 3) sets forth obligations and responsibilities of the local agencies, the Service, and TNC, and 4) sets forth the remedies available to all of the parties in the event of breach of the Section 10(a) permit, including the rights of the Service to suspend or revoke the overall permit.

Actual implementation of the HCP should include a process of management, compliance, enforcement, evaluation, and amendment to remain a viable procedure. Management of the HCP, although hampered by lack of funding, is progressive and ongoing. Preserve lands have been established and largely protected, wildlife populations are being monitored, and efforts continue to remove sand shielding barriers on preserve land. However, perhaps more attention needs to focus on research needs, public information, and active habitat enhancement and restoration.

Compliance of the HCP and implementing agreement has generally received poor follow-up from both local agencies and the Service, but is necessary to monitor zoning changes, record mitigation fee assessments, and supervise land use decisions. Although various entities worked together to complete the plan, there has been little attempt since that time to monitor

compliance or establish an adequate tracking system. The Service is charged with evaluating the permit by conducting a periodic review to determine whether the HCP is functioning as it was intended to function, and whether the necessary protection for the lizard is being realized. Violations in compliance with the HCP need to be identified and addressed in a timely manner before the process worsens.

Enforcement of the HCP has been limited to Service enforcement of the provisions of the Endangered Species Act, including the Section 10(a) permit. Unauthorized damage to habitat, interference with sand transport to conserved areas, or failure to pay or require fees are all violations of the Section 10 **(a)** permit. These violations must be corrected, or the Service must at the very least implement the option to suspend or to revoke that portion of the permit which applies to the unlawful activities. Even though the Endangered Species Act should provide adequate protection for the Coachella Valley fringe-toed lizard, it is not without problems. Habitat may be destroyed, but unless the Service can prove that lizards were taken with the habitat, it is difficult to impose penalties. While legally, enforcement actions could be brought against all parties involved in an unlawful taking; the bulldozer operator, the land developer, and the city or county that permitted the action on land known to be occupied by Coachella Valley fringe-toed lizards, in reality, law enforcement has been slow or lacking.

Evaluation of the HCP has also been slow, but is now underway. Faced with the evidence of a continuing fringe-toed lizard population decline, and evidence that the implementing agreement is not being adequately fulfilled, the Service has now initiated the process of reviewing the Coachella Valley HCP. Options are currently being explored to identify additional audit or monitoring measures appropriate to assure the fiscal and biological integrity of this and any future HCPs.

In the absence of complete scientific data, the cautious approach is to adopt a conservative strategy, and because of this there was a process built into the HCP to amend the document as new information becomes available. However, there has been a reluctance to re-open "a can of worms" on the part of both local agencies and the Service. Amending the HCP to get it back on track may be an arduous process but one which may be necessary. Working in concert with the amendment process is perhaps the need to suspend or revoke the Section 10(a) permit until protection of the Coachella Valley fringe-toed lizard is again guaranteed.

Habitat Conservation **Plan Audit**

During 1991, an article by an investigative newspaper reporter raised questions regarding the collection of development fees in Riverside County. Since at least 1989, refuge personnel and others have recognized the need to evaluate the effectiveness and management of the fringe-toed lizard HCP, including a financial audit. Annual reports are required from local governments, but few of the reports are ever received by the Service. In an effort to obtain a complete inventory of these required annual reports,

personnel from the Carlsbad Enhancement office contacted the Coachella Valley Association of Governments in late 1991 and found out that approximately half of the reports apparently were never done. Based on this information, the need for an audit became imperative, and the Service decided to establish a cooperative agreement with Riverside County to expand the scope of the County's contract with accounting firm Price Waterhouse to include a complete audit of HCP revenue collections. Price Waterhouse was, at the time, reviewing other County fee collections, and an audit overlap seemed both economical and efficient. The Service also decided to assign AFWE the responsibility to designate a staff person to manage the cooperative agreement and be the Service contact through the course of the audit. To meet this need, in January of 1992, Regional Director Plenert designated Dave Riley as the AFWE representative responsible for exploring options with Riverside County for auditing the fiscal management of the HCP. In addition, Riley was directed to review the Region's HCP endeavors to assure that HCPs are accomplishing their biological intent consistent with the purposes of the Endangered Species Act. Riley was further asked to investigate and identify any additional audit or monitoring measures which may be appropriate to assure both the fiscal and biological integrity of current and future HCPs.

An audit of the HCP was finally initiated during 1993 to determine if mitigation fees are being collected correctly and submitted on time. The audit is scheduled to be completed in 1994 and will cost the Service an estimated $75,000.

E. ADMINISTRATION

1. Personnel

Salton Sea Staff - (left to right) Back Row 10, 6, 8, 7
Middle Row 1, 2, 3
Front Row 5, 4, 9

1. E. Clark Bloom - Project Leader GS-485-12 PFT
2. Daniel Dinkler - Primary Assistant Refuge Manager GS-485-11 PFT
3. William Radke - Wildlife Biologist GS-486-11 PFT Transferred 9/2/93
4. Kathleen Arnett - Administrative Support Assistant GS-303-6 PFT Resigned 10/1/93
5. Sandi Harris - Office Automation Clerk GS-303-5 PFT
6. Lee Laizure - Heavy Equipment Mechanic WG-5803-10 PFT
7. Richard Marquez - Engineering Equipment Operator WG-5716-10 PFT
8. Marcos Orozco Engineering Equipment Operator WG-5716-9 PFT
9. Marcia Radke - Wildlife Biologist GS-486-7 TPT Resigned 9/2/93
10. Mark Marquez - Maintenance Mechanic Helper WG-4749-5 TFT

Not Pictured

Kathy Molina - Biological Technician GS-485-4 TPT EOD 4/3/93

Kevin DesRoberts - Refuge Operations Specialist GS-485-7 PFT EOD 2/7/93

Robert Berryman - Laborer WG-2 TPT - EOD 6/28/93

Kelly Chapin - SCA Volunteer 10/2/92 - 1/31/93

Kenneth Sturm - SCA Volunteer 2/1/93 - 5/1/93

AMY Goodwin - SCA Volunteer 6/15/93 - 8/31/93

Kim Coffey - SCA Volunteer 10/1/93 - 12/31/93

As a satellite to Salton Sea NWR, **Coachella** Valley Refuge is operated as a collateral responsibility by personnel working out of Calipatria. During 1993, Salton Sea Refuge personnel visited Coachella Valley NWR on 80 days, primarily for biological surveys, research activities, maintenance, coordinating the YCC crew, and law enforcement. An additional 10 days were spent attending meetings specific to Coachella Valley NWR issues.

2. Youth Procrrams

Refuge Operations Specialist Kevin DesRoberts and crew leader Amy Goodwin (SCA volunteer) were primarily responsible for the 1993 Youth Conservation Corps (YCC) program stationed at Coachella Valley NWR. The enrollee work force consisted of only three males, ages fifteen to eighteen. The other half of enrollees (two males and one female) failed to ever report to work. One of the enrollees quit after the first day, but was soon replaced by another worker, who, however, was terminated in the seventh week of the program due to severe disciplinary problems. All the enrollees, except for the replacement worker, were randomly selected in late April. Letters of acceptance were sent to all drawn applicants, as well as a brief overview of the YCC program.

Safety rules were emphasized by both the crew leader and the ROS, and observed by the enrollees. No injuries occurred during the 1993 YCC program. Dehydration **was** never a problem as plenty of water was always available, and water breaks encouraged.

The 1993 YCC Crew: (right to left) A. Goodwin, D. Inderwiesche, B. Ureste, A. Ramos, A. Delagarza, and L. Harris. 07/93, KJD

Despite personnel setbacks, and one uncooperative worker, the 1993 YCC crew was able to accomplish nearly every job task outlined by both the Salton Sea NWR and TNC. These work projects included: removal of two and a quarter miles of barbed wire fencing, which marked the previous refuge boundary; construction of one and a quarter miles of barbed wire fencing at the new borders; removal of a half mile of chicken wire fence and all the irrigation tubing from the grape vineyards, which occupy a large portion of the newly acquired section of the Preserve; collection of Creosote seeds for the purpose of replanting native vegetation in the place of the non-native vineyards and Salt Cedar trees. The purpose of these projects was to restore the land back to its natural landscape of sand dunes, which is crucial to the survival of fringe-toed lizards and other endemic wildlife. The YCC crew also prepared the site of the new Nature Conservancy office and eventually moved the former office into the new one. Some of these projects included: removal of lumber, chain-linked fence, a water tank, parts of a swimming pool, and a tennis court from the new site; the destruction of an old fence and the construction of a new one; cleaning and painting of two buildings on the site; assisted in building a fireplace in one of the buildings from stones they collected; and the replacement of broken window panes.

Environmental awareness activities conducted once a week included visits to: San Bernardino County Museum, Hi-Desert Museum, Riverside Municipal Museum, Los Angeles County Natural History Museum, Santa Ana Zoo, San Diego Wild Animal Park, San Jacinto State Park, Joshua Tree National Monument, and Thousand Palms Oasis. Most of these were accompanied by a narrative or tour either given by their crew leader or museum/park personnel.

4. Volunteer Program

A challenge cost share agreement was established with California Department of Forestry to assist in removal of grape vineyards on the recently acquired Washington Farms parcel. Conservation crews started in December and spent 23 crew days removing plastic drip lines and wire from the vineyards. Crews continued working though February and completed a lot of work with minimal cost to the Service.

A California conservation crew (CCC) spent two weeks during April working on the refuge. They worked primarily on removing drip lines and wire from the vineyard on the newly acquired Di'Mare tract. In addition, the CCC crew completed various projects for TNC at the preserve headquarters.

California conservation crew stopping for a quick photo while working in the vineyard on the newly acquired Di'Mare tract.
04/05/93, KJD

5. Funding

There is currently no funding for Coachella Valley NWR. In order to meet management needs we must utilize base funding for Salton Sea NWR. In addition, the refuge received $10,000 for management of the Coachella Valley NWR from a management endowment fund managed by The Nature Conservancy for the Preserve (See Section D.4). This money is typically used for saltcedar removal and maintenance activities, law enforcement and research activities, biological monitoring and contaminant surveys, and to off-set administrative costs.

During 1993, the Service provided a total of 110 staff days by 9 staff members at a cost of $17,600. In addition, there was approximately $1000 spent for fuel as well as an additional 25 days of staff time ($4,550) devoted to reports, data analyses, and related issues. This brings the grand total of funds expended by the Service at Coachella Valley NWR for 1993 to $23,150. Obviously, the funding provided by the management endowment does not meet overall refuge funds needed to meet Service commitments on the Preserve. The amount of funds to be spent at the refuge next year is expected to exceed the amount spent in 1993. This increase will result from active habitat restoration to be conducted on lands recently acquired by the Service. Increasing operational, maintenance needs, and refuge commitments at Coachella Valley NWR really require staffing a position specifically for the refuge and appropriate funding.

F. HABITAT MANAGEMENT

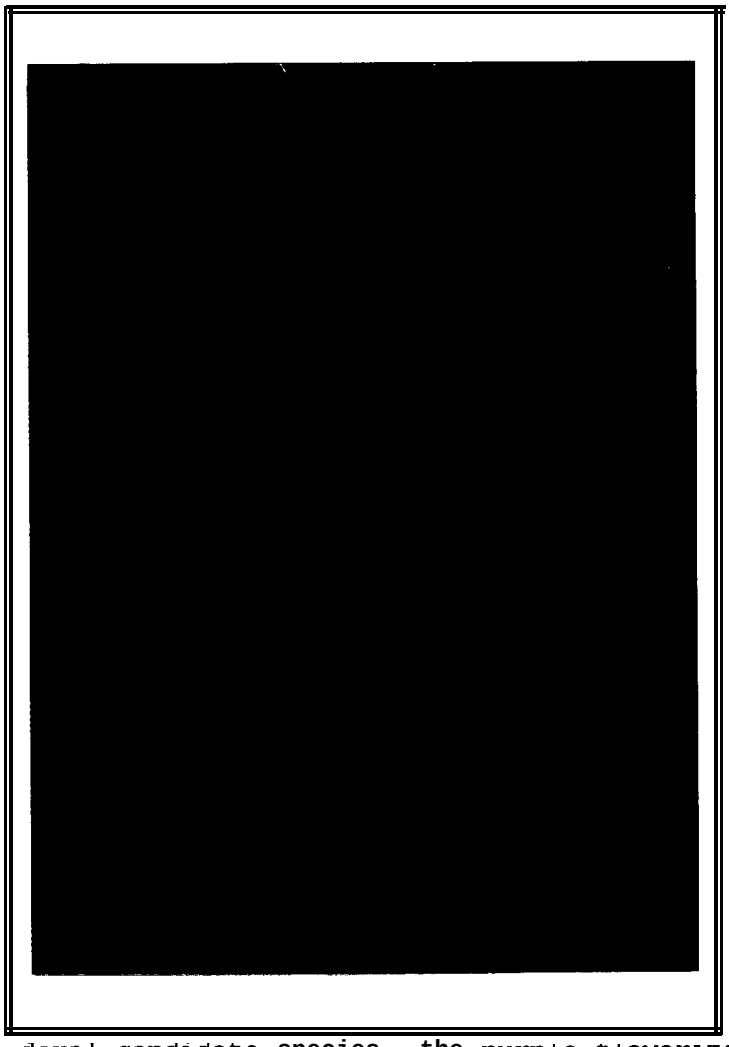
1. General

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.

A combination of natural features including tall, steep mountains, meager precipitation supporting relatively little vegetation, and rainfall occurring in sudden bursts to create flooding, combine to wash sand and gravel from the surrounding hills into the valley. Periodic flash floods from the Little San Bernardino Mountains provide waterborne sediments which are then picked up by the valley's strong winds and sorted to create an extensive and dynamic system of sand dunes in the Coachella Valley. It is these isolated dunes upon which the Coachella Valley fringe-toed lizard and numerous other plants and animals depend. About 518 sq.km.(200 square miles) of suitable habitat once covered the Coachella Valley, however, this has been drastically reduced.

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, and 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 divaricata), 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.



A federal candidate species, the purple-flowering Coachella Valley milkvetch, Astragalus lentiginosus coachellae, grows throughout the refuge during years of ample rain fall. CV-1629, 04/08/93 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 feet wide, and 10 to 20 feet long. Dominant plants include creosote, saltbush (Atriplex polycarpa), burrobush, cheesebush (Hymenoclea salsola), coldenia (Tequilia 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.

Desert velvet is one of many plant species endemic to the sandy plains located on the refuge CV-1642, 04/08/93, WRR

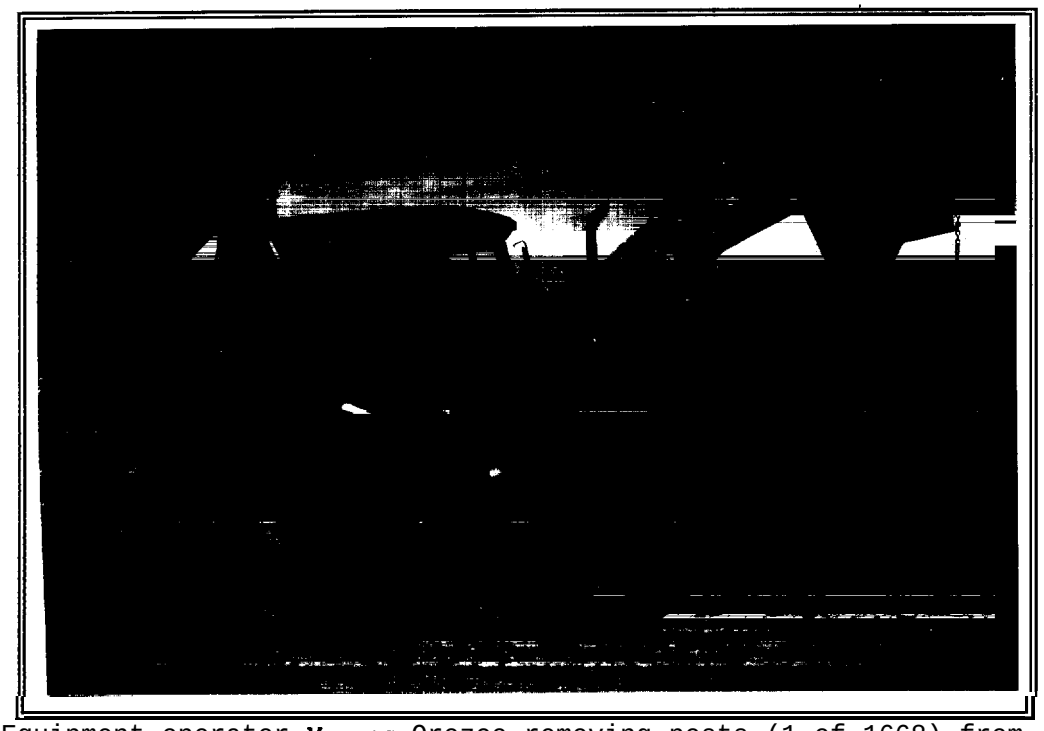
Plant species of special concern which may occur on refuge lands include Wiggin's croton (Croton wigginsii), flat-seeded spurge (Euphorbia platysperma), and Coachella milkvetch.

Perpetuation of the fringe-toed lizard is dependent upon the continuing renewal of windblown sand. Invasive exotic vegetation, especially saltcedar (Tamarix aphylla), abumashi (Schismus barbatus), and Russian thistle (Salsola australis) are serious habitat threats. Wind shielding, by establishment of tree rows or upwind development, acts to stabilize sand dunes and eventually prevents habitat renewal, eliminating the fringe-toed lizard population.

6. Other Habitats

Removal of grape vineyards (160 acres) was initiated on the recently acquired Washington Farms and Di Mare parcels. The process has turned out to be very time consuming and labor intensive. Vineyard components consist of 1 post on each side of a row, 5 strands of support wire, dripline, and vine support stakes. Wire support poles and drip lines were removed from both vineyards by refuge and California Department of Forestry (CDF) personnel. The original intent was to push vines and stakes into piles and then burn them. However, the stakes were found to have been treated with

copper chromate and arsenic (carcinogens), which would be released into the air when stakes are burned. This is a violation of EPA regulations and therefore was not done. Instead, the stakes will need to be removed by hand, which is a labor intensive and rather unpleasant experience.

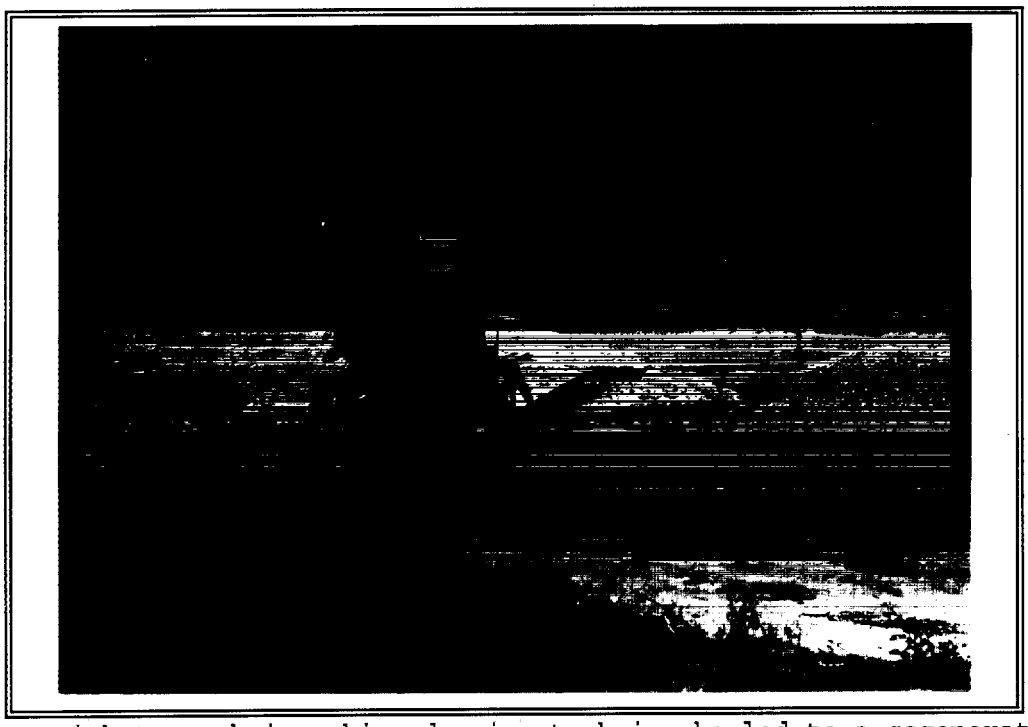


Equipment operator Marcos Orozco removing posts (1 of 1668) from the vineyard on Washington Farms tract. (N-1733, 03/16/93, WRR

10. Pest Control

Aggressive removal of Tamarisk was initiated in 1993. Four Tamarisk tree rows were removed with a dozer on the Di'Mare parcel during March. The trees were chipped and then hauled to a cogeneration plant in Mecca during May by a tree removal service at no cost. Although the tree removal did not cost the Service the chipping operation resulted in several piles of debris left behind, which refuge personnel had to remove. Following tree removal resprouting Tamarisk was treated with Garlon 4. The cut-stump method and hand application was used to prevent impacts on wildlife.

Equipment operator Richard Marquez removing Tamarisk trees on the Di'Mare tract. CV-1721, 03/16/93, WRR

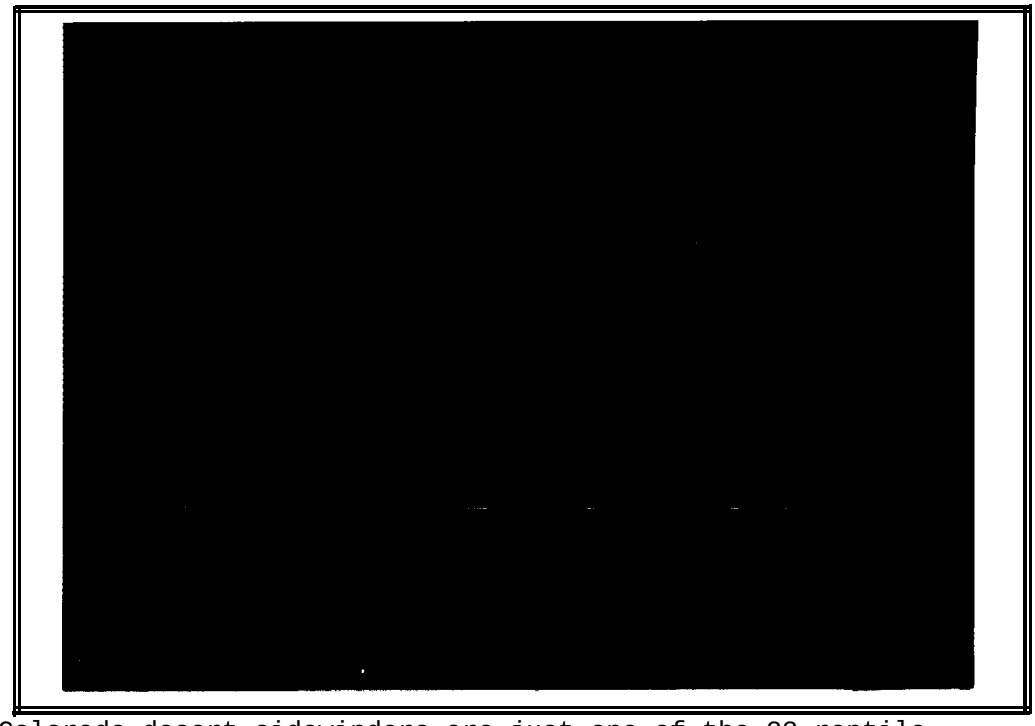


Tamarisk trees being chipped prior to being hauled to a cogeneration plant. CV-1728, 05/25/93, WRR

Wildlife biologist M. Radke completed an EA for using Integrated Pest Management on the refuge. This will enable refuge staff to use a variety of IPM techniques to control Tamarisk and other pest species on the refuge and complete habitat restoration for the CVFTL.

G. WILDLIFE

1. Wildlife Diversity



Colorado desert sidewinders are just one of the 23 reptile species protected on the preserve. cv-1744, 04/05/91, WRR

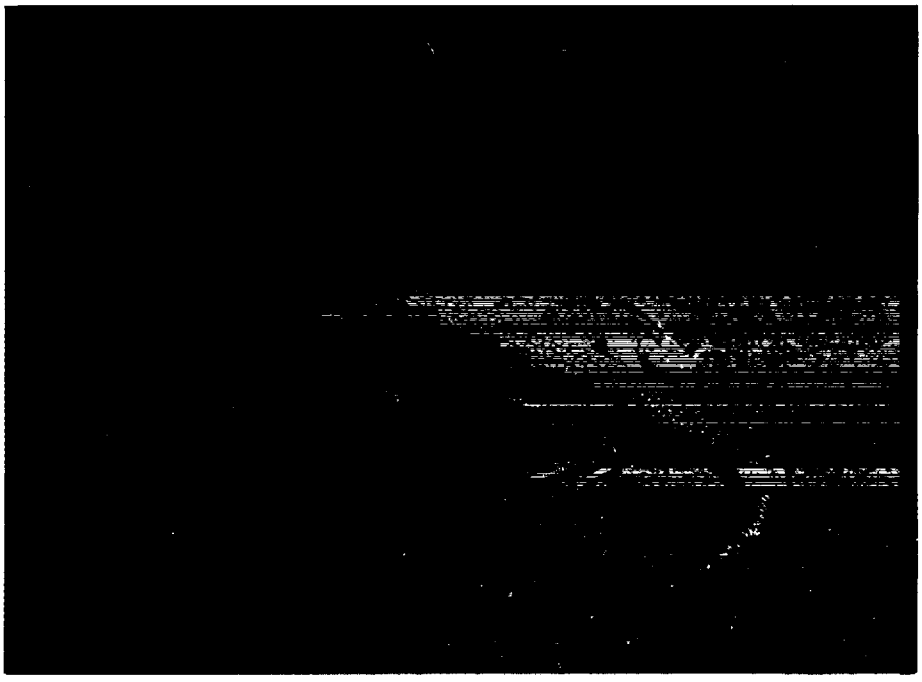
Desert lands protected by the Coachella Valley Preserve support a surprising diversity of wildlife species. Many of the wildlife species are closely associated with unique habitats on the Preserve, while others are migrants taking temporary advantage of shade and perennial water associated with native 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.

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 (Phrvnosoma mcallii). Species of special concern include the Palm Springs round-tailed ground squirrel (Spermophilus tereticaudus 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.

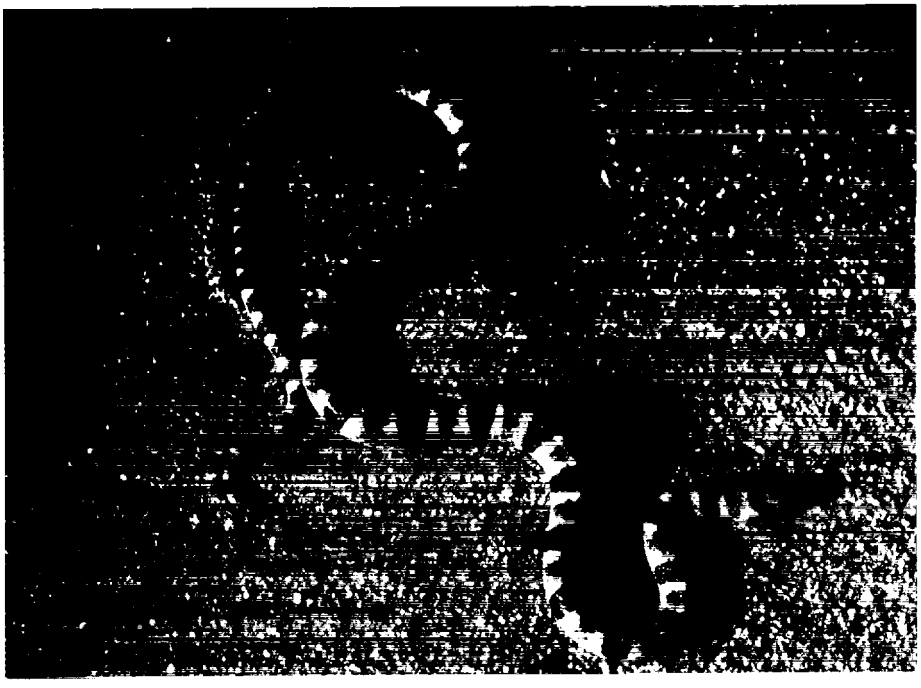
Historically, the range of the Coachella Valley fringe-toed lizard was nearly all of the valley floor from San Gorgonio Pass to the Salton Sea and extended northeast to include a portion of the Indio Hills. Some 270 square miles once served as fringe-toed lizard habitat, but increasing development has 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 proposed to downlist 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 one of five species of fringe-toed lizards in the world, three of which are found in the United States. The species are distinguished from one another based primarily on morphological and behavioral traits. The Coachella Valley fringe-toed lizard averages about 150 mm to 240 mm (6 to 9 inches) in total length, with the tail normally making up over half this length. Males are slightly larger than females. This fringe-toed lizard is whitish or sand-colored on both its back and belly surfaces with a pattern of darker eye-like markings forming longitudinal stripes over the shoulders and back. Small black dots may be present along the sides and diffuse black lines are present beneath the lower jaw. There is a lack of side markings beneath the shoulder. The area surrounding the eye is bright orange, and during the breeding season, adults may have an orangish wash to the sides. Coachella Valley fringe-toed lizards usually have three internasal scales and fewer than 29 femoral pores.



The Coachella Valley fringe-toed lizard has numerous morphological, physiological, and behavioral adaptations which allow it to compete favorably in a limited environment. Habitat destruction now threatens the animal with extinction. CV-1615, 04/23/91, WRR

Several investigators have long recognized the number of adaptations which the lizard has developed to survive in a dynamic and harsh environment. 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 aided by the small, rounded scales on the lizard's skin which reduce the friction of its body against the sand and protect the body from abrasion. The lizard receives its name from its toes, which have a row of enlarged comb-like scales to increase the foot's surface area and improve traction when pushing against the sand. The fringe-toed lizard is able 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 to facilitate rapid burying, and the lower jaw is shorter than the upper, preventing sand from entering the lizard's mouth when it dives. There is a flap of skin covering the ears, preventing sand grains from entering the ears during burrowing. 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.



The western shovel-nosed snake is a common nocturnal animal which feeds primarily on insects, spiders, scorpions, centipedes and moth pupae. CV-1804, 04/23/91, WRR

Although they are capable of digging, fringe-toed lizards often use the 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 become 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 enter winter dormancy from November through February when temperatures fall below the species activity range, however, they can become active for short periods during any month of the year if temperatures are favorable.

Individual fringe-toed lizards live for about five years. They seem to 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. It 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 insectivorous, but will also eat plant material. Natural predators of fringe-toed lizards include leopard lizards (Gambelia wislizenii), whiptail lizards (Cnemidophorus tigris), coachwhips (Masticophis flagellum), sidewinders

(Crotalus cerastes), kestrels (Falco sparverius), roadrunners (Geococcvx californianus), ravens (Corvus corax), loggerhead shrikes (Lanius ludovicianus), and coyotes (Canislatrans). 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 Preserve System Management Plan. The concept behind monitoring is to provide a means for managers to assess whether management actions and policies are accomplishing stated management objectives. Currently, four transects are each censused six times to establish trend information. Refuge transects were operated between May 26 and June 09 during the spring of 1993. Also, two transects were operated during autumn between September 20 and October 1 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 6. CVFTL Cummulative Totals Observed on Transects During 1993

TRANSECT	ADULTS	JUVENILES
CVP #1	19	6
CVP #2	120	22
CVP #3	36	7
CVP #4	69	19
TOTALS	244	54

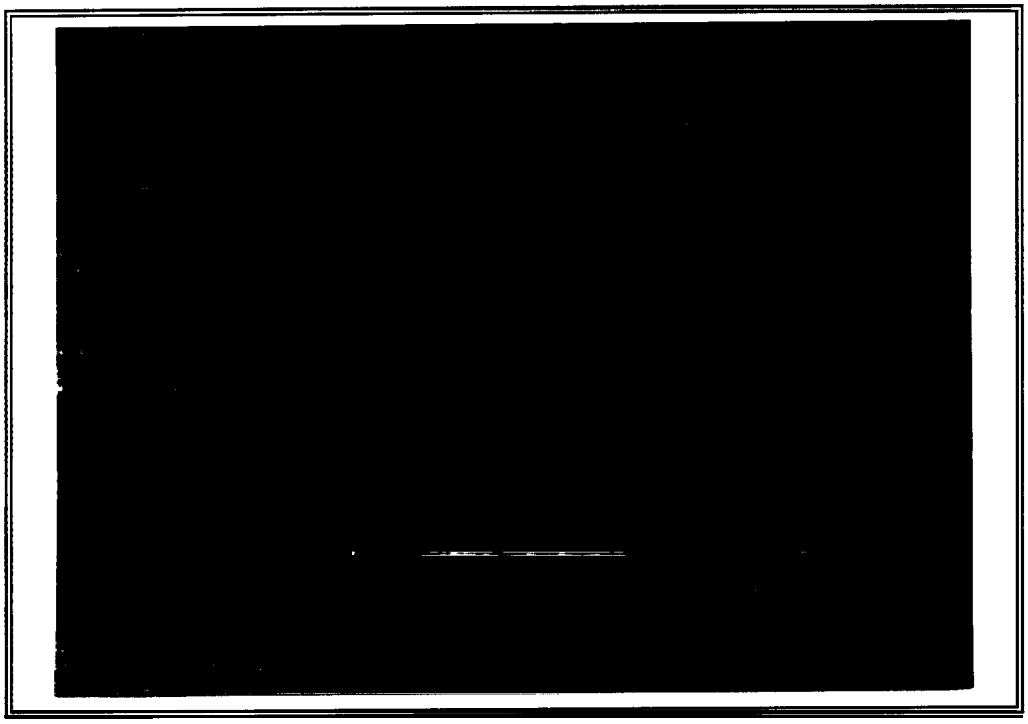
Table 7. Average Number of CVFTL Per Census 1987 - 1993.

TRAN-SECT	1987	1988	1989	1990	1991	1992	1993
CVP #1	2.0	1.0	1.3	1.2	.0	4.0	4.0
CVP #2	4.3	2.0	5.2	4.0	0.7	14.0	24.0
CVP #3	1.7	0.5	3.2	0.5	0.7	3.0	7.0
CVP #4	---	---	---	3.3	2.1	11.0	14.0

Table 8. CVFTL Adult/Juvenile Ratio 1987 - 1993.

TRAN-SECT	1987	1988	1989	1990	1991	1992	1993
CVP #1	1.4/1	0	1.0/1	0	0	1.0/1	3.0/1
CVP #2	0.6/1	0	1.4/1	3.8/1	0.4/1	2.5/1	5.0/1
CVP #3	0.4/1	0	0.9/1	0	0	2.3/1	6.0/1
CVP #4	---	---	—	9.0/1	6.0/1	0.6/1	3.7/1

The increase in the number of fringe-toed lizards observed during spring surveys resulted from high recruitment from the 1992 cohort. This is likely a result of abundant food and ample spring and summer rains which created appropriate soil moisture for incubation.



Gravid female fringe-toed lizards (indicated by bright orange on sides of the belly) were seen often during the spring surveys.
CV-1822, 06/02/93, WRR

10. Other Resident Wildlife

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.

Although little about these lizards on the refuge is known, researchers Allen Muth and Mark Fisher studied populations of flat-tails west of Brawley, California during the past three years. The following information is a result of their work.

Male and female flat-tails do not differ significantly in size, and sex ratios are essentially equal. The flat-tailed horned lizard occupies a home range averaging 19,200 square meters (209,280 square feet). In parts of their range, these horned lizards prefer Ambrosia sp. and Psorothamnus sp., but seem to avoid Tequilia sp. and Larrea sp. which were also abundant. The reason for this may be that the preferred plants are low-growing, densely branched shrubs having multiple stems. Such vegetation provides denser shade, and accumulates more sand than do single stem species.

Depending on temperature, flat-tails are obligate hibernators, and are essentially inactive from mid-November through mid-February. During this period of winter dormancy, adults occupy burrows which they dig up to 10 cm (four inches) deep. Most burrows are less than 5 cm deep, and the end of the lizard's dormancy period is correlated with the soil temperature at this depth. Some individuals, especially juvenile lizards, are occasionally active throughout the winter.

Flat-tailed horned lizards occur throughout the refuge in unknown numbers. The Service has been petitioned to list this animal as an endangered species. CV-1823, 05/27/93, WRR

The flat-tailed horned lizard's cryptic coloration closely matches the ground, and makes them very difficult to see. As a result, they respond to potential predators by flattening their body to the ground and remaining immobile rather than fleeing. There appears to be little or no mortality during winter dormancy. Instead, horned lizard survival is lowest during late spring and summer when the lizards are active and exposed to more encounters with predators. Flat-tails are active before sunrise and after sunset, and are therefore available to both nocturnal and diurnal predators. Surprisingly, most predation occurs from round-tailed ground squirrels, however, other documented predators include various snakes, roadrunners, loggerhead shrikes, coyotes, and kit foxes.

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.

Insect populations can vary greatly at Coachella Valley NWR from year to year. The conditions which bring about these population fluctuations are varied and are not completely understood, however, one of the greatest variables is rainfall. While some insect species are able to respond to high rainfall almost immediately, for others the response can be delayed for several years.

H. PUBLIC USE

1. General

The Coachella Valley is one of the fastest developing areas in the country. The human population increased 113% from 1980 to 1991, and the Coachella Valley Preserve receives an estimated 20,000 visitors each year. Most visitation occurs between November through April, with a high proportion of visitors wintering here from out of state. 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, horseback riding, 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 can be extremely confusing to the public, and also to agency law enforcement officers.

7. Other Interpretive Programs

Refuge Operations Specialist K. DesRoberts conducted a slide show for the conservation club at Del Web's Sun City. The presentation covered ecology and current status of the CVFTL and habitat restoration taking place on the refuge. The conservation club currently supplies docents for the preserves volunteer program and will hopefully be used to aid in completing restoration projects on the refuge.

16. Other Non-Wildlife Oriented Recreation

Currently, a 24-foot wide corridor designated for public hiking and equestrian use occurs along the west refuge boundary, and through the northern portion of the refuge (see attached-map). Service regulations on the refuge are standard regulations governing all National Wildlife Refuges, with main objectives aimed at protection of designated critical habitat for wildlife threatened with extinction. Therefore, hiking and equestrian use were not expressly approved on Service lands when the refuge was established. However, in 1989, an Environmental Assessment was submitted to the Service by BLM to include a Public Equestrian and Hiking Trail System within the Coachella Valley Preserve, including refuge land.

A final Biological Opinion for this trail system was provided to BLM on June 29, 1990 by Service Enhancement biologists. It was the belief of the Service that a trail system, as specified in the Biological Opinion, was not likely to jeopardize the continued existence of the Coachella Valley fringe-toed lizard. The proposed action allowed establishment of 4.5-miles of trails on refuge land, analyzed the impacts, cumulative effects, and incidental take associated with the trail, established reasonable and prudent measures to be taken, and required specific terms and conditions which must be complied with. The Biological Opinion also set forth Conservation Recommendations relating to the issue of trail use. It is important to note that trail use may be suspended should monitoring efforts reveal that incidental take of fringe-toed lizards has exceeded the levels authorized by the Biological Opinion.

17. Law Enforcement

Refuge lands continue to remain threatened by a number of ***issues*** including flood control proposals and illegal activities such as off-road vehicle use, equestrian use, indiscriminate shooting, dumping, public hiking, general trespass, habitat destruction, photography, and collecting. While each of these issues is important, their collective impact is especially significant.

Dumping is a common occurrence along the refuge boundary.
CV-1630, 04/08/93, WRR

The Bureau of Land Management currently receives Preserve endowment funds totalling $19,000 each year, which help fund a law enforcement position for the area. As a result, BLM ranger Robert Judkins 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. Additional patrol was conducted by refuge officers during dove hunting season, and due to BLM's personnel shortage, refuge officers patrolled the area more often.

Winter rains provided a tremendous amount of exotic Brassica sp. on the refuge during 1993. This mustard produces abundant seed and created favorable habitat for mourning doves. Enormous numbers of doves attracted a proportional amount of hunters, many of whom paid little notice to Preserve boundary signs. For this reason, a large number of trespass tickets were written during the year. Another problem which increased during 1993 is the vandalizing of Preserve boundary signs. It appears that some people enjoy using the "lizard signs" for target practice. Unfortunately it hard to catch vandals in the act, so no tickets were written for this violation.

Other violations on Preserve lands include off-road vehicle use, dumping, vandalism, and use of firearms. Law enforcement on the area has been largely a hit-or-miss situation, and most violators are never apprehended.

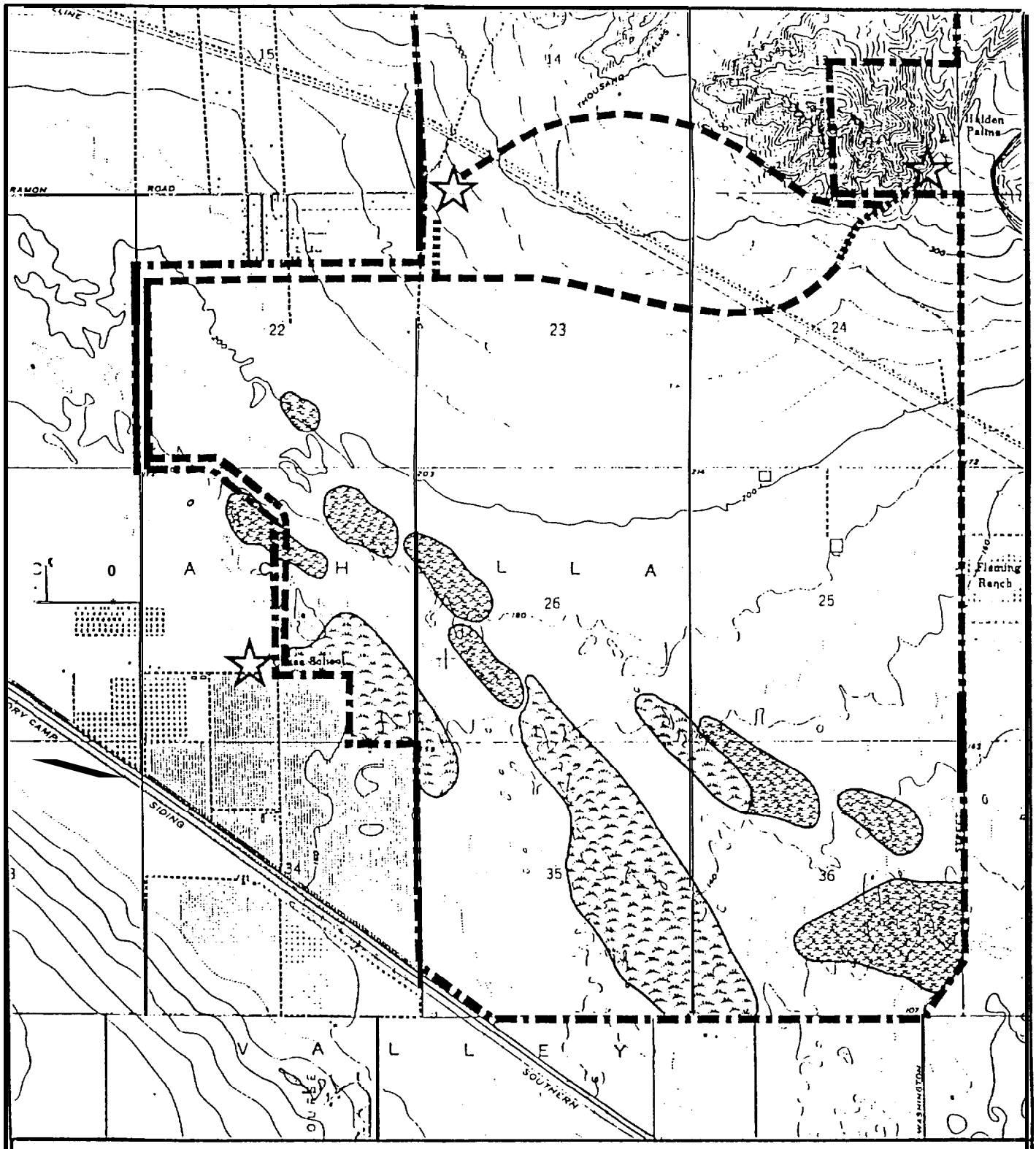


FIGURE 6- PREFERRED ALTERNATIVE (#1)

The following table depicts incidents investigated largely by BLM rangers from 1990 through 1993.

Table 9. Incidents Investigated on Preserve Lands Between 1990 - 1993.

VIOLATIONS: NUMBER OF CASES	[redacted]	[redacted]	1992	1993
Trespass	[redacted]	3	5	1
Littering	2	0	0	0
Resource Collection	1	0	1	2
Removing Vegetation	2	2	0	0
Possession of Narcotics	1	1	0	0
Dumping	2	0	2	2
Vehicle Code Violations	1	4	3	3
Hunting/Shooting	1	2	8	6
Motion Pictures 27.71	0	0	1	0
Total:	24	12	20	14

I. EQUIPMENT AND FACILITIES

1. New Construction

About 1 1/4-mile of 3-strand barbed wire boundary fence were installed along the northern refuge boundary. Refuge personnel and the YCC crew constructed fence along the correct boundary recently determined by survey. The old fence was removed in these areas and additional interior fences were removed. Additional boundary fences need upgrading or realignment and will hopefully be completed by 1995.

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.

2. Other Economic Uses

Because of its close proximity to glitzy, publicity-prone Palm Springs and because it is one of the last open desert areas in the Coachella Valley, the refuge is receiving increasing demand for what has traditionally been perceived as "nonconsumptive uses" such as photography and nature observation. Demands range from Hollywood film producers shooting movie or television footage, to photo agencies which "simply want to use the dunes as a backdrop" for their main subject, to commercial wildlife photographers who will stop at nothing to add fringe-toed lizards to their stock of endangered species photos, to a local family wishing to look at and photograph wildflowers.

Requests are carefully considered in regard to their individual and cummulative impact to plants and wildlife, particularly fringe-toed lizards. While some requests are denied, others are allowed only through the issuing of a Special Use Permit stating specific restrictions to prevent "take" of Coachella Valley fringe-toed lizards. The following table depicts SUPs issued during 1993:

Table 10. Special Use Permits Issued at Coachella Valley NWR During 1993.

Permit	Permittee	Purpose of Permit	Fee
55284	BFB studios	Commercial Photography	$100
55285	UC Riverside	Conduct Termite Research	N/A
55288	IID, Power Dept.	Remove 3/4 Mile of Powerline	N/A
55985	Palm Springs Museum	Conduct Educational Tour	N/A

4. Credits

K. DesRoberts completed sections: A,B,C,D4&5,E1,4&5,F6&10,G2,H7&17,I1,&J2
W. Radke completed sections: D4,5&6,F1,G1,2&10,H1&16,J1&2
A. Goodwin completed section: E2
C. Bloom edited the report.
Photographs are credited by initials.