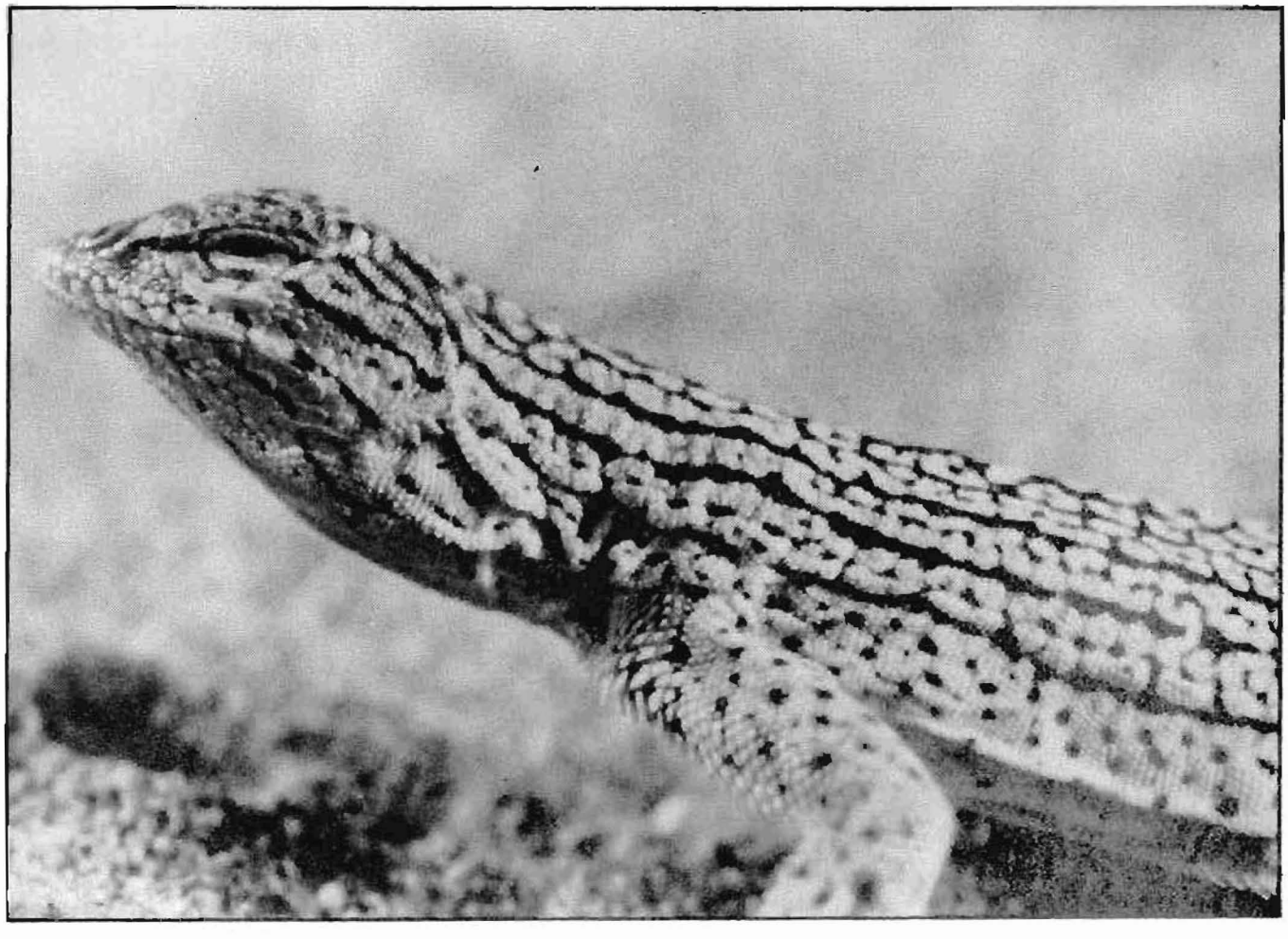
COACHELLA VALLEY FRINGE-TOED LIZARD

Recovery Plan



COACHELLA VALLEY FRINGE-TOED LIZARD RECOVERY PLAN

Published by

U.S. Fish and Wildlife Service

Portland, Oregon

Approved _____
Acting Regional Director, U.S. Fish and Wildlife Service

9/11/85
Date

THIS IS THE COMPLETED COACHELLA VALLEY FRINGE-TOED LIZARD RECOVERY PLAN. IT HAS BEEN APPROVED BY THE U.S. FISH AND WILDLIFE SERVICE. IT DOES NOT NECESSARILY REPRESENT OFFICIAL POSITIONS OR APPROVALS OF COOPERATING AGENCIES, AND IT DOES NOT NECESSARILY REPRESENT THE VIEWS OF ALL RECOVERY TEAM MEMBERS WHO PLAYED KEY ROLES IN PREPARING THIS PLAN. THIS PLAN IS SUBJECT TO MODIFICATION AS DICTATED BY NEW FINDINGS AND CHANGES IN SPECIES STATUS AND COMPLETION OF TASKS DESCRIBED IN THE PLAN. GOALS AND OBJECTIVES WILL BE ATTAINED AND FUNDS EXPENDED CONTINGENT UPON APPROPRIATIONS, PRIORITIES AND OTHER BUDGETARY CONSTRAINTS.

Literature Citation: U.S. Fish and Wildlife Service. 1984. Coachella Valley Fringe-toed Lizard Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 60 pp.

ADDITIONAL COPIES MAY BE OBTAINED FROM:

Fish and Wildlife Reference Service
Informatics General Corporation
6011 Executive Boulevard
Rockville, Maryland 20852
(800) 582-3421
(301) 770-3000 in Maryland

ACKNOWLEDGMENTS

The Coachella Valley Fringe-toed Lizard Recovery Plan was prepared by the Coachella Valley Fringe-toed Lizard Recovery Team:

Mr. Frank Hoover, Team Leader, California Department of Fish and Game

Ms. Faye Davis, Bureau of Land Management

Dr. Kathleen Franzreb, U.S. Fish and Wildlife Service

Dr. Wilbur Mayhew, University of California, Riverside

Mr. David Stevens, Southern California Edison Company

We especially want to thank A.S. England for providing the initial draft of Part I, and the other advisors to the recovery team for their assistance: Jim St. Amant, Steve Nicola, and John Brode (California Department of Fish and Game), Ted Rado (Bureau of Land Management), Paul Rovero (Riverside County Department of Parks), and Jim Cornett (Palm Springs Desert Museum).

Coachella Valley Fringe-toed Lizard

Recovery Plan Executive Summary

1. At what point or condition can the species be considered "recovered"?

   When two or more large-scale protected areas are secured that maintain viable self-sustaining populations.

2. What must be done to reach recovery?

   Protect existing habitat, minimize loss of habitat from development, restore habitat as needed, inform public of value of species and its habitat, enforce existing laws and regulations.

3. What specifically must be done to meet the needs of #2?

   Determine size and locations of preserves, secure and protect the selected preserve sites, develop management plans for reserves, conduct research studies on habitat requirements and effects of habitat alterations, investigate life history, develop conservation education program.

4. What management/maintenance needs have been identified to keep species recovered?

   Protect sand source necessary to provide sufficient sand to maintain habitat quality on the protected secure areas. Adequately manage large enough reserves to prevent loss of genetic variability and habitat fragmentation.

TABLE OF CONTENTS

		Page
PART I	INTRODUCTION	1
	Brief Overview	1
	Taxonomy	2
	Description	3
	Historical and Current Distribution	5
	Ecology and Behavior	7
	Activity	7
	Reproductive Biology	7
	Food Habits	8
	Behavioral and Morphological Adaptations	9
	Habitat Requirements	10
	Causes of Decline	11
	Conservation Efforts	15
PART II	RECOVERY	18
	Objectives	18
	Step-down Outline	22
	Narrative	27
	Literature Cited	47
PART III	IMPLEMENTATION SCHEDULE	51

PART I

INTRODUCTION

Brief Overview

The Coachella Valley fringe-toed lizard (CVFTL) (*Uma inornata*) is restricted to sandy habitats on the floor of the Coachella Valley, Riverside County, California. The behavioral and morphological adaptations required to survive in this harsh environment have been the subject of numerous scientific investigations (Mosauer 1935, Stebbins 1944, Mayhew 1965, and Pough 1970).

In the early 1970's concern among scientists, resource managers, and conservationists about the future of the CVFTL stimulated the first studies designed to assess changes in distribution and population levels, determine causes of apparent declines, and predict future status (England and Nelson 1976, Turner et al. 1981, England 1983). These studies showed drastic CVFTL population reductions because of habitat loss from urban and agricultural developments, blow-sand control programs, and off-road vehicle use.

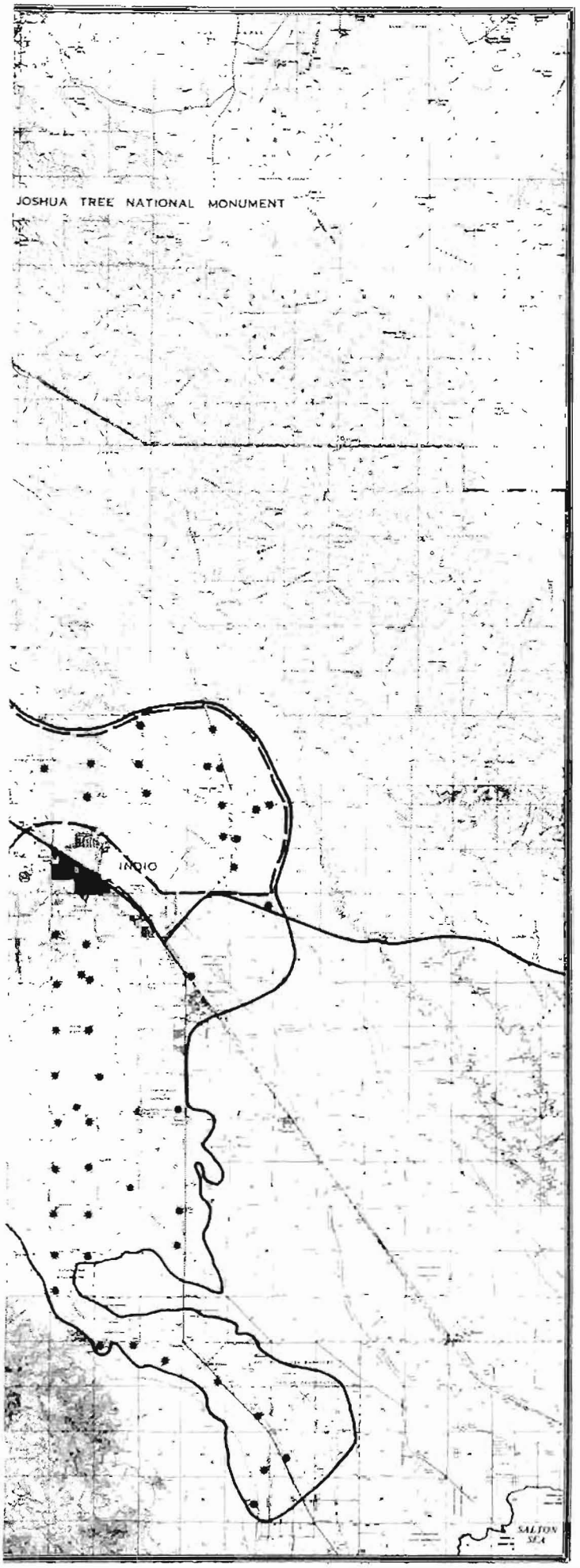
The CVFTL was proposed for addition as threatened to the U.S. Fish and Wildlife Service's List of Endangered and Threatened Wildlife and Plants in 1978 (43 *Federal Register* 44806). Amendments to the Endangered Species Act in late 1978 delayed final listing and critical habitat designation until September 25, 1980 (45 *Federal Register*

63812). The California Fish and Game Commission added the lizard to its state list of endangered species in June 1980.

Critical habitat was designated for the CVFTL by the U.S. Fish and Wildlife Service on September 25, 1980 (45 Federal Register 63812) (Map 1). It consists of 11,920 acres (18.63 square miles) of private land and 690 acres (1.08 square miles) of Federally owned land (Bureau of Land Management). "Critical habitat" is defined as the specific areas within the geographical range occupied by the species that possess the physical or biological features essential for the conservation of the species and that may require special management protection. The northern boundary of the critical habitat for the CVFTL extends beyond the limits of the lizard's distribution to include the sand source which is essential in maintaining the essential wind-blown sand habitat.

Taxonomy

Because of the allopatric distribution of the three California forms of the genus *Uma*, the taxonomic history of the CVFTL has been complex and uncertain. It was first described by Cope (1895). However, Camp (1916) and Van Denburgh (1922) described it as being synonymous with the Colorado Desert fringe-toed lizard (*U. notata*). It was elevated to species status by Heifetz (1941). Norris (1958) reduced the CVFTL to a subspecies of *U. notata*. Carpenter (1963) also showed CVFTL to be closely related to *U. notata*. However, based upon behavioral and reproductive traits, Mayhew (1964 a, b) showed the CVFTL to have


JOSHUA TREE NATIONAL MONUMENT
INDIO
SALTON SEA

certain similarities with the Mojave fringe-toed lizard (U. scoparia) that CVFTL did not share with U. notata. Mayhew (1964b) elevated the CVFTL once again to species rank. Pough (1973, 1974, 1977) also considered these three forms as separate species. Adest (1977), however, indicated that all three California species could be grouped as U. notata, based on his electrophoretic studies. The latest study on the CVFTL (Zalusky et al. 1980) also showed that, based on osteology and dentition, all three California species should be classified as U. notata. Thus, the status of the CVFTL has varied, depending on each investigator's interpretation of which characteristics are most important for taxonomic classification. At the present time most biologists familiar with this genus regard the CVFTL as a separate species (Mayhew, pers. comm.).

Because the animals in question obviously were derived from a common ancestor, and because all are highly successful in the same ecological setting, one would be very surprised if the three California forms differed markedly from each other, either genetically or morphologically. In fact, one should expect them each to retain those ancestral characters that had originally made the group successful in aeolian sand deposits.

Description

The CVFTL and the congeneric species, the Colorado Desert fringe-toed lizard (Uma notata) and the Mojave fringe-toed lizard (U. scoparia),

exhibit several external characters that make them easily distinguishable. The following detailed descriptions of these species were derived from information found in Smith (1946), Stebbins (1954), Norris (1958), Mayhew (1965), and Pough (1973).

Scales of Uma are smooth, not pointed or keeled, and overlap evenly giving the skin a velvety texture. Perhaps the most distinctive trait is a lateral row of elongated scales on the posterior edge of the toes. This "fringe" of scales is the source of the common name for lizards in the genus Uma. These structures are adaptations to existence in a sandy environment.

The CVFTL is a medium-sized lizard that averages approximately 150 mm to 240 mm (5.9 in. to 9.4 in.) in total length. Adult males range from approximately 70 mm to 122 mm (2.8 to 4.8 in.) in snout-vent length; adult females range from about 65 mm to 99 mm (2.6 in. to 3.9 in.). Tails comprise between 49% to 64% of the total length of adult lizards.

The CVFTL can be separated from the Mojave and Colorado Desert fringe-toed lizards by coloration and morphology. Dorsal color of the CVFTL is whitish to pale gray with a pattern of ocelli (eyelike markings) formed by dark markings on the pale background. The ocelli form a pattern of longitudinal stripes over the shoulders. The ventral surface is white. One or several black dots may be present on each side of the abdomen and dusky lines are present on the throat.

The CVFTL usually has three internasal scales and less than 29 femoral pores. In contrast, the Colorado Desert fringe-toed lizard has a buffy dorsal ground color, a single large, black, ventrolateral blotch on each side of the abdomen, an orange color surrounding the black blotches on the ventrolateral surface, and generally bolder throat markings. The Mojave fringe-toed lizard has a buffy dorsal ground color, scattered dorsal ocelli, larger black ventrolateral blotches, an overall greenish-yellow ventral coloration, black gular crescents, usually five internasals, and usually more than 29 femoral pores.

Historic and Current Distribution

A. S. England (1983) calculated that the CVFTL occupied approximately 200 square miles of aeolian (wind-blown) habitat in the Coachella Valley prior to significant agricultural development at the beginning of this century. This estimate was based on an analysis of museum records, published literature, historical observations by local collectors, and analysis of aerial photographs taken by the U.S. Army Corps of Engineers in 1955. At the time of England's analysis, nearly all natural habitat in the southern quarter of the valley had been converted to agricultural and associated urban uses. To reconstruct this part of the CVFTL's range, England correlated distribution records with a soil map prepared in the 1920's (Kocher and Harper 1928).

Based on an analysis by England (1983) the historical distribution of the CVFTL included approximately 144 square miles of suitable habitat west of the Coachella Canal and 56 square miles east of the canal. Suitable habitat in both areas is rapidly declining.

By August 1979, only 10 square miles of undeveloped habitat remained east of the canal; this habitat was fragmented into 69 parcels ranging from 10 to 640 acres and averaged less than 100 acres each. Because of the small size, isolation, and high development potential these parcels are not considered adequate for the long-term survival of CVFTL populations.

Undeveloped CVFTL habitat west of the Coachella Canal also has declined sharply. The orginal 144 square miles of habitat were reduced to 122 square miles by 1955, to 101 square miles by August 1978, and to 94.8 square miles by December 1982 (England 1983). It should be noted that portions of the remaining CVFTL habitat may only support very limited populations. Areas that may have naturally unsuitable CVFTL habitat or habitat of decreased value as the result of human influence (e.g., leeward side of windbreaks) have not been identified. Therefore, the actual quantity of remaining suitable CVFTL habitat could be substantially lower than the estimates presented above. The recent estimate of present, occupiable habitat throughout the range of the species is 127 sq mi (Coachella Valley Fringe-toed Lizard Habitat Conservation Plan Steering Committee 1984) (Map 1). However, even without taking this into consideration, based upon the above rate of habitat loss all habitat could be lost within the next 50 years.

Ecology and Behavior

Activity--Surface activity of the CVFTL is limited by ambient temperatures. Turner et al. (1981) noted that *U. inornata* were active when air temperatures (1 m above ground surface) were between 22-39° C and ground surface temperatures between 37-58° C. Mayhew (1964a) reported mean, modal, and median cloacal temperatures of the same value [38.0° C (100.4° F)] for 416 specimens of *Uma inornata*; maximum and minimum cloacal temperatures observed were 44.4° C (112° F) and 25.8° C (78.4° F), respectively. Seasonal changes in daily activity patterns reflect the observed preference for a selected range of ambient temperatures (Mayhew 1964a). The CVFTL can be active as early as February or March. Extremely high surface maximum temperatures from May through September are potentially lethal to the CVFTL. However, during these periods, activity becomes distinctly bimodal, with a midday period of inactivity and progressively earlier and later activity periods as day length changes and daily maximum temperatures rise. Periods of inactivity are spent below the surface where cooler temperatures prevail.

Reproductive Biology--CVFTL reproductive activity starts in the spring, shortly after adults emerge from winter dormancy. Examination of specimens collected in the field (Mayhew 1965) indicates that the reproductive season for the CVFTL extends from late April through mid-August. This reproductive period is not totally coincidental with the other two *Uma* species in that Mojave fringe-toed lizards are

sexually active through July, whereas the reproductive season of the Colorado Desert fringe-toed lizard terminates in September.

Location and timing of egg-laying has not been observed in the wild, but multiple clutches may be laid in one year (Mayhew 1965). Hatchling CVFTLs have been observed from late August (A. S. England, unpublished data) through the fall (Stebbins 1954, Mayhew 1965). A few precocial CVFTL may breed the summer after the year they hatch, but most do not reach sexual maturity until the second summer (Mayhew, 1965).

Food Habits--Although the food habits of the CVFTL have not been studied in great detail, generally it appears they are insectivorous, but also will take plant material (Stebbins 1944, Smith 1946, Mayhew 1965). Captive fringe-toed lizards have been observed eating insects, juveniles of their own and other lizard species, leaves, and flower parts (Carpenter 1963). Carpenter (1963) considered Mojave, Colorado Desert, and Coachella Valley fringe-toed lizards to be omnivorous. Minnich and Shoemaker (1972) observed that adult Mojave fringe-toed lizards consumed approximately 60% plant material in July and August, while juveniles took over 90% animal matter. Sampling techniques used by the authors of this latter study may have biased the results in favor of hard-to-digest materials because stomach contents were examined.

Behavioral and Morphological Adaptations--The CVFTL is restricted to sandy habitats - a seemingly inhospitable environment. Several behavioral and morphological adaptations allow the CVFTL to exist in this habitat (Stebbins 1943, 1944). The CVFTL has the ability to run across the sand at relatively high speeds and literally dive into it. CVFTLs may move short distances after burial, engaging in what has been called "sand-swimming" until the lizard is completely buried. The smooth scales reduce friction and make it easier for the lizard to "swim" through the sand. The enlarged fringe scales on the toes increase the foot surface thus aiding locomotion on and beneath the sand. The additional surface area created by the scales increases traction when moving across the sand.

Numerous morphological adaptations function to protect the lizard's body from abrasion and keep sand particles out of body openings. The CVFTL can partially close its nostrils to exclude most sand. When particles do get in, they are trapped in a U shaped nasal passage, analogous to a kitchen-sink trap, and are blown out by a burst of air. The snout is wedge- or shovel-shaped rather than blunt; thus the snout spreads the sand as the lizard dives. Because the upper jaw is longer and overlaps the lower jaw, the lizard can dive into sand without filling its mouth. Other adaptations include fringed eyelids with a double seal and a loose flap of skin that covers the ears when the lizard dives into the sand.

CVFTLs attempt to escape predators by "sand-swimming" and, to a lesser extent, by entering rodent burrows. "Sand-swimming" can also be used to reach cool sand (Pough 1970), thus avoiding high summer surface temperatures that can exceed 71° C (160° F). However, when shallow subsurface temperatures exceed tolerable limits, lizards may be forced to seek shelter under a shrub or in a rodent burrow (Pough 1970). CVFTLs also are capable of excavating a burrow to depths sufficient to reach cooler substrates (England and Wear, ms., in preparation).

Habitat Requirements

CVFTLs are restricted to deposits of fine wind-blown sand (Mosaeur 1935, Stebbins 1944, Norris 1958, Pough 1970, England and Nelson 1976, Turner et al. 1981) and are rarely found as far as 15 feet from a sand deposit (Mayhew, unpublished data). Turner et al. (1981) compared CVFTL densities on three plots upwind and three plots downwind from tamarisk (*Tamarix* sp.) windbreaks. CVFTL populations were either absent or much lower in number on all downwind plots; because the tamarisk trees effectively prevent the passage of blowing sand (see Causes of Decline).

Additional information is needed concerning the "preferred" or optimal habitats of the CVFTL. England and Nelson (1976 and unpublished data) were unable to distinguish consistent differences between track densities in sandy hummocks, sandy plain, and mesquite dune habitats. Turner et al. (1981), using a mark and recapture technique on seven

undisturbed plots, were also unable to detect consistently high densities in any of these habitat types. They estimated population densities to be from 1.8 to 18.2 lizards per acre.

Rainfall, particularly winter rain, is essential to the growth and flowering of desert vegetation. Vegetational condition is important in attracting and maintaining insect populations that serve as the primary food supply of the CVFTL. In years when rainfall is below normal, CVFTL reproduction is low (Mayhew 1965).

Causes of Decline

The primary reason for the decline of the CVFTL has been loss of habitat resulting from urban and agricultural development and associated windbreak structures. Off-road vehicle use has also had a negative impact on the CVFTL.

Until recently, the CVFTL has existed with relatively little interference from human beings. However, since the 1940's, the Coachella Valley has been undergoing dramatic growth in urban development and human population. In 1940, approximately 12,000 people lived in the Coachella Valley. By 1978, this figure had risen to over 130,000 permanent residents with an additional 71,000 seasonal visitors. The total of the part-time and permanent populations was estimated at over 220,000 in 1980, and is projected to increase by more than 70 percent (to over 380,000) by the year 2000 (Coachella

Valley Association of Governments 1978). Increased urban development, with concomitant destruction of fringe-toed lizard habitat, will accompany this population growth. Over 10,000 building permits were issued in the upper Coachella Valley in 1972. In the June 1979 issue of the Riverside County Marketing Digest, three Coachella Valley cities, Desert Hot Springs, Palm Desert, and Rancho Mirage, were reported to have annual growth rates of between 13 and 19 percent. All three were among the ten fastest growing cities in California; all are within fringe-toed lizard habitat.

Habitat losses in the southern end of the Coachella Valley have resulted primarily from agricultural development since the completion of the Coachella Canal during the first half of this century. Remaining undeveloped areas generally are less than one square mile in size, and have been overgrown by exotic plants such as Russian thistle (*Salsola australis*) and tamarisk. Application of agricultural pesticides may result in a reduction of food supplies for the CVFTL.

These exotic plant species obstruct the natural movement of wind-blown sand and further reduce the amount of available habitat. Habitat in the western three-quarters of the Valley, from Indio to Palm Springs and Desert Hot Springs, has been lost mainly through construction of condominiums, homes, golf courses, and associated commercial developments.

Early growth in the Coachella Valley occurred along the base of the San Jacinto and Santa Rosa Mountains, generally outside of CVFTL habitat. As these alluvial fans became more developed, development expanded into sandy areas.

To protect urban and agricultural areas from blow-sand, local governments, developers, and individual land owners have planted windbreaks composed of tamarisk. In 1974, 116 linear miles of windbreaks existed, and an additional 15 to 20 miles have been proposed along roads through the center of relatively undisturbed CVFTL habitat (Soil Conservation Service, unpublished data). Each row of tamarisk is an incremental habitat loss, and the protection provided by windbreaks encourages more development. Turner et al. (1981) showed that windbreaks have an additional significant negative effect on CVFTL populations in otherwise unaltered habitat, because windbreaks prevent or greatly reduce the movement of blow sand, a vital component of CVFTL habitat. Turner et al. found that population density estimates on three plots immediately upwind from a windbreak were 4.4, 43.0, and 45.0 lizards per hectare. Densities on paired plots immediately downwind from windbreaks were 0, 0.4, and 0 lizards per hectare, respectively. Studies have not been conducted to determine how far downwind populations of CVFTL are depressed within the wind shadow created by the windbreaks. However, Weaver (1979 and 1981) indicated that the shielding effects of any substantial barrier to the natural transport of sand will, in time, extend to the downwind end of the valley because of the extreme unidirectional nature of the sand

movement pattern. Numerous developments at the edges and in the center of the Coachella Valley also cast wind shadows on remaining CVFTL habitat that may cause substantial detrimental impacts on CVFTL populations by reducing the movement of wind blown sand. The U.S. Army Corps of Engineers is considering a flood-control project on the Whitewater River. Depending upon the alternative plan selected, the facility may be designed to prevent new sands from entering the Coachella Valley. If constructed, the dam(s) would act as a giant windbreak, causing substantial adverse impacts on the remaining CVFTL habitat.

Two major transportation corridors, the Interstate Highway 10/Southern Pacific railroad and Highway 111 rights-of-way, may act as barriers to lizard movement, effectively dividing the valley into three populations. Habitat fragmentation may prevent reestablishment in areas where population declines occur, resulting in local extirpations. The long-term effect of dividing gene pools through isolation of localized populations is another potential adverse impact that is not well understood.

Since the 1950's, large portions of remaining CVFTL habitat have been invaded by Russian thistle, a noxious weed from Asia that can form dense mats one to two feet thick which completely cover and stabilize the soil. CVFTL habitat usually is characterized by large, open sandy areas with scattered vegatation. Preliminary data suggest that less dense Russian thistle stands may not be detrimental to CVFTL

populations. Turner et al. (1981) recorded the highest CVFTL density (45.5 lizards per hectare) on a plot with moderate Russian thistle densities. However, over a period of years, the composition of the plant community may be altered, the food base changed, and the soil stabilized, resulting in CVFTL population reductions or local extirpations. In addition, plantain (Plantago insularis) and the introduced grass Schismus barbatus (no common name) are invading substantial habitat in the Coachella Valley. These species may also stabilize the soil and reduce the suitability of the habitat for CVFTL. The possible effects of such drastic habitat changes on lizard populations have not been studied.

Conservation Efforts

Coordinated CVFTL management efforts began in the fall of 1977 with the first meeting of the Coachella Valley Fringe-toed Lizard Advisory Committee. This committee was composed of professional scientists and resource managers dedicated to preventing the extinction of the CVFTL. The advisory committee provided data and assistance that contributed significantly to decisions by the U.S. Fish and Wildlife Service and California Fish and Game Commission to officially list the CVFTL. An outgrowth of the advisory committee's work has been a growing effort to acquire an ecological reserve to preserve a viable and sustaining population of CVFTL, as well as plants and other animals that occur in sandy habitats in the Coachella Valley. To facilitate achieving this goal, the Coachella Valley Ecological Reserve Foundation was formed

under the auspices of the Desert Protective Council and California Department of Fish and Game (CDFG). As of July 1983 CDFG has acquired 425 acres through the Environmental Protection Program and Energy and Resources Fund financing.

The majority of CVFTL habitat (including critical habitat) is in private ownership and subject to development; hence, a concerted, coordinated effort to secure habitat is essential. The Nature Conservancy (TNC) assumed this role in 1983 and has been actively involved, along with a variety of development interests in the Coachella Valley, to acquire an ecological reserve. TNC is interested in preserving a representative sample of the desert ecosystem. Sunrise Company, one of the valley's largest developers, is also helping to spearhead efforts to establish the reserve. This reserve boundary was delineated by TNC and includes much of the critical habitat as well as additional sand source areas north of the critical habitat.

Various cities, the Coachella Valley Association of Governments (CVAG), Riverside County, California Department of Fish and Game, Fish and Wildlife Service, Bureau of Land Management, Coachella Valley Water District, and other entities are actively involved in the development of a habitat conservation plan. This will be a comprehensive management plan to protect the CVFTL and is required before a Section 10 (see Endangered Species Act 1973, as amended)

permit to allow incidental take pursuant to other lawful activities will be issued. Without a Section 10 permit, developers would be subject to provisions of Section 9 of the Endangered Species Act which prohibits take (harm, harass, kill, etc.) of listed species.

TNC is negotiating to purchase 1,900 acres within the reserve boundaries at a cost of approximately $2 million. Several additional options may also be exercised by TNC to acquire 8,400 acres. More acreage may be added at a later date.

TNC and Bureau of Land Management (BLM) are engaged in negotiating a potential land exchange so that land that TNC may acquire in the reserve will be traded for BLM land elsewhere. TNC will later sell the land they eventually acquire from BLM and will recycle these funds into other purchases. BLM (or possibly another agency) will then manage the holdings in the reserve for the CVFTL.

Additional sources of funding for acquisition such as Land and Water Conservation Funds are being explored. Riverside County, several cities (i.e., Palm Desert), the Building Industries Association (developers) have agreed that a fee will be paid to the cities and/or county by the developers prior to the issuance of building permits for later transferral to TNC for the purchase of land in the reserve. These fees will be used to purchase land within TNC reserve boundaries and other reserve(s) as mitigation for development of land in the valley.

PART II

RECOVERY

Objectives

The primary objective of this recovery plan is to minimize further decline of the species and degradation of its habitat by securing two or more protected areas within historical habitat (one of these areas to be the already designated critical habitat) that maintain viable, self-sustaining populations, thus, permitting consideration for delisting. The size of the habitats and the lizard populations necessary for recovery needs to be determined.

Habitat destruction represents the greatest threat to this species. Very little of the CVFTL habitat is on public land where it can be more easily protected. Development on private lands within the Coachella Valley is taking place at an accelerating rate. To date, there has been little significant mitigation for CVFTL habitat destruction from urban and agricultural development. Habitat preservation is, therefore, a key issue in this recovery plan. Habitat without a secure source of aeolian sand is of little value to the long-term survival of the species.

The status of the CVFTL may be regarded as an indicator of the habitat quality. Maintaining and restoring conditions suitable to the long term survival of this lizard will also preserve a host of other

organisms such as the giant red velvet mite (Dinothrombium pandorae), Coachella Valley round-tailed ground squirrel (Spermophilus tereticaudus chlorus), and desert coackroach (Arenivaga investigata) that also depend on the aeolian sand ecosystem.

The following actions need to be taken in order to preserve the species and its habitat:

1. Secure habitat for preservation of the CVFTL. This is the most important element in the recovery plan. Without the establishment of two or more large-scale reserves within historical habitat supporting viable, self-sustaining populations, the long-term survival of the CVFTL cannot be assured. Primary emphasis should be on securing the critical habitat as one of the two or more large-scale reserves.

   As a precaution against the effects of catastrophic events (i.e., flood, disease, etc.) that may eliminate a population, two or more populations are necessary for long-term CVFTL survival. One large scale reserve of sufficient size so that no natural catastrophe could extirpate the population would be preferable but is not feasible (there is insufficient habitat remaining in one block to constitute this one large-scale reserve).

2. Study the biological requirements of the CVFTL.

3. Monitor CVFTL populations throughout the Coachella Valley to determine trends in numbers and areas inhabited.

4. Study the effects of habitat modifications (i.e., windbreaks, exotic vegetation, etc.) on CVFTL.

5. Study the feasibility of restoration of CVFTL habitat through rehabilitation.

6. Develop and provide public information and education programs to further public support and awareness of the importance of preserving CVFTL.

7. Enforce existing laws and regulations protecting CVFTL and their habitat. Additional laws and regulations may be required and/or existing ones modified.

Because of permanent habitat destruction, the CVFTL will never inhabit more than a fraction of its former range. Even with the implementation of actions suggested in this plan, the population levels will continue to decline on unprotected lands as development in the valley continues. Without implementation of this plan, it is conceivable CVFTL will continue to decline to the point of extinction.

The establishment of two or more large-scale reserves containing viable populations of CVFTL and secure habitat should overcome the primary threat to the continued existence of the species.

Step-down Outline

Prime Objective: The primary objective of the CVFTL recovery plan is to minimize further decline of the species and degradation of its habitat by securing and protecting suitable habitat in two or more large-scale protected areas (one of these areas to be the already designated critical habitat) within historical habitat that maintain viable, self-sustaining populations, thus, permitting consideration for delisting. The size of the areas to be preserved and the size of the CVFTL populations essential to recovery need to be determined.

1. Protect, manage, and enhance existing habitat.
    - 11. Determine appropriate method(s) to protect habitat.
    - 12. Protect critical habitat.
    - 13. Protect other areas as needed.
        - 131. Determine location and size for one or more large-scale protected areas in addition to the already designated critical habitat.
            - 1311. Assess habitat quality through surveys.
            - 1312. Evaluate CVFTL population viability (see 212).
            - 1313. Assess other considerations.
            - 1314. Select sites.
        - 132. Implement appropriate measures.
    - 14. Monitor existing habitat conditions and distribution of habitat and modify management actions accordingly.
        - 141. Develop habitat quality maps (see also item 214).

1411. Conduct habitat surveys

14111. Establish standard methodology.

14112. Select sites for surveys.

1412. Map CVFTL relative population densities.

142. Annually determine loss and degradation of habitat.

15. Develop and implement habitat management plan(s) for protected areas.

151. Rehabilitate/restore habitat within protected areas.

1511. Remove and/or eliminate Russian thistle and other exotic species.

1512. Remove windbreaks in areas to be restored.

1513. Rehabilitate abandoned agricultural areas as appropriate.

1514. Implement other rehabilitation procedures as appropriate.

152. Evaluate success of CVFTL in restored habitats and modify management actions if necessary.

1521. Determine rate and extent of natural colonization of CVFTL in rehabilitated areas.

1522. Determine CVFTL reproductive success in rehabilitated areas.

1523. Evaluate effectiveness of habitat restoration methods.

2. Maintain and enhance CVFTL populations.

21. Determine biological requirements and utilize results in management decisions.

    211. Determine population densities in various habitat types.

    212. Evaluate population dynamics and determine minimum sustainable population size.

    213. Analyze predator-prey and competitive relationships.

    214. Determine key variables of high, medium, and low quality habitats.

22. Determine population status regularly and utilize data in management decisions.

    221. Determine experimental design for sampling plots.

    222. Establish permanent study plots.

    223. Monitor population by regular surveys of selected plots.

23. Develop and implement recommendations to maintain CVFTL genetic diversity.

24. Determine effects of human-related modifications on CVFTL populations and utilize data in management decisions.

    241. Windbreaks.

    242. Exotic plants.

    243. Off-road vehicle use.

    244. Pesticide application.

    245. Other studies as needed.

25. Implement program to reestablish and evaluate CVFTL in rehabilitated areas under management control.

    251. Predict the probability of successful future reestablishment attempts.

    252. Select sites for analysis.

    253. Develop habitat management plan for sites to be used in the experimental reintroduction program.

    254. Restore sites to be used on a test basis.

    255. Reintroduce CVFTL, if necessary, into restored areas.

    256. Monitor CVFTL population numbers and conditions within restored areas.

3. Foster public awareness and support for the conservation of CVFTL and its ecosystem through an education and public awareness program.

    31. Establish interpretive kiosk with self-guided nature trail at the reserve sites.

    32. Prepare periodic press releases on the ecology and status of the CVFTL.

    33. Prepare programs on CVFTL recovery and management and present to schools, clubs, and other organizations.

    34. Develop and distribute posters on CVFTL for local businesses.

    35. Develop and distribute short films on conservation of the CVFTL.

4. Utilize existing laws and regulations protecting CVFTL and its habitat.

   41. Enforce State and Federal laws.

   42. Evaluate success of law enforcement.

   43. Propose appropriate new regulations or revisions.

Narrative

Prime Objective: The primary objective of the CVFTL recovery plan is to minimize further decline of the species and degradation of its habitat by securing and protecting suitable habitat in two or more large-scale protected areas (one of these areas to be the already designated critical habitat) within historical habitats that maintain viable, self-sustaining populations, thus, permitting consideration for delisting. The size of the areas to be preserved and the size of the CVFTL populations essential to recovery need to be determined.

1. Protect, manage and enhance existing habitat.

The majority of CVFTL habitat is privately owned. Considerable habitat has been lost by urban and agricultural development. Some habitat has also been degraded by unmanaged off-road vehicle use and by exotic plant species. Habitat must be protected and managed to minimize damaging uses and to maximize habitat quality for the CVFTL.

11. Determine appropriate method(s) to protect habitat.

Habitat may be protected and secured by lease agreements, cooperative agreements, memoranda of understanding, conservation easements, land exchanges or purchases.

The applicability of these methods to particular circumstances should be evaluated.

12. Implement appropriate measures to protect critical habitat.

Protective measures are necessary to secure habitat that can then be managed to enhance CVFTL populations by maximizing habitat quality and minimizing adverse habitat modifications.

13. Implement appropriate measures to protect other areas as needed.

Prime habitat outside the designated cirtical habitat should be protected and habitat management plans developed with the cooperation of landowners. Protective measures are necessary to secure habitat that can then be managed to enhance CVFTL populations by maximizing habitat quality and minimizing adverse habitat modifications.

131. Determine location and size for one or more large-scale protected areas in addition to the already designated critical habitat.

The number, location, and size of preserves necessary to provide adequate habitat for the survival of the species will be determined through evaluation of species' needs and discussion with population ecologists.

1311. Assess habitat quality through surveys.

Field surveys will be conducted to determine the habitat quality of all areas of prime habitat. Measures to improve habitat quality of each area surveyed will be identified.

1312. Evaluate CVFTL population viability (see 212).

The population viability of each area identified for a potential preserve will be determined. The results of the population viability study will be used to develop and refine a model that will estimate the condition and population trends of the CVFTLs within each area. Additional field checking of the physical model will be conducted.

1313. Assess other considerations.

Present ownership of CVFTL habitat will be determined and mapped, as will the security of the sand source of

each area. Fragmentation of habitat, land costs, present land development plans, ownership patterns, etc. will be evaluated.

1314. Evaluate and select areas.

All historic habitat should be examined paying particular attention to data concerning condition and population trends of CVFTLS within each area. Areas to receive recovery emphasis must be selected after evaluations of the data gathered from the above three tasks (1311 to 1313) have been done.

132. Implement appropriate measures.

Protective measures are necessary to secure habitat that can then be managed to enhance CVFTL populations by maximizing habitat quality and minimizing adverse habitat modifications.

14. Monitor existing habitat conditions and distribution of habitat, and modify management actions accordingly.

To ensure long-term survival of CVFTL the distribution and condition of the habitat will be monitored. Survey results will be used to modify management recommendations as appropriate.

141. Develop habitat quality maps (see also item 214).

A set of base maps will be developed that will indicate the quality of CVFTL habitat.

1411. Conduct habitat surveys.

Habitat must be surveyed using standard methodology for vegetation analyses. This information, when correlated with densities and distribution of CVFTLs, is essential to delineating the best remaining CVFTL habitat.

14111. Establish standard methodology.

A standard methodology will be developed for habitat quality surveys to ensure that survey data are comparable and to facilitate data comparison.

14112. Select sites for surveys.

Standard criteria will be developed and used to select sites that must be monitored.

1412. Map CVFTL relative population densities.

Relative population densities, when correlated with habitat condition and the vegetation analyses, will be necessary to delimit habitat quality.

142. Annually determine loss and degradation of habitat.

Low level aerial photography, ground surveys, or other means will be used to determine annual habitat loss and change of conditions. The maps will be used to demonstrate habitat quality and distribution which will help determine success of management actions and necessity for additional actions.

15. Develop and implement habitat management plan(s) for protected areas.

A management plan for each protected area will be developed that will outline each area's specific needs.

151. Rehabilitate/restore habitat within protected areas.

A program to rehabilitate or restore degraded habitat within specific management areas will be undertaken. This program will help increase habitat carrying, thus improving the species' status.

1511. Remove and/or eliminate Russian thistle and other exotic species.

Salsola and other exotic species have invaded certain areas of CVFTL habitat and are stabilizing the soil. A program to remove these species from specific habitat will be undertaken.

1512. Remove windbreaks in areas to be restored.

Tamarisk windbreaks have been shown to indirectly degrade CVFTL habitat by blocking free flow of aeolian sand on the downwind areas. Windbreaks will be evaluated relative to their economic importance, and specific windbreaks within areas to be rehabilitated will be removed to improve habitat.

1513. Rehabilitate abandoned agricultural areas, as appropriate.

Former habitat that has been converted to agriculture but now is fallow will be identified. Areas under management control will be rehabilitated if it is determined that such measures will restore the habitat.

1514. Implement other rehabilitation procedures as appropriate.

The effectiveness of the above referenced restoration methods will be monitored. If other appropriate restoration methods are identified, they also will be employed.

152. Evaluate success of CVFTL in restored habitats and modify management actions if necessary.

It will be necessary to evaluate the CVFTL status and population trends in response to habitat improvement so that refinements or modification in habitat restoration techniques can be implemented.

1521. Determine rate and extent of natural colonization of CVFTL in rehabilitated areas.

If the rate and extent of colonization of CVFTL in a newly restored area are found to be insufficient to maintain the population, other methods to enhance the population may be necessary.

1522. Determine CVFTL reproductive success in rehabilitated areas.

If the reproductive success of the CVFTL in a newly restored area is found to be insufficient to maintain the population, other methods to enhance the population may be necessary.

1523. Evaluate effectiveness of habitat restoration methods.

Different types of restoration methods, such as Russian thistle removal, removal of windbreaks, and rehabilitation of abandoned agricultural areas, will be evaluated to determine the most economical and efficient means to rehabilitate habitat. This will be accomplished by comparing and evaluating the response of CVFTL to newly restored habitats.

2. Maintain and enhance CVFTL populations.

The survival of the CVFTL depends on a rigorous program to not only sustain current population levels, but also to enhance the population in key areas.

21. Determine biological requirements and utilize results in management actions.

Many of the habitat requirements of CVFTL are little understood beyond their dependence on aeolian sands. Inherent in managing the species will be an understanding of its biological requirements, habitat preferences, and other aspects of the lizard's life history. Once these are better understood, additional recovery recommendations will be formulated.

211. Determine population densities in various habitat types.

Population densities may differ within various habitat types. Knowledge of population densities and apparent carrying capacities for various habitats will contribute to the program of improving the status of the species.

212. Evaluate population dynamics and determine minimum sustainable population size.

Age class structure, fecundity, and mortality will be evaluated in selected areas. These data should be valuable in determining management objectives and methods.

At the present time there are no established procedures to determine minimum population size. A panel of population geneticists will be convened to develop an appropriate research approach for determining minimum population size. Once determined, that research design will be pursued; however, it is anticipated that this will be an extremely costly procedure as well as time consuming (multiple years).

213. Analyze predator-prey and competitive relationships.

Little is known of predation pressures on the CVFTL. This element of the species' ecology will be studied in an effort to determine if predation pressure may adversely affect CVFTL population stability.

214. Determine key variables of high, medium and low quality habitats.

Through monitoring of the habitat and its condition along with CVFTL population status, factors important in determining the quality of the habitat will be identified.

22. Determine population status regularly and utilize data in management decisions.

The status of the various populations in the management area will be evaluated. These results can be considered in future management decisions.

221. Determine experimental design for sampling plots.

Alternative study approaches will be reviewed to ensure that the most appropriate experimental design for this species is selected and employed. The same experimental design will be used for all surveys to facilitate data comparison.

222. Establish permanent study plots.

Permanent study plots representative of various habitat conditions will be established so that comparable long-term population data can be obtained.

223. Monitor population by regular surveys of selected plots.

Selected plots will be regularly (survey frequency will depend on population and habitat conditions and

available funding levels) surveyed to yield long-term population trends and to aid in evaluating the success of management actions.

23. Develop and implement recommendations to maintain CVFTL genetic diversity.

Protecting two or more large scale reserves that are disjunct with no gene flow will eventually result in the populations becoming genetically isolated. Such isoloation will reduce the genetic variability of each population, hence, they will be less able to cope with varying environmental conditions. Because a loss of genetic plasticity would reduce the probability of long-term survival of the species, it is necessary to develop and implement recommendations to minimize the reduction of genetic diversity. The panel of geneticists referenced in 212 will also be asked to assess appropriate methods to maintain CVFTL genetic diversity.

24. Determine effects of human-related modifications on CVFTL populations and utilize data in management decisions.

Various types of habitat modifications can be deleterious to CVFTL. Different forms of habitat alteration should be analyzed to assess the effect on the quality of CVFTL habitat and CVFTL populations . Such information may be beneficial in designing measures to reduce the adverse effects on CVFTL.

241. Windbreaks.

Windbreaks of tamarisk trees have been established throughout the Coachella Valley. Research has shown that such windbreaks seriously stem the flow of aeolian sand and result in deterioration of CVFTL habitat. The long-term effects of windbreaks on CVFTL populations and habitat quality need to be further quantified. Additional data may be useful in designing windbreaks that are less deleterious to CVFTL.

242. Exotic plants.

Exotic species such as mustards (*Brassica* spp.) and Russian thistle (*Salsola* spp.) have become well-established in some important habitat areas.

The effects of these densely populated weedy species on the CVFTL and its habitat need to be better identified and quantified. Appropriate management actions can then be developed and implemented.

243. Off-road vehicle use.

Off-road travel by dirt bikes, three-wheeled all terrain vehicles and four-wheel drive vehicles

(commonly used in the CVFTL habitat), can degrade CVFTL habitat quality. The effect of this type of impact needs to be thoroughly assessed so that appropriate control measures can be taken.

244. Pesticide application.

The application of pesticides to control agricultural pests may modify the availability of food for CVFTL in adjacent areas. Studies to assess the impacts of pesticides on CVFTL density, distribution, and reproductive physiology should be undertaken. If a negative effect is documented recommendations to minimize such adverse impacts should be developed and implemented.

245. Other studies as needed.

There are other human-related impacts that may adversely affect habitat quality that need to be evaluated; these include trash dumping, recreational uses, and urban and agricultural development.

25. Implement program to reestablish and evaluate CVFTL in rehabilitated areas under management control.

Various areas of degraded habitat that could be suitable for CVFTL if rehabilitated will be identified. Once the areas are restored, lizards may recolonize naturally; if not, translocation may be necessary.

251. Predict the probability of successful future reestablishment attempts.

Based upon habitat requirements and the success of habitat restoration measures, predictions for successful reintroduction of lizards can be made and tested through monitoring. Results will help guide future efforts in habitat restoration and CVFTL reintroduction/recolonization.

252. Select sites for analysis.

Sites will be selected and rehabilitated on an experimental basis. A habitat management plan will be developed for each such site (see 253).

253. Develop habitat management plan for sites to be used in the experimental reintroduction program.

A management plan to promote CVFTL survivability and long-term success in the sites selected for rehabilitation will be developed.

254. Restore sites to be used on a test basis.

After reviewing and evaluating degraded habitat, candidate or test areas will be selected and rehabilitated.

255. Reintroduce CVFTL, if necessary, into restored areas.

If CVFTL do not naturally recolonize restored areas or do so in insufficient numbers to maintain a viable population, individuals may be transplanted to the newly restored sites.

256. Monitor CVFTL population numbers and condition within restored areas.

A monitoring program will reveal if recolonization in restored areas is occurring and is sufficient.

Long-range surveys will be needed to evaluate the success of the restoration effort. To help ensure success of rehabilitation attempts, the population numbers of reintroduced populations will be monitored.

3. Foster public awareness and support for the conservation of CVFTL and its ecosystem through an education and public awareness program.

It is vitally important that residents of Southern California, and particularly the Coachella Valley, understand the threatened status of the species, the factors contributing to its decline, and its recovery needs.

31. Establish interpretive kiosk with self-guided nature trail at the reserve site(s).

An information center and self-guided trail with signs identifying dominant plants, describing animals, and important and unique habitat features will help increase the public's awareness of the area.

32. Prepare periodic press releases on the ecology and status of the CVFTL.

It is important to have periodic articles on various aspects of the species' biology and its status in the local news media. These articles should help enhance and maintain the public's knowledge and interest in the efforts to save the CVFTL.

33. Prepare programs on CVFTL recovery and management and present to schools, clubs, and other organizations.

Educational programs aimed at educating and informing school children will be developed. Similar programs for clubs and other organizations will also be developed.

34. Develop and distribute posters on CVFTL for local businesses.

Information posters appropriate for placement in local businesses and community centers, etc. will be developed and distributed in the Coachella Valley and other appropriate areas to further public awareness of CVFTL conservation.

35. Develop and distribute short films on conservation of the CVFTL.

Films are a very effective communication tool. A series of short films on various aspects of CVFTL conservation will be

developed and used as part of the overall public awareness program planned for CVFTL.

4. Utilize existing laws and regulations protecting CVFTL and its habitat.

Enforcement of all laws to protect the species and its habitat is crucial, particularly because most habitat is privately-owned.

41. Enforce State and Federal laws.

All Federal and State laws pertaining to the protection and conservation of CVFTL should be used to further the recovery effort.

42. Evaluate success of law enforcement.

Additional or more extensive efforts to enforce existing laws protecting the CVFTL may be needed. Periodic evaluations will provide an assessment of needed modifications in this area.

43. Propose appropriate new regulations or revisions.

Revisions in existing regulations may be necessary to enhance conservation efforts of the CVFTL. If revisions are not adequate to futher conservation and recovery goals, new legislation may be proposed.

Literature Cited

Adest, G. A. 1977. Genetic relationships in the genus Uma (Iguanudae). Copeia 1977:47-52.

Camp, C. L. 1916. Notes on the local distribution and habits of the amphibians and reptiles of southwestern California in the vicinity of the Turtle Mountains. Univ. California Publ. Zool. 12:503-544.

Carpenter, C. C. 1963. Patterns of behavior in three forms of the fringe-toed lizard (Uma - Iguanidae). Copeia 1963:406-412.

Coachella Valley Association of Governments. 1978. CVAG 1978 populations projections for the Coachella Valley 1978-2000. CVAG, Palm Desert, CA.

Coachella Valley Fringe-toed Lizard Habitat Conservation Plan Steering Committee. 1984. Coachella Valley fringe-toed lizard habitat conservation plan (draft). Prepared under contract by Thomas Reid, Asso., Palo Alto, CA.

Cope, E. D. 1895. On the species of Uma and Xantusia. Amer. Nat. 29:938-939.

England, A. S. 1983. The Coachella Valley, an endangered ecosystem--progress report on conservation and management efforts. In Holden Brink (ed.). Cal-Neva Wildlife Transactions. Pp. 148-156.

England, A. S., and S. G. Nelson. 1976. Status of the Coachella Valley fringe-toed lizard (Uma inornata). Inland Fisheries, Adm. Report. No. 77. 29 pp.

Heifetz, W. 1941. A review of the lizards of the genus (Uma). Copeia 1941:99-111.

Kocher, A. E., and W. G. Harper. 1928. Soil survey of the Coachella Valley area, California. Rep. Bur. Soils, U. S. Dept. Agr., Ser 1923 16:485-535.

Mayhew, W. W. 1964a. Photoperiodic responses in three species of the lizard genus Uma. Herpetologica 20:95-113.

Mayhew, W. W. 1964b. Taxonomic status of California populations of the lizard genus Uma. Herpetologica 20:170-183.

Mayhew, W. W. 1965. Reproduction in the sand-dwelling lizard Uma inornata. Herpetologica 21:39-55.

Minnich, J. E., and J. H. Shoemaker. 1972. Water and electrolyte turnover in a field population of the lizard, Uma scoparia. Copeia 1972:650-659.

Mosauer, W. 1935. The reptiles of a sand dune area and its surroundings in the Colorado Desert, California. A study of habitat preference. Ecology 16:13-27.

Norris, K. S. 1958. The evolution and systematics of the iguanid genus Uma and its relationship to the evolution of other North American desert reptiles. Bull. Amer. Mus. Nat. Hist. 114:247-328.

Pough, H. F. 1970. The burrowing ecology of the sand lizard Uma notata. Copeia 1970:145-157.

Pough, F. H. 1973. Uma inornata. Catalogue of American amphibians and reptiles, account No. 126. Society for the Study of Amphibians and Reptiles.

Pough, F. H. 1974. Uma scoparia. Catalogue of American amphibians and reptiles, account No. 155. Society for the Study of Amphibians and Reptiles.

Pough, F. H. 1977. Uma notata. Catalogue of American amphibians and reptiles, account No. 197. Society for the Study of Amphibians and Reptiles.

Smith, H. M. 1946. Handbook of lizards. Comstock Publ. Co., Ithaca, N.Y. xxi + 557 pp.

Stebbins, R. C. 1943. Adaptations in the nasal passages for sand burrowing in the saurian genus Uma. Amer. Nat. 77:38-52.

Stebbins, R. C. 1944. Some aspects of the ecology of the iguanid genus Uma. Ecol. Monogr. 14:311-332.

Stebbins, R. C. 1954. Amphibians and reptiles of western North America. McGraw-Hill Co., N.Y. xxii+ 528 pp.

Turner, F. B., D. C. Weaver, and J. C. Rorabaugh. 1981. The abundance of the fringe-toed lizard (Uma inornata) at ten sites in the Coachella Valley, California. Part I. The effect of blowsand reduction on the abundance of the fringe-toed lizard (Uma inornata) in the Coachella Valley. Rept. Prep. for Corps of Engineers, Los Angeles District.

Van Denburgh, J. 1922. The reptiles of western North America. Vol. 1. Occas. Papers California Acad. Sci. 10:1-611.

Weaver, D. C. 1979. Assessment of effects of flood control alternatives on blowsand conditions in the Coachella Valley, Whitewater River basin. Rept. to U.S. Corps of Engineers.

Weaver, D. C. 1981. Aeolian sand transport and deposit characteristics at ten sites in the Coachella Valley, California. Part II. The effect of blowsand reduction on the abundance of the fringe-toed lizard (Uma inornata) in the Coachella Valley. Rept. Prep. for Corps of Engineers, Los Angeles District.

Zalusky, S. B., A. J. Gaudin, and J. R. Swanson. 1980. A comparative study of cranial osteology in the North American sand lizards, genus Uma (Reptilia: Iguanida). Copeia 1980:296-310.

PART III

IMPLEMENTATION SCHEDULE

The table that follows is a summary of scheduled actions and costs for the Coachella Valley Fringe-toed Lizard Recovery Plan, as elaborated upon in Part II, Narrative section. This table indicates the priority in scheduling tasks to meet the objectives, which agencies are responsible to perform these tasks, a time-table for accomplishing these tasks, and lastly, the estimated costs to perform them. Implementing Part III is the action of the recovery plan, that when accomplished, will bring about the recovery of this threatened species. The Bureau of Land Management will only be involved in actions occurring on lands under their jurisdiction.

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES

Information Gathering - I or R
(research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other or to be determined

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

RECOVERY ACTION PRIORITIES

1 = An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.

2 = An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.

3 = All other actions necessary to provide for full recovery of the species.

PART III IMPLEMENTATION SCHEDULE
Coachella Valley Fringe-toed Lizard

General Category	Plan Task	Task No.	Task Priority[2]	Duration of Task (Yrs)	Responsible Agency[1] FWS Region	FWS Program	Other	Fiscal Year Costs Est.[2] 1 (in $1,000's)	2	3	Comments and Notes
I14	Determine appropriate method(s) to protect habitat	11	1	3	1	SE		1.5	2.0	2.0	
							CDFG*	1.5	2.0	2.0	
							BLM	1.0	1.0	1.0	
A7	Implement appropriate measures to protect the Critical Habitat	12	1	Continuous	1	SE*		To be determined			
							BLM				
I2	Assess habitat quality	1311	1	3	1	SE		2.5	2.5	2.5	
							CDFG*	2.5	2.5	2.5	
							BLM				
I2	Evaluate CVFTL population viability	1312	1	3	1	SE		2.0	2.0	2.0	See also 212
							BLM	2.0	2.0	2.0	
							CDFG	2.0	2.0	2.0	
I14	Assess other considerations	1313	1	3	1	SE		2.0	2.0	5.0	
							CDFG*	3.0	3.0	5.0	
I14	Evaluate and select areas	1314	1	1	1	SE*				3.0	
							CDFG			3.0	
A7	Implement appropriate measures	132	1	To be determined	1	SE*		To be determined			
							CDFG				
							BLM				

General Category	Plan Task	Task No.	Task Priority[2]	Duration of Task (Yrs)	Responsible Agency[1] FWS Region	FWS Program	Other	Fiscal Year Costs Est.[2] 1 (in $1,000's)	2	3	Comments and Notes
I2	Conduct habitat surveys	1141	1	Continuous	1	SE*		5.0	5.0	5.0	Includes 14111 and 14112
							CDFG	5.0	5.0	5.0	
							BLM	5.0	5.0	5.0	
R2	Map CVFTL relative population desities	1412	1	Continuous	1	SE		To be determined			
							CDFG*				
							BLM				
I2	Annually determine loss and degradation of habitat	142	1	Continuous	1	SE		0.5	0.5	0.5	
							BLM*	1.0	1.0	1.0	
							CDFG	0.5	0.5	0.5	
M3	Remove and/or eliminate Russian thistle	1511	2	Continuous			CDFG*	To be determined			
							BLM				
M3	Remove windbreaks in areas to be restored	1512	1	Continuous			CDFG*	To be determined			
							BLM				
M3	Rehabilitate abandoned agriculture areas, as appropriate	1513	1	Continuous			CDFG*	To be determined			
							BLM				
M3	Implement other rehabilitation procedures appropriate	1514	2	Continuous			CDFG*	To be determined			
							BLM				

General Category	Plan Task	Task No.	Task Priority[2]	Duration of Task (Yrs)	Responsible Agency[1] FWS Region	FWS Program	Other	Fiscal Year Costs Est.[2] (in $1,000's) 1	2	3	Comments and Notes
I13	Determine rate of colonization in rehabilitated areas	1521	2	To be determined	1	SE	BLM CDFG*	To be determined			
I13	Determine reproductive success in rehabilitated areas	1522	2	To be determined	1	SE	BLM CDFG*	To be determined			
I4	Evaluate effectiveness of habitat restoration methods	1523	2	1			CDFG BLM				To start FY 4 (5.0K)
I1	Determine population densities in various habitat types	211	1	3	1	SE*	BLM CDFG	2.0 2.0 2.0	2.0 2.0 2.0	2.0 2.0 2.0	
I1	Evaluate population dynamics and determine minimum sustainable population size	212	1	5	1	SE	BLM CDFG*	To be determined			
I10	Analyze predator-prey and competitive relationships	213	3	3			BLM CDFG*	5.0 5.0	5.0 5.0	5.0 5.0	
I2	Determine key variable of high, medium, and low quality habitat	214	1	3	1	SE*	CDFG BLM	3.0 3.0 3.0	3.0 3.0 3.0	3.0 3.0 3.0	
R1	Determine experimental design for sampling plots	221	1	1	1	SE*		3.0			

General Category	Plan Task	Task No.	Task Priority[2]	Duration of Task (Yrs.)	Responsible Agency[1] FWS Region	FWS Program	Other	Fiscal Year Costs Est.[2] 1 (in $1,000's)	2	3	Comments and Notes
I1	Establish permanent study plots	222	1	1			CDFG*	5.0			
I1	Monitor population by regular surveys of selected plots	223	1	Continuous	1	SE*	CDFG	3.0 2.0	3.0 2.0	3.0 2.0	
R1	Develop and implement recommendations to maintain CVFTL genetic diversity	23	2	To be determined	1	SE*		To be determined			
R1	Determine effects of windbreaks	241	1	3			BLM*	10.0	10.0	10.0	
R1	Determine effects of exotic plants	242	1	3			CDFG*	10.0	10.0	10.0	
R1	Determined effects of off-road vehicles	243	1	3			BLM*	7.5	7.5	7.5	
R1	Undertake analysis of effects of pesticide	244	1	3	1	[illegible]*		10.0	10.0	10.0	
R1	Undertake other studies as needed	245	To be determined	To be determined	1	SE*		To be determined			

General Category	Plan Task	Task No.	Task Priority[2]	Duration of Task (Yrs)	Responsible Agency[1] FWS Region	FWS Program	Other	Fiscal Year Costs Est.[2] 1 (in $1,000's)	2	3	Comments and Notes
I3	Predict success of reestablishment attemps	251	2	3	1	SE*	CDFG BLM	To be determined			
M3	Select sites for analysis	252	2	1	1	SE*		3.0			
M3	Develop habitat management plan for experimental reintroduction sites	253	2	1			CDFG*	3.0			
M3	Restore sites to be used on a test basis	254	2	1	1	SE	CDFG* BLM	To be determined			
M3	Reintroduce CVFTL into restored sites	255	2	To be determined	1	SE	CDFG BLM	To be determined			
I1	Monitor CVFTL population numbers and condition within restored sites	256	2	Continuous	1	SE*	BLM CDFG	To be determined			
O1	Establish interpretive kiosk in reserve sites	31	3	1			CDFG*	2.0			
O1	Issue press releases	32	3	Continuous	1	SE	BLM CDFG	To be determined			
O1	Presentations	33	1	Continuous	1	SE	BLM CDFG	To be determined			
O1	Posters	34	3	Continuous			BLM CDFG	To be determined			
O1	Develop and distribute short film on CVFTL	35	3	1	1	SE	BLM CDFG	To be determined			

General Category	Plan Task	Task No.	Task Priority[2]	Duration of Task (Yrs)	Responsible Agency[1] FWS Region	Program	Other	Fiscal Year Costs Est.[2] (in $1,000's) 1	2	3	Comments and Notes
02	Enforce State and Federal laws	41	1	Ongoing	1	LE	CDFG BLM	0.5	0.5	0.5	FY 85 PA(4a)
02	Evaluate success of law enforcement	42	2	Continuous	1	LE	CDFG	0.5 0.5		0.5 0.5	
03	Propose appropriate new regulations or revisions	43	2	Continuous	1	SE	CDFG		0.5 0.5		

*lead agency
Continuous = once a task is begun it will continue indefinitely
Ongoing = currently underway

[1]Key to Agencies

CDFG = California Department of Fish and Game
SE = Endangered Species, LE = Law Enforcement, CE = Environmental Contaminants (U.S. Fish and Wildlife Service)
BLM = Bureau of Land Management

[2]Fiscal Year: 1 = FY 85, 2 = FY 86, 3 =87

APPENDIX

Agencies Reguested to Provide Comments During Agency Review -

Director
California Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

State Director
Bureau of Land Management
Federal Office Bldg., Rm E-2841
2800 Cottage Way
Sacramento, CA 95825

Dr. Wilbur Mayhew
Department of Biology
University of California
Riverside, CA 92521

Mr. Dave Stevens
Southern California Edison Co.
2344 Walnut Grove Avenue
Rosemead, CA 91770