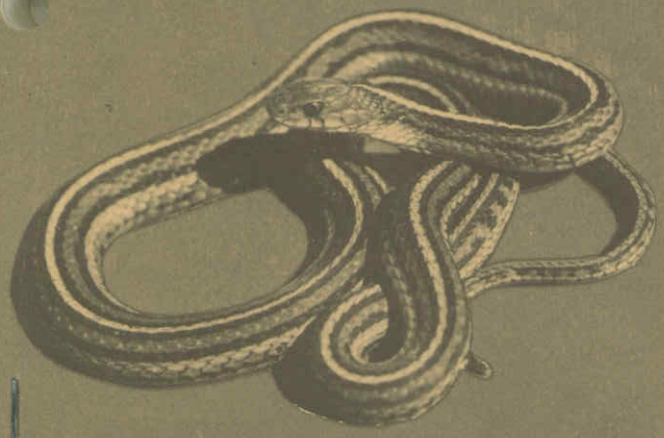
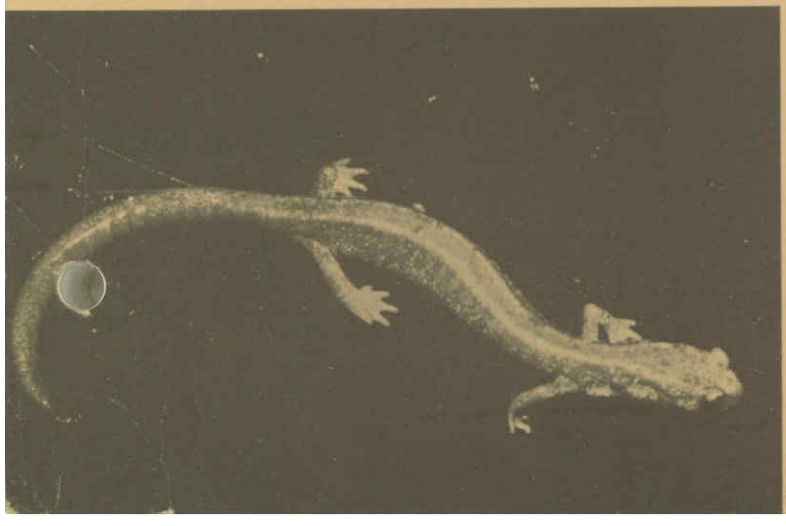
AT THE CROSSROADS 1980

A Report on California's Endangered and Rare Fish and Wildlife





AT THE CROSSROADS

A Report on the Status of California's Endangered and Rare Fish and Wildlife

State of California

Resources Agency,

Fish and Game Commission and

Department of Fish and Game

December 1980

TO WHOM IT MAY CONCERN:

The 1980 edition of "At the Crossroads", a report on California's endangered and rare fish and wildlife, is designed to be a permanent file copy with subsequent update and addition materials submitted periodically. Recipients of this edition should periodically check with the Department of Fish and Game at 1416 Ninth Street, Sacramento, California 95814 (916-445-1146 or 916-445-5186) to bring your file copies up-to-date on all revisions.

This publication is now being handled in such a manner to cut printing and distribution expenses.

E C Fullerton

Director

STATE OF CALIFORNIA—RESOURCES AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF FISH AND GAME
1416 NINTH STREET
SACRAMENTO, CALIFORNIA 95814
(916) 445-3531

Honorable Edmund G. Brown Jr., Governor
State of California
Sacramento, California 95814

Dear Governor Brown:

Enclosed is the fifth biennial report on the status of California's endangered and rare fish and wildlife, which is transmitted herewith pursuant to the legislative mandate under the "California Species Preservation Act of 1980". Like the previous At the Crossroads, this report describes the current status of the fish and wildlife species listed by the Fish and Game Commission as endangered or rare, and summarizes what is being done to ensure the continued survival of those species.

As with all wildlife, but especially the endangered species, the key to survival is protection of habitat. For species threatened with extinction that occupy public land, the protection and preservation of habitat can usually be arranged through the cooperative efforts of government agencies. However, great difficulty is encountered in preserving endangered species when these species occur on private lands.

Thus far, the most successful way of preserving endangered species habitat in private ownership has been through acquisition by state and/or federal agencies. However, the rapidly escalating price of the remaining wildlands is reducing the effectiveness with which we can preserve habitat.

Without some incentive for and means whereby local governments can be encouraged or required to protect habitat on private land, or without substantially greater state appropriations to acquire habitat, we may not succeed in preserving some species.

The original list of state-designated endangered and rare species was compiled in 1971, with 43 forms of fish and wildlife included. As our knowledge of the status of additional threatened species increased, the list has been amended with status designation changes and species additions. This report describes the current status of 63 forms of fish and wildlife. To reduce labor and printing costs, the Department is asking recipients of this edition of At the Crossroads to maintain a copy in their files for future use. As subsequent addenda are prepared, they will be made available to recipients of this edition.

Sincerely,

E C Fullerton

Director

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On the cover: A collage of wildlife.

SUMMARY

This report describes the current status of 63 forms of fish and wildlife species listed by the Fish and Game Commission as endangered or rare, as authorized under the California Endangered Species Act, Sections 2050-2055 of the California Fish and Game Code. The report summarizes what has been accomplished and makes recommendations to ensure the enhancement and continued survival of those species. A biennial report will be provided to the Legislature to keep them appraised on the status of listed species. As addenda to "At the Crossroads" are prepared they will be made available to recipients of this edition.

INTRODUCTION

State Background

The California Legislature was the first in the United States to prohibit the importation, taking, possession, and sale of endangered and rare species. The Endangered Species Act of 1970, authored by Assemblymen Warren and Sieroty, expressed the Legislature's concern over California's threatened wildlife, defined rare and endangered wildlife, and gave authority to the Fish and Game Commission to identify animals in California that are rare and endangered. On May 21, 1971, the Commission declared the first group of 43 animals endangered or rare.

A legislative mandate in 1970, the California Species Preservation Act, authored by Assemblyman Karabian, directed the California Department of Fish and Game to inventory all threatened fish and wildlife, develop criteria for rare and endangered species, and report to the Governor and the Legislature every two years on the status of these animals. On January 1, 1972, the Department submitted its first biennial report, "At the Crossroads - a report on California's endangered and rare fish and wildlife." That report described the 43 species of wildlife threatened with extinction or possible peril and recommended actions for their protection and preservation.

Subsequent status reports were made in 1974, 1976 and 1978. This is the fifth edition of At the Crossroads.

Other state legislation to protect and restore endangered wildlife includes the Environmental Protection and Research Act of 1970 which created an Environmental Protection Program Fund from the sale of personalized automobile license plates.

Assembly Joint Resolution Number 31 in 1970 memorialized the President, Congress, and the Secretary of the Interior to assist the Department of Fish and Game in compiling a species inventory of threatened fish and wildlife and to establish criteria for determining rare and endangered species.

The Legislature appropriated $1 million from the General Fund to reimburse the Department for 1974-75 fiscal year nongame species management and protection activities. General Fund reimbursement has continued each year and it has increased to where $9.3 million is budgeted for 1981-82.

Assistance also is provided by a seven-member Citizens Nongame Advisory Committee, appointed by the Director of Fish and Game in 1975 to review and advise the Department on its nongame species programs and to recommend sources of funding.

The Department of Fish and Game and the U. S. Fish and Wildlife Service entered into a cooperative agreement in 1976, under which the Department agreed to manage federal- and state-listed endangered, threatened and rare species, and became eligible to receive Endangered Species Act grant-in-aid funds. The Department

has renewed this agreement annually since 1976. In 1979, the agreement was revised to include plants following the Endangered Species Act amendments of 1978. Endangered and rare plants are covered in a separate biennial report as required under the California Native Plant Protection Act of 1977.

Federal Background

Although Congress earlier had enacted endangered species legislation (the Endangered Species Preservation Act of 1966 and the Endangered Species Conservation Act of 1969) the shortcomings of this legislation, and the inability or unwillingness of many states to enact programs to protect endangered species, made it apparent that stronger measures were needed. As a consequence, Congress passed, and the President signed on December 28, 1973, a new Endangered Species Act (P.L. 93-205), which extended federal authority over migratory, resident and foreign species of animals and plants declared endangered or threatened by the Secretary of the Interior. The 1973 Act defined wildlife to include all taxa in the animal kingdom except harmful insects, thus extending to invertebrates protection previously available only to vertebrates. The Act also extended protection to plants for the first time in the history of federal endangered species legislation.

The Act required all federal agencies to protect and restore species so listed, and prohibited federal agencies from funding or carrying out activities or programs that would adversely affect the critical habitat of endangered or threatened species. The Act also provided that states entering into cooperative agreements with the Fish and Wildlife Service may receive grant-in-aid funds to manage federally-listed species within the state.

The 1973 Act defined "endangered species" and "threatened species" as follows:

> Endangered Species means any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man.
>
> Threatened Species means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Wildlife found in California and its offshore waters, which are on the federal list of endangered (E) and threatened (T) species, are as follows:

Insects
- Mission Blue Butterfly (E)
- Lotis Blue Butterfly (E)
- Palos Verdes Blue Butterfly (E)
- El Segundo Blue Butterfly (E)
- Smith's Blue Butterfly (E)
- San Bruno Elfin Butterfly (E)
- Lange's Metalmark Butterfly (E)
- Kern Primrose Sphinx Moth (T)
- Delta Green Ground Beetle (T)
- Valley Elderberry Longhorn Beetle (T)

Fishes
- Little Kern Golden Trout (T)
- Lahontan Cutthroat Trout (T)
- Paiute Cutthroat Trout (T)
- Mohave Chub (E)
- Bonytail Chub (E)
- Colorado Squawfish (E)
- Tecopa Pupfish (E)
- Owens Pupfish (E)
- Unarmored Threespine Stickleback (E)

Amphibians
- Santa Cruz Long-toed Salamander (E)
- Desert Slender Salamander (E)

Reptiles
- Blunt-nosed Leopard Lizard (E)
- Island Night Lizard (T)
- Coachella Fringe-toed Lizard (T)
- San Francisco Garter Snake (E)

Birds
- California Brown Pelican (E)
- Aleutian Canada Goose (E)
- California Condor (E)
- Bald Eagle (E)
- American Peregrine Falcon (E)
- California Clapper Rail (E)
- Light-footed Clapper Rail (E)
- Yuma Clapper Rail (E)
- California Least Tern (E)
- San Clemente Loggerhead Shrike (E)
- San Clemente Sage Sparrow (T)
- Santa Barbara Song Sparrow (E)

Mammals
- Morro Bay Kangaroo Rat (E)
- Salt Marsh Harvest Mouse (E)
- Sperm Whale (E)
- Gray Whale (E)
- Finback Whale (E)
- Sei Whale (E)
- Blue Whale (E)
- Humpback Whale (E)
- Right Whale (E)
- San Joaquin Kit Fox (E)
- Southern Sea Otter (T)

Severe penalties for those convicted of violating provisions of the Act can be imposed, and a reward system to encourage apprehension is provided. A person, other than a state or federal official, who gathers evidence leading to conviction can be rewarded up to a maximum of $2,500. A person also can commence a civil suit enjoining any person or governmental agency from violating provisions of the Act.

Cooperative Agreement

An important part of the federal Endangered Species Act is a provision that requires the Secretary of the Interior to negotiate cooperative agreements with states whose programs and authorities for managing federally-listed endangered and threatened wildlife meet certain minimum biological and legal standards. States which sign cooperative agreements with the Fish and Wildlife Service are eligible to receive federal grant-in-aid funds on a 2/3-1/3 federal-state matching basis.

In June 1976, California signed such an agreement and subsequently applied for and received grant-in-aid funds. With these funds, the Department has been able to expand its programs to better deal with the problems and needs of protecting and restoring endangered, threatened, and rare species, including state-listed species not on the federal list. Also, included in the grant-in-aid program are funds for acquiring critical habitat of endangered and threatened species.

Habitat Preservation

A key factor in the battle to preserve wildlife species lies in the preservation of the natural ecosystems in which these animals exist--ecosystems threatened by a rapidly changing environment. Preserving habitat for endangered species benefits numerous other species as well. The Salt Marsh Harvest Mouse, for example, is only a small part of the natural community of plants and animals in the tidal marshlands of the San Francisco Bay. But if the survival of this unique animal can be assured, a wide diversity of wildlife equally dependent on this habitat can be preserved. In short, endangered species preservation is habitat preservation.

Since 1970 the Department of Fish and Game has been acquiring habitat and preserving important natural ecosystems. A system of ecological reserves has been established and coastal wetlands, such as Upper Newport Bay and Bolsa Chica Marsh in southern California and Bair Island and other tidal marshlands in the San Francisco Bay area, have been preserved. Much of this has been accomplished through funds provided by the Environmental Protection and Research Act and special appropriations from the Legislature.

Other agencies of state government also have been responsive to the needs of endangered wildlife. The Department of Parks and Recreation has established natural preserves within the park system for the California Least Tern, the American Peregrine Falcon, Belding's Savannah Sparrow, the Light-footed Clapper Rail, San Francisco Garter Snake and Yellow-billed Cuckoo. Habitat important to the survival of the Morro Bay Kangaroo Rat and the Peninsular Bighorn Sheep was added to the Montana De Oro and Anza Borrego Desert state parks, and the establishment of the Morro Rock Natural Preserve in Morro Bay State Park gave protection to the endangered Peregrine Falcon. Also, the California Department of Transportation partially restored a breeding pond for the Santa Cruz Long-toed Salamander at Valencia Lagoon.

Federal agencies have made substantial contributions toward endangered species preservation by establishing national wildlife refuges, research natural areas and similar environmental protection units to protect critical habitat.

Contributions have also been made by county and city planning departments and local governments. An example is the preservation of the Palo Alto Marsh and Salt Marsh Harvest Mouse habitat by the City of Palo Alto through its Baylands Nature Interpretive Center. The County of San Mateo has committed itself to the protection of the San Bruno Elfin and Mission Blue Butterflies on San Bruno Mountain through acquisition of a large park, and it is sponsoring studies to prepare a habitat conservation plan for the portion of the Mountain subject to development.

Conservation organizations and concerned citizens' groups have provided additional impetus to endangered species habitat preservation. The California Natural Areas Coordinating Council has compiled an inventory of 2,300 natural areas and the University of California has established a Natural Land and Water Reserves System. The National Audubon Society, The Nature Conservancy, and the National Wildlife Federation are among conservation organizations prominent in preserving natural areas in California through acquisition and contributions of funds. The Nature Conservancy was instrumental in helping establish in the Department a new unit called the California Natural Diversity Data Base Program, one of whose objectives is to identify and catalogue locality data for all native fauna and flora in the state to enable government agencies to protect native species and their habitats.

This is not to say all that is needed has been accomplished. Much remains to be done, and with continuing and increased financial support and public interest, the state will be able to protect and conserve habitat essential to the preservation of California's endangered and rare fish and wildlife.

Recent Listing Changes

In October 1980, the State list of endangered and rare species was amended by action of the California Fish and Game Commission. The following species were

added to the endangered list: California Freshwater Shrimp; Bull Trout; Desert Pupfish; Coachella Fringe-toed Lizard; Elf Owl; Great Gray Owl; Least Bell's Vireo; Giant Kangaroo Rat; Amargosa Vole; and Inyo Brown Towhee. The Thicktail Chub, now probably extinct, was deleted from the endangered list. The following were added to the rare list: Trinity Bristle Snail; Shasta Crayfish; Magic Gecko; San Joaquin Antelope Squirrel; and Sierra Nevada Red Fox. The Modoc Sucker and the Fresno Kangaroo Rat were reclassified from rare to endangered. Also, the list now incorporates the Bald Eagle as the species rather than as the southern subspecies, and the scientific name of Wolverine was corrected to reflect the current taxonomic classification. These amendments were made to reflect our current knowledge about the status of state wildlife species and subspecies. The changes bring the total number of wildlife forms on the State endangered and rare list to 63, 14 more than had been included in the previous biennial report.

Species listed in this publication do not necessarily comprise all native species that are endangered or rare in the state. There is a need for citizens to provide information that would justify further investigation for species that may be in decline or already depleted. Persons with such information should contact the Department of Fish and Game, 1416 Ninth Street, Sacramento, CA 95814.

Endangered and Rare Species Accounts

The species accounts that follow summarize the actions taken by the Department of Fish and Game to fulfill the intent of the Legislature and the Congress with regard to endangered species legislation. Fauna species accounts are listed in phylogenetical order. Species status is discussed in each of the species accounts.

The animals on the following pages have been declared endangered by the California Fish and Game Commission because their continued existence is jeopardized by one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition or disease.

The animals that have been declared rare, although not presently threatened with extinction, are in such small numbers throughout their range that they may become endangered if their environments worsen.

All animals listed are protected and may be taken only for research purposes under a memorandum of understanding issued by the Department of Fish and Game, as authorized by the Fish and Game Commission.

Following the species accounts is a listing of extinct and extirpated wildlife species.

The fifth biennial report on the status of California's endangered and rare fish and wildlife was published by the Department of Fish and Game, E. C. Fullerton, Director, under the auspices of the Resources Agency, Huey Johnson, Secretary, and with the cooperation of the Fish and Game Commission, Elizabeth L. Venrick, Ph.D., Chairperson. The Report was edited by Robert D. Mallette, Wildlife Management Supervisor, and Stephen J. Nicola, Senior Fisheries Biologist, and produced by the Conservation Education Branch, Sacramento, California.

December 1980.

Gastropods

TRINITY BRISTLE SNAIL
(Monadenia setosa)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a medium-sized, dull-surfaced, brown to chestnut-colored snail, with a lighter peripheral band. The peripheral band may have a dark central stripe. The adult shell is 25-35 mm (1-1.4 in.) in diameter and has six whorls. The periostracum bears short translucent bristles from which M. setosa derives its name. Spider webs and small leaf particles often become entangled in the bristles making the snails more difficult to see. The body of the snail is dark gray with closely spaced russet or salmon-colored tubercles resulting in an overall light reddish-brown appearance. This species has been called the "California Northern River Snail" by the U. S. Fish and Wildlife Service.

DISTRIBUTION: The Trinity Bristle Snail is known from living individuals or shells at only four locations along Trinity River and its tributaries in Trinity County. This snail occurs near spring seeps on moist but generally well drained, somewhat stable, leaf mold covered slopes in mixed deciduous-coniferous forests and on stabilized, forested riparian benches. It is found only in the presence of hardwood overstory in moderate to deep shade. Juveniles up to 9 mm (.36 in.) diameter live beneath the loose bark of standing deadwood 0.5-3 m (1.64-9.84 ft.) above ground level. Larger juveniles and adults do not climb. Because it is uncommon, even within its restricted range and has a very distinctive shell, it is vulnerable to overharvesting by shell collectors.

RECOVERY EFFORTS: The Department and the U. S. Forest Service conducted or funded studies on the snail's distribution, abundance, and habitat requirements in 1978. The U. S. Forest Service recognizes M. setosa as a sensitive species and has developed an interim management plan for it.

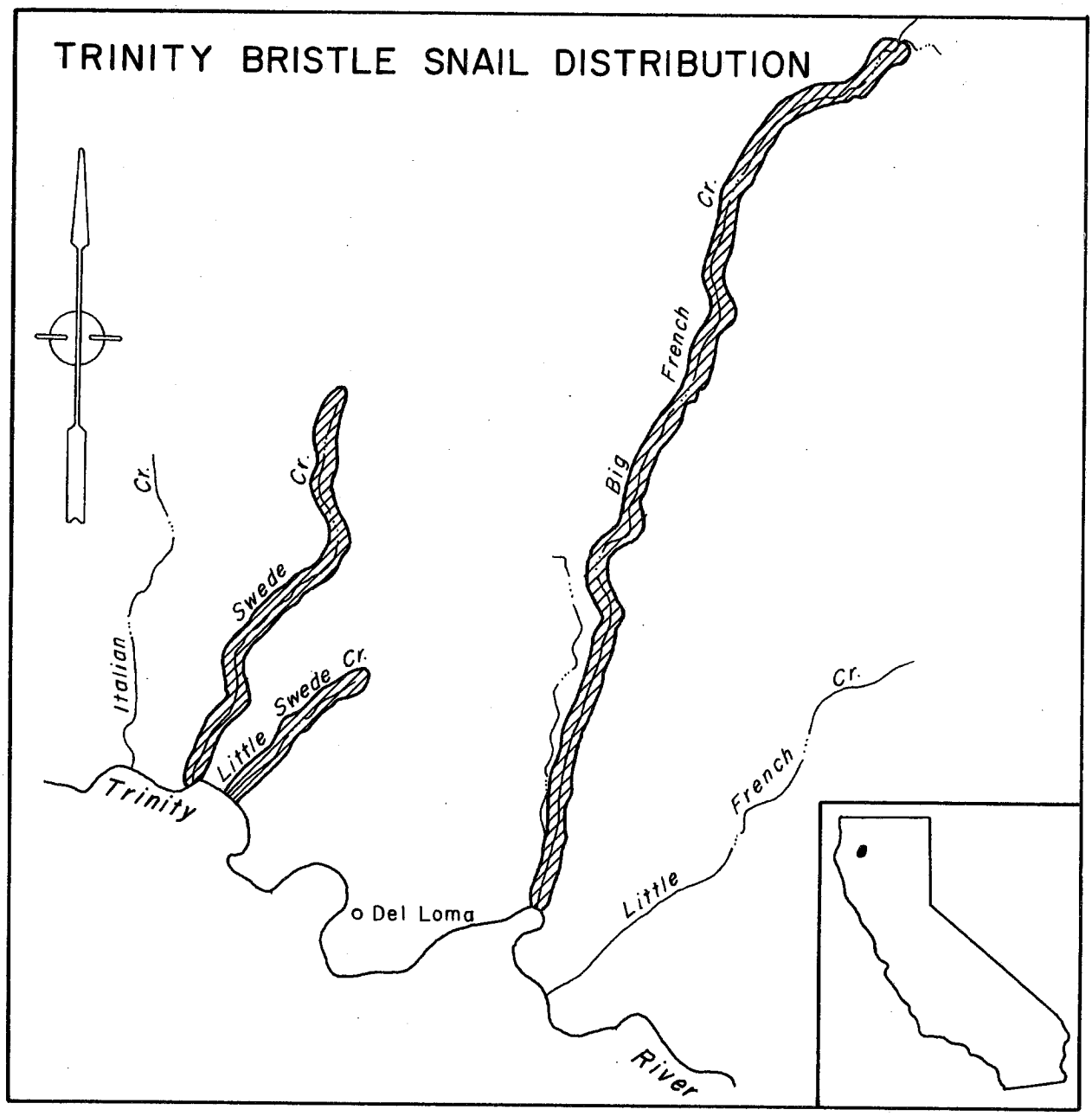
FUTURE MANAGEMENT: In light of a recent "new locality record" additional surveys for the species should be undertaken. Studies should be initiated on limiting factors, reproductive biology, and activity cycles to provide necessary information for the protection of the species.

REFERENCES:

Armijo, P. 1979. Monadenia setosa (California northern river snail). Interim species management plan. U. S. Forest Service, Shasta-Trinity National Forest. Unpublished MS. 24 pp.

Roth, B., and L. L. Eng. 1980. Distribution, ecology, and reproductive anatomy of a rare land snail, Monadenia setosa Talmadge. Calif. Fish Game 66(1):4-16.

Talmadge, R. R. 1952. A bristled Monadenia from California. Nautilus 66:47-50.



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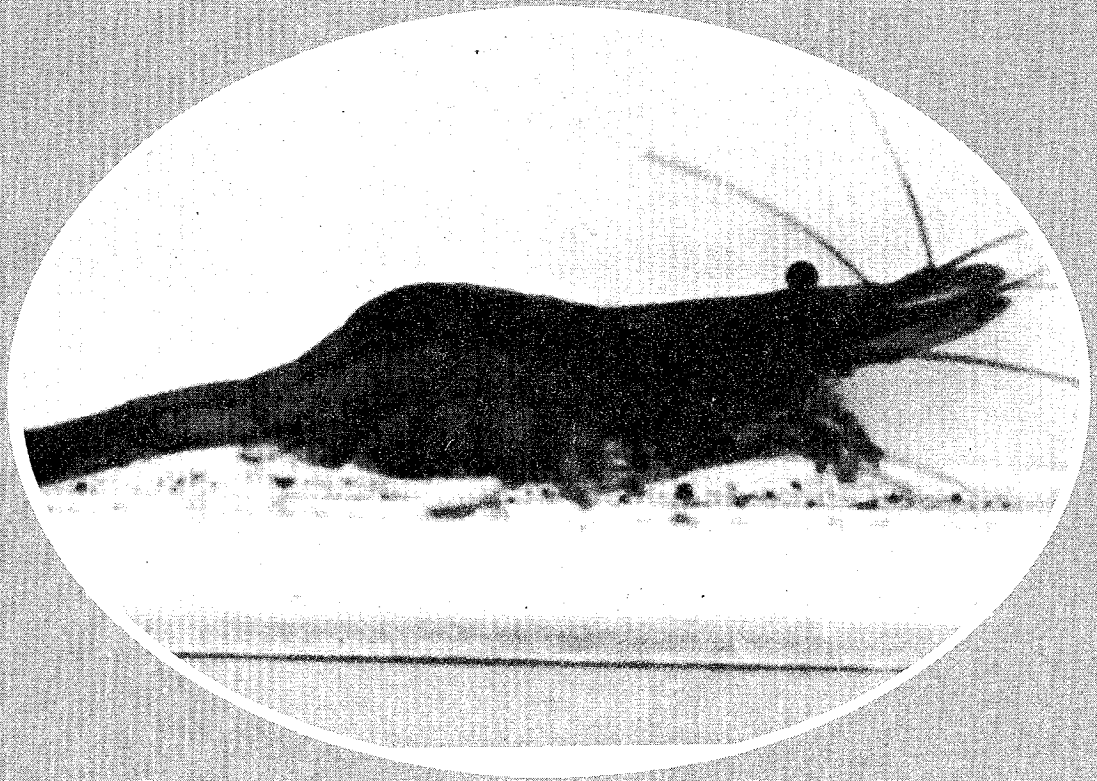
Crustaceans



CALIFORNIA FRESHWATER SHRIMP
(Syncaris pacifica)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: Syncaris pacifica is a small shrimp seldom exceeding 50 mm (2 in.) total length. Males and juveniles are translucent to nearly transparent. Females may be translucent, but often are dark reddish-brown to nearly black. These dark individuals may or may not exhibit a broad tan dorsal band. The first and second pereiopods (walking legs) are chelated and have terminal tufts of setae. Exopods are present on the legs even in the adult stage. A short spine above the eye (supraorbital) and a prominent rostrum are also present. The rostrum has 0-3 dorsal spines and up to 10 ventral spines.

DISTRIBUTION: This species is endemic to Marin, Napa, and Sonoma counties where it lives in shallow, low-gradient streams with good riparian cover and undercut banks. Originally it was abundant in several streams in the three county area. As recently as 1964 S. pacifica still occurred in at least 10 streams. By 1975 it had apparently been extirpated from five of these localities. Causes for the decline of populations are related to increased residential and agricultural development and the resultant increased demand for water. Some formerly perennial streams are now dry during the summer. Impoundments have further reduced essential habitat, grazing has collapsed undercut banks, and clearing has reduced riparian vegetation.

RECOVERY EFFORTS: The Department has conducted studies on the distribution, habitat requirements, and life history of this species. These studies are continuing.

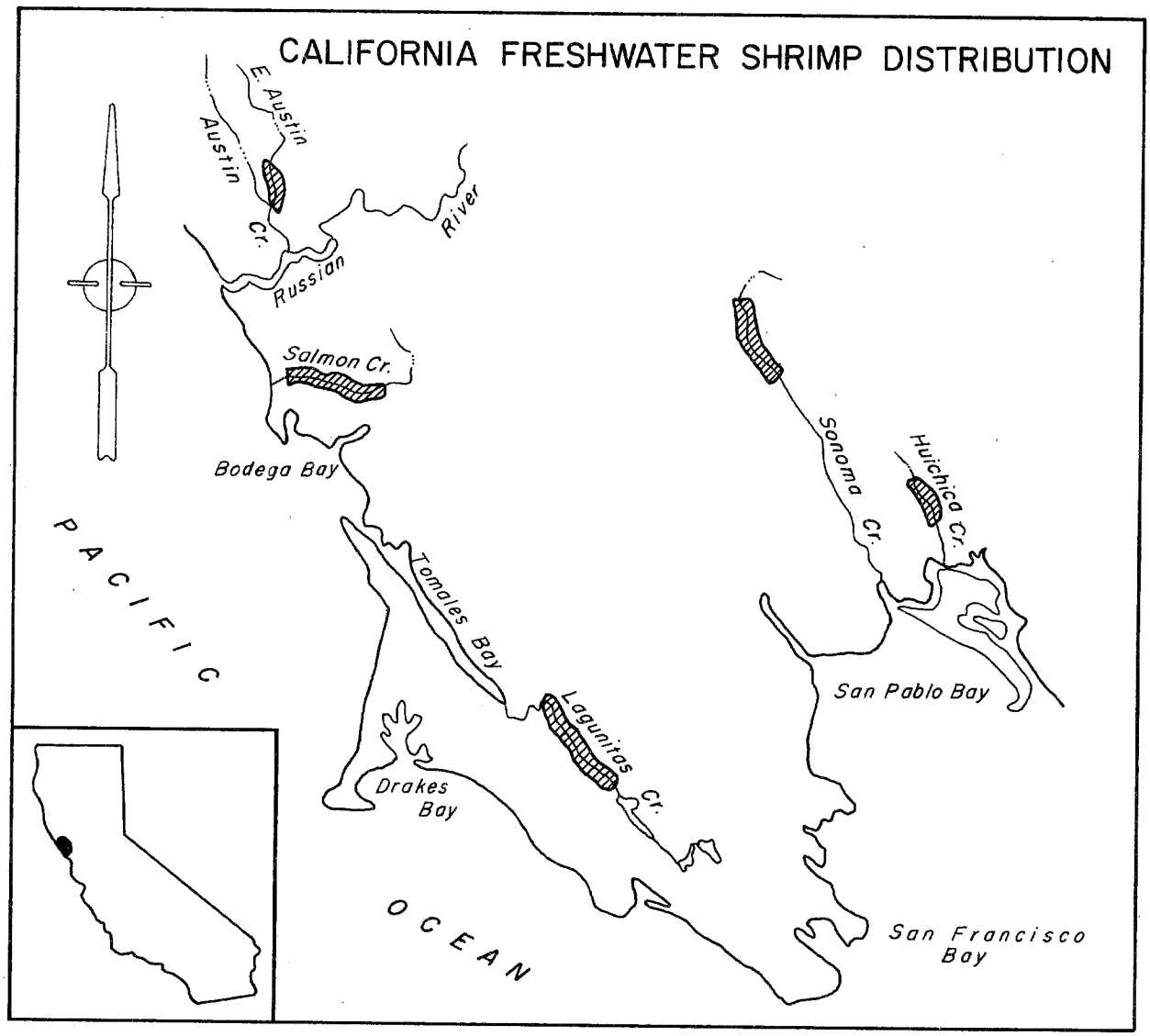
FUTURE MANAGEMENT: In streams such as Lagunitas Creek with flows controlled by upstream dams, it is important to establish the minimum winter flushing flows necessary to maintain the essential undercut banks and prevent excessive siltation. Streams where shrimp populations have been extirpated need to be surveyed to determine the feasibility of restocking. Studies must be implemented to determine the importance of upstream movement by the shrimp in maintaining their populations. A memorandum of understanding with the California Department of Parks and Recreation should be prepared in order to provide maximum protection for the shrimp on state park lands.

REFERENCES:

Born, J. W. 1968. Osmoregulatory capacities of two caridean shrimps, Syncaris pacifica (Atyidae) and Palaemon macrodactylus (Palaemonidae). Biol. Bull. 134:235-244.

Hedgpeth, J. W. 1968. The Atyid shrimp of the genus Syncaris in California. Int. Rev. Ges. Hydrobiol. 53:511-524.

_____. 1975. California fresh and brackishwater shrimps, with special reference to the present status of Syncaris pacifica (Holmes). Final Rep., U. S. Fish Wild. Serv., Off. Endang. Spec., Contract 14-16-008-841. 27 pp. + 7 fig.



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SHASTA CRAYFISH
(Pacifastacus fortis)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: Pacifastacus fortis is a small- to medium-sized crayfish, adults are 26-50 mm (1.04-2 in.) carapace length, which is typically brownish green to dark brown dorsally and bright orange ventrally. Occasional individuals are blue with salmon undersides. The rostrum is denticulate (toothed) and the chela (claws) are large and robust. This species has been called the "Placid Crayfish" by the U. S. Fish and Wildlife Service.

DISTRIBUTION: This relictual species is found only in northeastern Shasta County. It is restricted to Fall River, Hat Creek, and that section of Pit River which connects them. The historical range of the Shasta Crayfish was probably not much greater than its present range; however, water and agricultural developments and an increasing human population have reduced available habitat, and the introduction of exotic crayfish has created additional threats to the species. It is usually found on sandy bottoms among rubble in cool, clear waters associated with large springs.

RECOVERY EFFORTS: The Department conducted or funded studies on the distribution, abundance, and habitat requirements of this species during 1978 and 1979. Monitoring of the populations is continuing. Take and use of crayfish as bait in Pit River and all its tributaries between Lake Britton Dam and Fall River-Cassel Road Bridge near Fall River Mills was prohibited by the Fish and Game Commission (December, 1980).

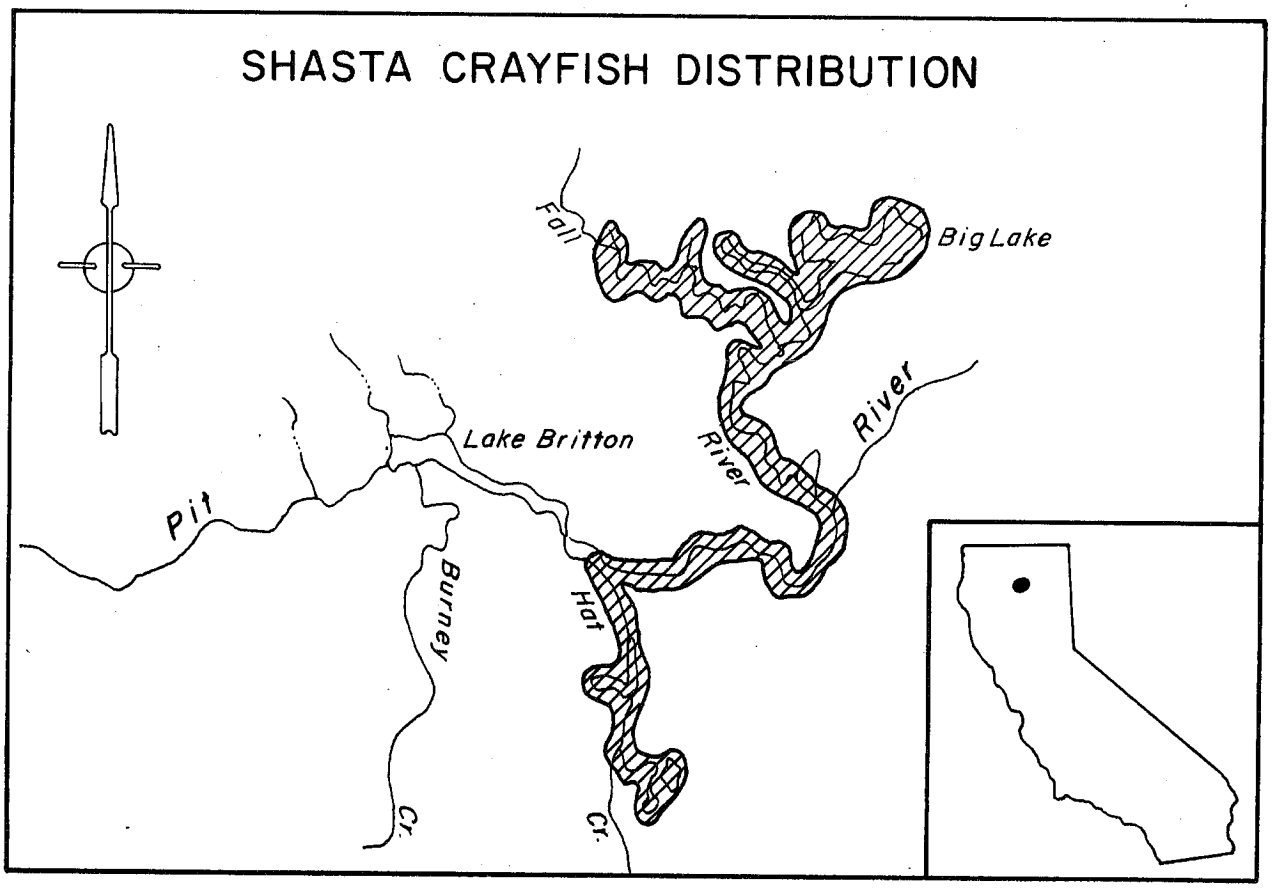
FUTURE MANAGEMENT: The reproductive success, food requirements, longevity, and other aspects of the biology and population dynamics of this species need to be determined. Shasta Crayfish populations and populations of the exotic crayfish introduced within Shasta Crayfish range should be monitored.

REFERENCES:

Bouchard, R. W. 1977. Distribution, systematic status, and ecological notes on five poorly known species of crayfishes in western North America (Decapoda: Astacidae and Cambaridae). Freshwater Crayfish. 3:409-423.

_____. 1978. Taxonomy, distribution, and general ecology of the genera of North American crayfishes. Fisheries. 3:11-19.

Hobbs, H. H., Jr. 1972. Crayfishes (Astacidae) of North and Middle America. U. S. Environmental Protection Agency, Water Pollution Control Research Series, Identification Manual 9. 173 pp.



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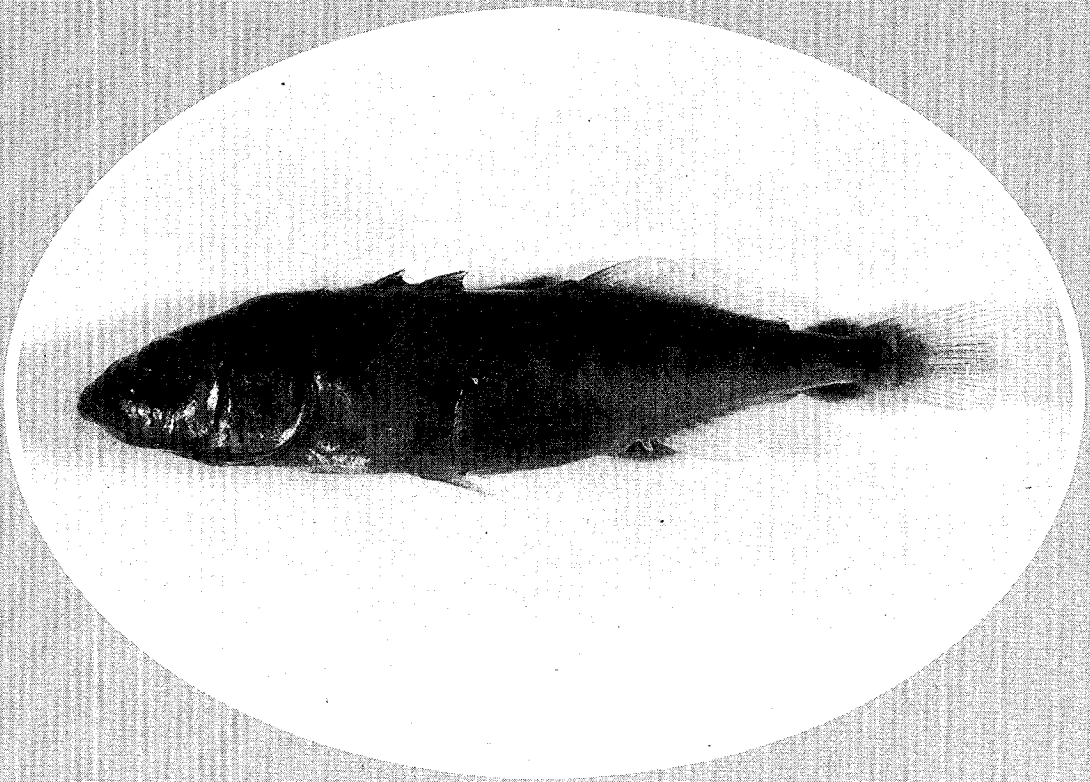
Fishes



BULL TROUT
(Salvelinus confluentus)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Bull Trout is actually a char which closely resembles the Dolly Varden (Salvelinus malma) in appearance yet differs meristically, osteologically and physically for example, the head is broader and longer. Bull Trout are olive green with small yellowish spots on the back and small distinctive red spots on the sides. There are no black spots or wavy lines on the body or fins, which helps distinguish it from Brook Trout (Salvelinus fontinales) and Brown Trout (Salmo trutta). The leading edges of the paired and anal fins are white or cream colored and all fins are free of any spotting except for a few yellowish spots on the base of the tail.

DISTRIBUTION: Bull Trout are primarily non-anadromous occuring in a north-south distributional pattern along the Rocky Mountain and Cascade ranges of North America. They are most frequently found in interior drainages such as those of the Frazier and Columbia River Systems. In California the Bull Trout is native only to the McCloud River of Shasta and Siskiyou counties. Preferred habitat is deep pools of coldwater rivers, ideally less than 15.6 C (60 F).

Historically, Bull Trout were reported to be relatively abundant in the McCloud River downstream from Lower Falls. Since the completion of Shasta Dam, there has been a slow decline in Bull Trout abundance. Shasta Dam blocked migrating King Salmon from their historical spawning grounds on the McCloud River. It is suspected that the young salmon were an important food source for Bull Trout.

Since the completion of McCloud Dam and the diversion of a major portion of the river flow to the Pit River drainage in 1965, the primary habitat of the Bull Trout has been radically altered and there has been a dramatic decline in Bull Trout abundance to the point where they are approaching extirpation today. Stream flow has been reduced up to 90 percent and water temperatures have substantially increased in much of the river. The dam blocked off and inundated spawning areas. All of these factors have probably provided Rainbow and Brown Trout with a competitive advantage over the Bull Trout.

RECOVERY EFFORTS: Recovery efforts are just beginning and have been largely limited to fish population data from the McCloud River drainage collected during routine fisheries management surveys. Lake Shasta for example has been routinely sampled by gill net surveys and creel census since 1952. McCloud Reservoir was surveyed by creel census and gill sampling during 1973 and 1974. Since 1975 the Department has creel censused the 5 mile reach of the McCloud River immediately below the reservoir.

An indepth population study was conducted on a portion of this river reach in 1975 by the University of California. During the summer of 1977 and 1978 an intensive search for Bull Trout was made on the river from Lower Falls downstream to Lake Shasta. Underwater observations and gill net and hook and line sampling was used in an effort to locate and capture Bull Trout for artificial propagation.

Although over 11,000 trout were examined no Bull Trout were collected and none have been observed in the river since the last confirmed report in 1975. In 1976 the

Department made take and possession of Bull Trout illegal and in 1980, the Fish and Game Commission added the Bull Trout to the state endangered species list.

FUTURE MANAGEMENT: Currently the Department is seeking cooperation and participation from the operators of the Pit-McCloud Hydroelectric Project in preparing and implementing a recovery plan for the Bull Trout. This could involve maintenance stocking. Also the Department will maintain surveillance over timber harvesting and other habitat altering activities within the McCloud River drainage and make recommendations to protect habitat.

REFERENCES:

Cavender, T. M. 1978. Taxonomy and distribution of the bull trout, Salvelinus confluentus (Suckley) from the American northwest. Calif. Fish Game. 64(3):139-174.

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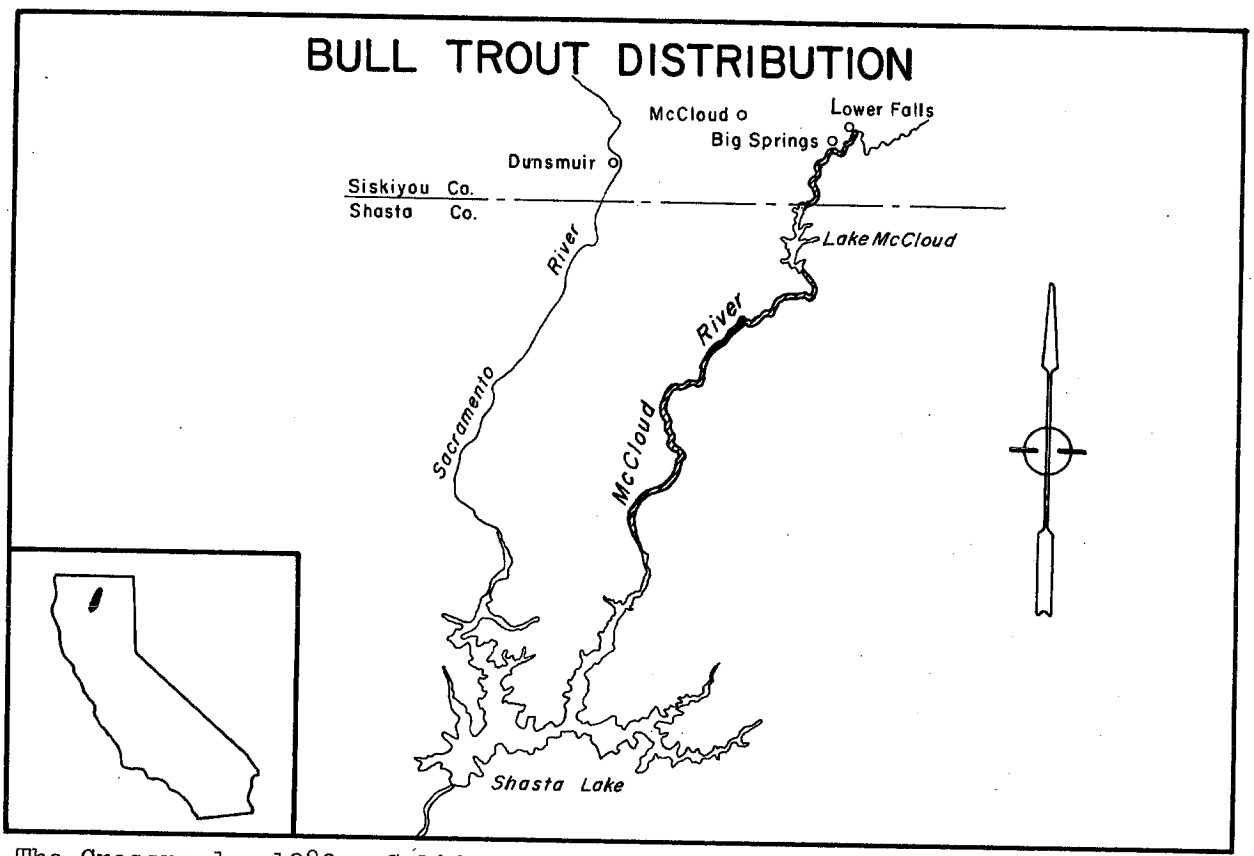
Rode, M. and D. A. Hoopaugh, Status of the bull trout, Salvelinus confluentus (Suckley), in California, MS, in prep., Calif. Dep. Fish Game, Sacramento.

Wales, J. H. 1939. General report of investigation on the McCloud River drainage in 1938. Calif. Fish Game 25(4):272-309.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

MOHAVE CHUB
(Gila bicolor mohavensis)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: Miller (1973) placed Gila bicolor mohavensis as a subspecies of G. bicolor. This subspecies can be distinguished by its rather slab-sided body, with a relatively deep caudal peduncle. It has only apical radii on its scales, typically 8 anal fin rays and from 18-29 gill rakers. The color is dark olive above to bluish or creamy white on the belly. There are brilliant bluish or gold reflections on the sides, giving a metallic appearance.

DISTRIBUTION: This subspecies was originally found in the Mojave River from above the junction of the east and west forks downstream to Soda Lake. In its native habitat, it is now restricted to Lake Tuendae and nearby springs at Fort Soda (formerly the Zzyzx Mineral Springs Resort) on the west side of Soda Lake near Baker, San Bernardino County. It has also been successfully introduced into three artificial refugia in southern California. The Arroyo Chub (G. orcutti) was introduced into the Mojave River and has hybridized with the Mohave Chub in all areas except in existing refugia.

RECOVERY EFFORTS: Although the Mohave Chub population at Fort Soda has been flourishing, in 1969 the Department started transplanting Mohave Chub into various refugia. To date 12 introductions have been made, three have been successful (Desert Research Station, Barstow Way Station and Lark Seep Lagoon), and the status of a fourth (Lake Norconian) is uncertain. Habitat improvement work has been carried out at Fort Soda and the chub population is doing well.

FUTURE MANAGEMENT: Additional habitat improvement work at Fort Soda is planned for 1980, including creation of an additional "study pond", improvement of the water supply system and removal of emergent aquatic plants from the main lake and spring habitats. Studies of the early life history and habitat requirements are also planned. Additionally, an intensive survey of the entire Mojave River drainage will be conducted. Specimens collected on this survey will undergo standard taxonomic identification as well as electrophoretic examination. Information on abundance and distribution obtained from these surveys will be used to develop a status report and a species management plan. Additional transplant locations will also be evaluated for their suitability.

REFERENCES:

Hubbs, C. L., and R. R. Miller. 1943. Mass hybridization between two genera of cyprinid fishes in the Mohave Desert, California. Pap. Mich. Acad. Sci. Arts Let. 28(1942):343-378.

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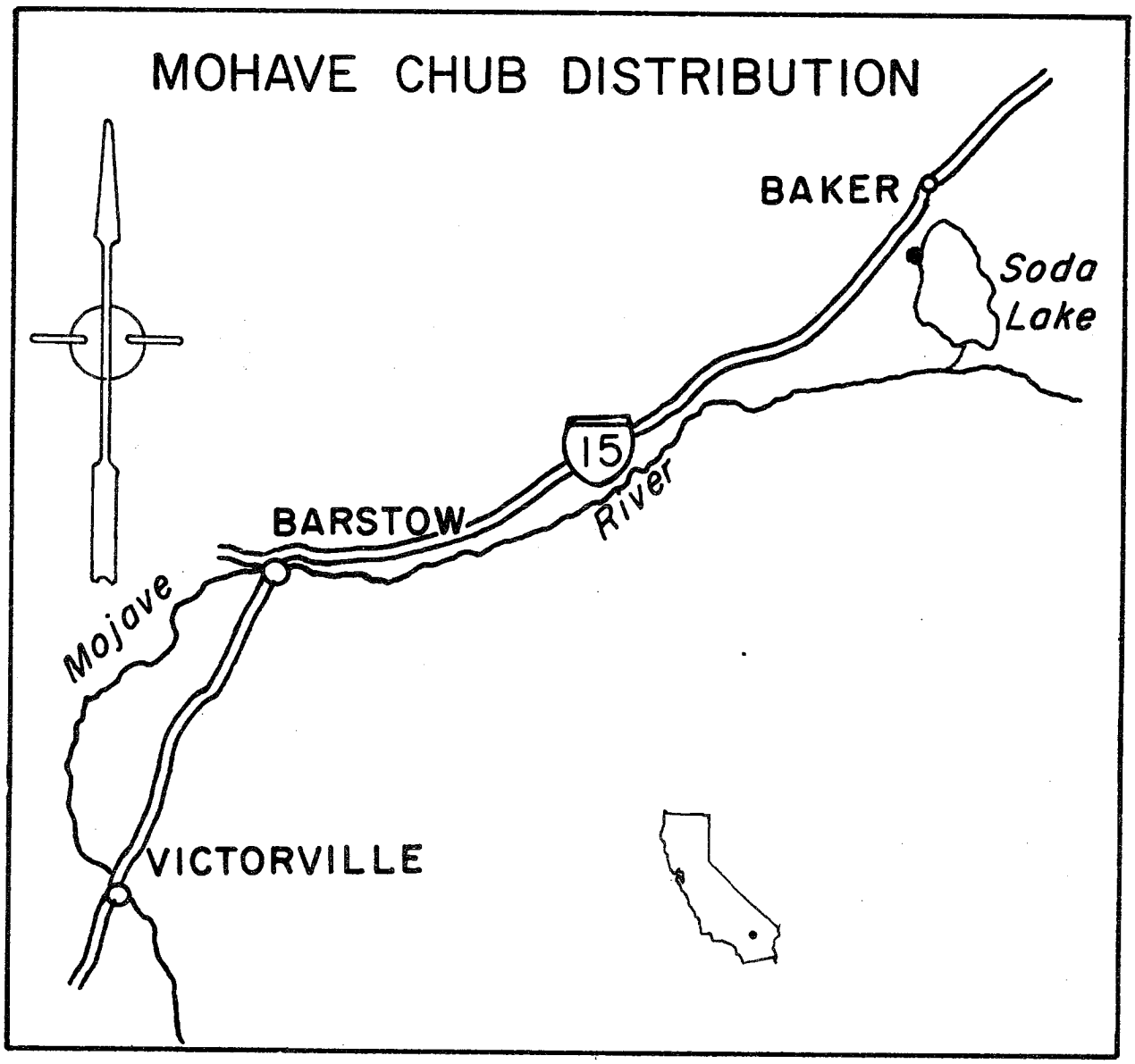
St. Amant, J. A., and S. Sasaki. 1971. Progress report on re-establishment of the Mohave Chub, Gila mohavensis (Snyder), an endangered species. Calif. Fish Game 57:307-308.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

OWENS TUI CHUB
(*Gila bicolor snyderi*)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: This subspecies usually has from 52-58 lateral line scales which possess lateral as well as apical radii, 7 anal rays, and 10-14 gill rakers. In life it is dusky olive above and whitish below, with blue and gold reflections along the side. There is considerable gold on the side of the head, often strongest along the margin of the preopercle. The fins are generally washed with olive-brown or reddish brown; the pelvics and anal becoming pale posteriorly, but lacking a definite whitish border.

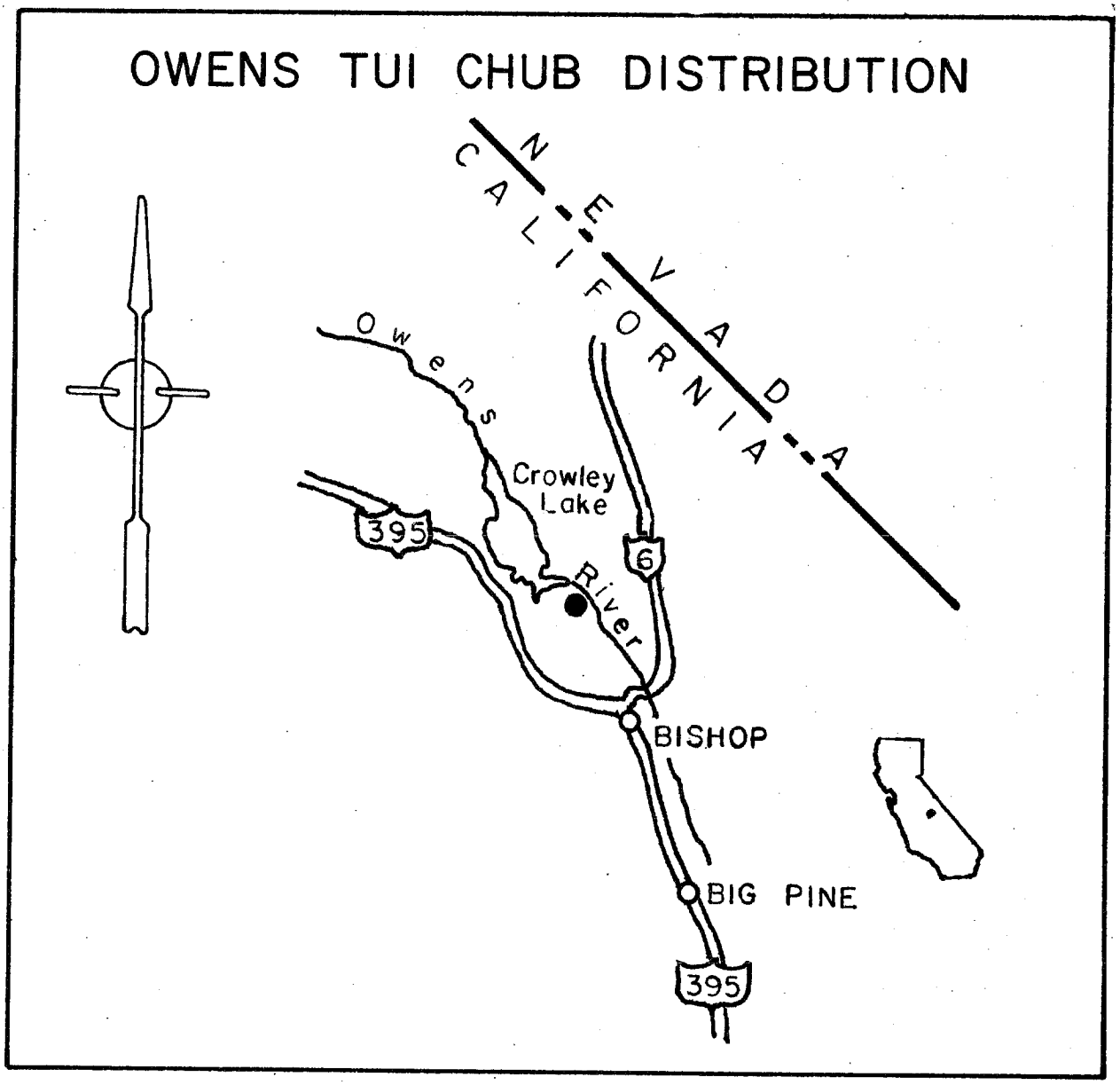
DISTRIBUTION: Formerly found throughout the Owens River basin in Mono and Inyo counties, the only pure population now known is located in a 13 km (8 miles) section of the Owens River channel below Crowley Lake dam. A few individuals were transplanted into Owens Valley Native Fish Sanctuary in 1974. Diversion of most of the Owens River below Crowley Lake has eliminated the bulk of the native habitat for this species. Illegal introductions of the Lahontan Tui Chub into Crowley Lake has eliminated through hybridization the population of Owens Tui Chub there.

RECOVERY EFFORTS: A survey of the Owens Tui Chub population in the Owens gorge below Crowley Lake dam is presently being conducted. Information on habitat requirements, basic life history, and present status should provide the necessary data to develop a species management plan.

FUTURE MANAGEMENT: The population transplanted into the Owens Valley Native Fish Sanctuary has remained limited primarily because of the limited amount of habitat. The size of the sanctuary habitat was increased during 1979/80, and additional chubs will be introduced. Other locations will be evaluated as potential transplant sites for Owens Tui Chub. A status report and species management plan will be developed.

REFERENCE:

Miller, R. R. 1973. Two new fishes, *Gila bicolor snyderi* and *Catostomus fumeiventris*, from the Owens River basin, California. Univ. Mich. Mus. Zool. Occ. Pap. 667:1-19.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

BONYTAIL CHUB
(Gila elegans)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This is a large chub native to the Colorado River drainage. It grows to about 61 cm (2 ft). It has a short head with a broad snout. The back is sharply arched behind the head, particularly in adults. The caudal peduncle is extremely long and slender and nearly round in cross section. The dorsal and anal fins are large and sickle-shaped, and the caudal fin is long, pointed, and deeply forked. The eyes are small and set low on the head. Color is bluish above and pale below.

DISTRIBUTION: Historically, the Bonytail Chub occurred in the mainstream of the Colorado River and the lower-gradient portions of its major tributaries. It is now mostly confined to the lower Yampa and Green rivers, with possibly only a remnant population persisting in lakes Mohave and Havasu and the California portion of the Colorado River. Habitat alteration caused by construction of large dams are believed to have blocked access to major spawning areas. Reduced water temperatures, elevated salinity in the lower river, and introduced exotics have also reduced reproduction and recruitment.

RECOVERY EFFORTS: A Colorado River Fishes Recovery Team was appointed by the Fish and Wildlife Service to determine the abundance and distribution of the Bonytail Chub in the Colorado River, and to determine what measures are necessary for its survival and replenishment. Surveys of the upper Colorado River are currently being conducted.

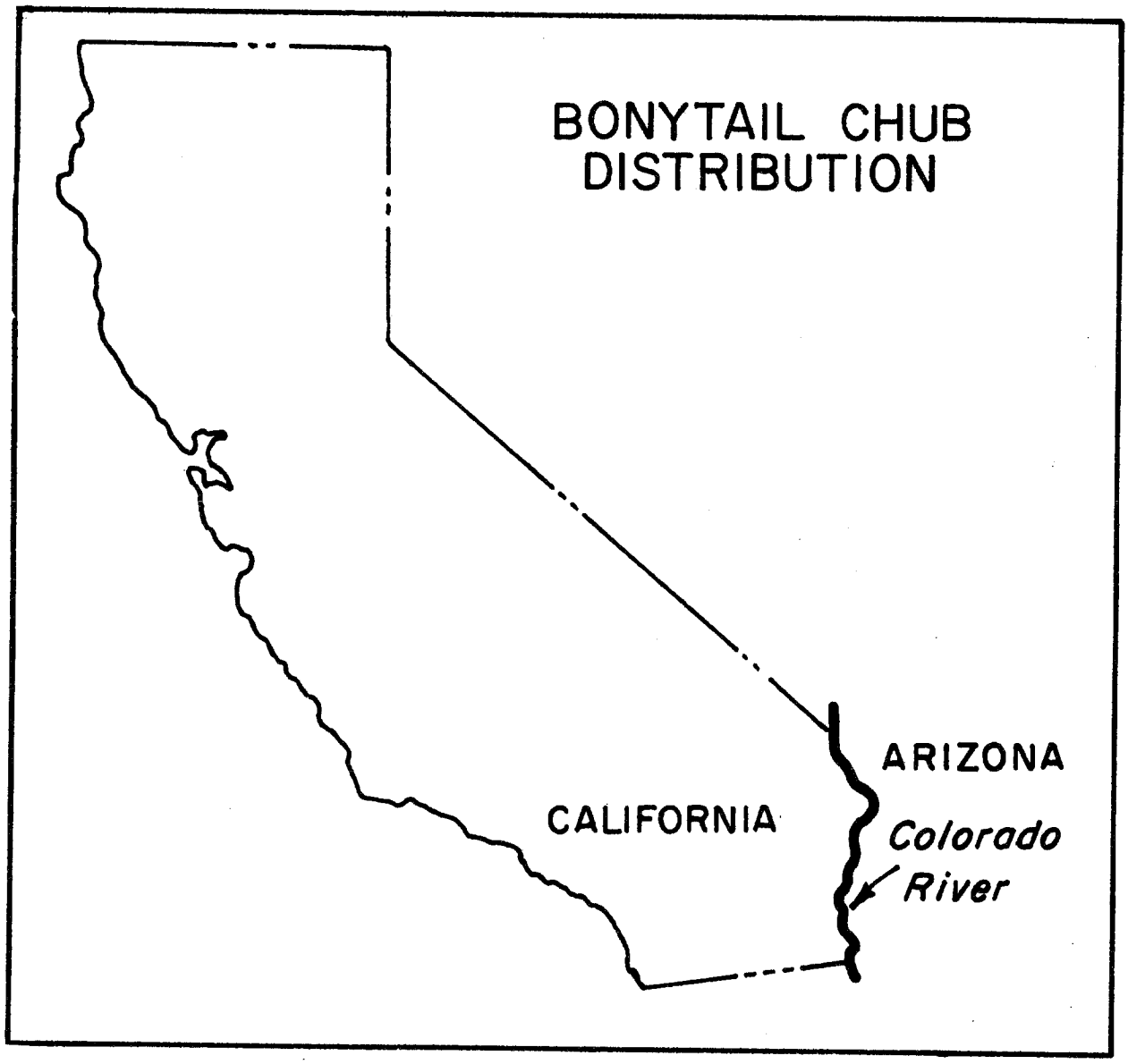
FUTURE MANAGEMENT: Artificial propagation or a spawning channel may be needed to restore this species in California. Efforts to capture adult Bonytail Chub to provide a broodstock for artificial propagation at Willow Beach NFH will continue. Surveys of the lower Colorado River, lakes Mohave and Havasu will continue. A recovery plan will be prepared and management recommendations will be implemented.

REFERENCES:

Beland, R. D. 1953. The effect of channelization on the fishery of the lower Colorado River. Calif. Fish Game 39:137-139.

Dill, W. A. 1944. The fishery of the lower Colorado River. Calif. Fish Game 30:109-211.

Holden, P. B. and C. B. Stalnaker. 1975. Distribution and abundance of mainstream fishes of the middle and upper Colorado River basins, 1967-1973. Trans. Amer. Fish. Soc. 104(2):217-231.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

COLORADO SQUAWFISH
(Ptychocheilus lucius)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This is one of the largest minnows in the world. It has been reported to reach lengths of more than 150 cm (5 ft.) and weights of 36 kg (80 lb). The head may make up one-quarter of the total body length. It has a somewhat pike-like appearance but there are no teeth in the mouth. The head is long, slender, and depressed, with a large mouth and small eyes. The scales are small, with 80-90 in the lateral line, which is strongly decurved anteriorly. Coloration is dusky-greenish above, silvery on the sides, and yellowish to white on the belly.

DISTRIBUTION: Originally abundant throughout the Colorado River and major tributaries in slow, deep water, it is now present only in a few localities in the upper drainage (Green River in Wyoming and the Yampa River in Utah and Colorado). It has not been seen below Glen Canyon Dam in northern Arizona since 1968. Extensive habitat alterations, including channelization, the construction of large reservoirs, the lowering of river water temperatures, flow reductions, increasing salinity of the lower Colorado River, and the introduction of exotic fishes have probably prevented successful reproduction and recruitment in the lower river.

RECOVERY EFFORTS: A Colorado River Fishes Recovery Team was appointed by the Fish and Wildlife Service to determine the status of the squawfish in the Colorado River, and to determine what measures are necessary for its survival and replenishment. The Team has prepared a draft recovery plan and the agencies involved are presently finalizing the plan and beginning to implement the recommendations. The Fish and Wildlife Service is rearing squawfish broodstock and juveniles at Willow Beach National Fish Hatchery, Arizona. Eventually these fish will be restocked throughout the Colorado River. Offspring from these broodstock are also being reared at the Department's Chino Fish and Wildlife Base and at a refugium near the Colorado River.

FUTURE MANAGEMENT: Artificial propagation or development of a spawning channel may be the only ways to restore this species in California. Work on artificial propagation will continue and fish will be marked and released at key locations along the lower Colorado River. Further studies on movement, behavior and preferred habitat are also planned. A management plan for the lower Colorado River will be developed.

REFERENCES:

Colorado River Fishes Recovery Team. 1978. Colorado Squawfish Recovery Plan. U. S. Fish Wildl. Serv., Denver. 31 pp.

Holden, P. B., and C. B. Stalnaker. 1975. Distribution and abundance of mainstream fishes of the middle and upper Colorado River basins, 1967-1973. Trans. Amer. Fish. Soc. 104(2):217-231.

Minckley, W. L. 1973. Fishes of Arizona. Ariz. Game Fish Dep., Phoenix. 293 pp.

Vanicek, C. D., and R. H. Kramer. 1969. Life history of the Colorado squawfish Ptychocheilus lucius, and the Colorado chub, Gila robusta, in the Green River in Dinosaur National Monument, 1964-1966. Trans. Amer. Fish. Soc. 98:193-208.

Winn, H. E., and R. R. Miller. 1954. Native postlarval fishes of the lower Colorado River basin, with a key to their identification. Calif. Fish Game 40:273-285.

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

LOST RIVER SUCKER
(Catostomus luxatus)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: This is a large sucker that may grow to 97 cm (3 ft). The head is long and slender. The mouth is subterminal and very protrusible. The gillrakers are short and triangular. Color is pale to dark above and white to cream below.

DISTRIBUTION: This species is native to the Lost River drainage and the upper Klamath River. Currently, populations are known to exist in the Clear Lake Reservoir and its tributary, the Lost River in Modoc County, and in Iron Gate Reservoir and Copco Lake on the Klamath River, Siskiyou County. Lakes and deep pools within streams are preferred habitat. Like other suckers, this species migrates up rivers in the spring to spawn.

RECOVERY EFFORTS: Distribution surveys of the Lost River drainage above and below Clear Lake dam were conducted in 1973 and 1975. Specimens for taxonomic analysis were collected from the Lost River drainage in 1978 and 1979, and from Copco Lake in 1979 and 1980.

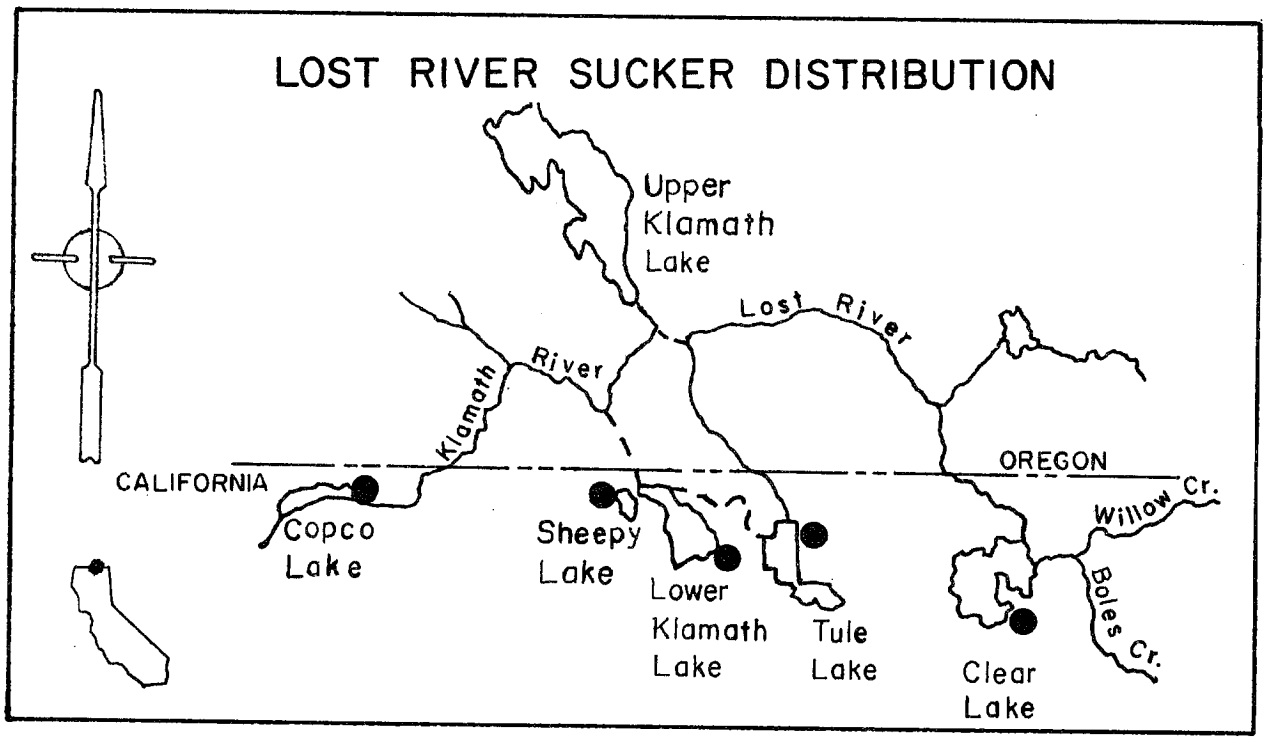
FUTURE MANAGEMENT: The Department is continuing to study the abundance, distribution, and biology of this fish throughout its known range. A management plan will be prepared and recommendations made in an attempt to prevent further habitat loss and to restore habitat within the Lost River. The Department will investigate the possibility of establishing a minimum pool at Clear Lake Reservoir, screening the outflow of Clear Lake Dam, setting a minimum flow in the Lost River, and installing fish screens on agricultural diversions in the Lost River.

REFERENCES:

Andreasen, J. K. 1975. Systematics and status of the family Catostomidae in southern Oregon. Ph.D. Disser. Oregon State Univ., Corvallis. 76 pp.

Coots, M. 1965. Occurrences of the Lost River Sucker, Deltistes luxatus (Cope), and Shortnose Sucker, Chasmistes brevirostris Cope, in northern California. Calif. Fish Game 51:68-73.

Koch, D. L., and G. P. Contreras. 1973. Preliminary survey of the fishes of the Lost River system. Univ. Nevada, Desert Res. Inst., Reno, Proj. Rep. 23, 45 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

MODOC SUCKER
(Catostomus microps)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: A small sucker rarely reaching 20 cm (8 in). The scales are small with 79-89 lateral line scales. The dorsal fin has 10 or 11 rays (rarely 12). Body coloration varies from dark above and white below with no markings to black above with highly mottled sides and white below. Males in spawning condition have nuptial tubercles on the ventral fins and a bright reddish lateral band.

DISTRIBUTION: This species is known only from eight tributaries to the Pit River: Turner, Hulbert, Washington, Dutch Flat, Johnson, and Rush creeks, Modoc County, and Ash and Willow creeks, Lassen County. It is found in large shallow pools with mudsubstrates, in partially shaded streams, and pools within intermittent streams. Threats to the species arise from habitat alteration by channelization, water diversion, and grazing practices, and from hybridization with the Sacramento Sucker (C. occidentalis).

RECOVERY EFFORTS: Several cooperative studies of the Modoc Sucker have been completed. In 1973 and 1974 a study of its distribution, abundance, and habitat requirements was completed by the Department and the University of California at Davis. In 1977 the Department and Modoc National Forest completed a study of habitat conditions, transplant sites, and taxonomic characters. In 1978 the Department and Modoc National Forest completed a study of spawning behavior and spawning habitat requirements. Additionally the Water and Power Resources Service sponsored a study of the Modoc Sucker in the Pit River and its tributaries by the Desert Research Institute of the University of Nevada during 1979. The Modoc National Forest and the Department are jointly preparing a management plan for the species.

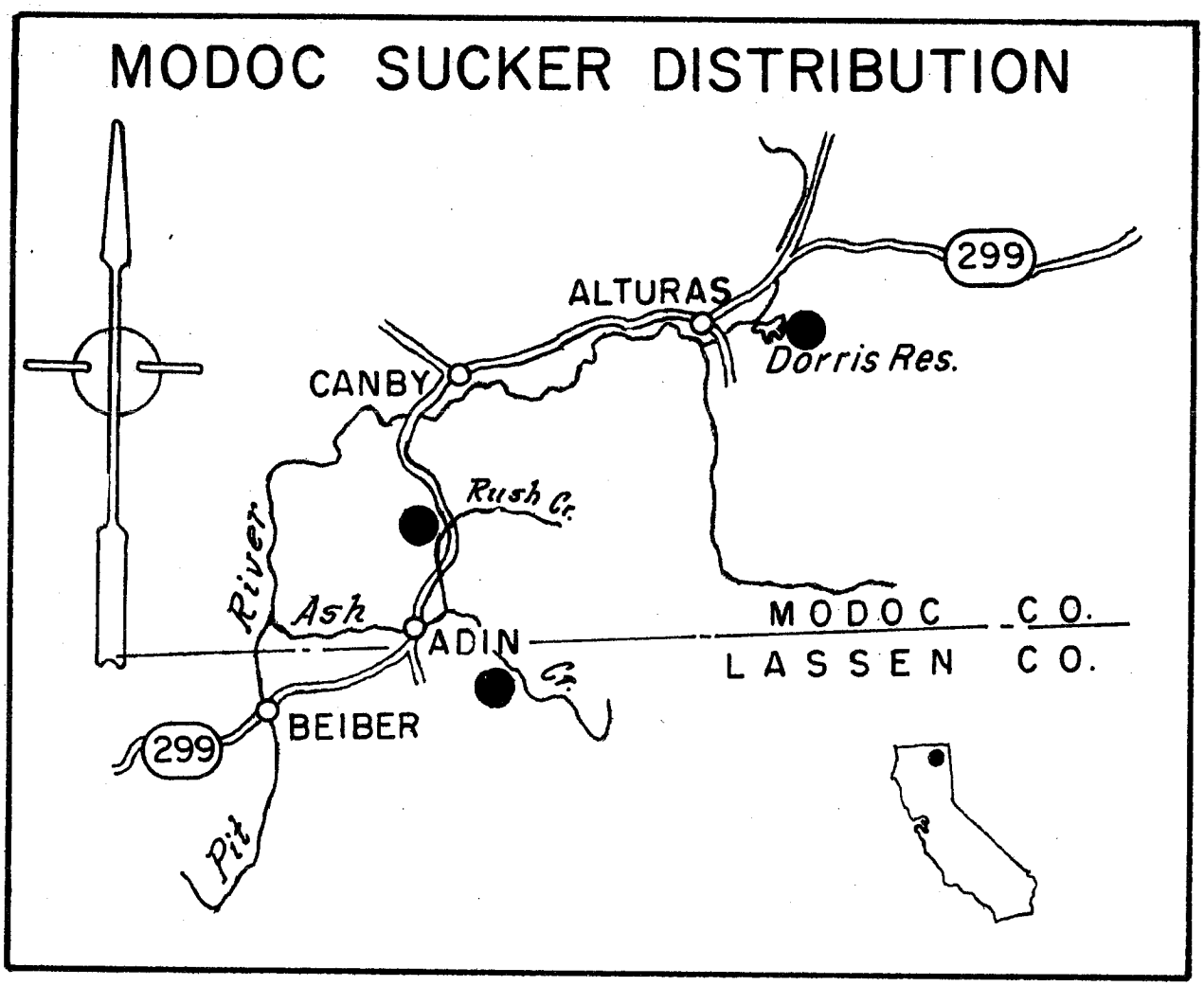
FUTURE MANAGEMENT: Future management efforts will be aimed at developing and implementing a plan protecting and restoring existing habitats, transplanting Modoc Suckers into additional streams in the Pit River system, and constructing barriers to prevent Sacramento Suckers from entering streams occupied by Modoc Suckers.

REFERENCES:

Boccone, V., and T. J. Mills. 1979. Spawning behavior and spawning substrate preference of the Modoc sucker, Catostomus microps (Rutter). Calif. Dep. Fish Game, Inland Fish. End. Spec. Program Special Publ. 79-2. 33 pp.

Cooper, J., D. Koch, and E. Lider. 1979. A fishery investigation of the Modoc sucker (Catostomus microps) and the rough sculpin (Cottus asperrimus) in the Pit River drainage between Turner Creek and Juniper Creek, Lassen and Modoc counties, California. Univ. Nev., Desert Res. Inst., Reno. U.S.D.I. Contract Study No. 8-07-20-V0030. 79 pp.

Mills, T. J. 1980. Life history, status, and management of the Modoc sucker, Catostomus microps (Rutter) in California with a recommendation for endangered classification. Calif. Dep. Fish Game, Inland Fish. End. Spec. Program Special Publ. 80-6, 35 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SHORTNOSE SUCKER
(Chasmistes brevirostris)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: This is a heavy-bodied lake sucker, nearly round in cross section, that may grow to 51 cm (20 in). The mouth faces forward, and the thin lips lack papillae. The gill rakers are branched and bear tufts of fine filaments. The color is dark above and white to cream colored below.

DISTRIBUTION: Although the historical records of this species are sketchy, the species probably occurred in upper and lower Klamath Lakes, Tule Lake and other rich shallow lakes of the upper Klamath-Lost River system. Today only a remnant population of this species remains in Copco Reservoir, Siskiyou County. It is found in association with a more abundant population of hybrid lake suckers (Shortnose Sucker x Klamath Largescale Sucker). This species has been extirpated from Clear Lake Reservoir and Lost River, Modoc County. Its decline there is attributed to the construction of the dam at Clear Lake Reservoir, export of water from Lost River, an unsuccessful effort to reclaim Tule Lake for agricultural purposes, other losses of habitat, and hybridization with the Klamath Largescale Sucker. This planktivore is ideally suited for lacustrine existence. Spawning occurs in the spring in streams tributary to the Lake, probably over gravel bottoms in clear cool water.

RECOVERY EFFORTS: Recent emphasis has been in collecting specimens for taxonomic analysis. Past effort includes distribution surveys of the Lost River drainage above and below Clear Lake Reservoir in 1973 and 1975.

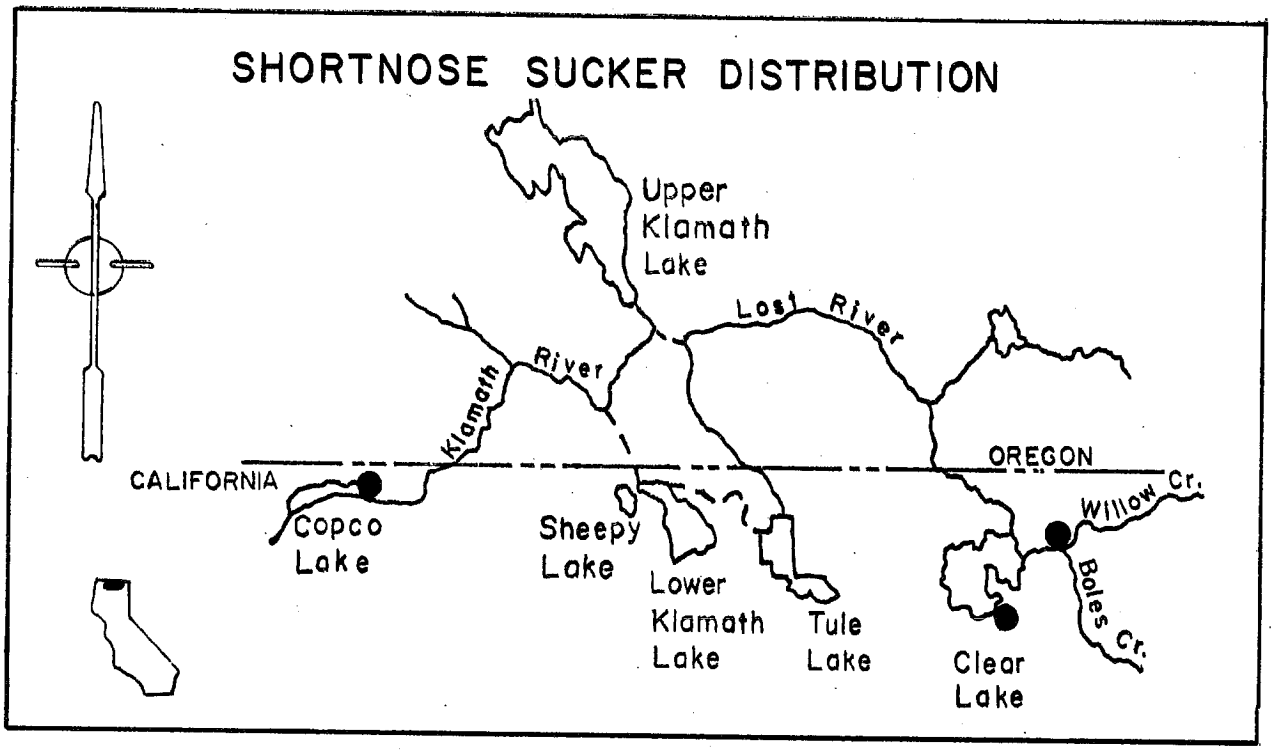
FUTURE MANAGEMENT: Efforts in managing this species include continued sampling to collect and identify additional unhybridized specimens and in determining their abundance. A status report will be prepared describing past and present taxonomic studies, its biology, habitat modification, and causes of hybridization.

REFERENCES:

Andreasen, J. K. 1975. Systematics and status of the family Catostomidae in southern Oregon. Ph.D. Disser., Oregon State Univ., Corvallis. 76 pp.

Coots, M. 1965. Occurrences of the Lost River sucker, Deltistes luxatus (Cope), and shortnose sucker, Chasmistes brevirostris Cope, in northern California. Calif. Fish Game 51(2):68-73.

Koch, D. L., and G. P. Contreras. 1973. Preliminary survey of the fishes of the Lost River system. Univ. Nevada, Desert Res. Inst., Reno, Proj. Rep. 23. 45 pp.



At the Crossroads, 1980. Calif. Dep. of Fish and Game.

HUMPBACK SUCKER
(Xyrauchen texanus)

CLASSIFICATION: State- Endangered
Federal - Not Listed

DESCRIPTION: This species is also called the Razorback Sucker because of the sharp-edged hump just behind the head. This feature is most prominent in larger individuals. The remaining morphological features are typical of other California suckers. The Humpback Sucker grows to about 61 cm (2 ft) and 3.6-4.5 kg (8-10 lb). Color is olivaceous, except during spawning when the dorsal surface turns dark brown to black, and the ventral surface turns bright yellow to orange.

DISTRIBUTION: Formerly found throughout mainstem Colorado River and its major tributaries in association with Colorado Squawfish and Bonytail Chub. It is now found in reduced numbers above Lake Powell, with even smaller populations in lakes Mohave and Havasu. Occasionally taken by anglers in California, it has also been collected by biologists in Senator Wash Reservoir, where they seem more abundant than elsewhere in the California portion of the Colorado River. The population decline was probably the result of habitat alteration caused by dams and channelization, and by competition and predation by introduced species. Limited spawning habitat and water level fluctuations during the spawning season have also caused the present population status.

RECOVERY EFFORTS: A Colorado River Fishes Recovery Team was appointed by the Fish and Wildlife Service to determine abundance and distribution of the Humpback Sucker in the Colorado River, and to determine what measures are necessary for its continued survival. Studies on spawning behavior, movement patterns, and habitat preference are currently being conducted at Senator Wash Reservoir. This information will provide baseline data for preparing a species management plan. The species can be artificially propagated in hatchery facilities.

FUTURE MANAGEMENT: Additional studies need to be carried out at both Senator Wash Reservoir and the Lower Colorado River to determine population status and possible limiting factors. Artificial propagation or development of spawning areas or channels within the Colorado River may be necessary to restore this species in California. A recovery plan needs to be developed and management recommendations implemented.

REFERENCES:

Dill, W. A. 1944. The fishery of the lower Colorado River. Calif. Fish Game 30: 109-211.

Douglas, P. A. 1952. Notes on the spawning of the humpback sucker, Xyrauchen texanus (Abbott). Calif. Fish Game 38:149-155.

Gustafson, E. S. 1975. Early development, adult sexual dimorphism, and fecundity of the razorback sucker, Xyrauchen texanus (Abbott). U. S. Fish Wildl. Serv., Albuquerque, Contract 14-16-0002-3585, 28 pp.

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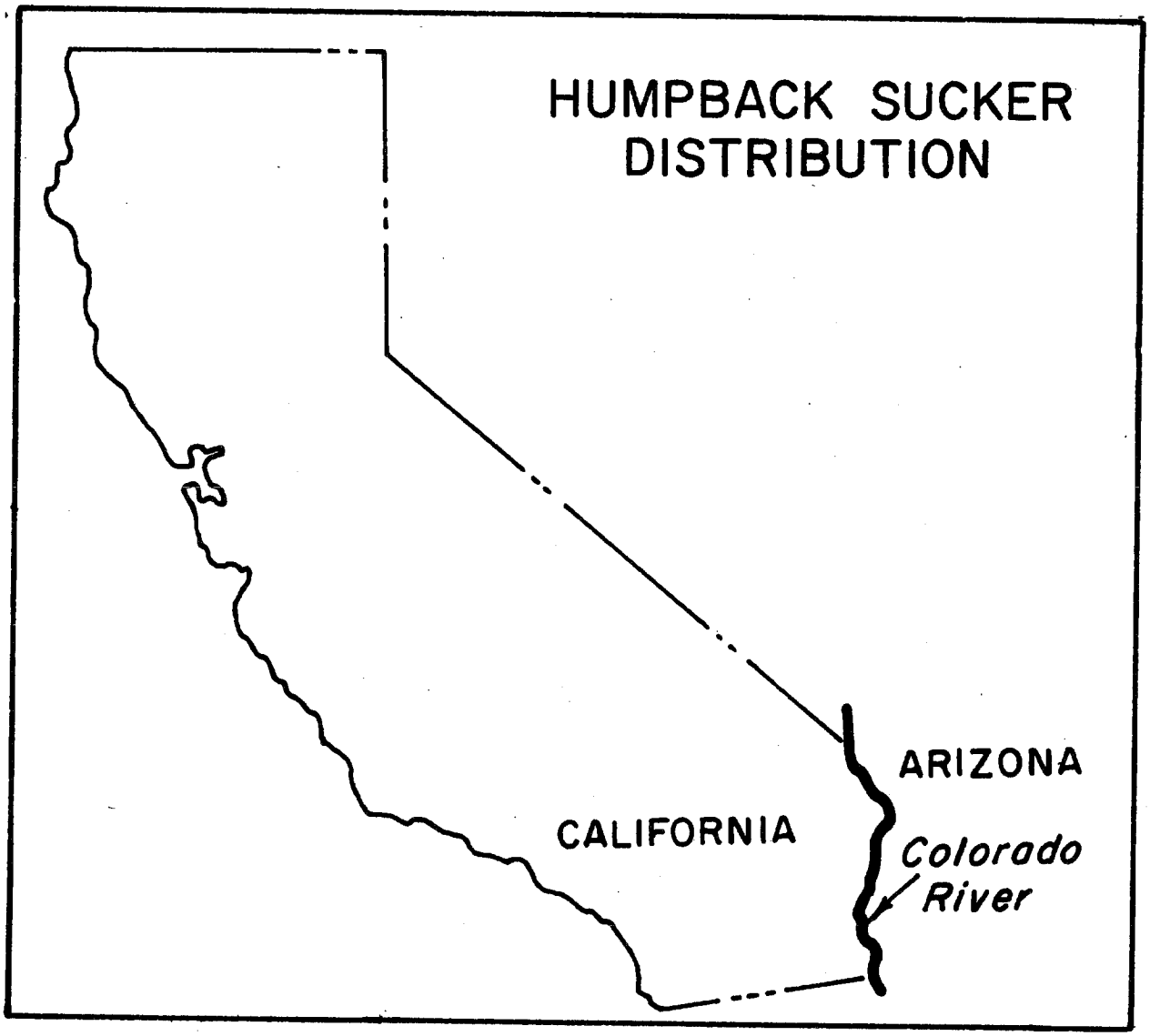
Mamika, K. 1979. A literature review and summary report on the razorback sucker (Xyrauchen texanus). U. S. Bur. Land Manage., Yuma, Contract AZ-050-PH9-107, 16 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

DESERT PUPFISH
(Cyprinodon macularius)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: This is a small, less than 75 mm (3 in.), chunky fish with a single series of incisorlike teeth in each jaw. The central cusp on the tricuspid teeth is spatulate like C. milleri. The dorsal fin is equidistant between the base of the caudal fin and the snout. C. macularius also has spinelike projections on the circuli of the scales. Males are larger and stouter than females and during the breeding season they become bright blue with lemon yellow tails and caudal peduncles. The tail has a black terminal band. Females are tan to olive with a lateral band of 5-8 disrupted vertical bars. Males also possess the bars but they are not as prominent.

DISTRIBUTION: Originally C. macularius were found in California, Arizona, and Baja California, along the lower Colorado and Gila rivers, and in the Sonoyta River of northern Sonora, Mexico. Populations along the California portion of the Colorado River have disappeared following damming, channelization and the introduction of exotic game and forage fishes. As the Imperial and Coachella valleys developed, the populations of pupfish in the desert springs were extirpated by habitat damage and the introduction of exotic species.

The Desert Pupfish became established in Salton Sea subsequent to its formation in 1905. They originated from either the Colorado River or from the desert springs that may have been flooded by the sea (most likely from both sources). Subsequently they flourished along the shoreline and in the several agricultural drains that enter the sea.

In the last decade Tilapia (Tilapia zillii), introduced in an attempt to control aquatic weeds in canals, and mollies (Poecilia spp.), escapees from a tropical fish farming venture, have become established in the Salton Sea and surrounding drains. Their numbers have grown while the pupfish has declined to the point where it is now an insignificant component of the fish fauna.

Department surveys in 1978 and 1979 revealed that the last remaining natural habitats in California are lower San Felipe Creek, a tributary to the Salton Sea, and a wetlands area adjoining San Felipe Creek, San Sebastian Marsh. Both habitats also contain nonnative fishes, but because the habitat is still natural and undisturbed, the pupfish remains abundant. Presently the pupfish population in these areas is estimated at 5000 fish. Today, C. macularius occur in three habitat types: artificial manmade refugia; marginal habitats in and around the Salton Sea (shoreline pools and agricultural drains); and a natural desert spring habitat in the San Felipe Creek drainage.

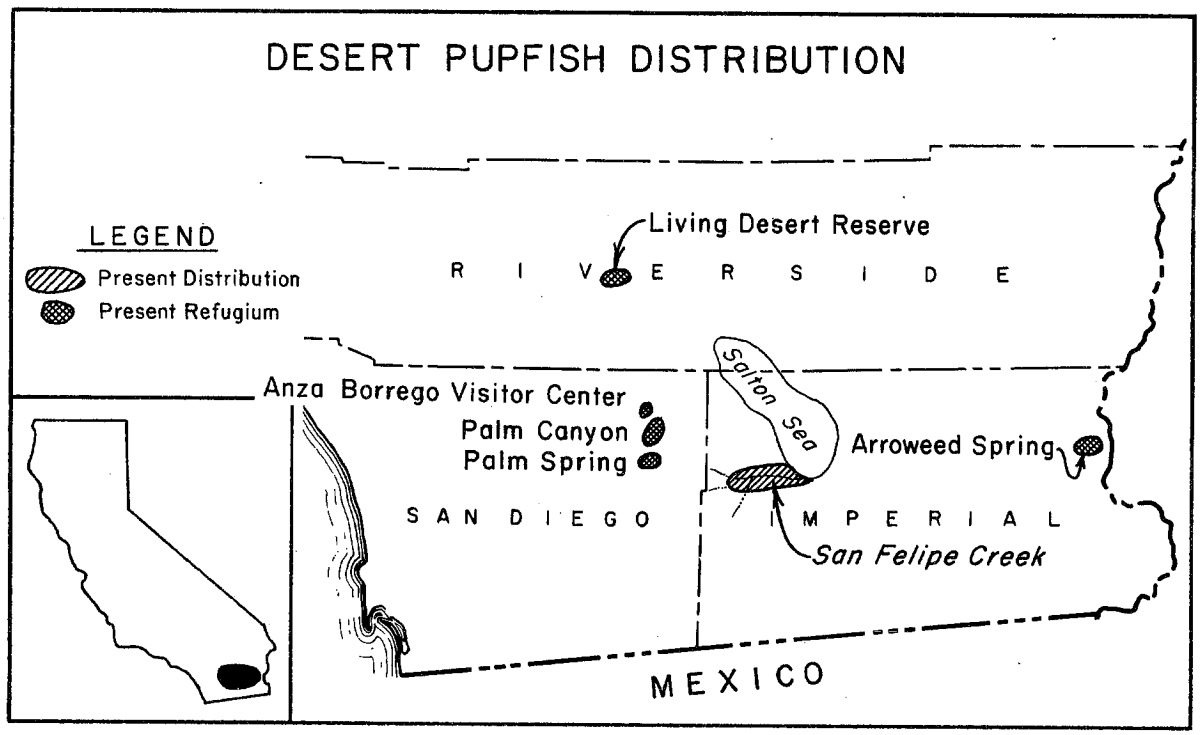
RECOVERY EFFORTS: Although the Desert Pupfish was only recently (1980) listed by the State of California as an endangered species, much work has already been put into protection of the species, primarily in establishing refugia to prevent total loss of the species. The first refugium for desert pupfish was established at Palm Canyon, San Diego County, within the Anza Borrego Desert State Park in 1970. In 1972, a second refugium was established at the Living Desert Reserve, Riverside County. A third refugium was established at Arrowweed Spring, Imperial County, in

1975. A fourth refugium was established at Palm Spring in 1978, again within the Anza Borrego State Park. The last refugium was also established within the Anza Borrego State Park at the Visitor Center. All refugia populations are small but doing well.

FUTURE MANAGEMENT: Work is currently underway to either exchange or acquire lands along San Felipe Creek. The area is threatened by proposed agricultural development and subdivision of the adjacent and surrounding private lands using groundwater for irrigation. It is possible that groundwater pumping will reduce the flow of water to the springs feeding the marshes and lower the water table to the point where permanent water areas will not exist throughout the summer months. The feasibility of installing a concrete spillway downstream of the permanent water area on San Felipe Creek is also being studied. This barrier would prevent upstream movement of exotic species from the Salton Sea into San Felipe Creek during periods of flood. Exotic fish species which currently occur within lower San Felipe Creek will be removed to prevent population expansion.

REFERENCE:

Black, G. F. 1980. Status of the desert pupfish, Cyprinodon macularius (Baird and Girard), in California. Calif. Dep. Fish Game, Inland Fish. Endang. Spec. Program Special Publ. 80-1, 42 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

COTTONBALL MARSH PUPFISH
(Cyprinodon milleri)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This species is distinguished from other pupfishes by having a shorter and narrower caudal peduncle, more lateral and predorsal scales, and reduced or absent pelvic fins. This species is similar to other Death Valley pupfishes (C. salinus, C. nevadensis) in coloration and degree of sexual dimorphism. Individuals of both sexes have 7 or 8 vertical bars on the sides. The dorsal fin is blackened in males, and melanophore concentrations also occur at the distal margins of the pectoral, anal, and caudal fins. In live females the caudal, anal and pectoral fins are clear.

DISTRIBUTION: C. milleri is known only from Cottonball Marsh, Death Valley National Monument, California. The marsh itself is an extremely fragile habitat which has some unique environmental characteristics. The pupfish occupies the small pools and interconnecting channels which range in salinity from 14 o/oo-160 o/oo. The interconnecting marsh channels offer fairly stable temperatures, fluctuating only 2 or 3 degrees per day, but the pools may fluctuate as much as 15 C (59 F) each day.

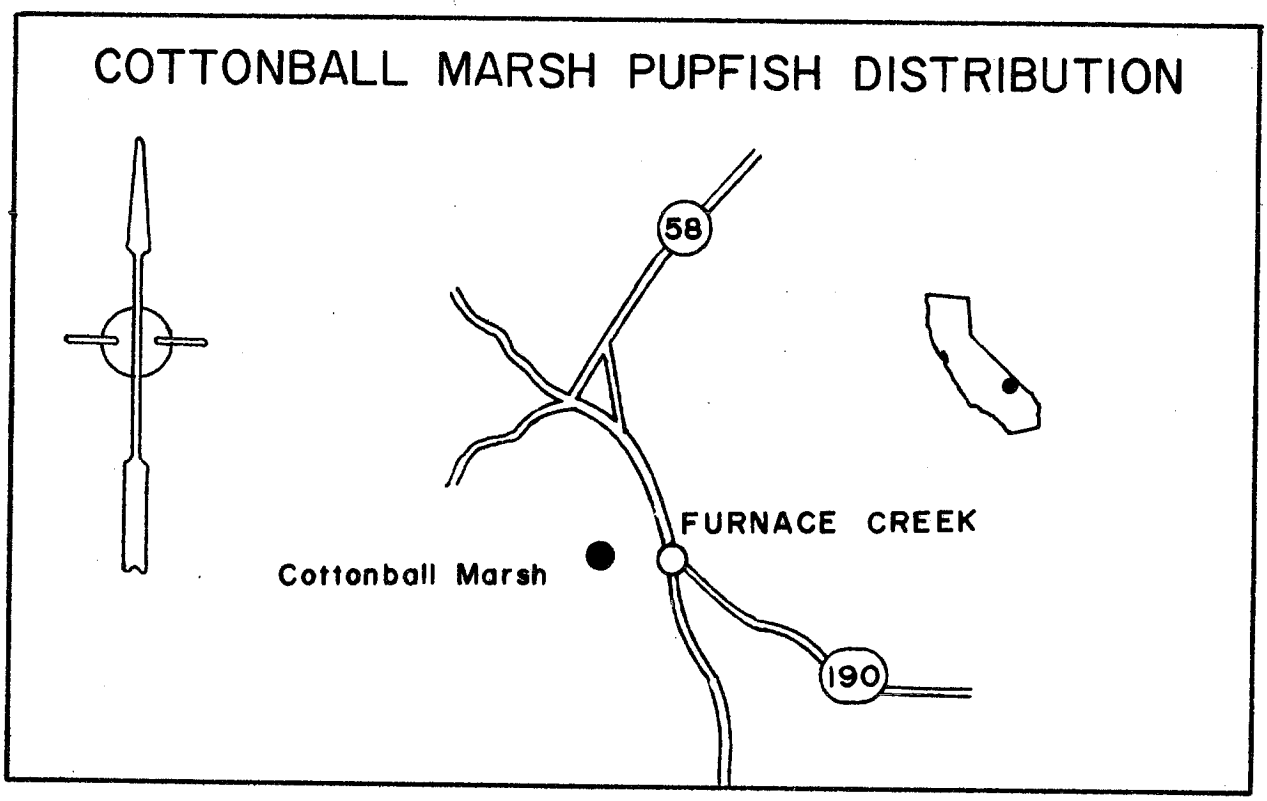
RECOVERY EFFORTS: Because the marsh is in a remote area of the national monument, visitor impact has been low. Additional protection for this fragile salt marsh terrain is currently being sought in legislation which designates as wilderness an area of the monument that includes Cottonball Marsh. This wilderness recommendation was submitted to Congress in 1976 but no action has been taken to date. The National Park Service conducts periodic flights over the marsh to monitor existing conditions. A status report-management plan has been completed.

FUTURE MANAGEMENT: In cooperation with the National Park Service, the Department will continue to monitor the pupfish population at Cottonball Marsh to keep abreast of any developments that may affect its well-being. Water flow to the marsh also will be monitored and additional biological data on C. milleri will be obtained.

REFERENCES:

Courtois, L. A. 1980. Origin, status, and future management of the Cottonball Marsh pupfish, Cyprinodon milleri (La Bounty and Deacon), in Death Valley, California. Calif. Dep. Fish Game Inland Fish. End. Spec. Prog. Special Publ. 80-4. 27 pp.

La Bounty, J. F., and J. E. Deacon. 1972. Cyprinodon milleri, a new species of pupfish (family Cyprinodontidae) from Death Valley, California. Copeia 1972 (4):769-780.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

TECOPA PUPFISH
(Cyprinodon nevadensis calidae)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This fish is similar to other pupfishes, but has larger scales, a narrower interorbital, and more posteriorly placed pelvic fins, each with 6 rays. The dorsal fin is farther back than on the Owens Pupfish (C. radiosus). The caudal fin of males has a prominent black edge, but otherwise this species is similar in color to C. radiosus.

DISTRIBUTION: This subspecies was originally found only in the outflows of North and South Tecopa Hot Springs, Inyo County, from which it has been eliminated. Surveys have been conducted to determine if the subspecies may exist elsewhere, but no new populations have been found. Elimination of the Tecopa Pupfish from its original locality was due to habitat alteration and the introduction of mosquitofish.

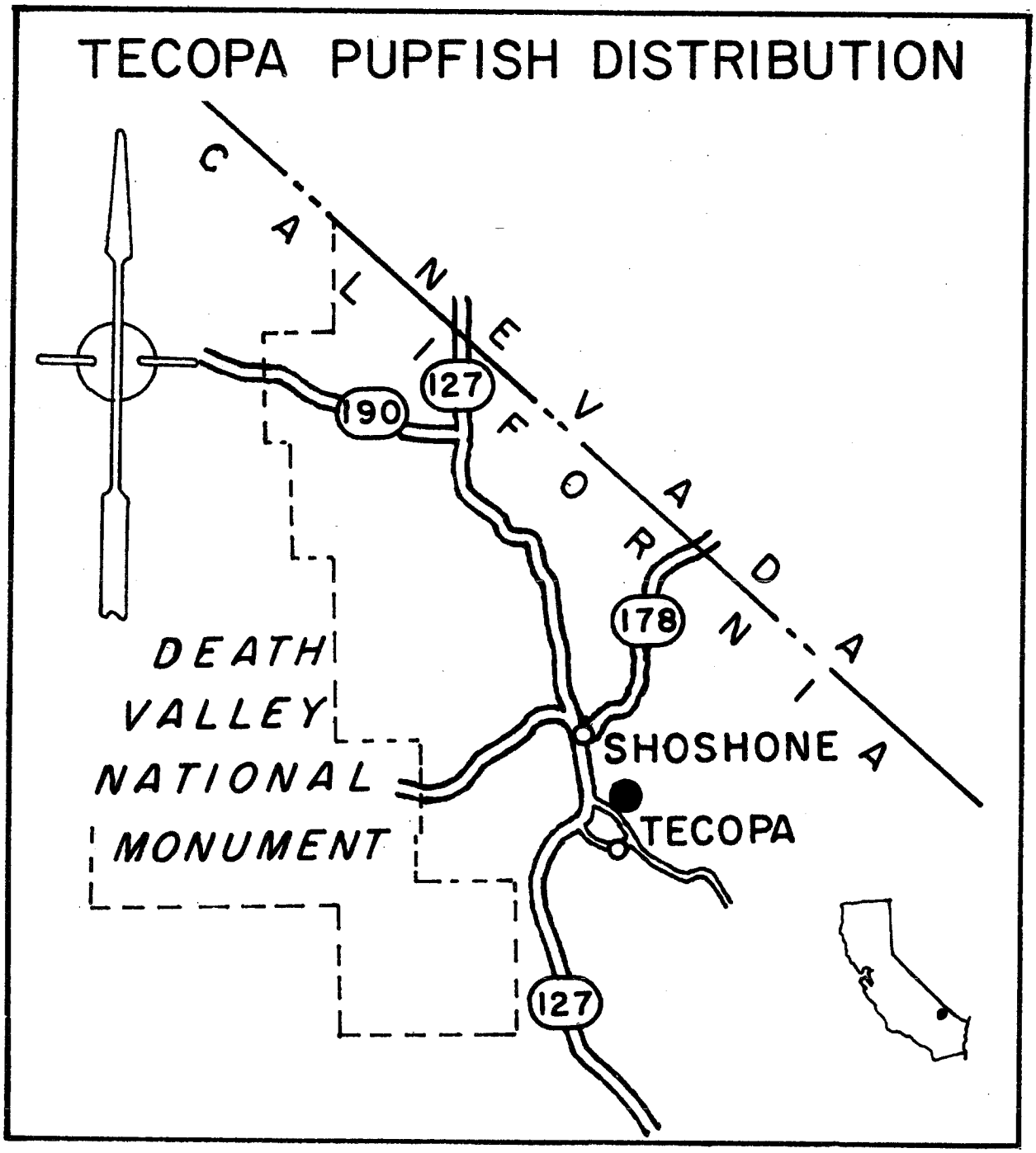
RECOVERY EFFORTS: An intensive survey of the spring habitats in and around Tecopa was completed during 1977. The few pupfish populations present were determined not to be Tecopa Pupfish. In 1978 two springs previously reported to be fishless were found to contain pupfish. Although insufficient numbers of specimens could be collected (due to the small population size) preliminary identification showed several taxonomic characteristics similar to those reported for C. n. calidae.

FUTURE MANAGEMENT: A small number of pupfish from these two springs will either be transplanted to other locations or reared under controlled conditions. Either method should produce a sufficient number of adult pupfish to permit valid taxonomic identification. Annual surveys of springs in and around the Tecopa area should continue in an attempt to locate any other existing populations.

REFERENCES:

Miller, R. R. 1948. The cyprinodont fishes of the Death Valley system of eastern California and southwestern Nevada. Univ. Mich. Mus. Zool. Misc. Publ. 68:1-155.

Selby, D. A. 1977. Report on the aquatic systems of the Tecopa-Shoshone area of the Death Valley system: Fish, invertebrate, and habitat status. Calif. Dep. Fish Game, Sacramento. 93 pp. (Typewritten).



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

OWENS PUPFISH
(Cyprinodon radiosus)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This is a small, less than 51 mm (204 in.), stout-bodied fish with notched teeth. The dorsal fin is far forward, with a thickened first ray. There are 7 pelvic fin rays. Male breeding coloration is bright blue on the body, with a narrow, dusky to black band on the tail. Females are brown above to whitish below, with dark blotches on the sides.

DISTRIBUTION: Originally abundant in the Owens Valley from Lone Pine northward to Fish Slough, much of its original habitat was eliminated by drainage and drying of marshes due to diversion and export of water from the drainage. This species also has been eliminated from some areas by competition from introduced exotic fishes. It is now confined to several small areas in Fish Slough and a small spring north of Big Pine. Preferred habitat is still or slow moving shallow water with some vegetation.

RECOVERY EFFORTS: In 1968, an Owens Valley Native Fish Sanctuary, 8.1 ha (20 acres), was established at Fish Slough to provide a protected habitat for the Owens Pupfish and other native species. During 1969, a second refugium in the Fish Slough basin was established at BLM Spring. A third pupfish refugium was created at Warm Springs, Inyo County, in 1970. The original sanctuary was expanded in 1973 with the acquisition of another 34 ha (84 acres). These areas were designated as an Ecological Reserve by the Fish and Game Commission in 1977. The pupfish populations have expanded to fill the available habitat but periodically exotic gamefish and crayfish have invaded the sanctuaries. During 1979-80 work was completed on a secondary dam below the sanctuary to expand available pupfish habitat. This will provide more of the type habitat preferred by the Owens Pupfish. Exotic species have been eradicated from Warm Springs and the sanctuary. A status report has been completed and future management actions identified.

FUTURE MANAGEMENT: Additional land in the Fish Slough area needs to be acquired. This will ensure continued habitat integrity by precluding groundwater pumping for agriculture or other development. Existing populations and habitats will be monitored to keep abreast of any changes or possible problems. Potential transplant areas throughout the known historic range of the species will be surveyed.

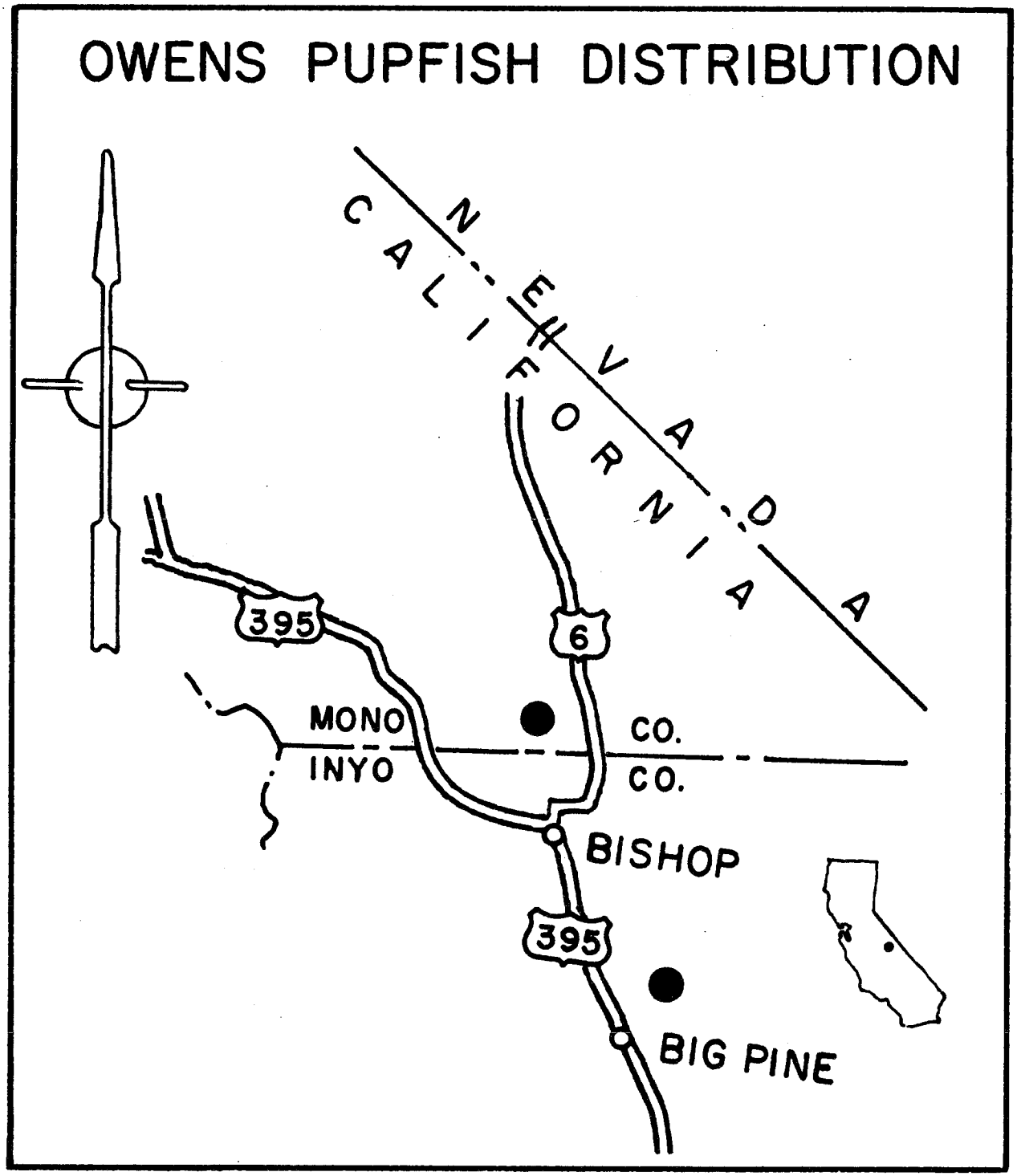
REFERENCES:

Courtois, L. A., and W. Tippets. 1979. Status of the Owens pupfish, Cyprinodon radiosus (Miller), in California. Calif. Dep. Fish Game Inland Fish. End. Spec. Prog. Special Publ. 79-3. 31 pp.

Miller, R. R. 1948. The cyprinodont fishes of the Death Valley system of eastern California and southwestern Nevada. Univ. Mich. Mus. Zool. Misc. Publ. 68:1-155.

Miller, R. R., and E. P. Pister. 1971. Management of the Owens pupfish, Cyprinodon radiosus, in Mono County, California. Trans. Amer. Fish. Soc. 100 (3):502-509.

Pister, E. P. 1974. Desert fishes and their habitats. Trans. Amer. Fish. Soc. 3:531-540.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

UNARMORED THREESPINE STICKLEBACK
(Gasterosteus aculeatus williamsoni)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: Three sharp erectile spines precede the soft dorsal fin. Pelvic fins are sharp spines. The body is without scales, but may have 1-4 plates on the sides, though the average number is fewer than 1. Color is greenish to olive above, grading to silvery on the lower sides and belly. During spawning season males have scarlet throat and belly, blue eyes, and greenish fins, while females have pinkish throat and belly. Size is small, rarely over 76 mm (3 in). This subspecies has fewer lateral plates (average 2.0), shorter and weaker spines, and more rounded pectoral and caudal fins than the other subspecies of G. aculeatus.

DISTRIBUTION: Formerly found in the Los Angeles, San Gabriel, Santa Ana, and Santa Clara rivers, the unarmored form until recently was known only from the Soledad Canyon portion of the upper Santa Clara River, Los Angeles County, and San Francisquito Canyon, a small tributary below Soledad Canyon. A stickleback population found in San Antonio Creek, Santa Barbara County, on Vandenberg Air Force Base, has also been identified as G. a. williamsoni. Populations from the Los Angeles basin streams in Los Angeles, San Gabriel, and Santa Ana rivers have been extirpated. The population in Santa Clara River is threatened by increased recreational use and development in Soledad Canyon, hybridization with G. a. microcephalus, and the introduction of exotic predators. The San Antonio Creek population is potentially threatened by pesticide runoff and increased groundwater pumping from upstream agricultural areas, and development of MX missile test facility. G. a. williamsoni are found in slow moving streams and shallow pools which contain abundant algae and other aquatic plants.

RECOVERY EFFORTS: A recovery team was appointed in 1975 by the U. S. Fish and Wildlife Service. The team has prepared a recovery plan (1977) and identified management activities and essential habitat. The U. S. Forest Service has taken several actions to protect stickleback habitat in the Soledad Canyon from human disturbance. The Department has chemically treated tributaries to the Santa Clara River to eradicate the African Clawed Frog (Xenopus laevis), a potential exotic predator.

FUTURE MANAGEMENT: The Department and U. S. Forest Service will continue to implement management objectives, as outlined in the recovery plan, designed to prevent further habitat alteration of the Santa Clara River in Soledad Canyon. Streams in the south coastal area will be surveyed for possible transplant sites, and electrophoretic analysis of various stickleback populations throughout southern California will be conducted to confirm their taxonomic identity. The subspecies will be reestablished in as many locations as possible throughout its former range.

REFERENCES:

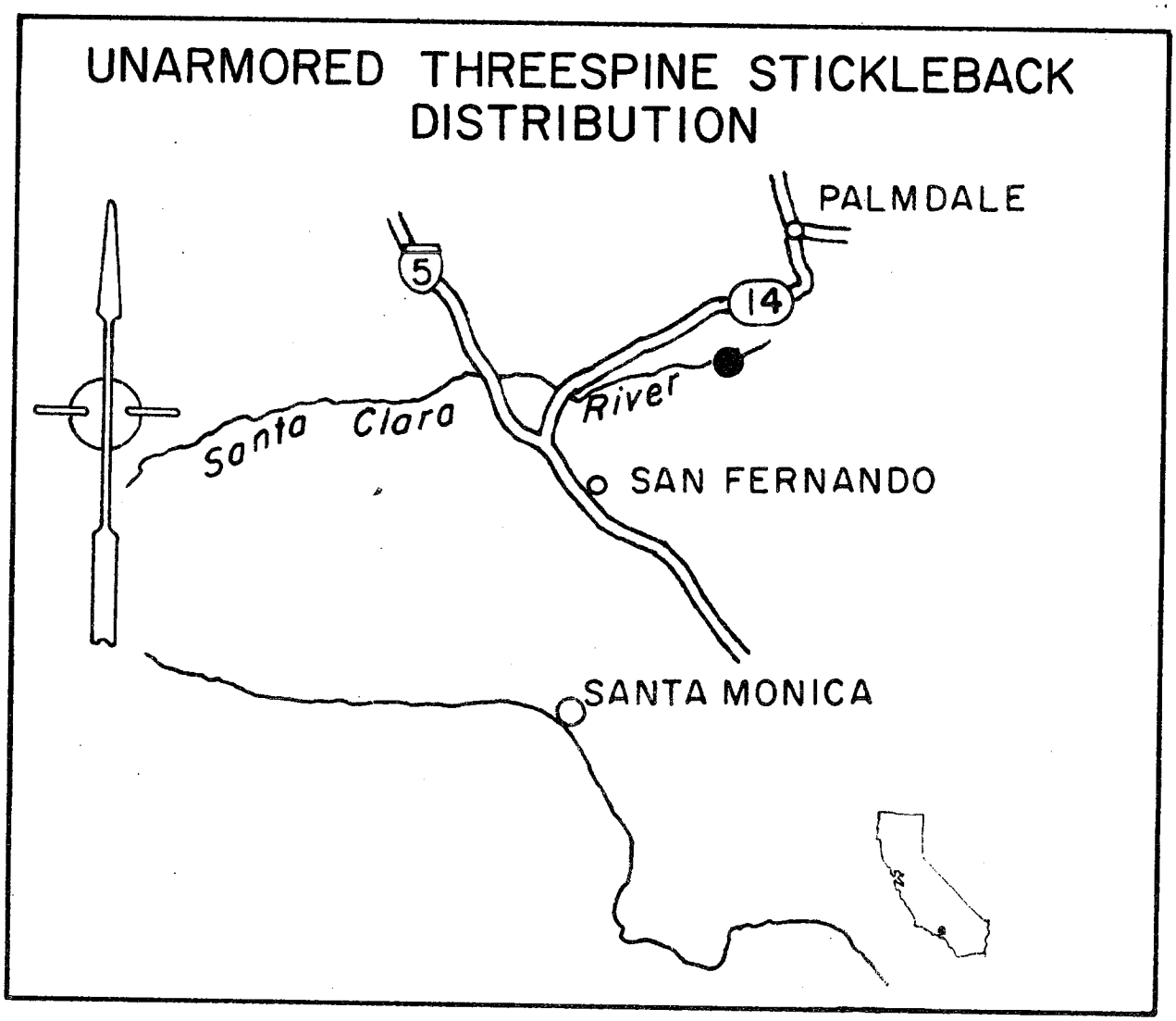
Bell, M. A. 1976. Evolution of phenotypic diversity in Gasterosteus aculeatus superspecies on the Pacific Coast of North America. Syst. Zool. 25:211-227.

Miller, R. R. 1960. The type locality of Gasterosteus aculeatus williamsoni, and its significance in the taxonomy of California sticklebacks. Copeia 1960 (4):345-350.

_____ and C. L. Hubbs. 1969. Systematics of Gasterosteus aculeatus, with particular reference to intergradation and introgression along the Pacific coast of North America: a commentary on a recent contribution. Copeia 1969 (1):51-69.

Ross, S. T. 1973. The systematics of Gasterosteus aculeatus (Pisces: Gasterosteidae) in central and southern California. Natur. Hist. Mus. Los Angeles Co. Contr. Sci. 243:1-20.

Unarmored Threespine Stickleback Recovery Team. 1977. Recovery plan for unarmored threespine stickleback, Gasterosteus aculeatus williamsoni, an endangered fish. U. S. Fish Wildl. Serv., Portland. 49 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

ROUGH SCULPIN
(Cottus asperrimus)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a slender sculpin that is olive brown to purplish above, with sides finely mottled with dusky and gray, the dusky color making 4-5 blotches. The ventral surface is speckled. Pelvic fins are colorless, but the others are barred. Lateral line does not extend beyond the base of the last dorsal ray. Dense prickles extend from pectoral fin posteriorly along body adjacent to the lateral line to the caudal peduncle.

DISTRIBUTION: The Rough Sculpin is found in the Pit River from Tunhel Reservoir upstream to Fall River Mills, the lower reaches of Hat Creek and Clark creeks and in the Fall River and its tributaries, Shasta County. They are found on a variety of substrates particularly fine-grained bottoms of large streams. The water is usually deep, cool, clear and fast-flowing. Despite a limited distribution, it is relatively abundant where found.

RECOVERY EFFORTS: An initial survey of the relative abundance and distribution of this species was completed in 1974 through cooperative efforts of the Department and the University of California, Davis. This work continued and a summary report on status and distribution was published in 1978.

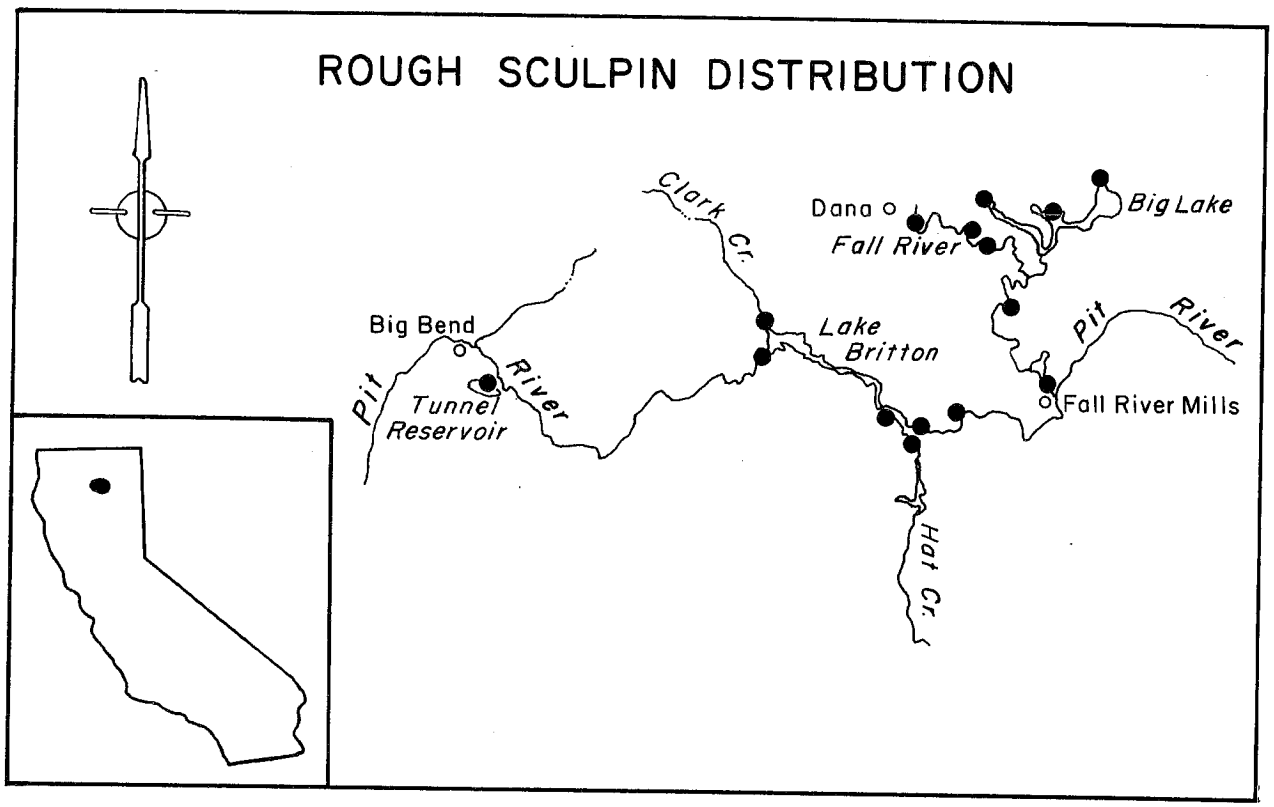
FUTURE MANAGEMENT: The Department will prepare a joint management plan for the species in cooperation with the U. S. Forest Service, PG&E and private land owners. To date, habitat degradation is minimal due to the attitudes of local land owners. Perpetuation of the species is dependent upon maintaining the unaltered conditions which presently exist.

REFERENCES:

Daniels, R. A. and P. B. Moyle. 1978. Biology, distribution and status of Cottus asperrimus in the Pit River drainage, northeastern California. Copeia 1978 (4):673-679.

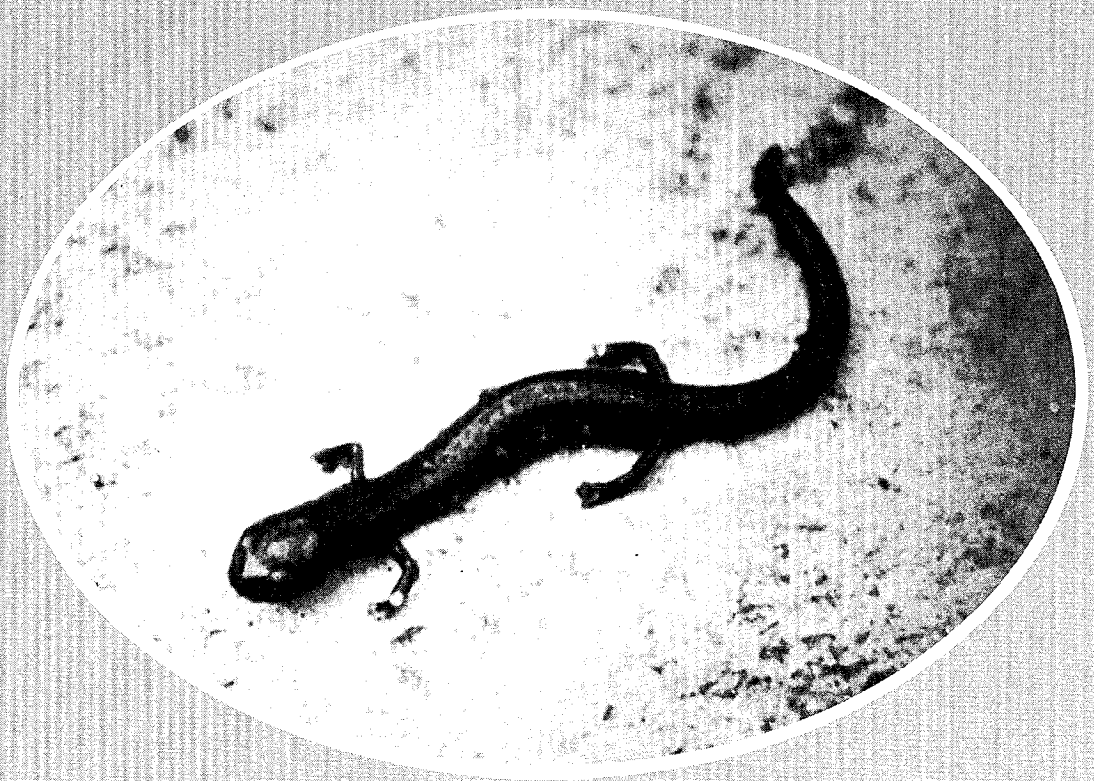
Robins, C. R., and R. R. Miller. 1957. Classification, variation, and distribution of the sculpins, genus Cottus, inhabiting Pacific slope waters in California and southern Oregon, with a key to the species. Calif. Fish Game 43:213-233.

Rutter, C. 1908. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation. Bull. U. S. Bur. Fish 27(1907):103-152.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

Amphibians



SANTA CRUZ LONG-TOED SALAMANDER
(Ambystoma macrodactylum croceum)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This is a small salamander with relatively long toes. Color is black above with irregular mid-dorsal spots of metallic yellow-gold to orange. The ventral side is sooty in color. The teeth form a continuous or broken row across the roof of the mouth. Adults grow to about 127 mm (5 in).

DISTRIBUTION: This salamander is known only from three localities in Santa Cruz County and three localities in Monterey County, all in the vicinity of Monterey Bay. It frequents coastal woodland and chaparral near ponds and freshwater marshes in which it breeds. Adult salamanders spend the dry months away from the ponds in rodent burrows and other subterranean retreats. During the winter and early spring the adults are active on the surface and migrate to and from the breeding ponds on rainy nights.

RECOVERY EFFORTS: The Department has purchased 18.6 ha (30 acres) of habitat at the Ellicott Station locality and the remaining undisturbed portion of Valencia Lagoon with funds from the Environmental Protection Program. These areas have been designated as the Santa Cruz Long-toed Salamander Ecological Reserve by the California Fish and Game Commission.

The U. S. Fish and Wildlife Service has acquired an additional 50 ha (123 acres) at Ellicott Station, which has been added to the National Wildlife Refuge system. The refuge and the state's ecological reserve are being managed by the Department under a Memorandum of Understanding with the Fish and Wildlife Service.

A recovery team was organized in 1975, and a recovery plan has been published.

A fish and wildlife management plan for the Santa Cruz Long-toed Salamander Ecological Reserve was completed and recommendations are being carried out. An artificial, temporary breeding pond was constructed at Valencia Lagoon in 1970 by the California Department of Transportation and was enlarged in 1974. A permanent facility was completed in 1978. Studies of population size, movements, and general ecology have been conducted at Valencia Lagoon and Ellicott Station.

FUTURE MANAGEMENT: Management objectives outlined in the recovery plan will continue to be implemented by the Department and the U. S. Fish and Wildlife Service. The Department will pursue purchase of additional habitat at Valencia in cooperation with The Nature Conservancy. The Department will also assist the Central Coast Regional Coastal Commission staff and county personnel in developing guidelines for county local coastal plans.

REFERENCES:

California Department of Fish and Game. 1975. Fish and wildlife management plan for the Santa Cruz Long-toed Salamander Ecological Reserve, Santa Cruz County, California. 12 pp. (mimeo)

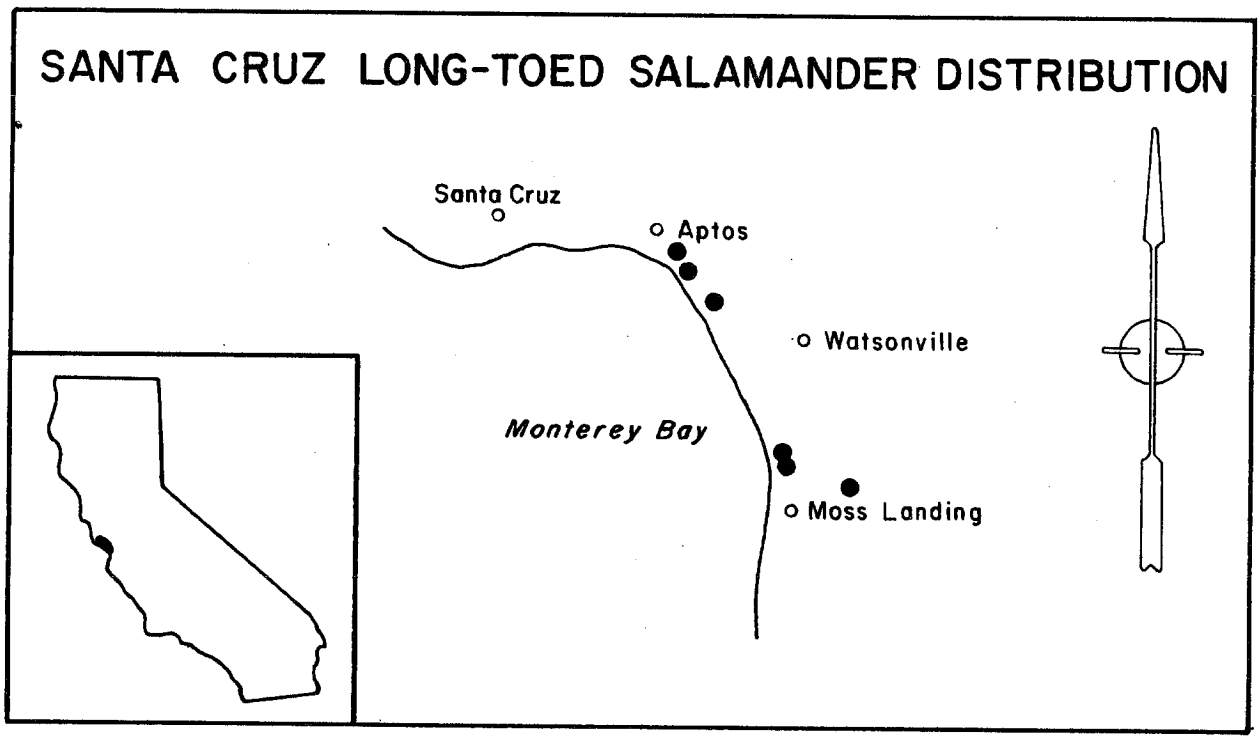
Ferguson, D. E. 1961. The geographic variation of Ambystoma macrodactylum Baird, with the description of two new subpsecies. Amer. Midl. Nat. 65:311-338.

Reed, R. J. 1979. Population study of the Santa Cruz long-toed salamander (Ambystoma macrodactylum croceum) at Valencia Lagoon 1977-78, with notes on habitat and occurrence in Santa Cruz and Monterey counties. Calif. Dep. Fish Game Rep., contract S-1180. 90 pp. + append.

Russell, R. W. and J. E. Anderson. 1956. A disjunct population of the long-nosed (sic) salamander from the coast of California. Herpetologica 12:137-140.

Talent, L. G. and C. L. Talent. 1980. A population of the endangered Santa Cruz long-toed salamander, Ambystoma macrodactylum croceum, from Montery County, California. Calif. Fish Game 66(3):184-186.

U. S. Fish and Wildlife Service. 1977. Santa Cruz long-toed salamander recovery plan. U. S. Fish Wildl. Serv., Portland. 49 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SISKIYOU MOUNTAIN SALAMANDER
(Plethodon stormi)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a slim-bodied salamander with short legs. Color is dull brown to chocolate brown on the dorsal surface and sides, often profusely speckled with white or yellowish flecks. The ventral surface is purplish gray. Adults grow to 102-152 cm (4-6 in).

DISTRIBUTION: Occurs near the Hutton Guard Station, the Cook and Green Guard stations, along Joe and Dutch creeks in the upper Applegate River drainage, and along Seiad and Horse creeks in the Klamath River drainage, Siskiyou County. It is associated with loose rock rubble and talus on north-facing slopes or with heavily wooded areas.

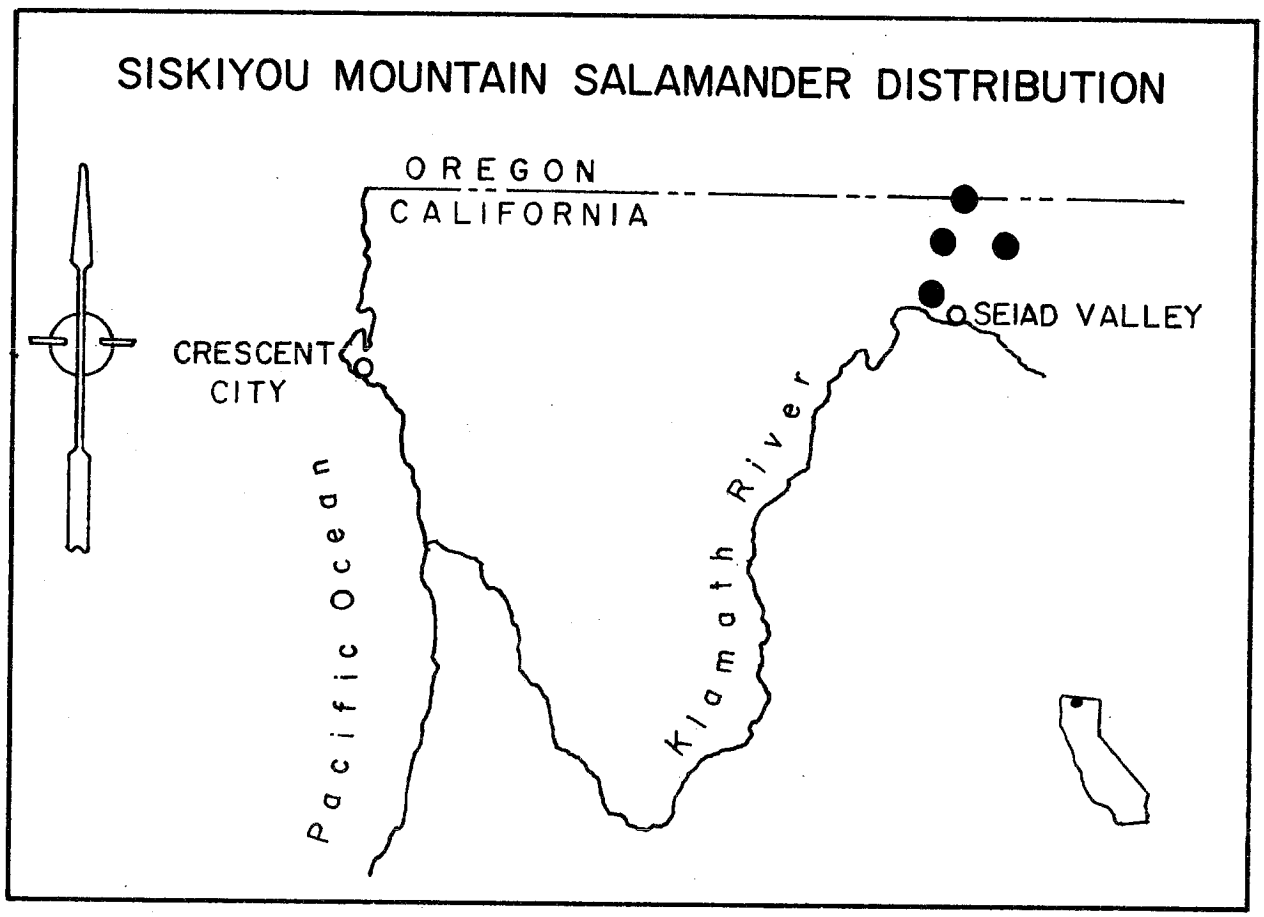
RECOVERY EFFORTS: The U. S. Forest Service has been appraised of the status of this salamander. Preliminary studies on the ecology of this species have been completed by the University of Michigan, under funding from the U. S. Army Corps of Engineers.

FUTURE MANAGEMENT: Further studies to determine if additional populations occur in California will be conducted, and in cooperation with the U. S. Forest Service, a habitat management plan will be prepared.

REFERENCES:

Brodie, E. D. 1970. Western salamanders of the genus Plethodon: systematics and geographic variation. Herpetologica 26(4):468-615.

Nussbaum, R. A. 1974. The distributional ecology and life history of the Siskiyou mountain salamander, Plethodon stormi, in relation to the potential impact of the proposed Applegate Reservoir on this species. U. S. Army Corps of Engineers, Portland. 32 pp. (typewritten)



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

DESERT SLENDER SALAMANDER
(Batrachoseps aridus)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This is a moderately small slender salamander with a short tail. There are four toes on all feet. Color is blackish above, overlaid with an indistinct lighter band. Ventrally, the trunk is a darker blackish maroon and the underside of the tail is flesh colored. Adults grow to 102-114 mm (4-4 1/2 in).

DISTRIBUTION: Known only from Hidden Palm Canyon, a tributary of Deep Canyon, about 16 km (10 miles) south of Palm Desert, Riverside County. It is found in crevices between limestone sheets and under limestone slabs and other rocks along the base of cliffs where continuous water seepage occurs. During the late winter and early spring, these salamanders may also be found beneath rocks and other objects on the floor of the canyon.

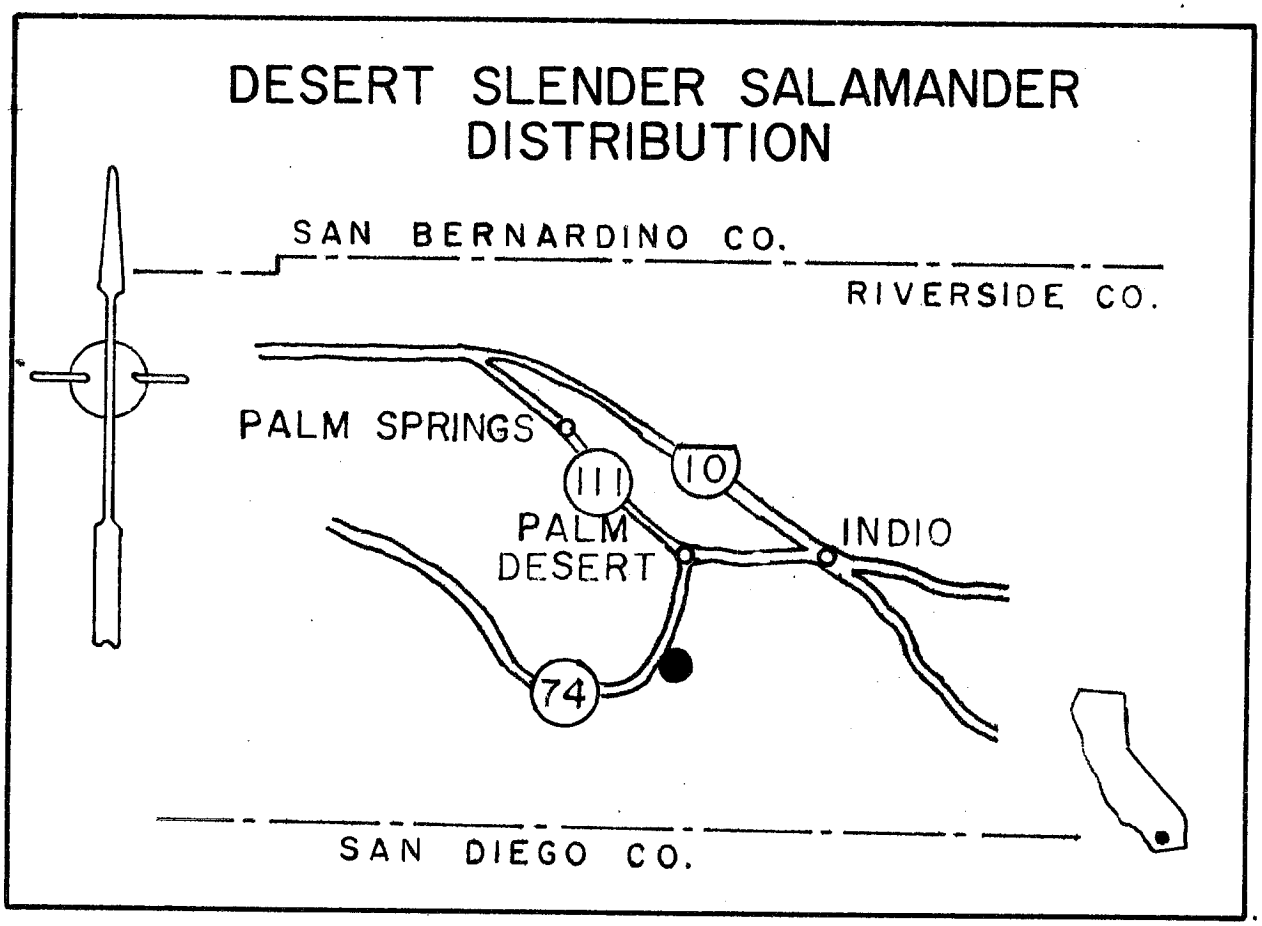
RECOVERY EFFORTS: The Department has purchased 57 ha (141 acres), which comprises the habitat of this salamander, with Environmental Protection Program funds. It was officially designated as the Hidden Palm Ecological Reserve by the Fish and Game Commission. A management committee was formed to coordinate management of the Reserve. In September 1976, a severe tropical storm destroyed about 50% of the salamander habitat in Hidden Palm Ecological Reserve. A study was initiated to determine the amount of remaining habitat and the distribution of salamanders in it. During the study it became apparent that the remaining habitat needed protection from further erosion. A gabion structure of heavy mesh wire filled with rocks was installed at the edge of the most important habitat area to prevent further erosion of the soil. Nearby canyons in the Santa Rosa Mountains are being checked for possible occurrence of this species.

FUTURE MANAGEMENT: The hydrology of the spring will be studied to determine the source, quality, quantity of water supplying the salamander habitat. The watershed will be mapped and surveyed to determine if any development will impact the habitat. Plant succession and other aspects of the habitat at Hidden Palm will be monitored and changes recorded. The Department and the U. S. Bureau of Land Management will systematically survey springs and then water sources in the Santa Rosa Mountains to determine if additional populations of this species exist.

REFERENCES:

Boynton, K. L. 1971. The singular salamander. Desert Magazine 34(10):18-21.

Brame, A. H., Jr. 1970. A new species of Batrachoseps (slender salamander) from the desert of southern California. Nat. Hist. Mus. Los Angeles Co. Contrib. Sci. 200:1-11.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

KERN CANYON SLENDER SALAMANDER
(Batrachoseps simatus)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: Slender salamanders are rather small and wormlike with minute limbs, but this species has relatively long limbs and tail and a narrow head. All feet have four toes. The color is black on the sides and ventral surface, while the dorsal surface has dashes and patches of bronze and light reddish-brown pigment which may form an imperfect dorsal band. Adults grow to 114-127 mm (4 1/2 - 5 in).

DISTRIBUTION: This species is found in the Kern River Canyon from about Democrat Hot Springs downstream to Live Oak Picnic Area in Kern County. Individuals occur beneath pine, oak, and fallen chaparral logs, as well as large rock slides and talus on rather steep north-facing slopes.

RECOVERY EFFORTS: Surveys by the Department indicate that the habitat is in good condition. The U. S. Forest Service has been appraised of the status of this salamander.

FUTURE MANAGEMENT: Future road construction in the Kern River Canyon should be designed to prevent damage to the habitat of this species. Firewood cutting and other recreational activities detrimental to the habitat should be minimized.

REFERENCES:

Brame, A. H., Jr., and K. F. Murray. 1968. Three new salamanders (Batrachoseps) with a discussion of relationships and speciation within the genus. Nat. Hist. Mus. Los Angeles Co. Bull. 4:1-35.

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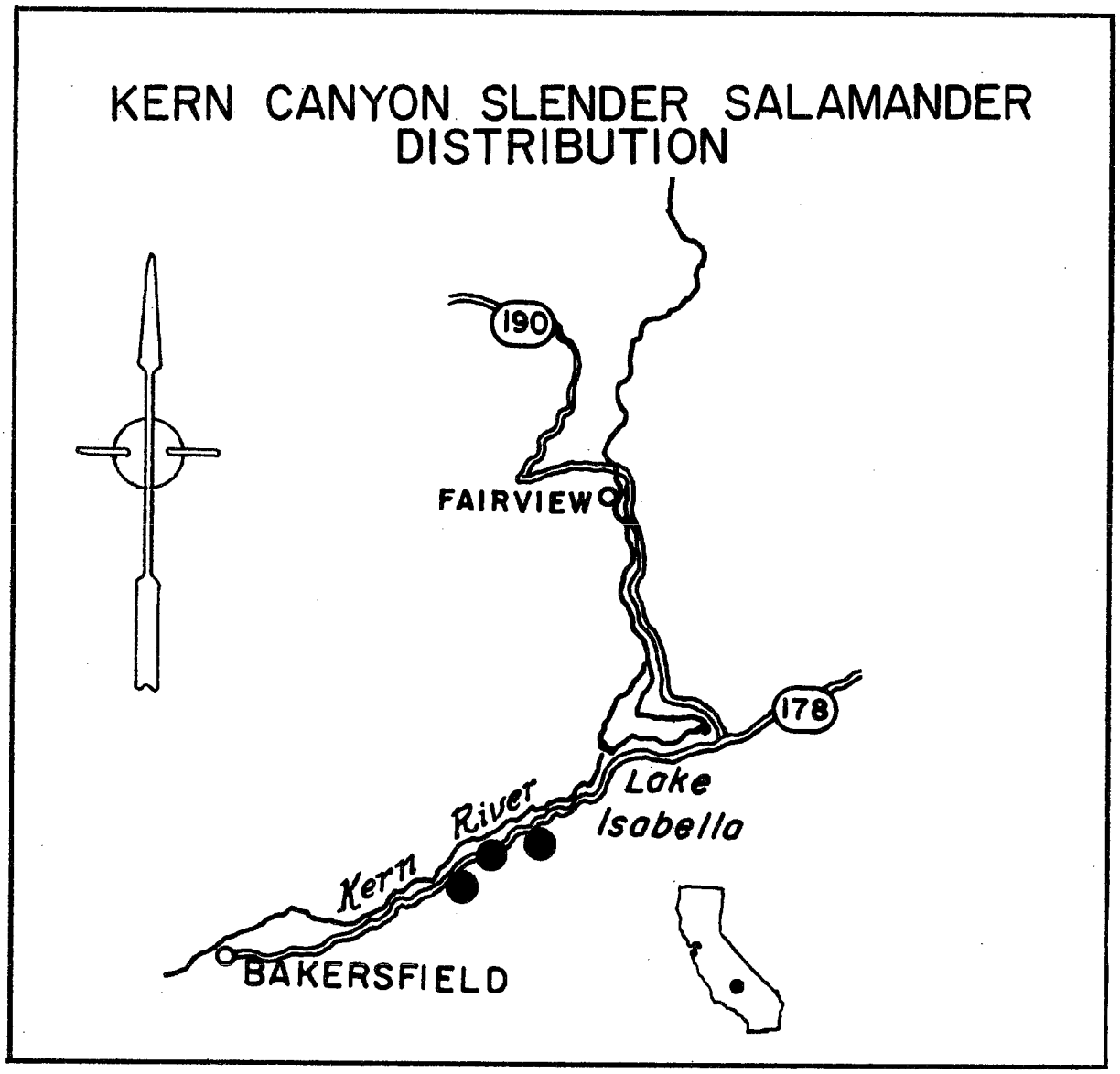


At The Crossroads, 1980. Calif. Dep. of Fish and Game.

TEHACHAPI SLENDER SALAMANDER
(Batrachoseps stebbinsi)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a relatively large and robust member of the genus Batrachoseps. It is distinguished by its relatively large feet and long legs. Dorsal color is dark, with dark red, brick red, light or dark brown, or light beige patches and blotches, sometimes forming an indistinct band. The sides and tail are black with small white flecks. The ventral surfaces are dark gray-black. Adults grow to about 127 mm (5 in).

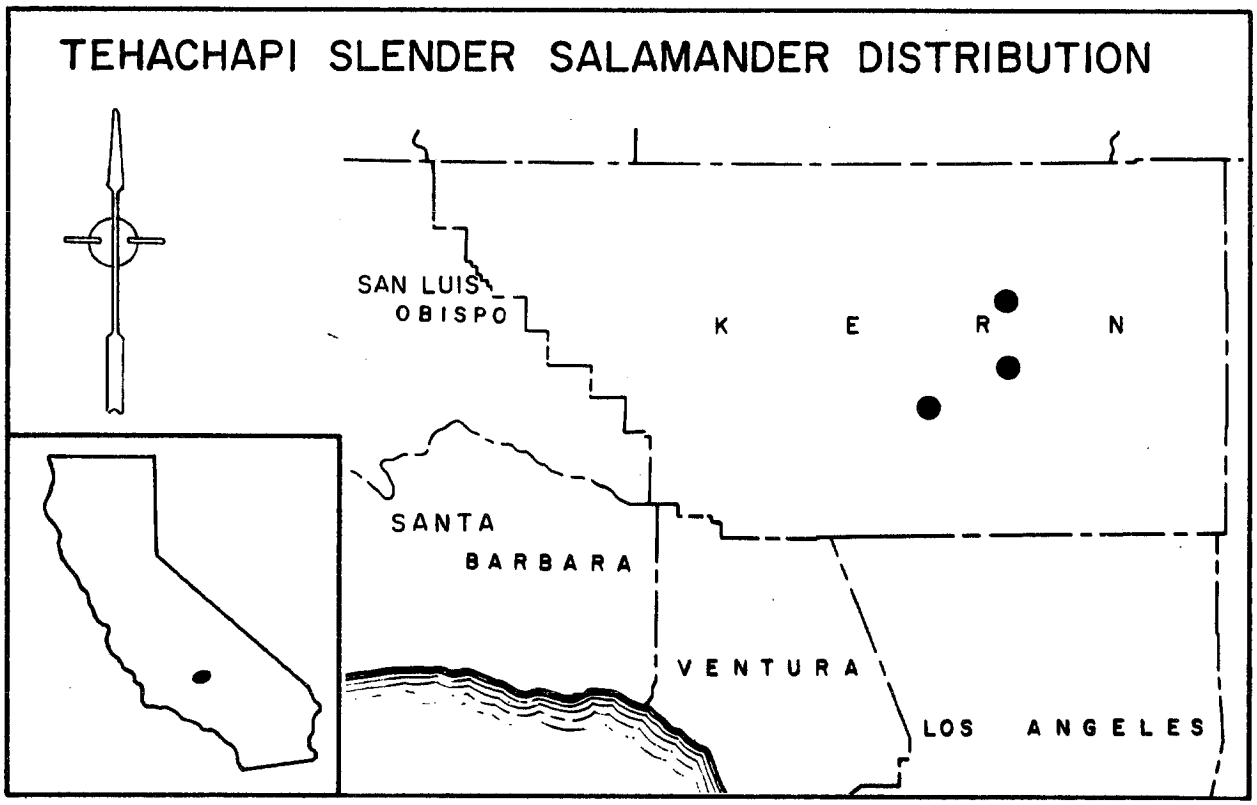
DISTRIBUTION: It has been collected from seven small areas in the Piute and Tehachapi mountains southeast of Bakersfield, Kern County. One area in the Tehachapis along State Highway 58 was damaged by freeway construction. This species lives in rock talus in foothill woodland, usually on north facing slopes.

RECOVERY EFFORTS: Recent surveys by the Department located two new populations in the Tehachapi Mountains. The Department has consulted with the U. S. Fish and Wildlife Service regarding a proposed flood control dam on Caliente Creek.

FUTURE MANAGEMENT: Proposed road construction along Caliente Creek road will be carefully reviewed to prevent damage to the habitat of this species. The U. S. Army Corps of Engineers will be appraised of possible habitat damage from flood control projects. The U. S. Bureau of Land Management administers several parcels of Tehachapi Slender Salamander habitat in Caliente Creek Canyon.

REFERENCES:

Brame, A. H., Jr., and K. F. Murray. 1968. Three new salamanders (Batrachoseps) with a discussion of relationships and speciation within the genus. Mus. Nat. Hist. Los Angeles Co. Bull. 4:1-35.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

LIMESTONE SALAMANDER
(Hydromantes brunus)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This salamander has webbed toes, a mushroom-like tongue with free margins, and a flattened body. Its color is uniformly brown above and pale brown to gray below. The underside of the tail is yellowish. The young are pale yellowish-green above, changing with age through pale yellow to beige or brown. Adults grow to 76-102 mm (3-4 in).

DISTRIBUTION: The Limestone Salamander occurs in the Merced River Canyon in the vicinity of Briceburg, and along Bear Creek, tributary to the Merced River, Mariposa County. It has also been found in Hell Hollow, about 6.4 km (4 miles) above Lake McClure, and at the confluence of Hell Hollow Creek with Lake McClure. As its name indicates, this species is associated with limestone outcrops. It is found in the digger pine-chaparral belt, where it lives in rock crevices and in talus, especially where overgrown with moss.

RECOVERY EFFORTS: Environmental Protection Program funds were used to purchase 48 ha (120 acres) of habitat near Briceburg in 1974. In 1975, this became the Limestone Salamander Ecological Reserve by action of the Fish and Game Commission. A fish and wildlife management plan for the Reserve has been prepared. The Bureau of Land Management has funded additional surveys for this species and is preparing a habitat management plan for the Merced River Canyon.

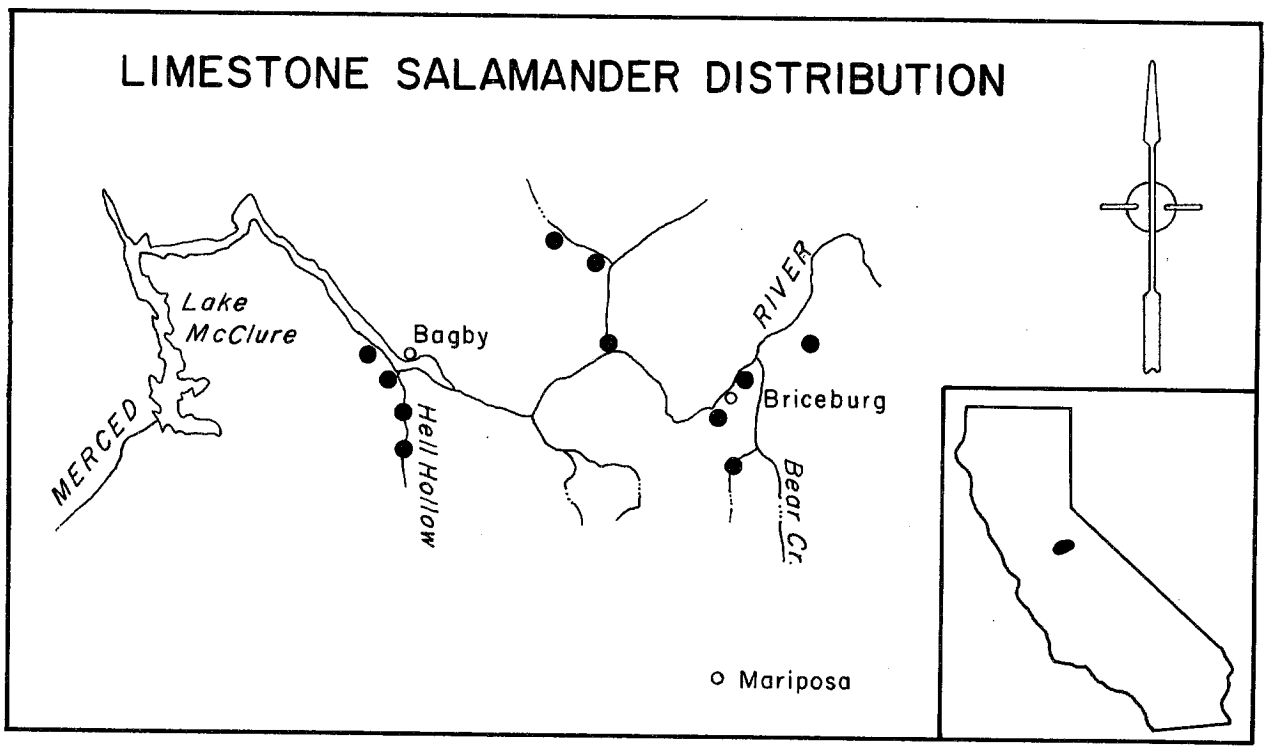
FUTURE MANAGEMENT: Any proposals to quarry, mine, or otherwise disturb limestone outcrops within the Merced River Canyon will be evaluated to determine if they will have adverse effects on the Limestone Salamander. Hell Hollow is mostly in private ownership and will be monitored closely for activities which would be detrimental to Limestone Salamander habitat. The Department will continue to implement management objectives for the Limestone Salamander Ecological Reserve.

REFERENCES:

Brode, J. M. 1975. Fish and wildlife management plan for the Limestone Salamander Ecological Reserve, Mariposa County, California. Calif. Dep. Fish Game. 11 pp. (mimeo)

Gorman, J. 1954. A new species of salamander from central California. Herpetologica 10:153-159.

Tordoff, W. III. 1980. Report of study of limestone salamanders on the Merced River. U. S. Bur. Land Manage., Folsom, Calif., Rep., Contract CA-040-CTO-09. 31 pp. (typewritten)



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SHASTA SALAMANDER
(Hydromantes shastae)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This species is very similar to the Limestone Salamander, except that the coloration on the dorsal side is gray-green, beige, tan, or reddish, and usually with yellow on the tail. The ventral surface is dark with white flecks or blotches. The young are gray-green, olive, tan, or reddish on the body and yellowish on the tail. Adults grow to 76-102 mm (3-4 in).

DISTRIBUTION: The Shasta Salamander inhabits limestone formations in several areas near Shasta Lake, Shasta County. They are found in moist limestone fissures and caves, and under rocks on the surface during wet weather in mixed pine-hardwood stands.

RECOVERY EFFORTS: The U. S. Forest Service, U. S. Bureau of Land Management, and University of California, Berkeley, have recently studied the distribution of this species and discovered several additional localities. This species has been found further south (Mountain Gate) and southeast (Ingot) than previously known. A recent discovery of this species on property owned by The Nature Conservancy extends the range 13-16 km (8-10 miles) to the north. The Shasta-Trinity National Forest has developed a management plan for this species on National Forest lands. The Department is negotiating a conservation easement with the Flintkote Company to protect remaining habitat at the Grey Rocks limestone quarry.

FUTURE MANAGEMENT: Protection of populations on private land will be pursued through conservation easements or habitat acquisition. Populations on National Forest lands will be protected through implementation of the management plan.

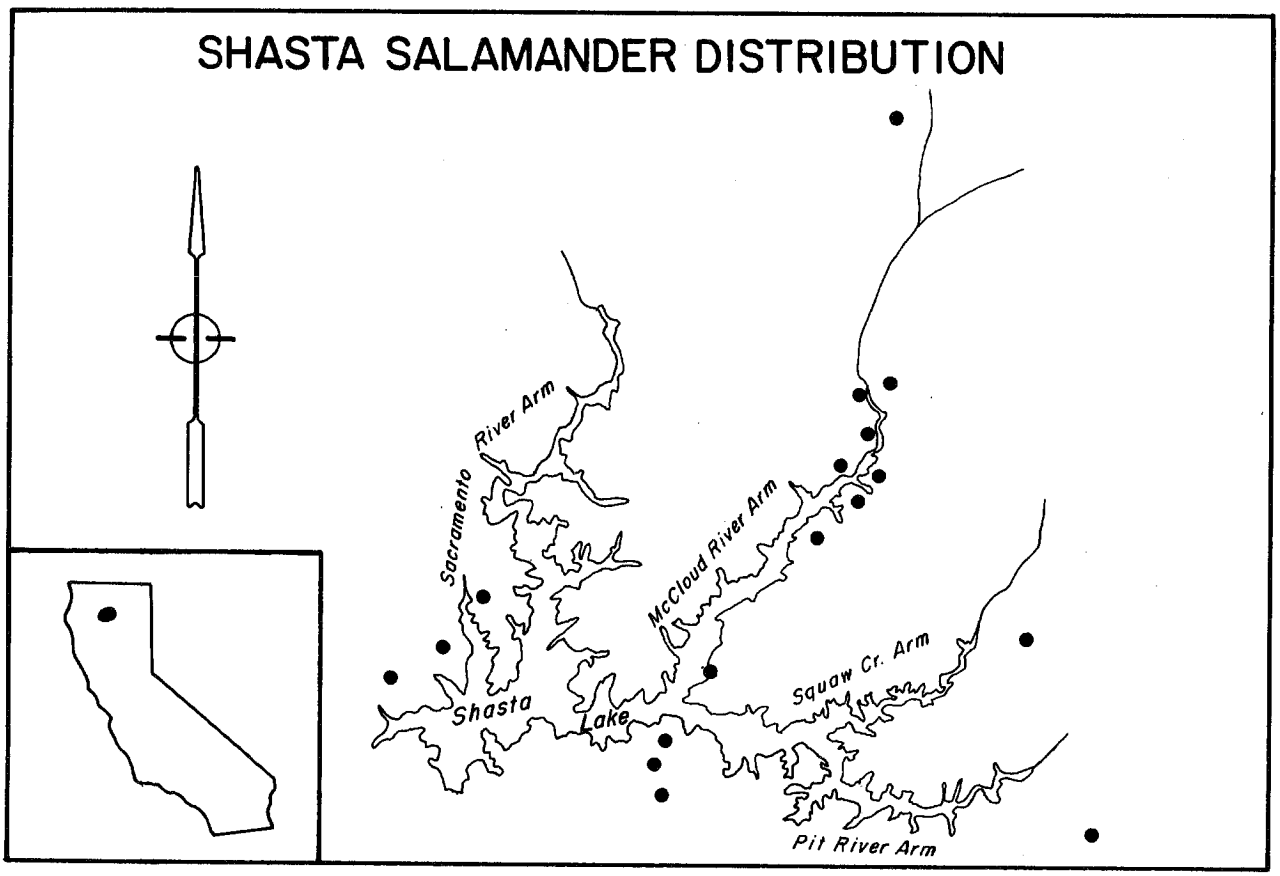
REFERENCES:

Bury, R. B., G. M. Fellers, and S. B. Ruth. 1969. First records of Plethodon dunni in California, and new distributional data on Ascapus truei, Rhyacotriton olympicus, and Hydromantes shastae. Herpetologica 3:157-161.

Gorman, J., and C. L. Camp. 1953. A new species of salamander of the genus Hydromantes from California, with notes on habits and habitat. Copeia 1953 (1):39-43.

Papenfuss, T., and P. Brouha. 1979. The status of the Shasta salamander (Hydromantes shastae), in: Shasta-Trinity National Forest comprehensive species management plan and a species status report. Shasta-Trinity Nat. For., Redding, Calif. 35 pp. (typewritten)

_____, and D. Cross. 1980. The status of the Shasta salamander (Hydromantes shastae) in the Mountain Gate and Cedar Creek areas of Shasta County. U. S. Bur. Land Manage., Redding, Calif. 10 pp. (typewritten)



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

BLACK TOAD
(Bufo exsul)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The dorsal surface of this species often appears shiny and lacquer-black. There is a narrow white or cream dorsal stripe, and the underside is white or cream with dense mottling and marbling of black. The throat is often spotted with dark markings. This small toad rarely exceeds 76 mm (3 in).

DISTRIBUTION: The range of this species is extremely restricted. It is found only in and around Deep Springs (Buckhorn Spring, Corral Spring) and Antelope Spring in Deep Springs Valley, Inyo County. It inhabits watercourses and marshes adjacent to the springs. Adults are more aquatic and diurnal than other toad species in California. Population sizes vary but appear to be adequate for maintenance of this species.

RECOVERY EFFORTS: The Department has purchased 291 ha (720 acres) to protect habitat of the Black Toad at Deep Springs. Deep Springs College, which owns property at Buckhorn and Antelope Springs, has been apprised of the legal status of this toad. The college has fenced an area to exclude livestock, and is manipulating irrigation water to minimize impacts on breeding toads and developing eggs and larvae.

FUTURE MANAGEMENT: The Department will prepare a fish and wildlife management plan for the State property and develop a Memorandum of Understanding with Deep Springs College for cooperative management of Buckhorn and Antelope Springs. The feasibility of fencing a portion of Antelope Spring, to exclude cattle during the toad breeding season, will be pursued with the college.

REFERENCES:

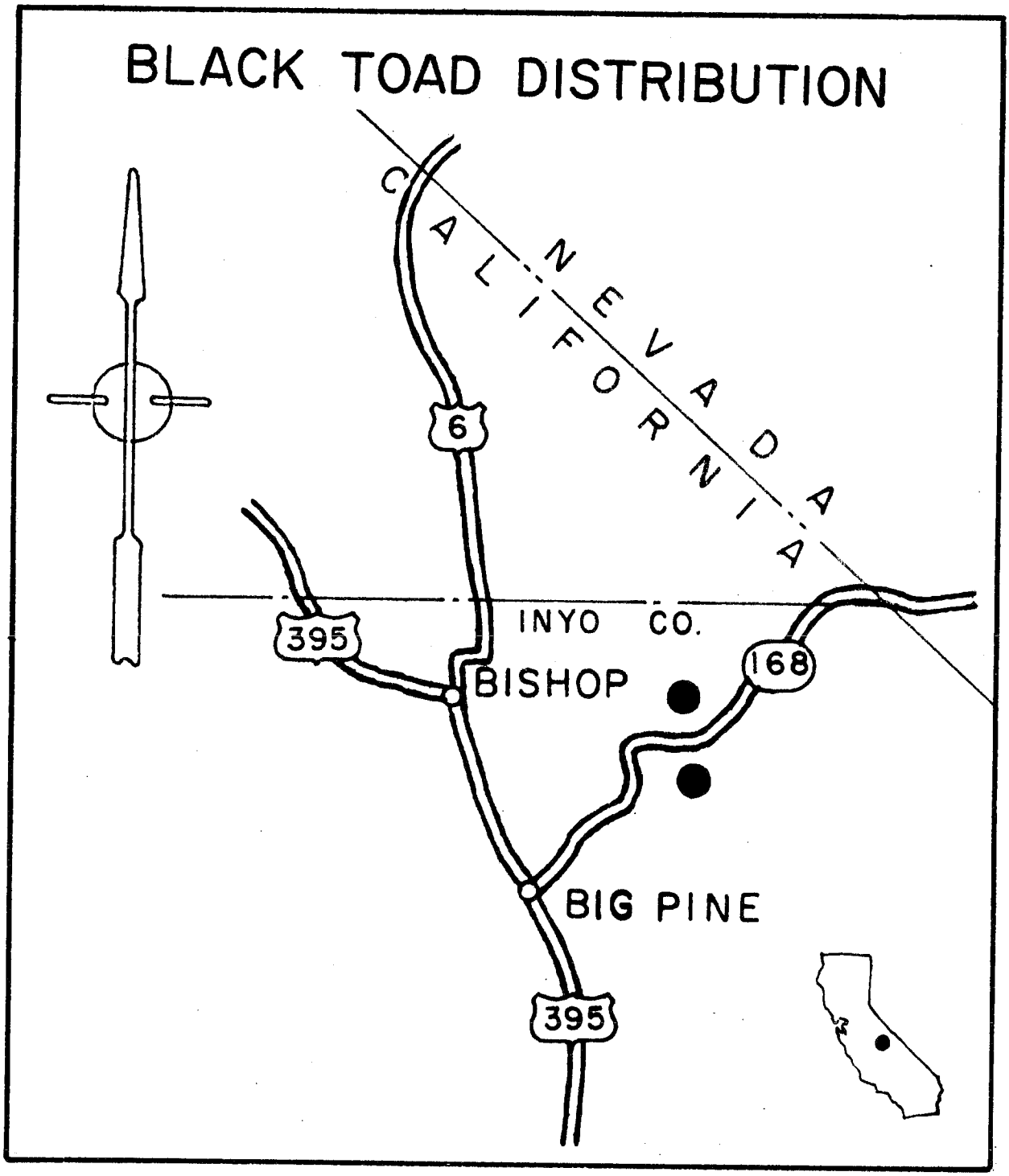
Myers, G. S. 1942. The black toad of Deep Springs Valley, Inyo County, California. Univ. Mich. Mus. Zool. Occ. Pap. 460:1-13.

Schuierer, F. W. 1961. Remarks upon the natural history of Bufo exsul Myers, the endemic toad of Deep Springs Valley, Inyo County, California. Herpetologica 17:260-266.

_____. 1962. Notes on two populations of Bufo exsul Myers, and a commentary on speciation within the Bufo boreas group. Herpetologica 18:262-267.

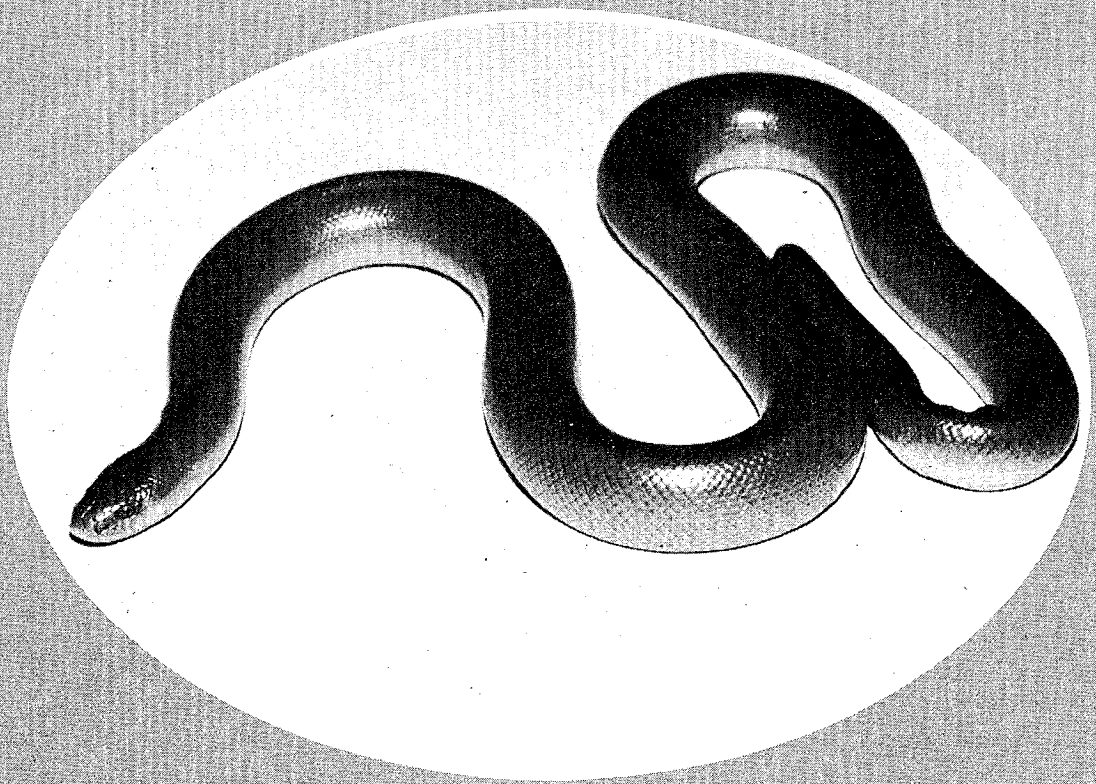
_____. 1972. The current status of the endangered species Bufo exsul Myers, Deep Springs Valley, Inyo County, California. Herpetologica Rev. 4(3):81-82.

Sherman, C. K. 1980. A comparison of the natural history and mating systems of two anurans: Yosemite toads (Bufo canorus) and black toads (Bufo exsul). Ph.D. Disser., Univ. Mich., Ann Arbor. 394 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

Reptiles



MAGIC GECKO
(Anarbylus switaki)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a medium sized lizard with soft skin and fine granular scales. The head is moderately broad, distinctly wider than the neck in adults. The eyes are large with vertical pupils and without movable lids. The tail is swollen with a constriction at the base. The body is fairly robust and the limbs are relatively long and slender. The dorsal color of the head and body is light grey-brown with indistinct medium brown spots. The head is marked with white spots and the back is marked with 5-7 crossbands of off-white. The tail is marked with alternating black and white bands posterior to the constriction. The limbs are light beige and the venter pinkish white. Length from snout to vent in adults is 53-84 mm (2 1/8-3 1/4 in).

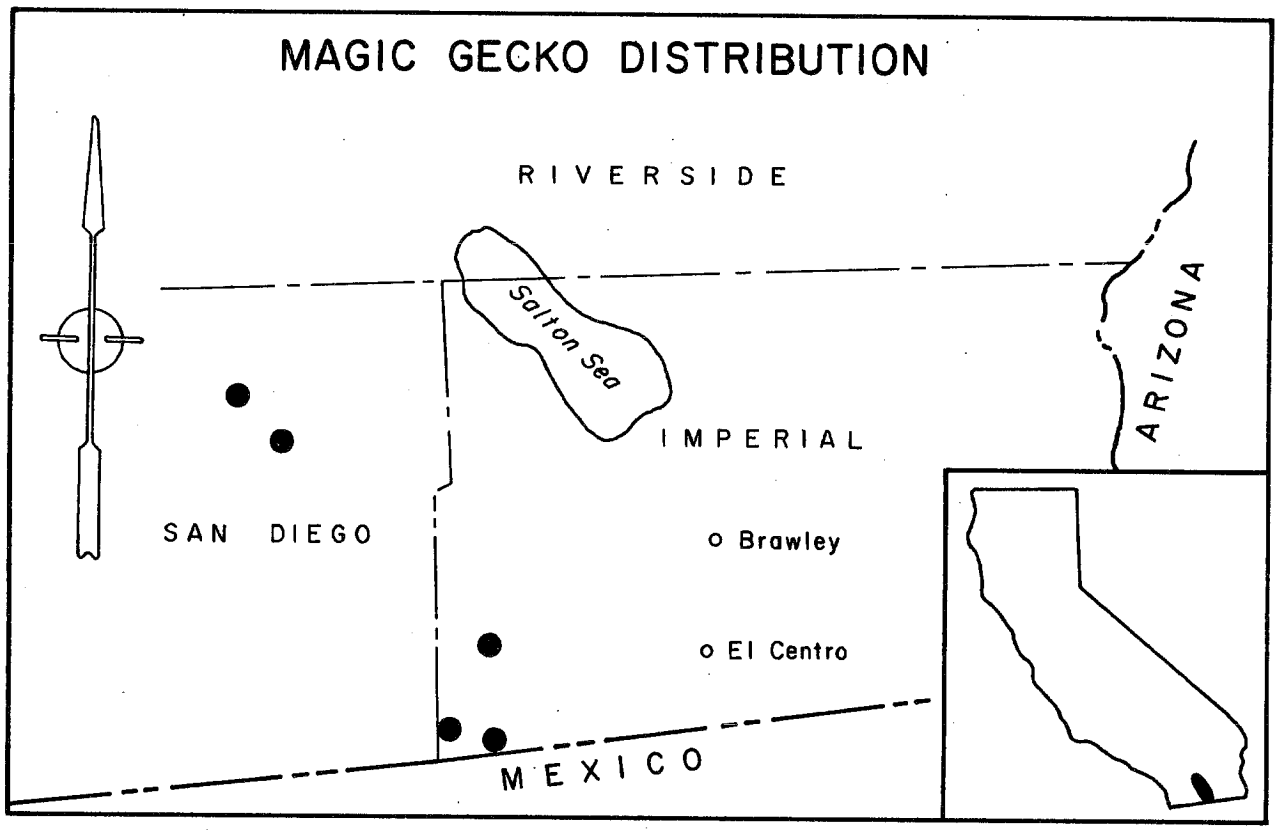
DISTRIBUTION: This species is known only from eastern San Diego County and western Imperial County. It has been found at only five localities since its discovery in 1976. These limited records indicate that the Magic Gecko inhabits rocky, boulder-strewn desert foothills, where it spends most of its life deep in the crevices and subterranean chambers which occur in the extremely rocky habitats. Intense searching for the Magic Gecko by reptile hobbyists and commercial collectors has severely degraded the habitat.

RECOVERY EFFORTS: The Department and the U. S. Bureau of Land Management are conducting a cooperative study to further identify the distribution and habitat requirements of this species.

FUTURE MANAGEMENT: The Department and the U. S. Bureau of Land Management will develop a cooperative management plan to protect the habitat of this species. The endangered species regulations will be enforced to prevent illegal collecting.

REFERENCES:

Fritts, T. H. 1979. The distribution, abundance, and habitat preferences of amphibians and reptiles in southwestern Imperial County - status of tubercolate geckos in southern California. U. S. Bur. Land Manage., Riverside, Calif. Rep., Contract CA-960-4350-5573-DE00. 27 pp. (typewritten)



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

COACHELLA FRINGE-TOED LIZARD
(Uma inornata)

CLASSIFICATION: State - Endangered
Federal - Threatened

DESCRIPTION: This lizard has fine scales and flattened body and tail. The toes are fringed with long pointed scales. The lower jaw is countersunk and the ears have well developed flaps. Dorsal surface is ground color and is grey with black reticulations forming a pattern of light circles with dark centers, some orange coloration may also be present. The throat is marked with diagonal lines and the underside of the tail has several black bars. The belly is white but may have a pinkish wash on the sides during breeding season. Small black dots may also occur on the sides of the belly. Length from snout to vent in adults is 70-115 mm (2 3/4 - 4 1/2 in).

DISTRIBUTION: The Coachella Fringe-toed Lizard is restricted to the Coachella Valley, Riverside County where it lives in fine windblown sand deposits such as sandy plains, sand hummocks, and mesquite dunes. It is especially adapted for living in these habitats and is restricted to them. By 1979, urbanization and agriculture had reduced the original habitat from 25,640 ha - 52,000 ha (99-200 sq miles). Habitat loss is continuing at a rate of about 500 ha (2 sq miles) per year. There is no habitat in the Coachella Valley that is safe from development. Large sand dunes have been leveled to construct homes, condominiums, and golf courses.

RECOVERY EFFORTS: The Department has requested funds from the California Environmental Protection Program for habitat acquisition. A local private conservation group is spearheading a fundraising drive to provide additional funds for habitat acquisition. A specific area in the Coachella Valley has been identified as suitable for an ecological reserve. The U. S. Army Corps of Engineers is funding a study to determine population densities of the Coachella Fringe-toed Lizard and the possible effects of flood control projects and windbreaks on their habitat.

FUTURE MANAGEMENT: The Department and U. S. Fish and Wildlife Service will prepare a management and recovery plan. The plan will identify alternative habitat areas for acquisition, or other protection, and mitigation alternatives for future projects that will impact Coachella Fringe-toed Lizard habitat.

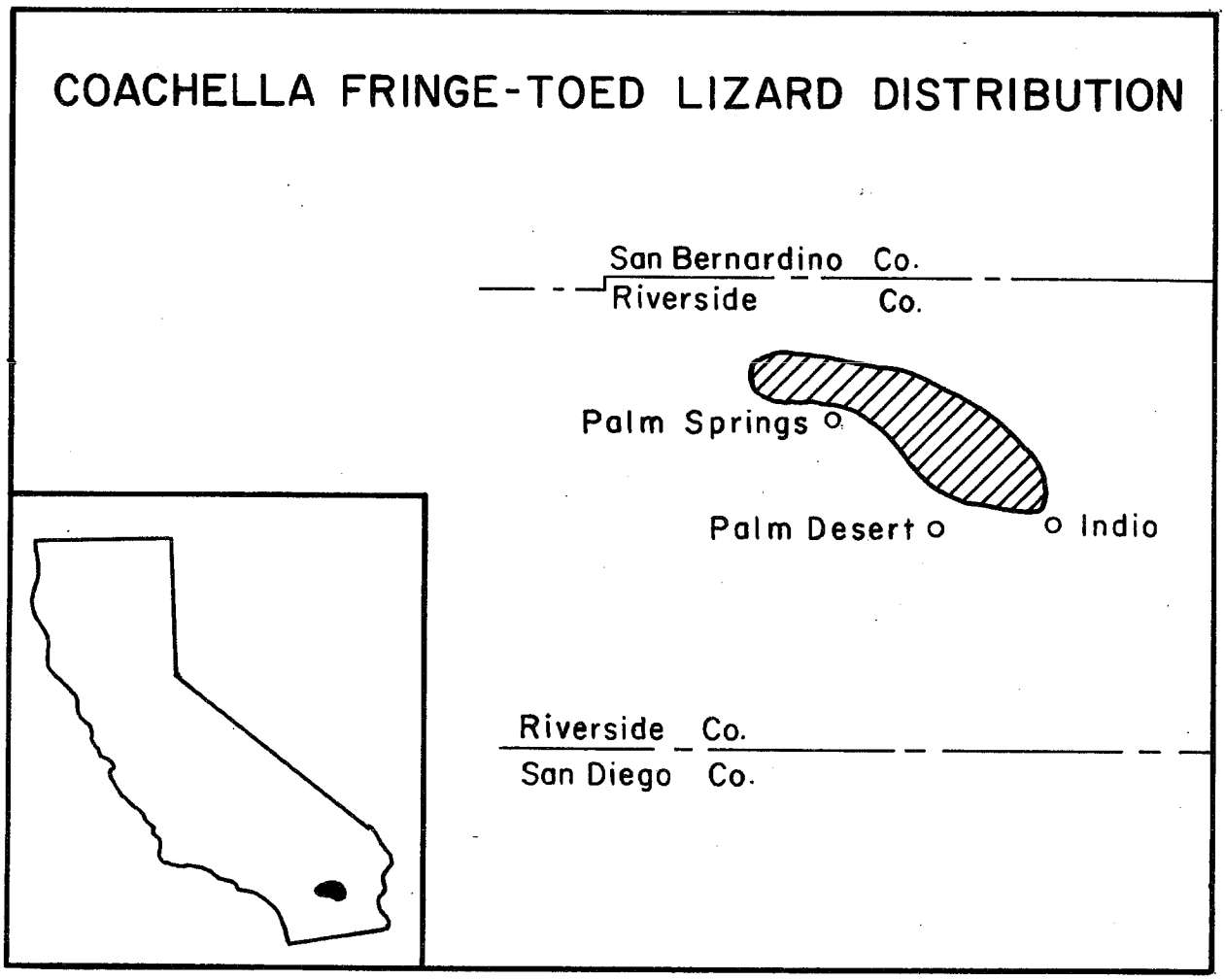
REFERENCES:

Brode, J. M. 1980. Reevaluation of the status of the Coachella fringe-toed lizard (Uma inornata) 1979. Calif. Dep. Fish Game, Sacramento. 5 pp. (typewritten)

England, A. S., and S. G. Nelson. 1976. Status of the Coachella Valley fringe-toed lizard (Uma inornata). Calif. Dep. Fish Game, Inland Fish. Branch Admin. Rep. 77-1, 29 pp.

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

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



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

BLUNT-NOSED LEOPARD LIZARD
(Gambelia silus)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This is a robust lizard with a long, round tail. Color above is grey or brown, with whitish crossbars on back and tail. Dark blotches on the back and tail and a short, blunt snout give this species its common name. Breeding females have orange or reddish spots on sides. Length from snout to vent in adults is 89-127 mm (3 1/2 - 5 in).

DISTRIBUTION: This species was originally found throughout the San Joaquin Valley and adjacent foothills from about San Joaquin County southward and into eastern San Luis Obispo County. Urbanization and agricultural development have eliminated nearly all leopard lizard habitat in the San Joaquin Valley. Of the wildlife habitat remaining in the San Joaquin Valley in 1976, 92,000 ha (228,000 acres) were identified as leopard lizard habitat. By April, 1980, this habitat had been reduced to 64,000 ha (158,000 acres). The Blunt-nosed Leopard Lizard now occurs in scattered locations in the valley and in the eastern portions of the coast ranges, including the Antelope and Carrizo Plains and Cuyama Valley. It inhabits sparsely vegetated plains, alkali flats, low foothills, grasslands, canyon floors, large washes, and arroyos.

RECOVERY EFFORTS: A recovery team was appointed by the U. S. Fish and Wildlife Service in 1975. The recovery team has drafted a recovery plan which was approved in 1980 and is scheduled for printing in 1981. The U. S. Forest Service is managing a 324 ha (800 acres) tract in Tulare County for this species, and a habitat improvement experiment with artificial burrows is being conducted there by the Department. A 180-ha (444-acre) Alkali Sink Ecological Reserve has been established near Mendota, Fresno County. Additional habitat acquisition projects are being pursued in Tulare and Kern counties by the Department and the U. S. Fish and Wildlife Service.

FUTURE MANAGEMENT: State and federal agencies will endeavor to implement management activities as described in the recovery plan, including continued acquisition of habitat. Surveys to identify habitat and enumerate leopard lizard populations will be completed by the Department and the U. S. Bureau of Land Management. The Department will continue experimental management on the U. S. Forest Service parcel.

REFERENCES:

Montanucci, R. R. 1965. Observations on the San Joaquin leopard lizard, Crotaphytus wislizenii silus Stejneger. Herpetologica 21:270-283.

_____. 1967. Further studies on leopard lizards (Crotophytus wislizenii). Herpetologica 23(2):119-126.

_____, R. W. Axtell, and H. C. Dessauer. 1975. Evolutionary divergence among collared lizards (Crotaphytus), with comments on the status of Gambelia. Herpetologica 31:336-347.

Tollestrup, K. 1979. The ecology, social structure, and foraging behavior of two closely related species of leopard lizards, Gambelia silus and Gambelia wislizenii. Ph.D. Disser., Univ. of Calif., Berkeley. 146 pp.

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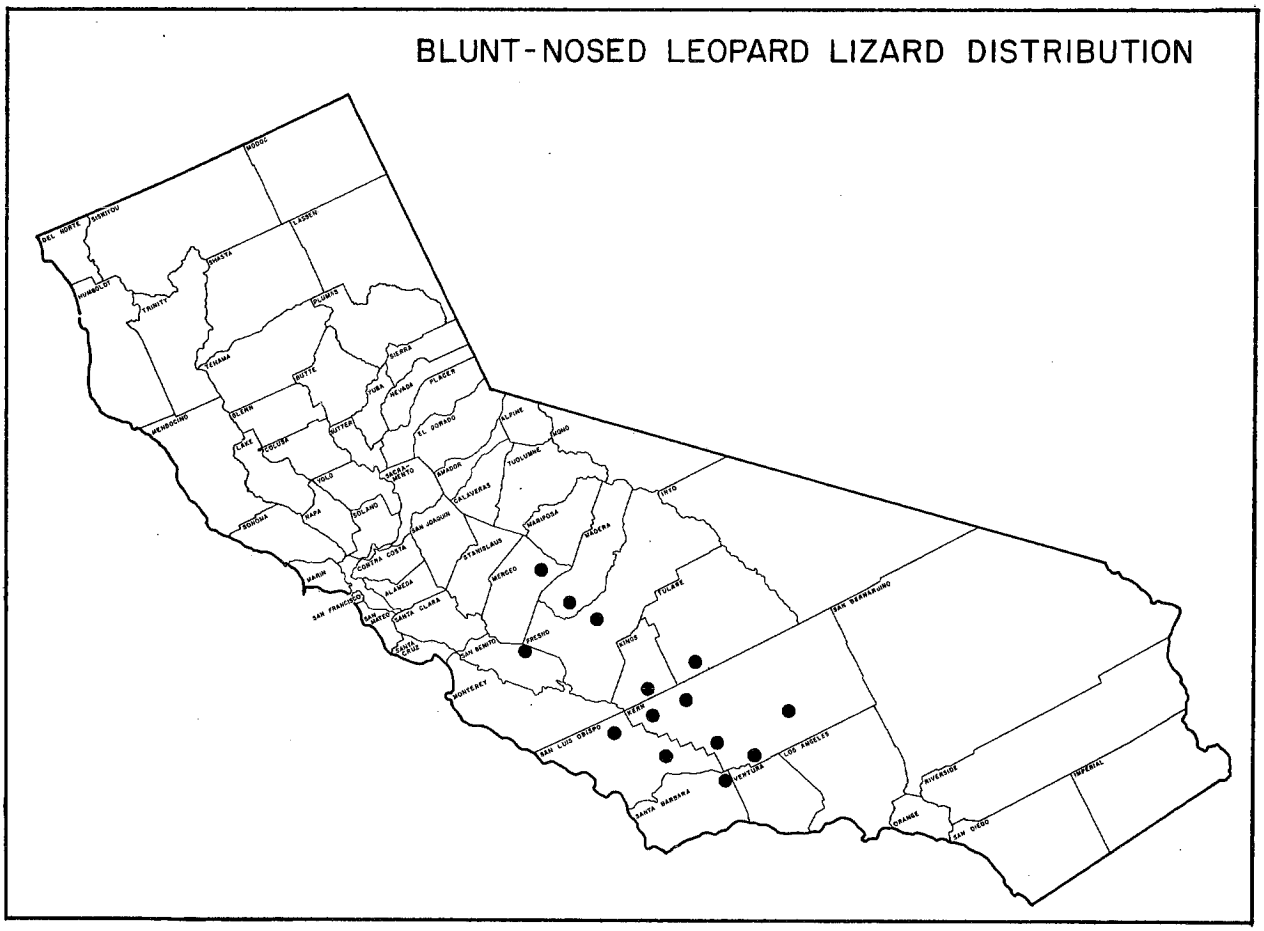
U. S. Fish and Wildlife Service. 1981. Blunt-nosed leopard lizard recovery plan. U. S. Fish Wildl. Serv., Portland. 32 pp. (in press).



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SOUTHERN RUBBER BOA
(Charina bottae umbratica)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a stout-bodied snake with a short, blunt tail that resembles the head. The skin is smooth and shiny. The scales on top of the head are large and sometimes asymmetrical. Color is olive or pale yellowish-brown dorsally and light yellow below. There is no color pattern, but there may be a few dusky flecks on the lower sides. Adults grow to about 51 cm (20 in).

DISTRIBUTION: This snake is known only from several localities in the San Bernardino Mountains, San Bernardino County; near Idyllwild, Riverside County; and Mt. Pinos, Kern County. It occurs in the pine forests near streams and meadows.

RECOVERY EFFORTS: The U. S. Forest Service has investigated the distribution of the Southern Rubber Boa in the Angeles, Los Padres, and San Bernardino National Forests. Recommendations have been made to lessen impacts on the snake from logging.

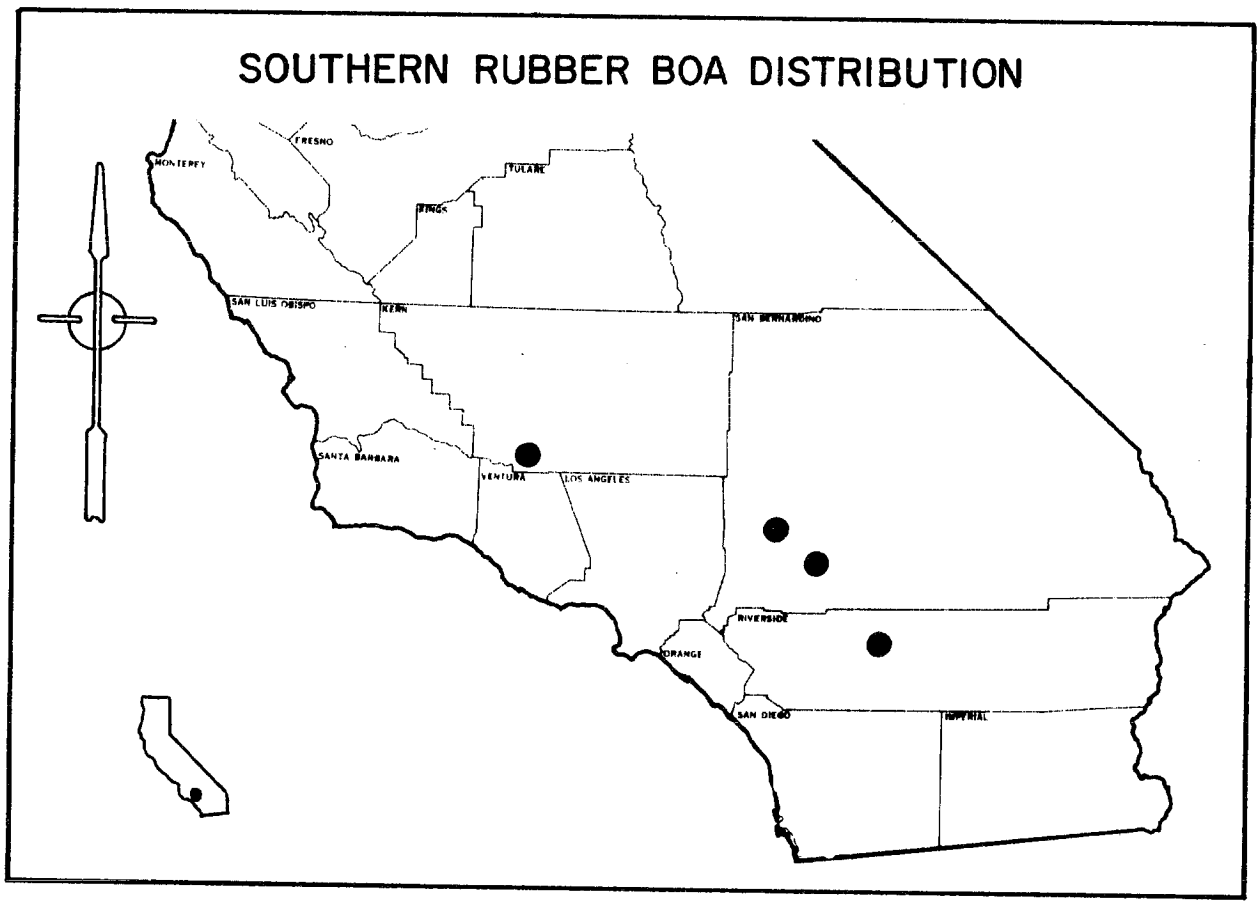
FUTURE MANAGEMENT: A Southern Rubber Boa Advisory Committee has been formed to coordinate studies and management of this snake. The principle causes of habitat damage include resort development, smog, logging, and wood gathering.

REFERENCES:

Cunningham, J. D. 1966. Observations on the taxonomy and natural history of the rubber boa, Charina bottae. Southwest. Natural. 11:298-299.

Erwin, D. B. 1974. Taxonomic status of the southern rubber boa, Charina bottae umbratica. Copeia 1974(4):996-997.

Klauber, L. M. 1943. The subspecies of the rubber snake, Charina. Trans. San Diego Soc. Nat. Hist. 10(7):83-90.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

ALAMEDA STRIPED RACER
(*Masticophis lateralis euryxanthus*)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is a slender, fast moving snake with a narrow neck and relatively broad head with large eyes. Color is black or dark brown above, with a distinct orange stripe down each side to or beyond the vent. The lateral stripe is one and two half-scale rows wide. In this subspecies of *M. lateralis*, the lateral stripe is yellow or cream and is only two half-scale rows wide. The forward portions of the ventral surface are orangish, and the posterior portions are cream grading to pinkish on the underside of the body and tail. Adults grow to a length of 91-112 cm (3-4 ft).

DISTRIBUTION: This racer occurs in the valleys, foothills, and low mountains of the Coast Range east of San Francisco Bay and west of the Central Valley in Contra Costa and Alameda counties. It is usually associated with chaparral, but may occur in grassland, open woods, and on rocky slopes.

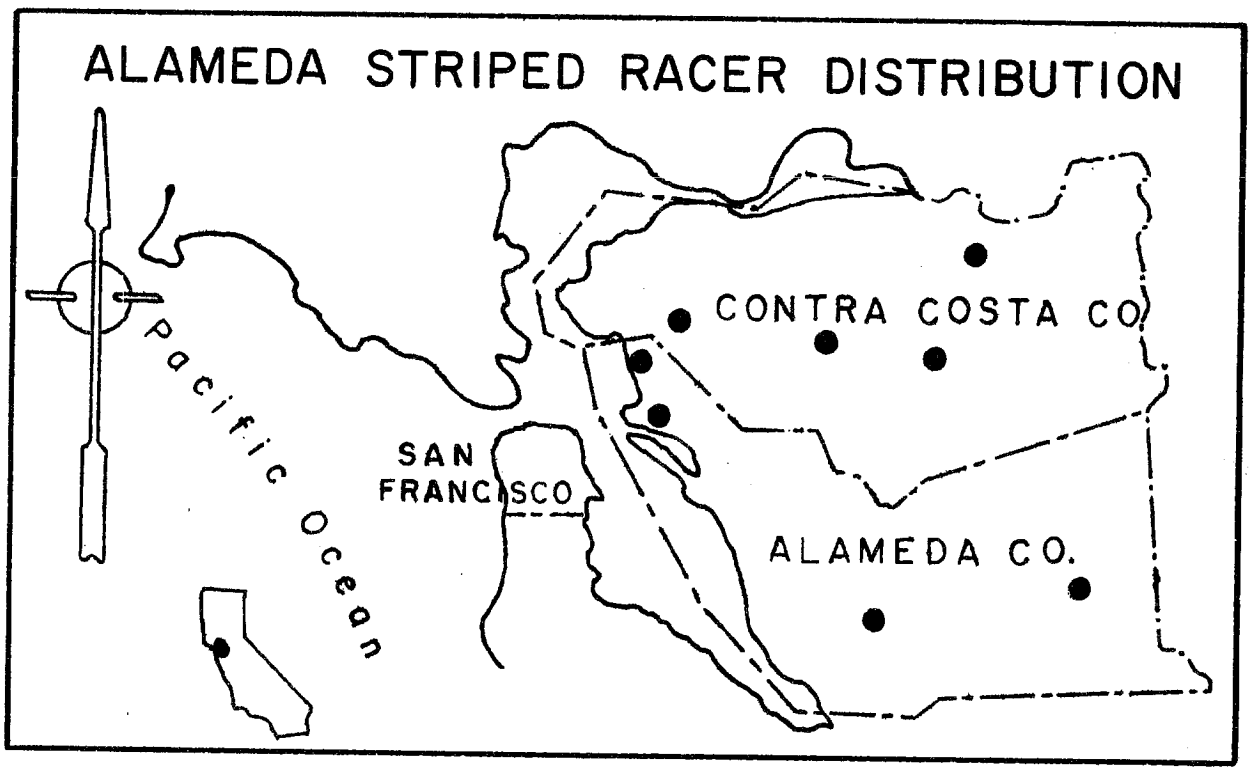
RECOVERY EFFORTS: Operators of several East Bay parks have been notified of the status of this subspecies and its probable occurrence in the parks; and the Department has provided distributional data to the Contra Costa County Planning Department.

FUTURE MANAGEMENT: Liaison will be maintained with county planners to protect habitat from human encroachment wherever possible. Major threats to this snake's habitat include urban development and water impoundment. Surveys will be made to determine if this subspecies occurs north of San Francisco Bay in Solano, Napa, and southern Sonoma counties.

REFERENCES:

Hammerson, G. A. 1979. Thermal ecology of the striped racer, *Masticophis lateralis*. Herpetologica 35(3):267-273.

Reimer, W. J. 1954. A new subspecies of the snake *Masticophis lateralis* from California. Copeia 1954 (1):45-48.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SAN FRANCISCO GARTER SNAKE
(Thamnophis sirtalis tetrataenia)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The scales of this species are of a typical colubrid. Body scales are in 19 rows and have weak to strongly keeled scales which lack apical pits. Scales of the fourth row on each side disappear at a point a little more than half way toward the vent. The remaining 17 rows extend to the posterior end of the body then drop out rapidly near the tail. There is a singular anal plate. Scutellation of the head is also typically colubrid. The rostral plate is large and prominent, there are usually seven upper labials.

This animal has a mid-dorsal stripe of greenish-yellow edged with black and a red stripe on each side which may be broken or divided. The belly is greenish-blue and the top of the head is red. Adults grow to a length of 45-130 cm (18-51 in).

DISTRIBUTION: This subspecies is found only in San Mateo County and has been extirpated from San Francisco County. Small populations occur near freshwater marshes, ponds, and slow moving streams along the coast from Sharp Park to Ano Nuevo and east into the Santa Cruz Mountains where suitable habitat occurs. The largest populations occur around lakes within the San Francisco Fish and Game Refuge. Loss of habitat to urbanization has destroyed the majority of the prime habitat for this animal.

RECOVERY EFFORTS: Known populations are regularly monitored and the individual's movements noted. New populations are being sought and key habitat is being delineated. Coordination efforts with local governments are attempting to protect known habitats.

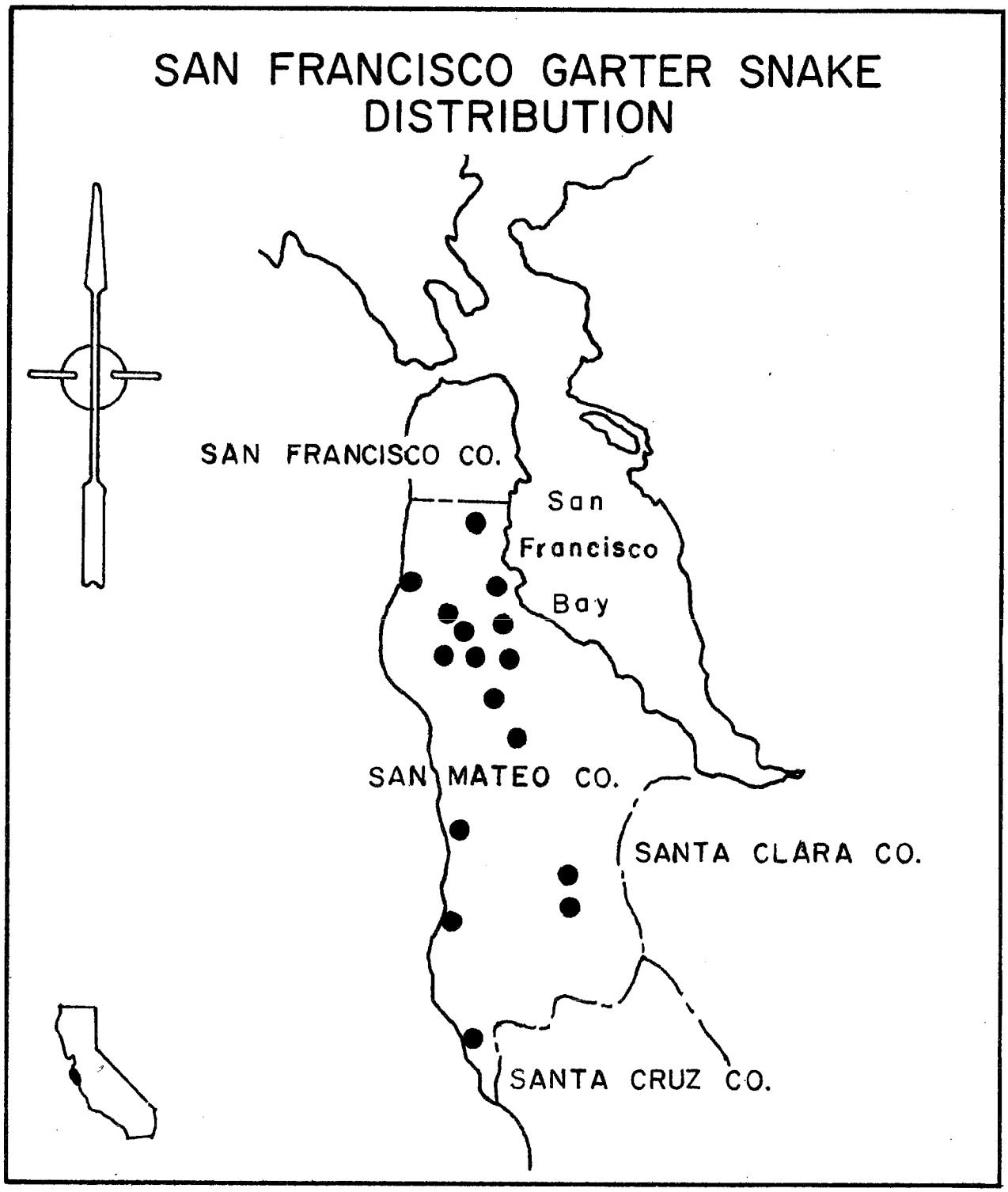
FUTURE MANAGEMENT: Studies of this species' population dynamics are essential to future management plans. Movement corridors, primary and secondary habitat requirements, and dispersal dynamics will be studied in order to learn how to best manage this animal. As populations of this animal are protected by adequate regulations and law enforcement, a change in classification to rare may be warranted.

REFERENCES:

Barry, S. J. 1978. Status of the San Francisco garter snake. Inland Fish. Endang. Spec. Program Special Publ. 78-2. 21 pp.

Fox, W. 1951. The status of the garter snake, Thamnophis sirtalis tetrataenia. Copeia 1951(4):257-267.

Stebbins, R. 1966. A field guide to western reptiles and amphibians. Houghton Mifflin, Boston. 279 pp.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

GIANT GARTER SNAKE
(Thamnophis couchi gigas)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: This is one of the largest garter snakes, reaching 137 cm (4 1/2 ft). The basic color is dull brown with a checkered pattern of well separated black spots on the dorsal side. There is a dull yellow-mid-dorsal stripe, and the lateral stripes are often not developed. The head is elongated with a pointed muzzle.

DISTRIBUTION: The original reported range of this snake was the San Joaquin Valley from the vicinity of Sacramento and Antioch southward to Buena Vista Lake. It appears that this snake has been extirpated from Buena Vista Lake and the Tulare Lake Basin. The present known distribution extends from the vicinity of Gridley, Butte County, to the vicinity of Burrel, Fresno County. It is one of the most aquatic of garter snakes and is usually found in areas of permanent freshwater, although it also frequents temporary water such as flooded rice fields and irrigation canals.

RECOVERY EFFORTS: The Department has completed preliminary survey work in the San Joaquin Valley and southern Sacramento Valley. The managers of several wildlife areas have been notified of the presence of this snake on their areas.

FUTURE MANAGEMENT: The distribution of this snake in the northern Sacramento Valley is not fully understood. Field surveys will be conducted to determine the northern limits of the Giant Garter Snake's range and its distribution in the Sacramento Valley. Recent pesticide testing programs have been carried out in potential Giant Garter Snake habitat. A better understanding of this snake's distribution and habitat preferences will allow more positive evaluation of future pesticide applications. The managers of State and Federal wildlife management areas and private duck clubs will be encouraged to retain aquatic habitat for this snake.

REFERENCES:

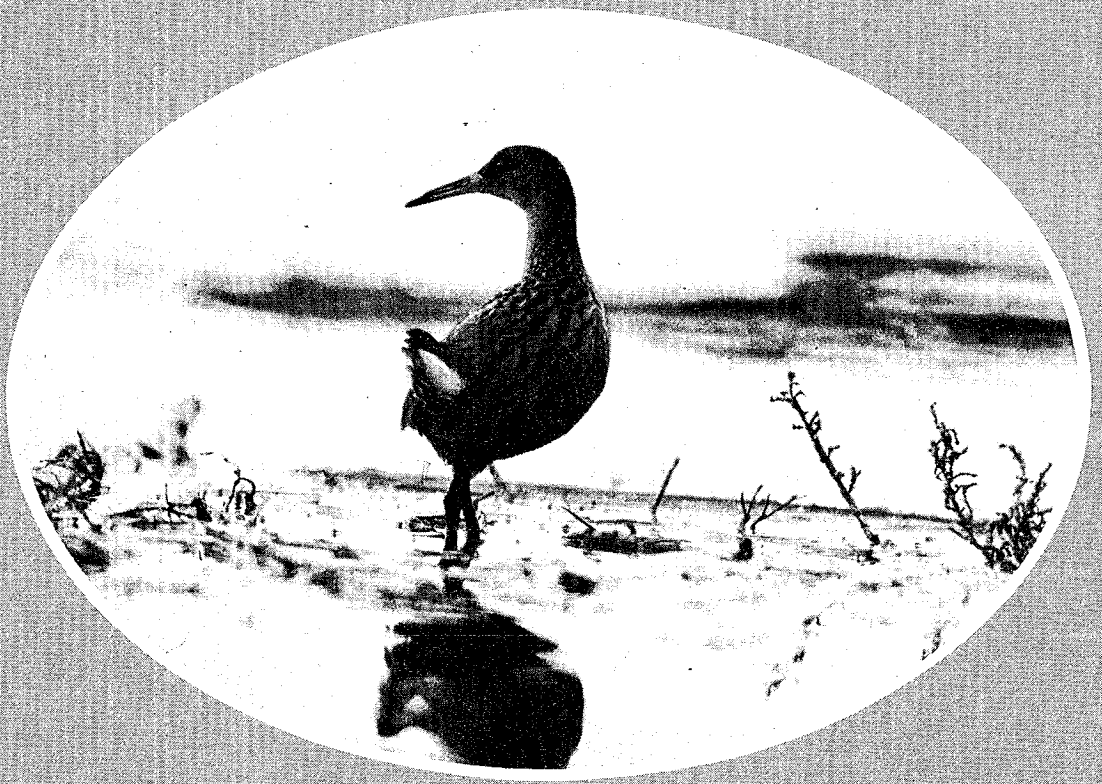
Fitch, H. S. 1940. A biogeographical study of the ordinoides artenkreis of garter snakes (genus Thamnophis). Univ. Calif. Publ. Zool. 44(1):1-150.

Fox, W. 1951. Relationships among the garter snakes of the Thamnophis elegans Rassenkreis. Univ. Calif. Publ. Zool. 50(5):485-530.

Hansen, G. E., and J. M. Brode. 1980. Status of the giant garter snake, Thamnophis couchi gigas (Fitch). Calif. Dep. Fish Game, Inland Fish. Endang. Spec. Program Special Publ. 80-5. 14 pp.

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

Birds



CALIFORNIA BROWN PELICAN
(Pelecanus occidentalis californicus)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The California Brown Pelican is a large grayish-brown coastal bird with a long, pouched bill. It is usually seen in flocks, flying in single file, alternately flapping and gliding in unison. It flies with its head and neck folded back on the shoulders. The California subspecies is distinguished from the eastern subspecies by its larger size and darker coloration. Adults have white heads and necks, whereas immatures are dark-headed.

DISTRIBUTION: The California Brown Pelican occurs along the Pacific coast from British Columbia to Mexico. Historically it nested from Monterey south to islands along the west coast of Baja California and in the Gulf of California. From 1968 through 1979, Anacapa Island was the only consistent breeding site in California. A small colony nested on Scorpion Rock, Santa Cruz Island, in 1972, 1974 and 1975. Santa Barbara Island was recolonized in 1980 by about 97 pairs. From 1974 to 1976 pelican productivity began to recover from DDT-related reproductive failures, but it declined severely in 1977 and 1978, apparently due to inadequate food supplies. Productivity on Anacapa Island increased again in 1979 with 980 young produced from 1258 nesting attempts, and in 1980, with 1440 young from 2150 nesting attempts. The number of young produced per nesting attempt, however, is still below what is considered normal for Brown Pelicans.

RECOVERY EFFORT: Management of the California Brown Pelican has included protecting nesting colonies from human disturbance, banning the use of DDT in the United States, and yearly monitoring of the reproductive success of the Channel Islands population. The National Park Service has closed the pelican colonies to public access during the nesting season and has declared West Anacapa Island a Research Natural Area. A closed zone has been established around the West Anacapa colony, preventing potential human disturbance from boats during the nesting season. All islands in the Gulf of California and along the Baja California coast used by nesting pelicans were declared sanctuaries by the government of Mexico in 1978. Biologists of the Department, U. S. Fish and Wildlife Service, National Park Service and University of California have continued to monitor pelican reproductive success and have studied the breeding biology and foraging behavior of this species. Presently, biologists are investigating the relationships between food abundance, nesting success and effects of commercial fishing in the area.

FUTURE MANAGEMENT: Protection and monitoring of the Channel Islands nesting colonies of California Brown Pelican will continue. A public awareness program is needed to publicize the existence of the closed zone around the Anacapa Island nesting colony and the need for such zones near all pelican colonies. The federal government should be urged to enter into a cooperative agreement with the government of Mexico to aid in the gathering of data and protection of the pelican nesting colonies in the Gulf of California and along the Pacific coast. Scorpion Rock, Santa Cruz Island, should be protected from disturbance during the pelican nesting season.

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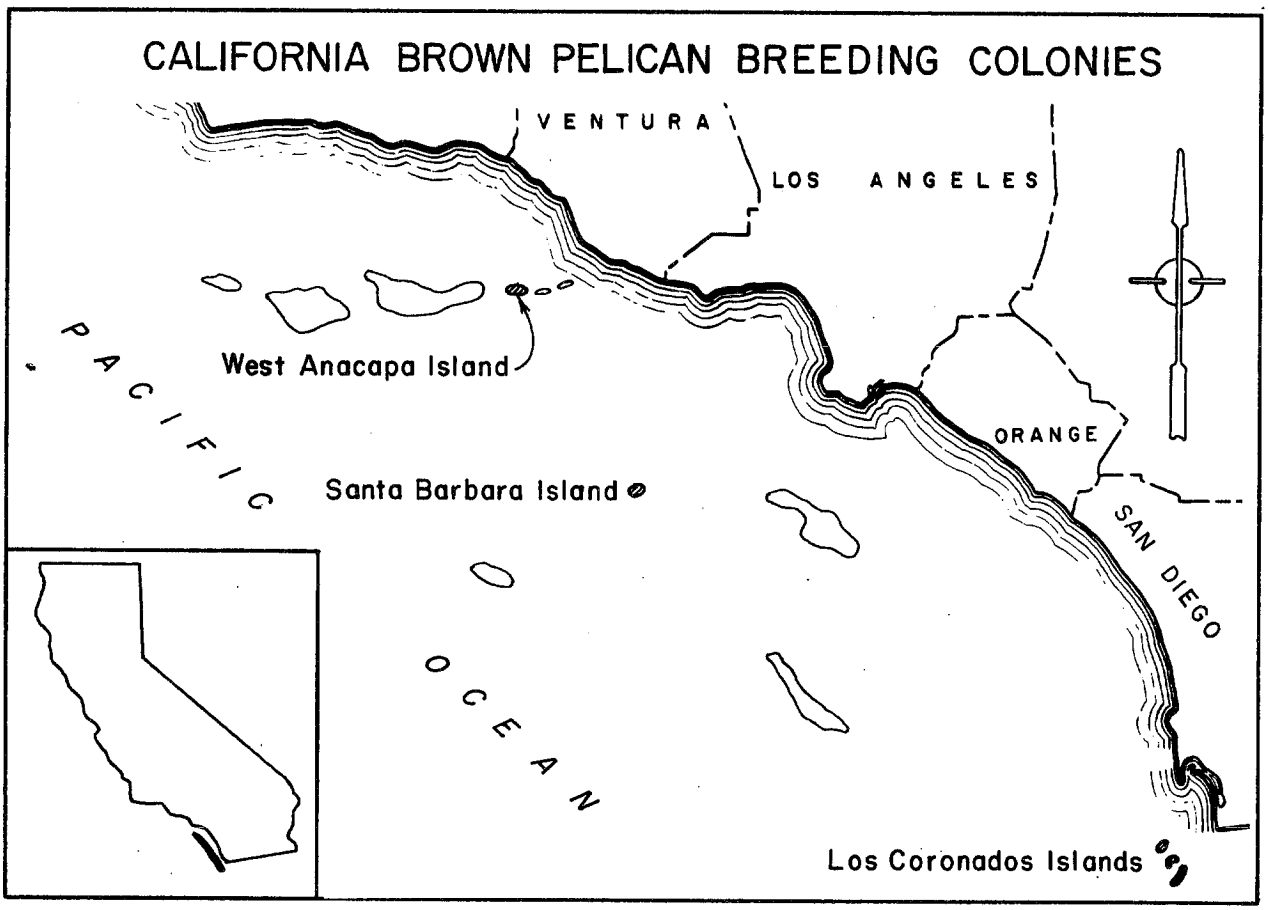

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

CALIFORNIA CONDOR
(Gymnogyps californianus)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This vulture is North America's largest land bird. Condors weigh approximately 9 kg (20 lb), and average wingspread is 3 m (9 ft). Coloration is mostly black. Young birds have a bare gray head and neck, and the underwing lining may be dark, white, or mottled. Adult plumage develops by 5 or 6 years of age; plumages of both sexes are identical. The underwing feathers of adults form a white, triangular wing bar, and the head and neck are mostly orange.

DISTRIBUTION: This species formerly ranged over much of western North America from British Columbia to Baja California. Many factors--including human disturbance and habitat changes, shooting, egg collecting, and environmental contamination--have contributed, or may have contributed, to reduction of population size and range and to a reproductive rate that is too low to maintain a stable or increasing population. The existing population is estimated to be fewer than 30 birds. Current range includes the mountains and foothills around the San Joaquin Valley. Nesting takes place in shallow caves in cliffs in the southern limit of this range. Condors are carrion eaters, feeding on the carcasses of cattle, sheep, deer and other animals that the birds find on foothill rangelands and other open country.

RECOVERY EFFORTS: All known nesting areas used in the last 20 years are located on U. S. Forest Service lands, and a habitat management plan for nesting and other habitats was developed by that agency in 1971. Prior to 1950, Forest Service had established the Sisquoc and Sespe condor sanctuaries to protect key roosting and nesting habitats; these areas were enlarged in later years. Other agencies and private organizations have secured additional key habitats, including Huff's Hole nesting area, inholdings in the Sespe Condor Sanctuary, and Hopper Mountain National Wildlife Refuge. Agencies have controlled uses of public lands in important condor habitats, such as placing moratoriums on oil, gas and mineral leasing activities and restrictions on aircraft, motor vehicles, blasting, human access and firearms use. In 1976, nine regions within the condor range were determined to be Critical Habitat under provisions of the Federal Endangered Species Act. A California Condor Recovery Plan was developed in 1975 and revised in 1980 by the California Condor Recovery Team. The plan provides guidelines for agency and organization actions needed to maintain and enhance the condor status. In 1979, U. S. Fish and Wildlife Service, Forest Service, U. S. Bureau of Land Management, Department of Fish and Game, and National Audubon Society entered a cooperative agreement on condor conservation programs. Under the agreement, the Condor Research Center was established to direct field research and public education activities. In 1980, Fish and Wildlife Service received federal approval for a program of radiotelemetry marking and captive propagation, but a pending state permit was cancelled following the accidental death of a condor chick being studied in the nest. A five-member Condor Advisory Committee has been established to review any new program proposals and provide advice to the Fish and Game Commission and the Department. Ongoing programs of member agencies under the cooperative agreement include annual population surveys, environmental project reviews, habitat assessments, observational condor population studies, condor sexing techniques, environmental contamination study, supplemental feeding program, and public education.

FUTURE MANAGEMENT: The Department will cooperate with other agencies and organizations in implementing the California Condor Recovery Plan and recovery efforts. A Department wildlife biologist will be assigned to work with the Condor Research

Center. Any future "hands-on" study proposals by Fish and Wildlife Service will be reviewed by the Fish and Game Commission, the Condor Advisory Committee, the Department, other agencies and the public before any possible new state authorization would be given. The Department will coordinate annual condor surveys and will continue to cooperate with other agencies on environmental reviews, assessments and studies.

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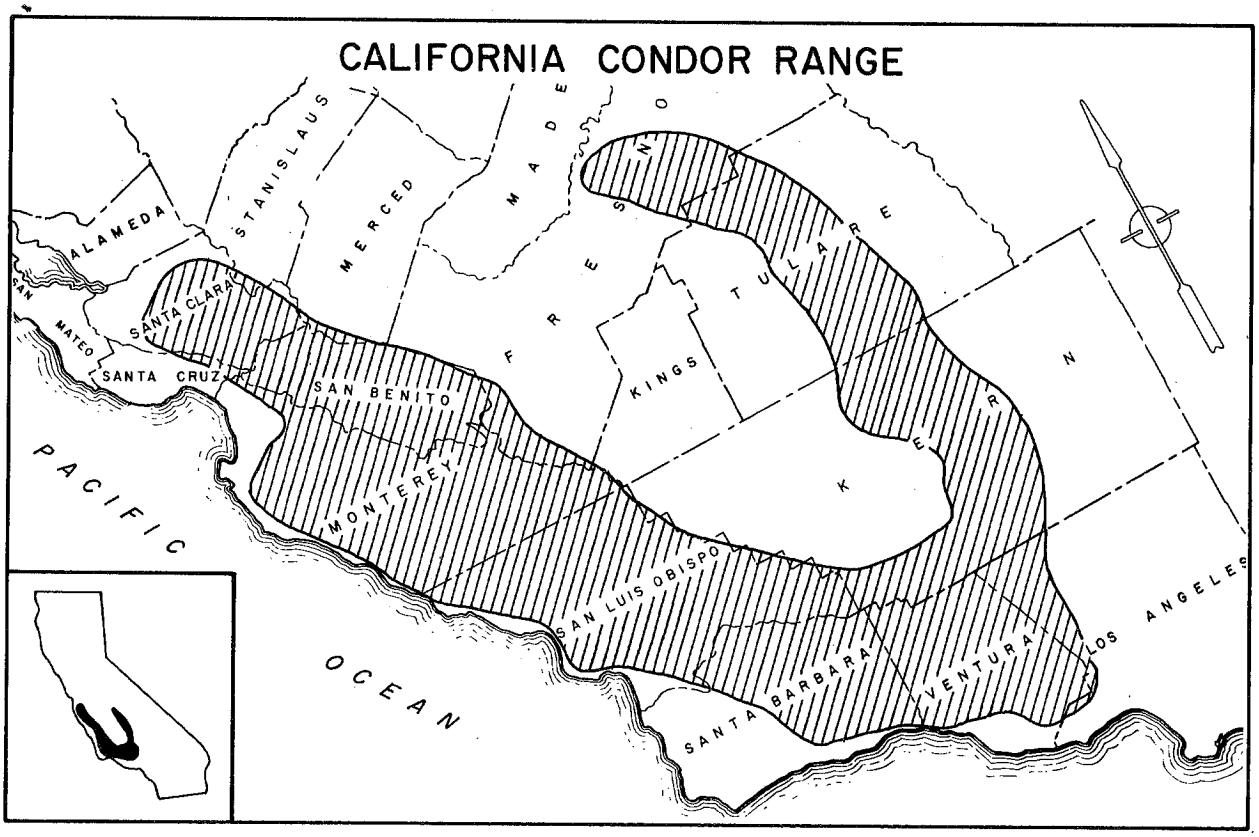

At the Crossroads, 1980. Calif. Dep. of Fish and Game.

BALD EAGLE
(Haliaeetus leucocephalus)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: Adults are brownish black with white head, neck and tail. Females are larger than males. Wingspans range from about 2-2½ m (6½-8 ft), and weights range from about 3½-6½ kg (8-14 lb). Plumage of young is mostly brown, blotched irregularly with white or buff. As birds approach maturity, at 4 or 5 years of age, the head, neck and tail become progressively whiter over several annual molts.

DISTRIBUTION: Historically, Bald Eagles bred from southern California--primarily near the coast and on the Channel Islands--north throughout much of central and northern California. Since 1977, all known breeding areas have been in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou and Trinity counties. In 1980, adult Bald Eagles occupied 52 known breeding territories; 43 territories were active (eggs were laid), and 33 territories produced 58 fledglings. Ninety-five nest sites were found in 54 territories used by Bald Eagles from 1963 to 1978; 68% of the nest sites were on U. S. Forest Service land and 21% on private lands. Most nests are constructed in dominant or co-dominant ponderosa and sugar pines within 1.6 km (1 mile) of a waterfront, mainly of reservoirs. Bald Eagles winter nearly statewide near reservoirs, lakes and rivers, feeding mainly on dead or dying fish and waterbirds, and to a lesser extent in upland area, feeding on carrion and some small, live prey. Perch trees overlooking foraging areas are important habitat features, as are specific forested areas used in winter as communal night roosts. In January 1979, 855 wintering birds were counted statewide. About half the state wintering population is found in the Klamath Basin.

RECOVERY EFFORTS: The California Bald Eagle Working Team was established in 1974 to advise agencies and provide guidance for Bald Eagle conservation activities in California. This team is composed of representatives from state and federal agencies and private industry. Structure and function of this team were modified in 1980. Nest territory plans have been developed by agency biologists for most breeding territories in accordance with guidelines established by the working team. These plans and field studies are used in assessing impacts of developments on Bald Eagles. Measures to protect eagle nesting territories are addressed in Timber Harvest Plan and environmental impact reviews for private lands, in Forest Service or other agency planning, and in Federal Endangered Species Act Section 7 consultations for federal lands or actions. Statewide nesting surveys were initiated in 1968, but thorough coverage was not attained until 1977. Each year several new nesting territories are discovered, partly or mainly because of continually improving survey efforts. The status of the State's breeding population was first studied in 1973. Forest Service has conducted special Bald Eagle studies for forest planning purposes. In 1977-78, a survey was made of all known territories used since 1963 to assess nest site characteristics and disturbance factors. Recently, Forest Service has been experimenting with sound recording of wild Bald Eagles as a technique for determining long-term occupancy patterns of individual birds at nesting territories. Initial efforts to restore a breeding population to the Channel Islands--after a 30-year absence--began in 1980 with the release of six Bald Eagles taken as wild nestlings in Washington State and fledged from artificial platform "nests" on Catalina Island. Annual mid-winter surveys of the State's wintering eagle population began in January 1978, part of a national survey system. In recent years, key wintering habitats have been identified, and several

major communal winter roosts have been protected from disturbance through acquisition or management. In 1979, studies were begun in the Klamath Basin to determine habitat characteristics of winter roosts. Several studies have been made since 1975 to assess Bald Eagle winter habitat needs on Forest Service and U. S. Bureau of Land Management lands. When sick or injured Bald Eagles are found, they are routinely placed in rehabilitation facilities, if possible, and any dead Bald Eagles are routinely autopsied to determine cause of mortality and are made available for pesticide analysis. In recent years, several attempts have been made to release rehabilitated birds. Many eagle conservation actions and issues have been publicized as part of agency and private conservation group information education efforts. In 1979, the Pacific Bald Eagle Recovery Team was established. The 8-member interagency team has representatives from five western states, including California, and three Federal agencies. The team has been developing a recovery plan encompassing all aspects of research, management, and public education needs and agency responsibilities. The goal of the plan is to restore the species to a non-endangered status. In 1980, the Fish and Game Commission changed the species nomenclature used on the State endangered bird list from Southern Bald Eagle (H. l. leucocephalus) to Bald Eagle (H. leucocephalus), in recognition of current taxonomic knowledge and in conformity with federal endangered species list nomenclature.

FUTURE MANAGEMENT: The Department will continue to participate on the California Bald Eagle Working Team and Pacific Bald Eagle Recovery Team. Ongoing programs will include the annual breeding and wintering population surveys, identification of essential habitats, attempts to restore breeding populations in selected historical habitats, rehabilitation of injured and sick eagles, monitoring of mortality factors, and ecological investigations. Efforts to protect Bald Eagles and their habitats will continue through Department cooperation with other agencies and organizations in timber harvest plan, environmental impact and federal Section 7 reviews and in law enforcement. The Department will coordinate efforts with California Department of Forestry and the Board of Forestry to develop Bald Eagle habitat protection guidelines for private timber operations. Continued efforts will be made to provide information and educational material to agency personnel and the general public.

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At The Crossroads, 1980. Calif. Dep. of Fish and Game.

AMERICAN PEREGRINE FALCON
(Falco peregrinus anatum)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The peregrine is a crow-size raptor with a wingspread of about 90-100 cm (35-40 in). Males are smaller than females. Adults are slate gray above; cream colored with a rufous wash below. The belly and underside of wings and tail have dark, narrow barrings, and the breast is spotted. The head is dark, with a broad black cheek patch. Legs and feet are yellow. Immatures are brown above, with buff-edged feathers; underparts are buff, streaked with brown, with barring under wings and tail; and legs are blue-gray to green-yellow.

DISTRIBUTION: Breeding birds are resident in the State. Other peregrines from more northern breeding populations either pass through the State during migrations or winter here. During migration and in winter, peregrines occur statewide. The peregrine formerly nested throughout most of California. In the mid-1940's, about 100 active nests (eyries) were known, but many others probably existed. The decline in California began about 1950. By 1969, perhaps fewer than 10 active nests remained. Food chain contamination by DDT was the major cause of the decline, but adverse habitat changes, illegal shooting, and illegal falconry activities contributed to it. In recent years annual breeding populations surveys have yielded increasing numbers of active eyries, partially because of improving status of local breeding populations and partially because of improving survey efforts. In 1980, 42 breeding pairs occupied territories chiefly in the central and north coast ranges and Cascade Range. Peregrines nest on protected ledges of high cliffs, mainly in woodland, forest, and coastal habitats. They feed primarily on pigeons, shorebirds, and songbirds, which they catch in flight. Coastal and inland marsh and riparian areas are important habitats year round, especially in non-breeding seasons.

RECOVERY EFFORTS: DDT use was banned in California in 1971, and other management and protection efforts were intensified during the 1970's. In some areas, however, mainly on the central coast, DDT-related eggshell thinning and nesting failures are continuing. Pesticide levels in peregrines are routinely analyzed for chemical contaminants using egg and carcass samples. In summer 1980, potential prey species collected from selected peregrine breeding areas were systematically sampled and analyzed to help identify sources of continuing DDT contamination. Annual monitoring of the breeding population began in 1970, with interagency survey efforts intensifying during the late 1970's. Nesting season surveillance efforts, entailing the stationing of observers near nest sites vulnerable to human disturbance, also have been expanded. Nest site attendants work closely with law enforcement agents. The U. C. Santa Cruz-affiliated Predatory Bird Research Group (PBRG), established a captive breeding population of American Peregrine Falcons during the late 1970's, and captive-produced young will be available for release in the early 1980's. Annually since 1977, PBRG also has used special management techniques to augment natural productivity of wild peregrines. Since 1978, U. S. Forest Service and U. S. Fish and Wildlife Service have been creating, restoring and enhancing nesting ledges at selected sites. U. S. Forest Service has established Peregrine Falcon habitat protection areas at nesting sites, and U. S. Fish and Wildlife Service has determined Critical Habitat for breeding Peregrine Falcons in three zones in north coastal California. The State has established two ecological reserves to protect peregrine nesting sites. Habitat protection measures are routinely addressed in Timber Harvest Plan reviews and environmental impact reviews at the State level

and in Section 7 consultation reviews at the Federal level. U. S. Bureau of Land Management and Forest Service have been identifying existing and potential peregrine nesting habitat on their lands. Legal, captive peregrines are registered and banded by the State. The Fish and Game Commission has authorized limited numbers of permits for captive-breeding of Peregrine Falcons. In late 1980, the Pacific American Peregrine Falcon Recovery Team--representing California, Oregon, Washington and Nevada--submitted a draft Recovery Plan to U. S. Fish and Wildlife Service, outlining actions needed to restore the species to non-endangered status. In 1980, the California Peregrine Falcon Working Group--with representatives from Department of Fish and Game, three federal agencies, and National Audubon Society--was formed to coordinate statewide management and protection efforts.

FUTURE MANAGEMENT: Annual breeding population surveys and nest site surveillance will be continued. Special management actions designed to augment productivity of breeding pairs, to encourage nest site attachment of reproductively failing pairs, and to create or enhance nest sites will be continued as needed on a site-by-site basis. The captive breeding program will be continued, and captive-produced offspring will be used as needed in California or other states to attempt to restore breeding populations or to augment existing ones. Interagency efforts, coordinated by the California Peregrine Falcon Working Group and guided by the Recovery Plan, will be made for protection and management of key habitats. Chemical contamination will be monitored routinely as long as pollution-induced reproductive failures continue, and efforts will be continued to identify contaminant sources. Department participation on the Working Group and Recovery Team will continue.

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At The Crossroads, 1980. Calif. Dep. of Fish and Game.

CALIFORNIA CLAPPER RAIL
(*Rallus longirostris obsoletus*)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The California Clapper Rail is a long-billed, brown bird with tawny breast, barred flanks, and a short upturned tail with white beneath. This secretive marsh bird is about the size of an American Coot.

DISTRIBUTION: The California Clapper Rail is a year-round resident of salt marshes adjacent to Elkhorn Slough and San Francisco, San Pablo, Southhampton and Suisun bays. It is a casual visitor to Tomales Bay and Bolinas Lagoon, and historically occurred at Humboldt and Morro bays, although not in recent years. Population numbers appear to fluctuate considerably from year to year. Habitat loss, habitat degradation by industrial pollution, and predation by introduced rats are the major threats to this Clapper Rail subspecies.

RECOVERY EFFORT: Recent acquisition and preservation of key habitat areas have made the status of this rail less tenuous. South San Francisco Bay and San Pablo Bay national wildlife refuges have been established and a portion of Bair Island, Coon Island and San Pablo Bay marsh lands have been acquired by the State. A National Audubon Society sanctuary has been established on portions of Greco Island and Mowry Slough in South San Francisco Bay. The Nature Conservancy has acquired Tubbs Island and portions of North San Pablo Bay, and the City of Palo Alto has preserved Palo Alto Baylands. The Department and U. S. Fish and Wildlife Service have monitored the California Clapper Rail population since 1970.

FUTURE MANAGEMENT: California Clapper Rail populations will continue to be monitored to determine both non-breeding and breeding densities and to better define current population trends. More intensive studies are needed to define habitat requirements and investigate possible conflicts with existing marsh management programs. Acquisition and preservation of marsh habitat should continue, particularly at Elkhorn Slough and in the Petaluma and Napa marshes. A program of marsh restoration and enhancement should be begun.

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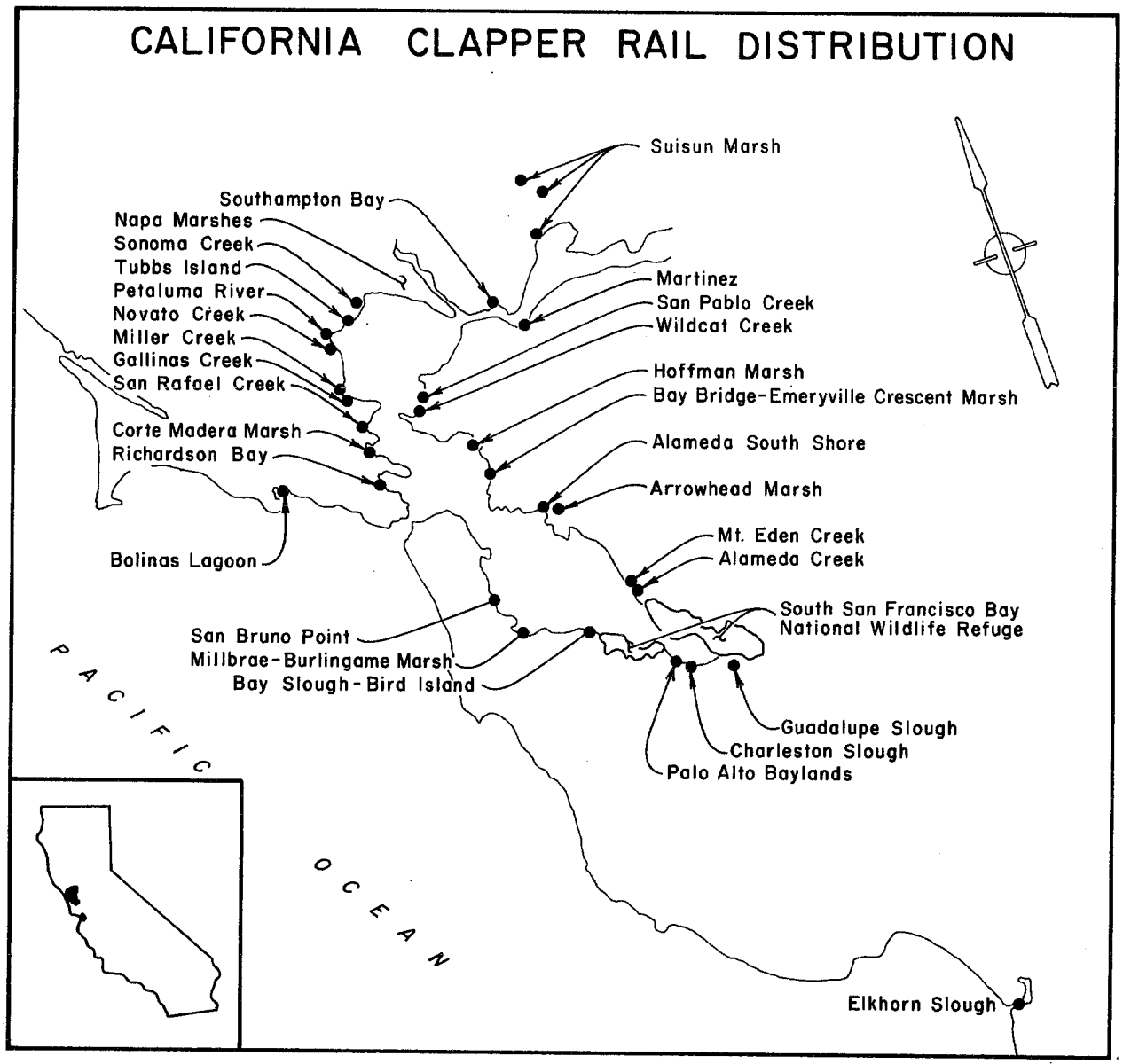

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

LIGHT-FOOTED CLAPPER RAIL
(*Rallus longirostris levipes*)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: This subspecies is similar to the California Clapper Rail except that it is slightly smaller and darker. It is the only Clapper Rail found in southern California coastal salt marshes.

DISTRIBUTION: The Light-footed Clapper Rail ranges from Santa Barbara, California, south to San Quintin Bay, Baja California, Mexico. Like several other endangered species, the Light-footed Clapper Rail inhabits the cordgrass-pickleweed association of the coastal salt marsh and is a year-round resident of this habitat. Less than one-third of an estimated 10,500 ha (26,000 acres) of salt marsh remains between Santa Barbara and the Mexican border. Habitat loss is considered to be the major cause for the decline of this rail subspecies. A 1980 census located 203 pairs in California.

RECOVERY EFFORT: Progress is being made toward a full understanding of the breeding ecology and habitat requirements of the Light-footed Clapper Rail. Habitat preference studies were conducted by U. S. Fish and Wildlife Service in 1974 and 1979. The Light-footed Clapper Rail Recovery Team has recently completed the Recovery Plan for this species. The Department is currently supervising a comprehensive survey and life history study of this rail. Efforts have been made to preserve existing salt marsh habitat. Upper Newport Bay and Bolsa Chica have been established as ecological reserves.

FUTURE MANAGEMENT: Light-footed Clapper Rail populations will be monitored regularly. Several southern California lagoons need to be reopened to tidal action. The Tijuana River marshes and Carpinteria Marsh should be acquired for public ownership. Bolsa Chica, marshes near the mouth of the Santa Ana River, and other marginal habitat should be restored. The Light-footed Clapper Rail Recovery Plan will be implemented.

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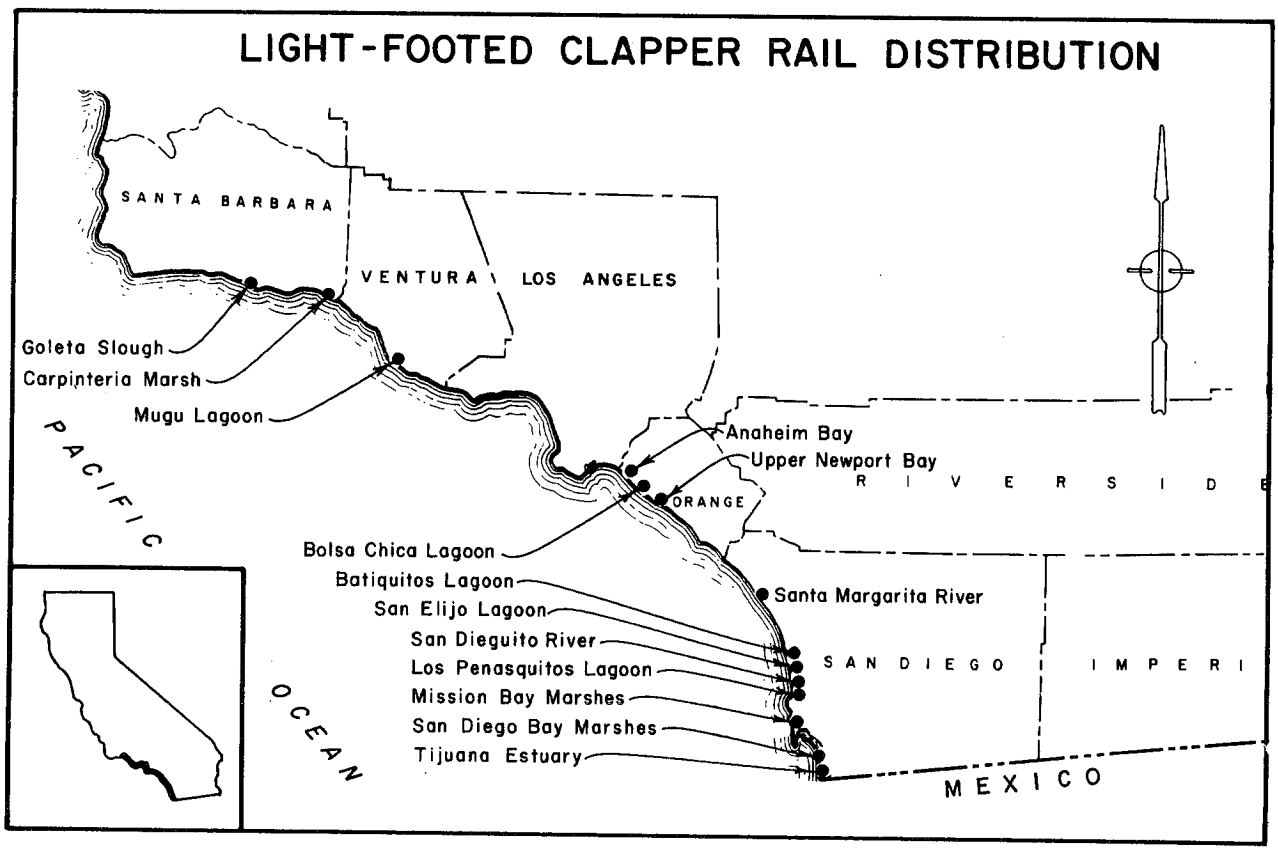

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

YUMA CLAPPER RAIL
(Rallus longirostris yumanensis)

CLASSIFICATION: State - Rare
Federal - Endangered

DESCRIPTION: The Yuma Clapper Rail is the smallest and palest of the three Clapper Rail subspecies in California. It is the only western Clapper Rail subspecies that inhabits fresh water marshes and is migratory.

DISTRIBUTION: The Yuma Clapper Rail nests in marshes along the Colorado River from Needles, San Bernardino County south to the Mexican border. It also occurs in the marshes surrounding the Salton Sea, Imperial County. Distribution varies from year to year with changes in local water conditions. Except for a small wintering population, the Yuma Clapper Rail migrates to inland and coastal marshes in Mexico in October and remains there until late April.

RECOVERY EFFORT: Studies of Yuma Clapper Rail distribution, abundance, and habitat requirements have been conducted by the Department, U. S. Fish and Wildlife Service, U. S. Water and Power Resources Service, U. S. Bureau of Land Management, University of California, Arizona Game and Fish Department, and Arizona State University since 1973. The Yuma Clapper Rail Recovery Team has submitted a draft recovery plan to the Fish and Wildlife Service. Programs of preservation and management of Clapper Rail habitat have been enacted at Havasu-Imperial and Cibola national wildlife refuges and at Imperial Wildlife Area.

FUTURE MANAGEMENT: Monitoring of Yuma Clapper Rail distribution and abundance will continue. Habitat will be maintained and enhanced for Clapper Rails at state and federal wildlife areas at the Salton Sea and along the lower Colorado River. The draft recovery plan should be completed and implemented.

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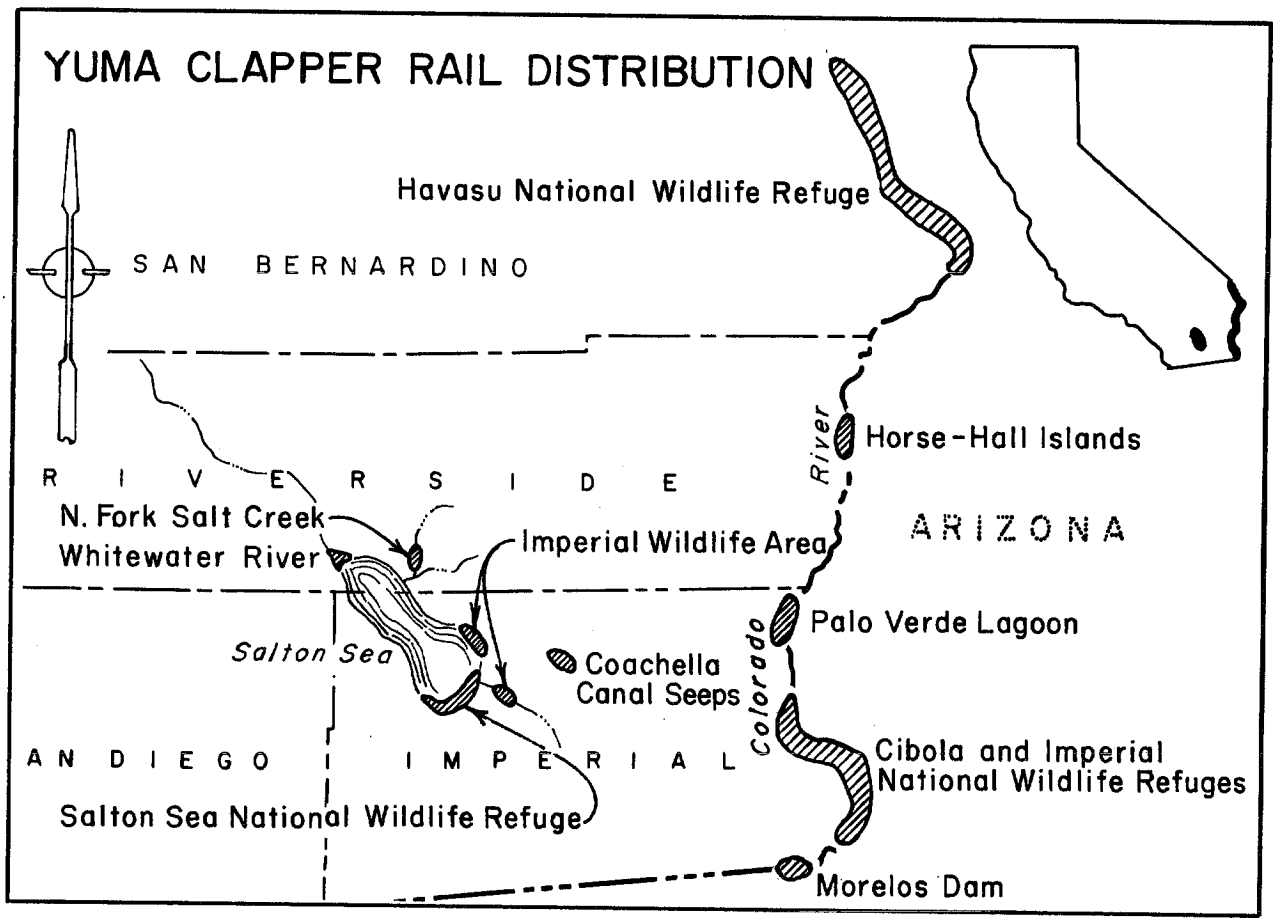

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

CALIFORNIA BLACK RAIL
(Laterallus jamaicensis coturniculus)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The California Black Rail is a sparrow-sized, slate-gray marsh bird with a small black bill, chestnut nape and white-spotted back and sides. It differs from the eastern subspecies in that it is slightly smaller and has a darker coloration and a more extended area of chestnut coloration on the nape of the neck.

DISTRIBUTION: Historically, this rail occurred in limited numbers in coastal salt marshes, from Tomales Bay, Marin County, south to northern Baja California, Mexico, and in inland freshwater marshes, including lower portions of the Colorado River and the delta of the Sacramento and San Joaquin rivers. Because of its small size and secretiveness, the California Black Rail is only rarely seen. Its current distribution and population size are not fully known. Destruction of coastal and inland wetlands by filling and draining threatens habitat vital to its existence.

RECOVERY EFFORTS: Several surveys of Black Rail distribution and abundance have been completed by the U. S. Fish and Wildlife Service, the Department, U. S. Bureau of Land Management, and Arizona State University. Areas surveyed include the Lower Colorado River, Coachella Canal, San Francisco Bay, Morro Bay, and portions of the Sacramento-San Joaquin Delta. Several marshes have been preserved through acquisition or easement.

FUTURE MANAGEMENT: A comprehensive statewide survey of California Black Rail distribution and abundance is needed. Investigations of the life history and habitat requirements of this species should be initiated. Preservation and restoration of marshlands will be continued.

REFERENCES:

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Repking, C. F. and R. D. Ohmart. 1977. Distribution and density of Black Rail populations along the lower Colorado River. Condor 79:486-489.

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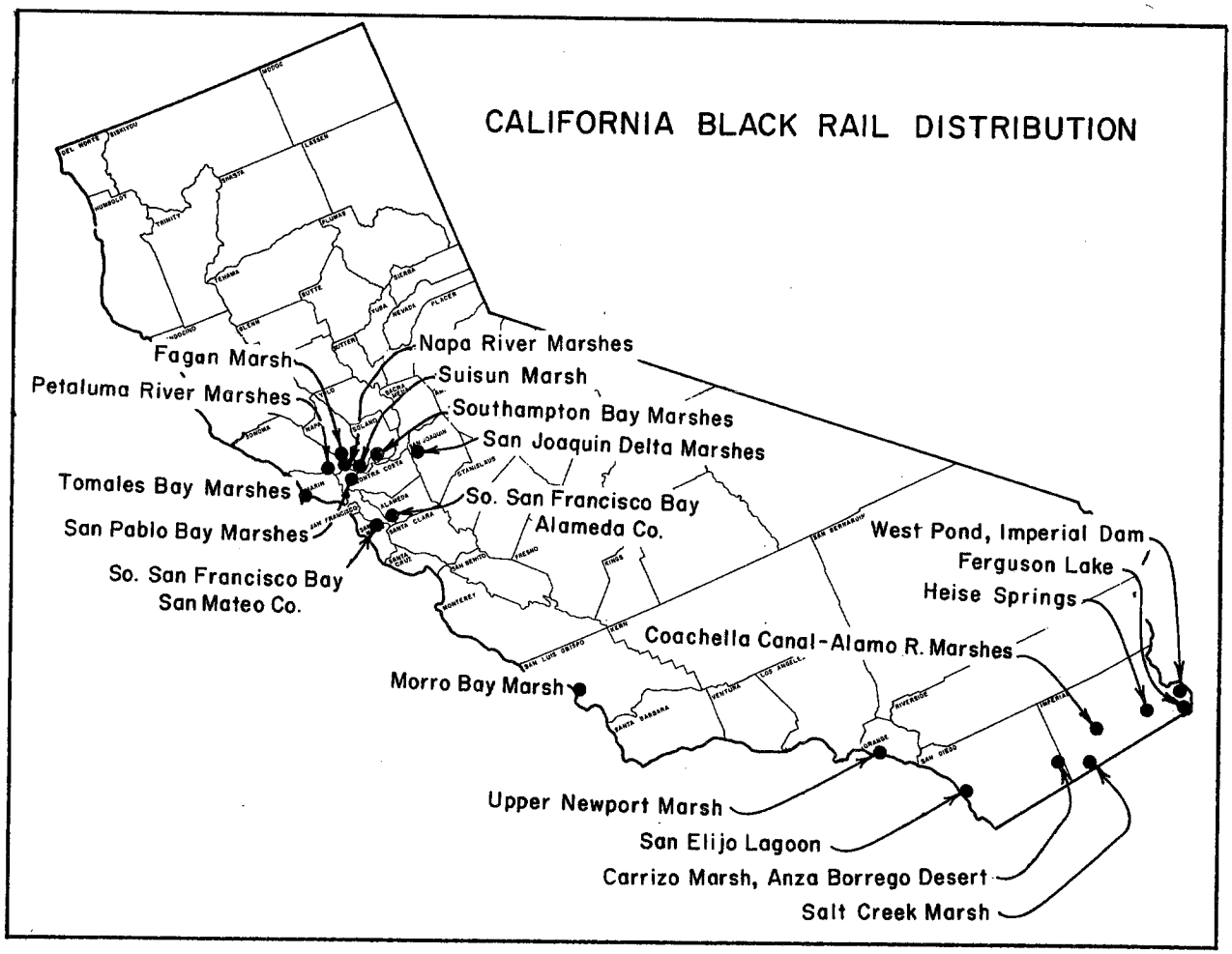

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

CALIFORNIA LEAST TERN
(Sterna albifrons browni)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The Least Tern, smallest of the terns, is recognized by its white body, gray wings, black outer flight feathers, black-capped head, and black-tipped yellow bill. Its quick wing beats and hovering action help distinguish it from the larger terns.

DISTRIBUTION: From April to early September the Least Tern occurs along the Pacific coast from San Francisco Bay to central Baja California, with breeding colonies distributed discontinuously. Wintering areas of the California subspecies are unknown but probably include southern coastal Mexico and Central America. Nesting colonies require flat areas characterized by little or no vegetation, mixed sand and shell or other loose substrate, freedom from disturbance, and nearness to a shallow water area, such as an estuary, with a good supply of small fish. The Least Tern is threatened with extinction because of human disturbance and because of continuing destruction of feeding and nesting habitats. About 32 colonies nested in California in 1980. The statewide breeding population was estimated at 624 pairs in 1973, 582 pairs in 1974, 600 pairs in 1975, 664 pairs in 1976, 775 pairs in 1977, 800 pairs in 1978, 850 pairs in 1979, and 900 pairs in 1980. About 50 percent of this population nests in San Diego County.

RECOVERY EFFORT: Several nesting and feeding areas have been protected through acquisition. The State Parks and Recreation Commission established the Least Tern Natural Preserve at Huntington State Beach in 1975. Sanctuaries have also been established at Alameda Naval Air Station, San Diego Naval Training Center, and Camp Pendleton, and programs of protection and habitat enhancement are being conducted. Buena Vista Lagoon Ecological Reserve has been established by the State, and portions of Bair Island in San Francisco Bay have been acquired under public ownership. Man-made nesting sites prepared by U. S. Fish and Wildlife Service at Seal Beach National Wildlife Refuge and by Department at Bolsa Chica Ecological Reserve were occupied by nesting Least Terns in 1979 and 1980. The California Least Tern Recovery Plan was approved by the Director, Fish and Wildlife Service, in April 1980.

FUTURE MANAGEMENT: Annual population surveys and protection of nesting colonies will be continued by the Department and U. S. Fish and Wildlife Service. Programs to restore and enhance degraded habitat, to induce colonization of new areas through use of decoys, and to acquire additional nesting habitat under public ownership, will also be carried out.

REFERENCES:

Atwood, J. L., P. D. Jorgensen, R. M. Jurek, and T. D. Manolis. 1977. California Least Tern census and nesting survey, 1977. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep. W-54-R.

Atwood, J. L., R. A. Erickson, P. R. Kelly, and P. Unitt. 1979. California Least Tern census and nesting survey, 1978. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep. Job V-2.13.

Massey, B. W. 1974. Breeding biology of the California Least Tern. Proc. Linn. Soc., New York, 72:1-24.

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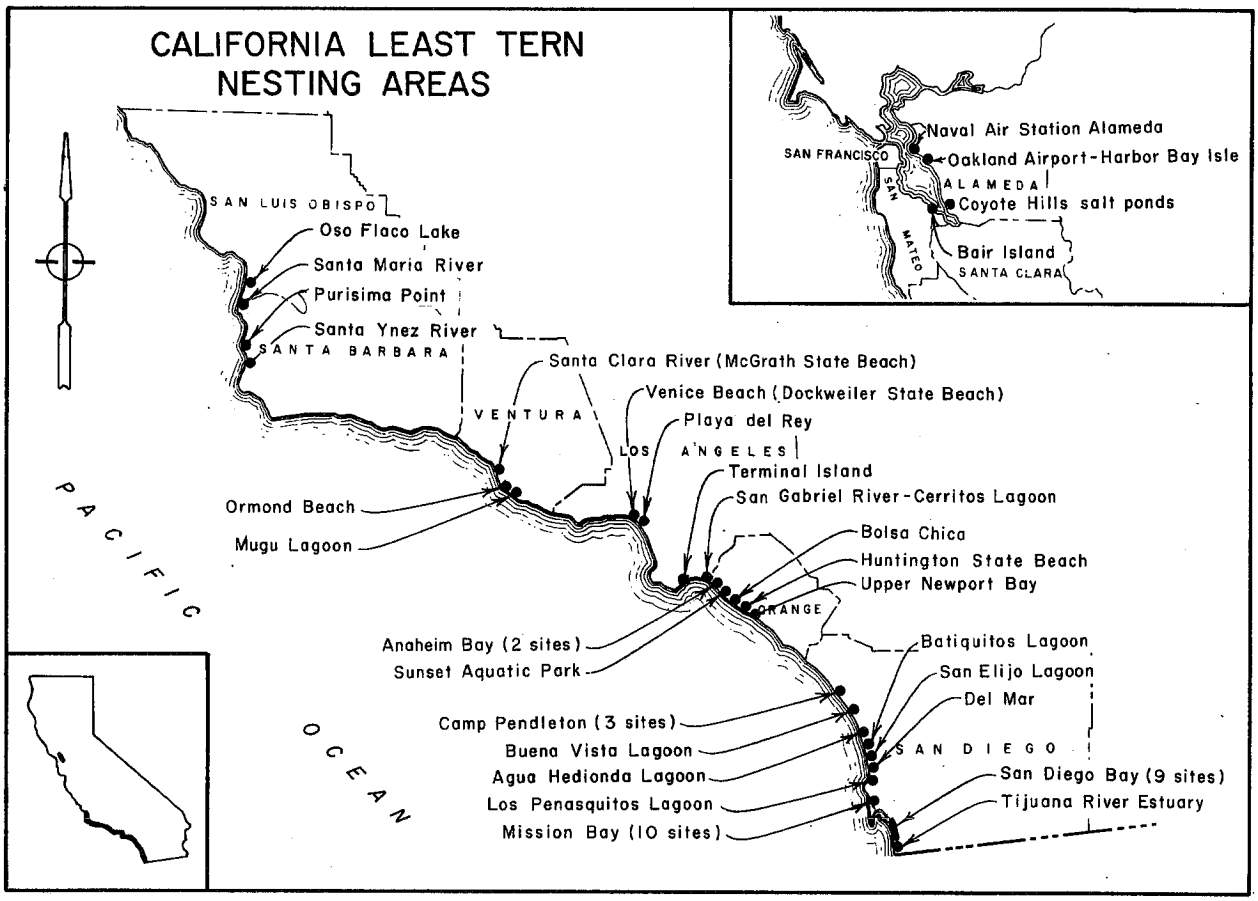


At The Crossroads, 1980. Calif. Dep. of Fish and Game.

CALIFORNIA YELLOW-BILLED CUCKOO
(Coccyzus americanus occidentalis)

CLASSIFICATION: State - Rare
Federal - Not listed

DESCRIPTION: This cuckoo is a slender brown bird, slightly larger than a Mockingbird, with white underparts. In flight its outspread wings are cinnamon colored, and from below its long tail is black with large white spots.

DISTRIBUTION: The California Yellow-billed Cuckoo historically nested along rivers and streams from Shasta County to southern California and along the Colorado River. It is seldom found far from dense streamside growth, nesting in either riparian vegetation or adjacent orchards. Sparse breeding populations are known now to occur along portions of the Sacramento, Feather, South Fork Kern, Santa Ana, Amargosa, Owens, and Colorado rivers. Cuckoos are summer residents, arriving in late May and departing for their Central or South American winter range in September. Accelerated land and water use changes throughout most of California have destroyed large tracts of the dense streamside plant growth utilized by the Yellow-billed Cuckoo. Within the remaining small tracts of riparian habitat, the percentage of early successional stage vegetation, which cuckoos require, has decreased as a result of flood control. A 1977 statewide survey located 144 cuckoos. Most pairs were found where there was a minimum of 10 ha (25 acres) of suitable riparian vegetation.

RECOVERY EFFORT: The Department has supervised two surveys of California Yellow-billed Cuckoo distribution and abundance, and recently conducted a study of cuckoo food habits and nesting behavior. Arizona State University recently completed a comprehensive Colorado River study of riparian plant and animal communities. Several parcels of riparian forest have been protected. Over 300 ha (770 acres) along the Sacramento River in Tehama, Glenn, and Butte counties and 526 ha (1300 acres) along the Santa Ana River in Riverside County have been acquired by the Wildlife Conservation Board. The Nature Conservancy has recently acquired 607 ha (1500 acres) along the South Fork Kern River above Lake Isabella in Kern County. The Department of Parks and Recreation has declared the western portion of Woodson Bridge State Recreation Area a Natural Reserve.

FUTURE MANAGEMENT: California Yellow-billed Cuckoo distribution and abundance will be monitored regularly. Preservation of 10 ha (25 acres) or larger parcels of riparian habitat by acquisition, easement, or memorandum of understanding with the landowner should be continued. A program of restoration of willow, cottonwood, and mesquite vegetation is needed, particularly in areas adjacent to habitat currently occupied by cuckoos.

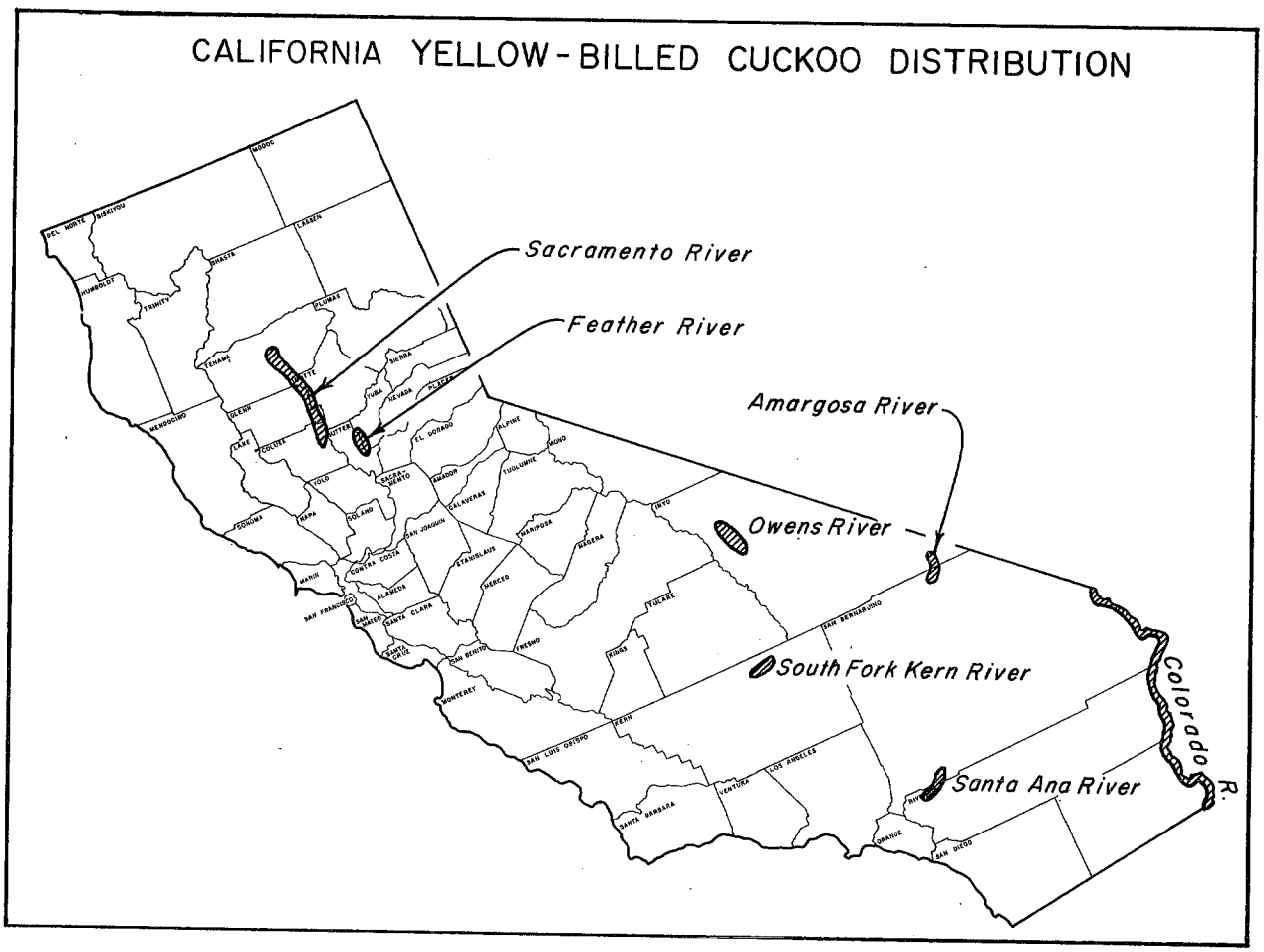
REFERENCES:

Gaines, D. 1974. Distribution, density and habitat requirements of the California Yellow-billed Cuckoo in the Sacramento Valley, 1972-73. Calif. Dep. Fish Game Prog. Rep., Proj. W-54-R-6.

_____. 1974. Review of the status of the Yellow-billed Cuckoo in California: Sacramento Valley populations. Condor 76:204-209.

_____. 1977. Current status and habitat requirements of the Yellow-billed Cuckoo in California. Calif. Dep. Fish Game, Sacramento.

Laymon, S. A. 1980. Feeding and nesting behavior of the Yellow-billed Cuckoo in the Sacramento Valley. Wildl. Manage. Branch Admin. Rep. 80-2, Calif. Dep. Fish Game, Sacramento.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

ELF OWL
(Micrathene whitneyi)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Elf Owl is a tiny, small-headed, earless owl, about the size of a large sparrow. Its shorter tail distinguishes it from the similar Pygmy and Ferruginous owls.

DISTRIBUTION: This migratory species reaches the western limit of its breeding range on the Colorado Desert in southeastern California. Occurrence of the Elf Owl within the State has always been rather sporadic and widely scattered along the lower Colorado River and at isolated desert springs. A 1978 survey of suitable Elf Owl habitat in the Colorado Desert revealed only ten breeding pairs in a riparian area along the Colorado River north of Needles, San Bernardino County. One unpaired individual was found along the Colorado River south of the San Bernardino-Riverside county line. No other Elf Owls were found during the survey. Man-caused destruction of mature willow-cottonwood-mesquite habitat is the primary factor for the decline of the Elf Owl population. Decreases in woodpecker populations, resulting in loss of nesting cavities, and competition for the remaining nest sites with European Starlings, may also be contributing to the decline. The current population of the Elf Owl in California is estimated to be about 10 pairs.

RECOVERY EFFORTS: Monitoring known breeding areas and surveying additional habitat not previously searched will continue.

FUTURE MANAGEMENT: Acquisition or easement of remaining Elf Owl habitat should be initiated. Other possible management techniques include using nest boxes to increase nesting cavity availability, control of Starlings in Elf Owl breeding areas, and restoration of cottonwood groves and mesquite woodland.

REFERENCES:

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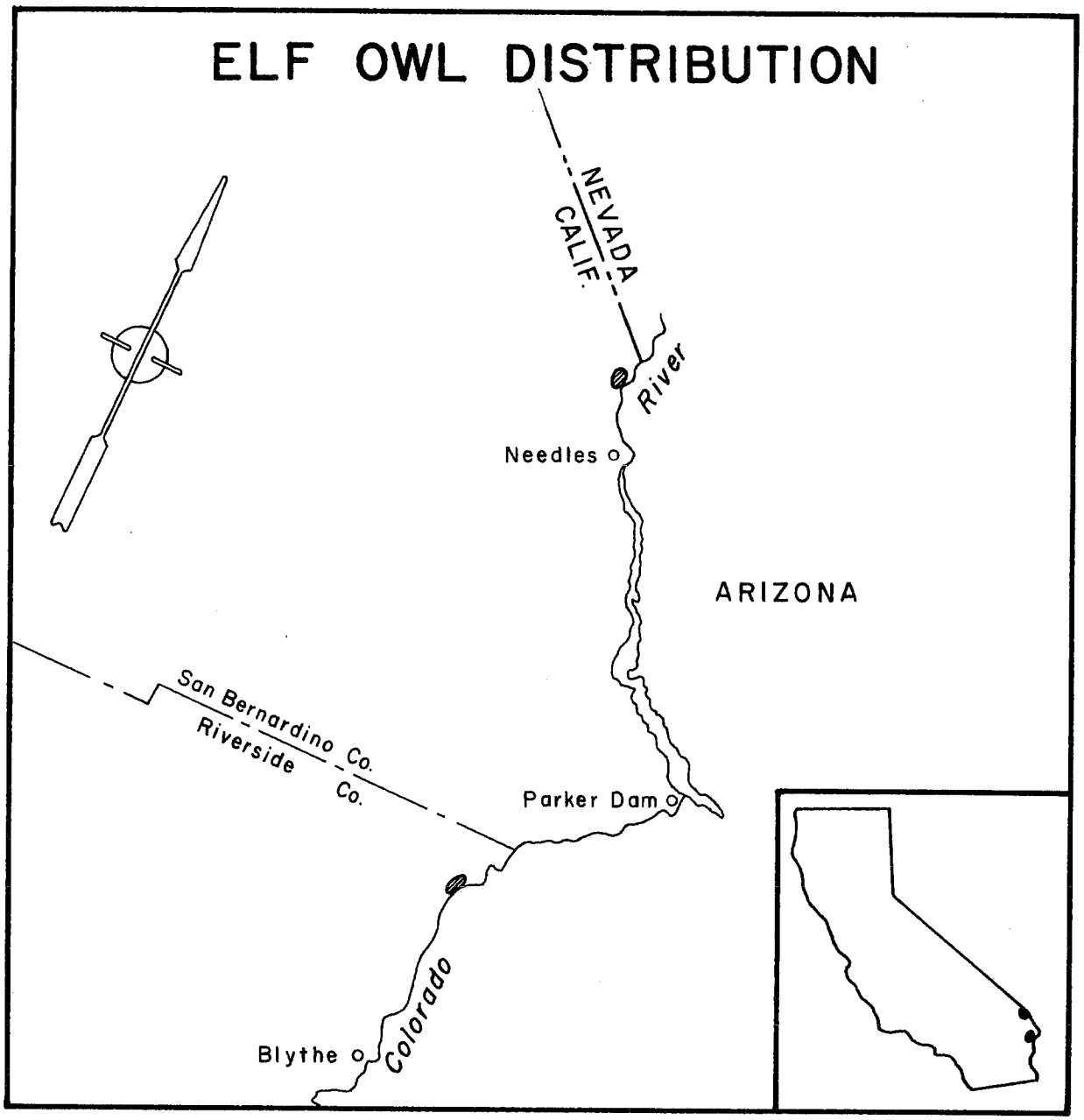

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

GREAT GRAY OWL
(Strix nebulosa)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Great Gray Owl is one of the largest owls. It is round-headed, without ear tufts and has prominent gray concentric circles on the facial disc. The tail is very long for an owl. The rounded facial disc, long tail, and absence of ear tufts distinguish the Great Gray Owl from the similarly sized Great Horned Owl.

DISTRIBUTION: Historically, the Great Gray Owl has been found in small numbers in California, associated with high elevation meadow systems in mature stands of mixed coniferous and Red Fir forest, primarily in the central Sierra Nevada. A 1979 survey of suitable Great Gray Owl habitat located only seven owls. Three birds were found in western Yosemite National Park and another outside the park in Stanislaus National Forest. The remaining three owls were located near Huntington Lake, Sierra National Forest. An additional Stanislaus National Forest site, occupied by at least one Great Gray Owl, was discovered in 1980. Human disturbance and changing land use practices are the primary factors for the disappearance of this species.

RECOVERY EFFORTS: Investigations to determine the species' breeding requirements and to further census suitable habitat are presently being undertaken.

FUTURE MANAGEMENT: Programs to restrict human access to known nesting areas and to preserve and improve habitat for the Great Gray Owl should be undertaken.

REFERENCES:

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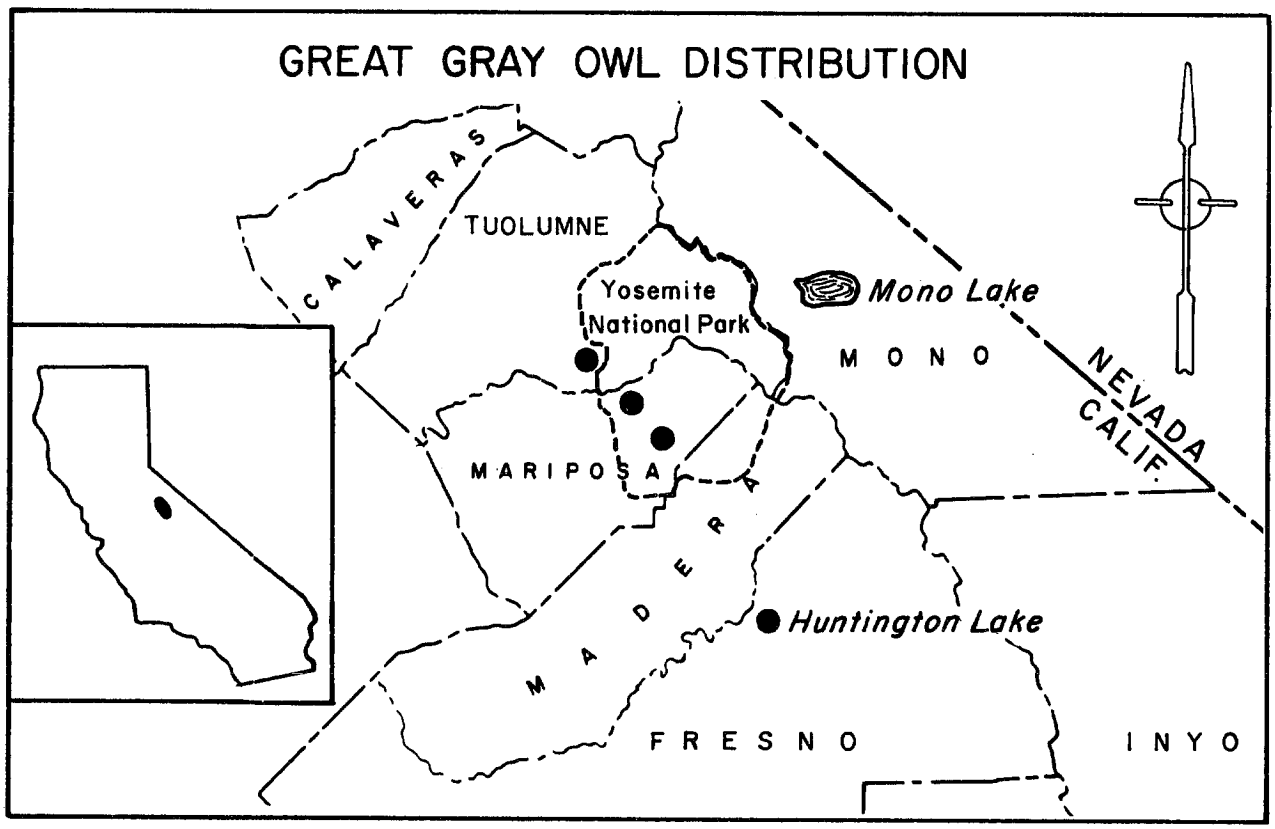

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

LEAST BELL'S VIREO
(Vireo bellii pusillus)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Least Bell's Vireo is a small grayish vireo with white underparts. One of its whitish wingbars is often inconspicuous, so that only one can be seen in the field. The rapid warbling song of the Least Bell's Vireo distinguishes it from more common vireo species.

DISTRIBUTION: The historical range of the Least Bell's Vireo in California included the central valley and the interior valleys of the central and southern coast ranges. Desert oases of the Owens Valley, Death Valley, and Mojave River Valley were also used by this vireo in the past. Recent surveys have shown that the distribution of the Least Bell's Vireo has become restricted to scattered riparian habitats in southern California. Within its range, this species was formerly one of the most abundant songbirds. Its California population now may be under 200 pairs. Nest parasitism by the Brown-headed Cowbird and predation are major factors reducing the nesting success of this species.

RECOVERY EFFORTS: Investigations to determine the species' breeding habitat requirements and to further census suitable habitat are presently being undertaken. A cowbird removal program in vireo nesting areas has been initiated.

FUTURE MANAGEMENT: Programs to preserve and improve riparian habitat will be continued. The cowbird removal program should be expanded to the extent needed to prevent extirpation of host species.

REFERENCES:

Goldwasser, S. 1978. Distribution, reproductive success and impact of nest parasitism by Brown-head Cowbirds on Least Bell's Vireos. Calif. Dep. Fish Game, Wildl. Manage. Branch Final Rep. IV-1.5.1.

Goldwasser, S., D. Gaines and S. R. Wilbur. 1980. The Least Bell's Vireo in California: a defacto endangered race. Amer. Birds 34:742-745.

Gray, M. V. and J. M. Greaves. 1980. Breeding Bell's Vireos in Santa Barbara County, California, 1980. Calif. Dep. Fish Game, Sacramento.

Rothstein, S. I., J. Verner and E. Stevens. 1980. Range expansion and diurnal changes in dispersion of the Brown-headed Cowbird in the Sierra Nevada. Auk 97:253-267.

Wilbur, S. R. 1979. The Bell's Vireo in California: a preliminary report. Amer. Birds 33:252.

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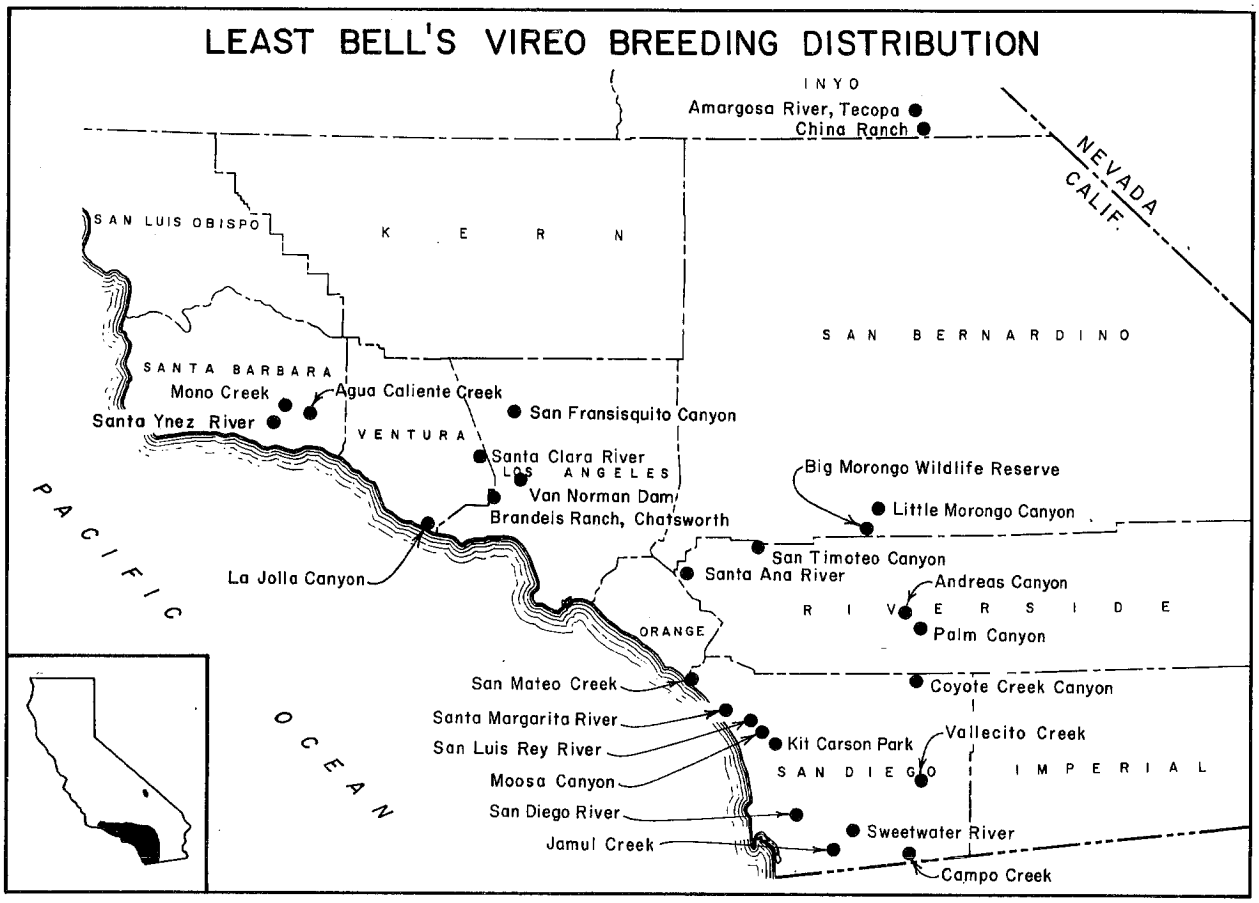


At The Crossroads, 1980. Calif. Dep. of Fish and Game.

INYO BROWN TOWHEE
(*Pipilo fuscus eremophilus*)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Brown Towhee is a dull gray-brown bird with a moderately long dark tail and pale rusty undertail coverts. The Inyo subspecies is distinguished from other Brown Towhees by its small bill, shorter toes and tarsi, and paler coloration.

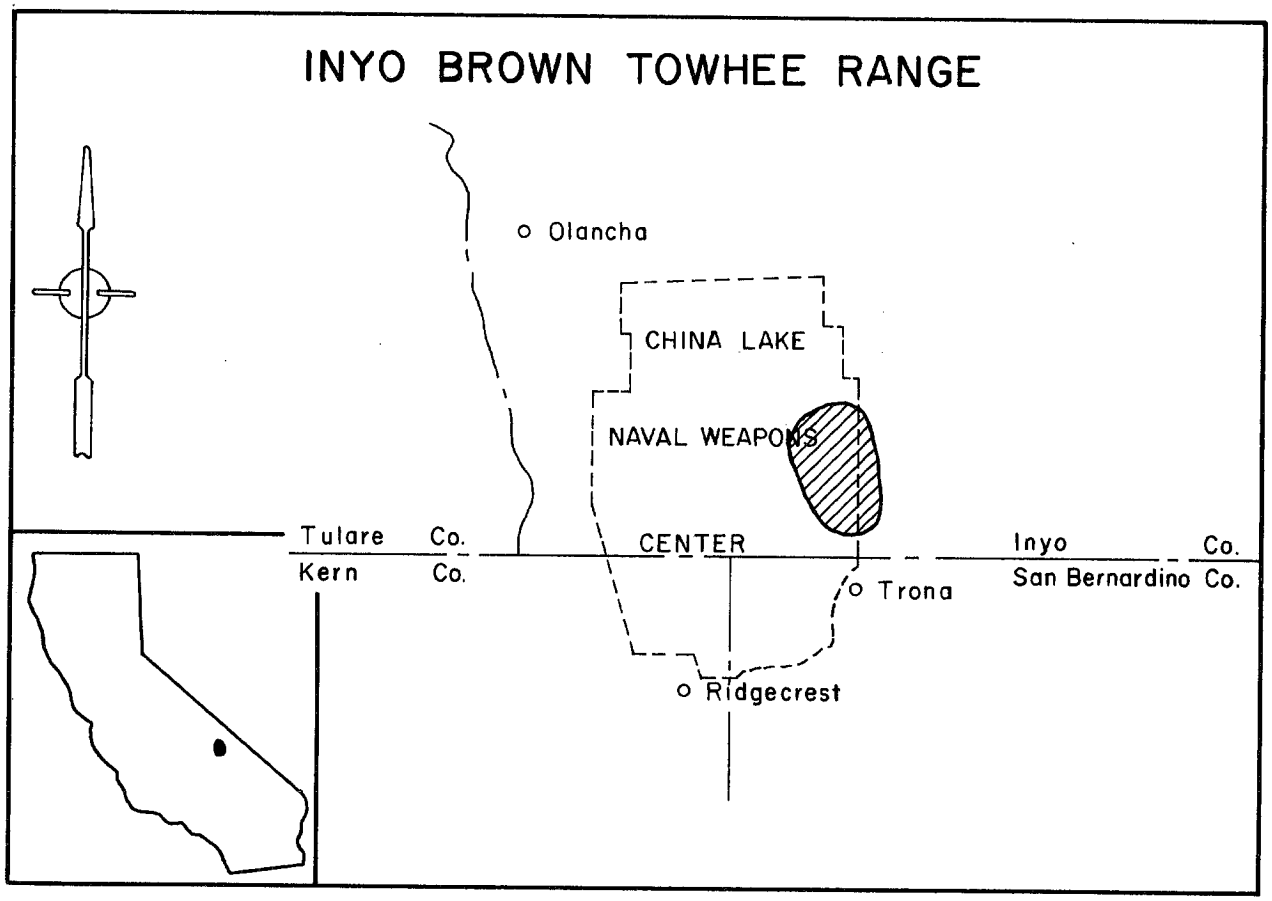
DISTRIBUTION: The Inyo Brown Towhee is found only in the southern Argus Range in Inyo County. It is resident in dense shrubby thickets near springs in rugged desert canyons. A survey conducted in 1978 and 1979 showed that the entire known population of this towhee is confined to 12 canyon areas within an 18 km (29 miles) diameter circle. The population size is estimated at between 72 and 138 individuals. It is endangered because of destruction of its essential riparian habitat by wild burros and by such human activities as mining and recreation.

RECOVERY EFFORTS: No recovery efforts have been instituted.

FUTURE MANAGEMENT: Most of the towhee's range is under military jurisdiction. Human disturbance can be controlled with the cooperation of local authorities and the education of those utilizing the area. Wild burros must be removed from the towhee's range so that their activity will not destroy essential riparian habitat.

REFERENCES:

Cord, B. and J. R. Jehl, Jr. 1979. Distribution, biology, and status of a relict population of Brown Towhee (*Pipilo fuscus eremophilus*). West. Birds 10:131-156.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

BELDING'S SAVANNAH SPARROW
(Passerculus sandwichensis beldingi)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Belding's Savannah Sparrow is distinguished from other subspecies of the Savannah Sparrow by its darker coloration, lack of distinct crown stripe, and heavy streaking on the throat, breast, and sides.

DISTRIBUTION: The Belding's Savannah Sparrow is a year-round resident of the coastal saltmarshes of southern California and northern Baja California, Mexico. It is closely associated with pickleweed (Salicornia sp.) habitat. More than 60% of California's saltmarsh habitat has been destroyed in this century. Habitat destruction is considered to be the major factor that resulted in the severe decline of the Belding's Savannah Sparrow population. Approximately 1610 breeding pairs were located in California in 1977.

RECOVERY EFFORT: Protection of saltmarsh habitat and study of the life history of the Belding's Savannah Sparrow have been the major management actions. Establishment of three reserves, Seal Beach National Wildlife Refuge, Upper Newport Bay and Bolsa Chica ecological reserves, and the formation of the California Coastal Zone Commission to regulate development, have helped preserve some of the remaining saltmarshes required by the Belding's Savannah Sparrow. Long-term studies of the breeding ecology and behavior of this species are being conducted under the supervision of California State University, Long Beach.

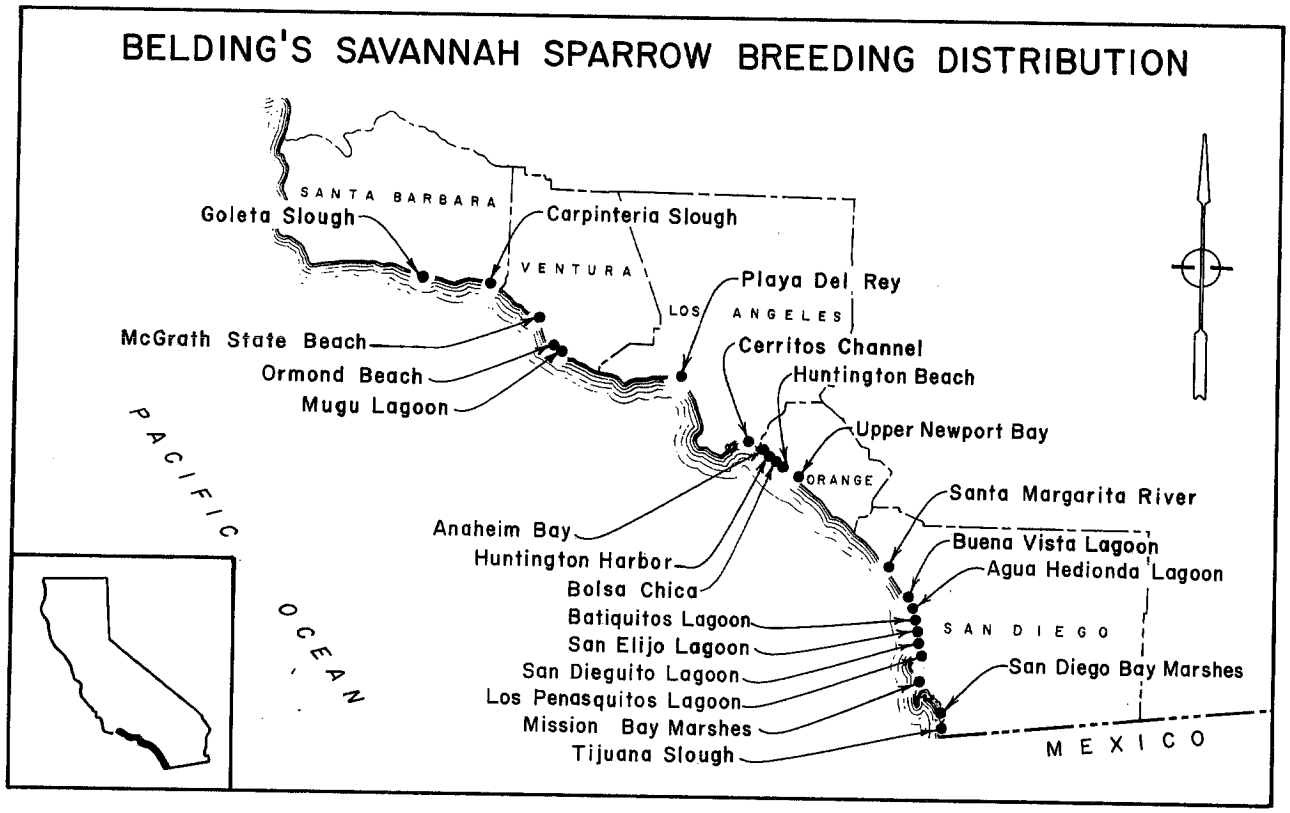
FUTURE MANAGEMENT: Efforts are being made to acquire Tijuana Estuary and Carpinteria Marsh under public ownership. Additional saltmarsh habitat will be restored through enhancement of tidal action and enlargement of upper littoral and maritime zones in such areas as Bolsa Chica, Huntington Beach, Agua Hedionda Lagoon, and Los Penasquitos Lagoon. Surveys of the Belding's Savannah Sparrow population will be conducted at least once every five years.

REFERENCES:

Bradley, R. A. 1973. A population census of the Belding's Savannah Sparrow. West. Bird Band. 48(3):40-43.

Massey, B. W. 1977. A census of the Belding's Savannah Sparrow in California, 1977. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep., Proj. E-1-1, Job IV-1.2.

_____. 1979. The Belding's Savannah Sparrow. U. S. Army Corps of Eng., L. A. District.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

Mammals

SAN JOAQUIN ANTELOPE SQUIRREL
(*Ammospermophilus nelsoni*)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The San Joaquin Antelope Squirrel has pinkish- to yellowish-brown fur with a narrow white line on each side of the back. The white underside of the tail can be seen as the tail curls over the back, when the squirrel is running.

DISTRIBUTION: The San Joaquin Antelope Squirrel has historically been found on dry, sparsely vegetated, loam soil on the western side of the San Joaquin Valley, from southern Merced County south to Kern and Tulare counties, including portions of the Carrizo Plain in San Luis Obispo County and Cuyama Valley in San Luis Obispo and Santa Barbara counties. A 1979 study found about 20 percent of the original range still occupied by antelope squirrels. Moderate densities of 3-10 squirrels per hectare were found on about 41,000 ha. The San Joaquin Antelope Squirrel is threatened by continued habitat loss due to cultivation and possibly by poisoning with rodenticides.

RECOVERY EFFORTS: The Department funded a study of the distribution of the San Joaquin Antelope Squirrel in 1979.

FUTURE MANAGEMENT: The distribution and abundance of the San Joaquin Antelope Squirrel on U. S. Bureau of Land Management lands should be thoroughly inventoried. The impact of rodenticides on the antelope squirrel within its range should be investigated. Reliable population census techniques should be established, so that these can be applied regularly.

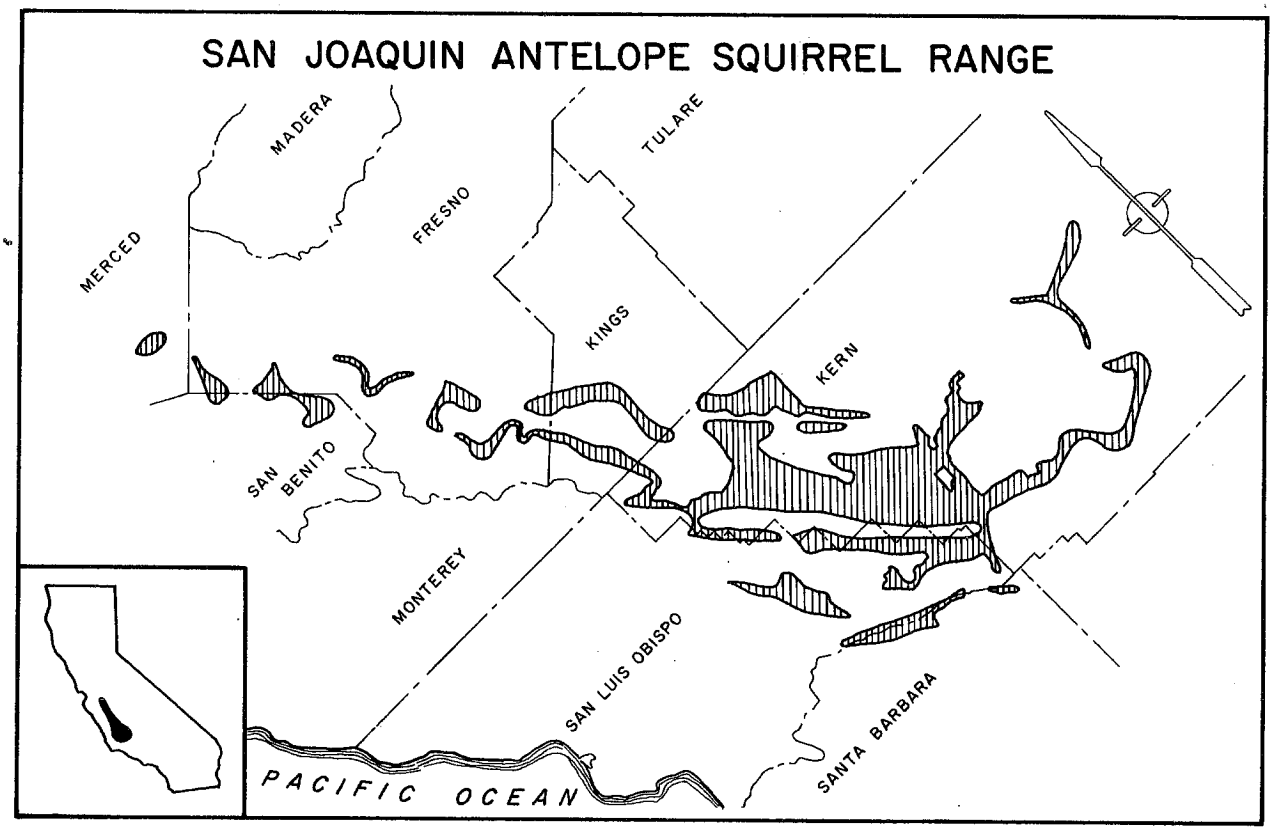
REFERENCES:

Grinnell, J., and J. Dixon. 1918. Natural history of the ground squirrels of California. Bull. Calif. St. Comm. Hort. 7:597-708.

Hawbecker, A. C. 1953. Environment of the Nelson antelope ground squirrel. J. Mamm. 34:324-334.

_____. 1958. Survival and home range in the Nelson antelope ground squirrel. J. Mamm. 39:207-215.

Williams, D. F. 1980. Distribution and population status of the San Joaquin Antelope Squirrel and Giant Kangaroo Rat. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep., E-W-4, IV-10.1.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

MOHAVE GROUND SQUIRREL
(Spermophilus mohavensis)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The Mohave Ground Squirrel is small, uniformly brownish-gray above and cream-colored below. It is readily distinguished from the similar Round-tailed Ground Squirrel by the white undersurface of the tail, which is held over its back while running. The White-tailed Antelope Squirrel, which shares much of the range of the Mohave Ground Squirrel and is about the same size, is distinguished from it by the white stripe on each side of its back.

DISTRIBUTION: The Mohave Ground Squirrel occurs only in the western Mojave Desert, from Olancha in Inyo County south to Victorville in San Bernardino County, and from the Tehachapi Mountains in Kern County east to the Granite Mountains in San Bernardino County. The Mohave Ground Squirrel occupies a wide variety of desert habitat at elevations ranging from 505-1525 m (1800-5000 ft). Plant communities include alkali sink and saltbush, creosote bush scrub, and Joshua Tree woodland. This species is threatened due to its limited range and the rapid rate at which habitat is being destroyed by urbanization and agricultural development. Off-road vehicle use is a serious threat in several areas within the range of this ground squirrel.

RECOVERY EFFORT: Surveys conducted by the Department and the U. S. Bureau of Land Management have clearly defined the distribution of the Mohave Ground Squirrel.

FUTURE MANAGEMENT: Regular censuses in all habitats are needed to provide indices of population status and trends. The effects of urbanization and agricultural development on Mohave Ground Squirrel habitat and range should be studied, and the relationship of Mohave and Round-tailed Ground Squirrels along the overlap of their ranges should be investigated to determine the degree of hybridization and intergradation. A program of preservation of essential habitat should be initiated.

REFERENCES:

Bartholomew, G. W., and J. W. Hudson. 1961. Desert ground squirrels. Sci. Am. 205:107-116.

Burt, W. H. 1936. Notes on the habits of the Mohave ground squirrel. J. Mamm. 17:221-224.

Hoyt, D. F. 1973. Mohave ground squirrel survey, 1972. Calif. Dep. Fish Game, Spec. Wildl. Invest. Final Rep., W-54-R-4, II-5.5. 10 pp.

Recht, M. A. 1977. The biology of the Mohave ground squirrel (Spermophilus mohavensis): home range, daily activity, foraging and weight gain, and thermoregulatory behavior. Ph.D. Disser., Univ. of Calif., Los Angeles. 117 pp.

Wessman, E. V. 1977. The distribution and habitat preferences of the Mohave ground squirrel in the southeastern portion of its range. Calif. Dep. Fish Game, Wildl. Manage. Br. Admin. Rep. 77-5. 15 pp.

Zembal, R., and C. Gall. 1980. Observations on Mohave ground squirrels, Spermophilus mohavensis, in Inyo County, California. J. Mamm. 61:348-350.

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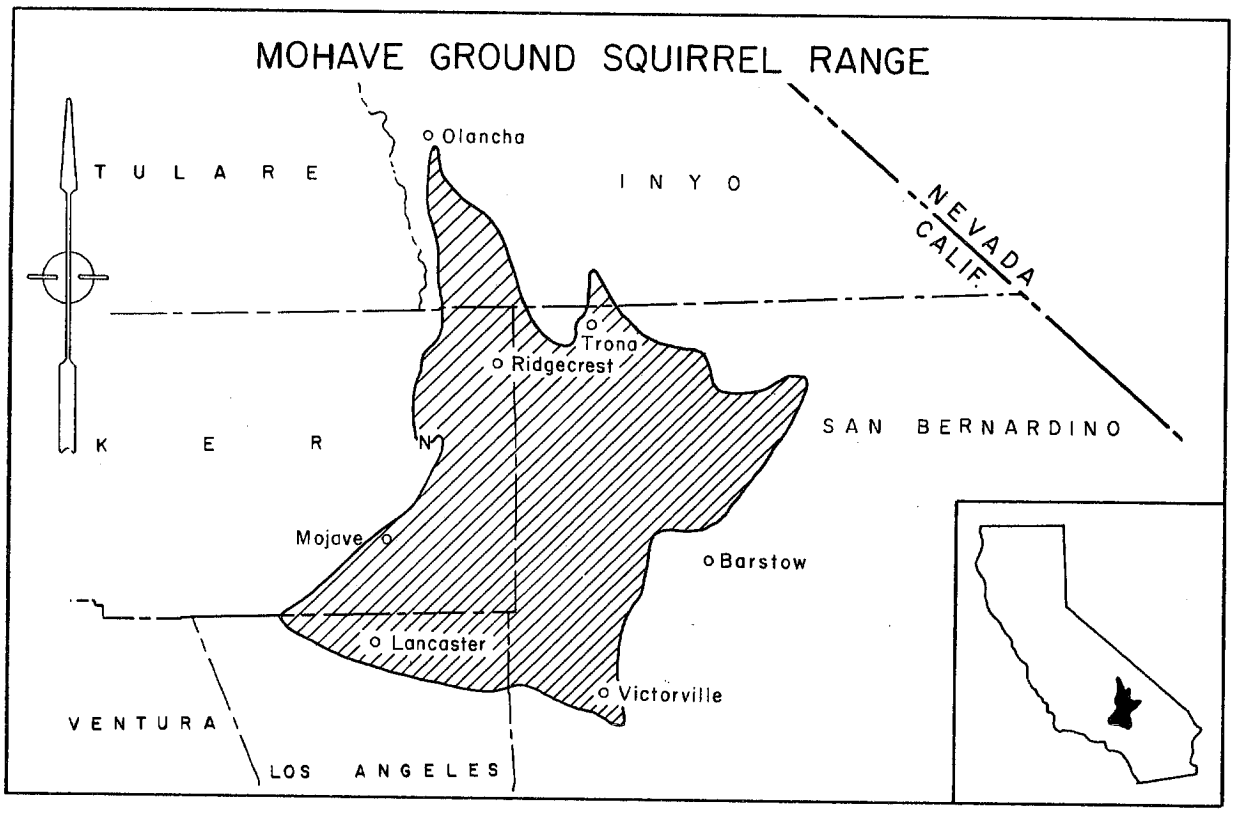


At The Crossroads, 1980. Calif. Dep. of Fish and Game.

MORRO BAY KANGAROO RAT
(Dipodomys heermanni morroensis)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The Morro Bay Kangaroo Rat is the darkest of all Kangaroo Rats. The lack of a complete white hip stripe distinguishes the Morro Bay Kangaroo Rat from other subspecies of the Heermann's Kangaroo Rat.

DISTRIBUTION: The Morro Bay Kangaroo Rat is restricted to a series of discontinuous areas characterized by low-growing shrubs and much open ground on compacted, sandy soils, on the south side of Morro Bay in San Luis Obispo County. Periodic surveys have indicated that kangaroo habitat and numbers have continued to decline. The total range of this subspecies decreased from 1243 ha (4.8 sq miles) in 1957 to less than 130 ha (0.5 sq miles) by 1978. Expansion of the Los Osos and Baywood communities, and reduction in habitat through seral succession of vegetation, threaten the continued survival of this kangaroo rat.

RECOVERY EFFORT: Management efforts have consisted of acquisition and preservation of a portion of the remaining habitat. Montana de Oro State Park has been enlarged, and 20.2 ha (50 acres) of kangaroo rat habitat adjacent to the park has been acquired by the Department. This parcel will be established as an ecological reserve. A management plan for the parcel has been written. A recovery plan for the Morro Bay Kangaroo Rat has been written by a consultant to the U. S. Fish and Wildlife Service.

FUTURE MANAGEMENT: Studies of Morro Bay Kangaroo Rat distribution and abundance will continue. An ecological reserve will be established on lands acquired by the State. A management program to protect and enhance habitat will be initiated, and will consist of vegetation reduction and removal on at least 40 ha (99 acres) of state property, to improve the area for kangaroo rat occupancy.

REFERENCES:

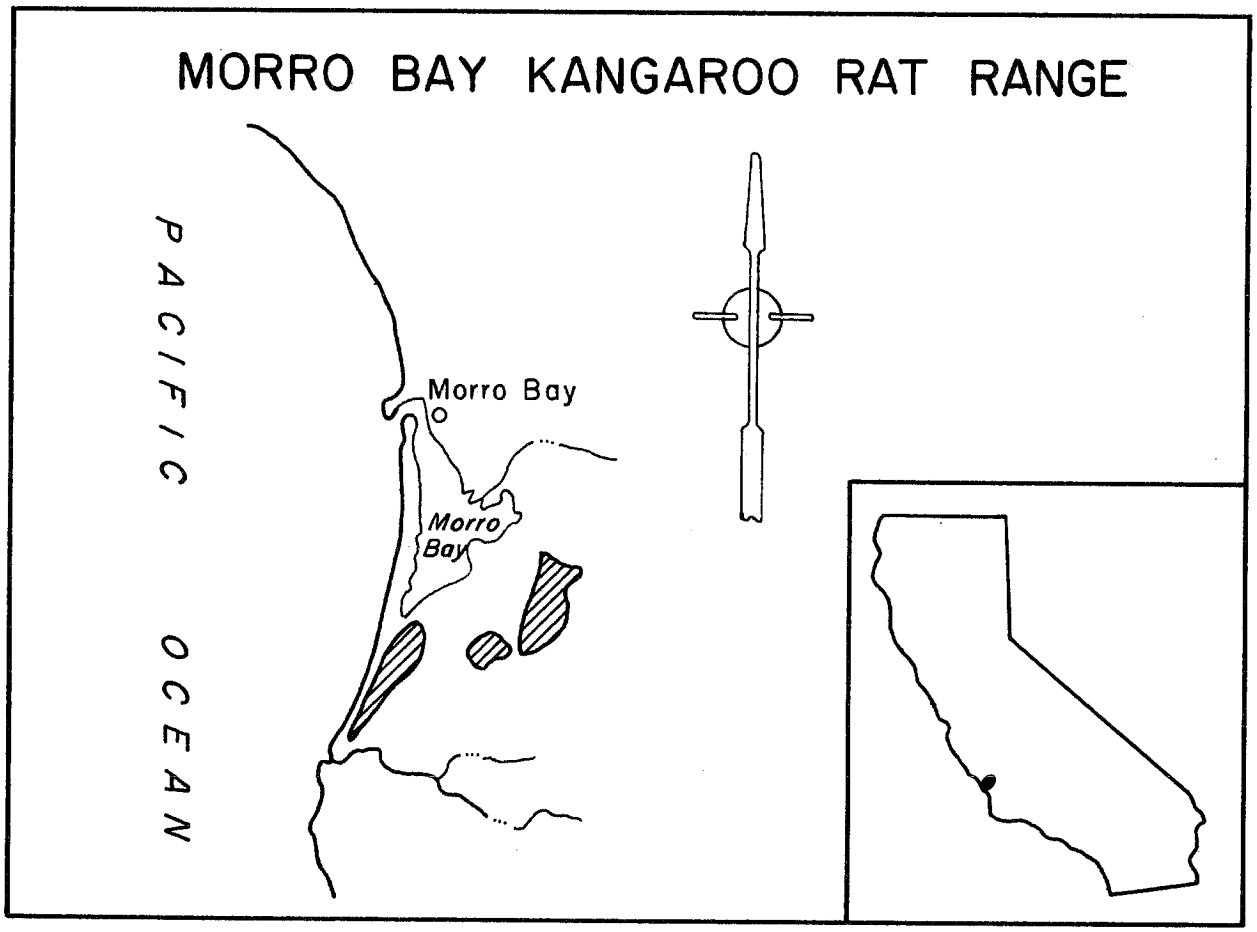
Congdon, J. D., and A. Roest. 1975. Status of the endangered Morro Bay kangaroo rat. J. Mamm. 56:679-683.

Roest, A. 1977. Distribution and population estimate of the Morro Bay kangaroo rat, 1977. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep., E-1-1, V-1.12. 19 pp + append.

Stewart, G. R., and A. I. Roest. 1960. Distribution and habits of kangaroo rats at Morro Bay. J. Mamm. 41:126-129.

Toyoshima, J. M. 1979. Morro Bay Kangaroo Rat survey, 1978. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep., E-W-2, V-1.13.

_____. 1980. Population and range of the Morro Bay Kangaroo Rat, 1979. Calif. Dep. Fish Game, Nongame Wildl. Invest. Final Rep., E-W-4, V-2.1.



At The Crossroads, 1980. Calif. Dep. of Fish and Game.

GIANT KANGAROO RAT
(*Dipodomys ingens*)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Giant Kangaroo Rat is the largest of the kangaroo rats, with head and body length over 130 mm (5.1 in) and body weight over 110 g (3.9 oz). Its large size distinguishes it from other kangaroo rats.

DISTRIBUTION: The Giant Kangaroo Rat has historically been found on fine sandy loam soils with sparse vegetation along the western side of the San Joaquin Valley, from southern Merced County south to Kern County, including portions of the Carrizo Plain in San Luis Obispo County and Cuyama Valley in San Luis Obispo and Santa Barbara counties. A 1979 study found this kangaroo rat in small, scattered colonies in a total 9,583 ha (37 sq. miles) area, which represents about 2% of the total area of the former geographic range. The Giant Kangaroo Rat is endangered primarily because of loss of habitat to cultivation. The trampling of colonies by cattle and the use of rodenticides near colonies may also threaten populations.

RECOVERY EFFORT: The Department funded a study of the distribution of the Giant Kangaroo Rat in 1979. Areas of most optimal habitat were identified.

FUTURE MANAGEMENT: The species should be placed on the federal endangered species list and Critical Habitat should be declared. A program of acquisition of the most optimal habitat on private lands should be initiated. Further field study is necessary to learn such aspects of the biology of the species as population dynamics and social behavior. A thorough survey of Giant Kangaroo Rat distribution and abundance on U. S. Bureau of Land Management lands within the known range should be conducted. The impact of rodenticides within the range of the kangaroo rat should be investigated. The effects of cattle and grazing on the kangaroo rat should also be determined.

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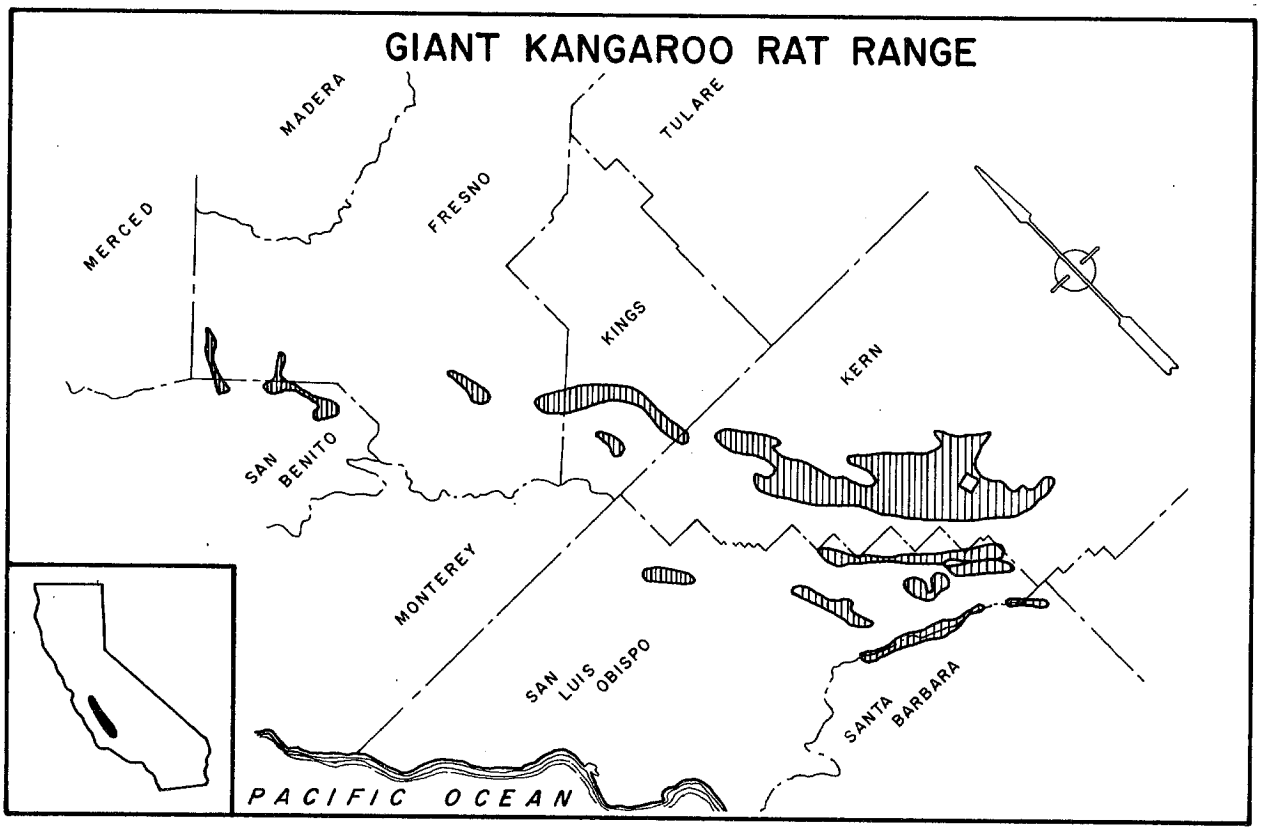

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

STEPHENS' KANGAROO RAT
(Dipodomys stephensi)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The Stephens' Kangaroo Rat is usually distinguished in the field from the very similar Pacific Kangaroo Rat by its characteristic tail markings, and in a prepared specimen by skull measurements.

DISTRIBUTION: Historically, the Stephens' Kangaroo Rat was found in the San Jacinto Valley of Riverside County, with small populations in extreme southern San Bernardino Valley and northwestern San Diego County. Recent surveys have indicated that this species occurs in less than 20 isolated localities. Agricultural development and urbanization has destroyed much of the preferred habitat of the Stephens' Kangaroo Rat, resulting in small, isolated populations vulnerable to total loss.

RECOVERY EFFORT: Distribution and abundance of the Stephens' Kangaroo Rat was determined in 1973 and 1974. An inventory of suitable habitat for Stephens' Kangaroo Rat was conducted by the U. S. Bureau of Land Management in 1976.

FUTURE MANAGEMENT: A preservation program for essential habitat thrqugh zoning, acquisition, or easement should be initiated. A comprehensive management plan for this species should be developed and implemented. Life history studies to determine the biology and habitat requirements should be conducted. A survey of apparently suitable habitat at Camp Pendleton Marine Corps Base, Seal Beach Naval Weapons Station - Fallbrook Annex, and March Air Force Base is scheduled for 1981.

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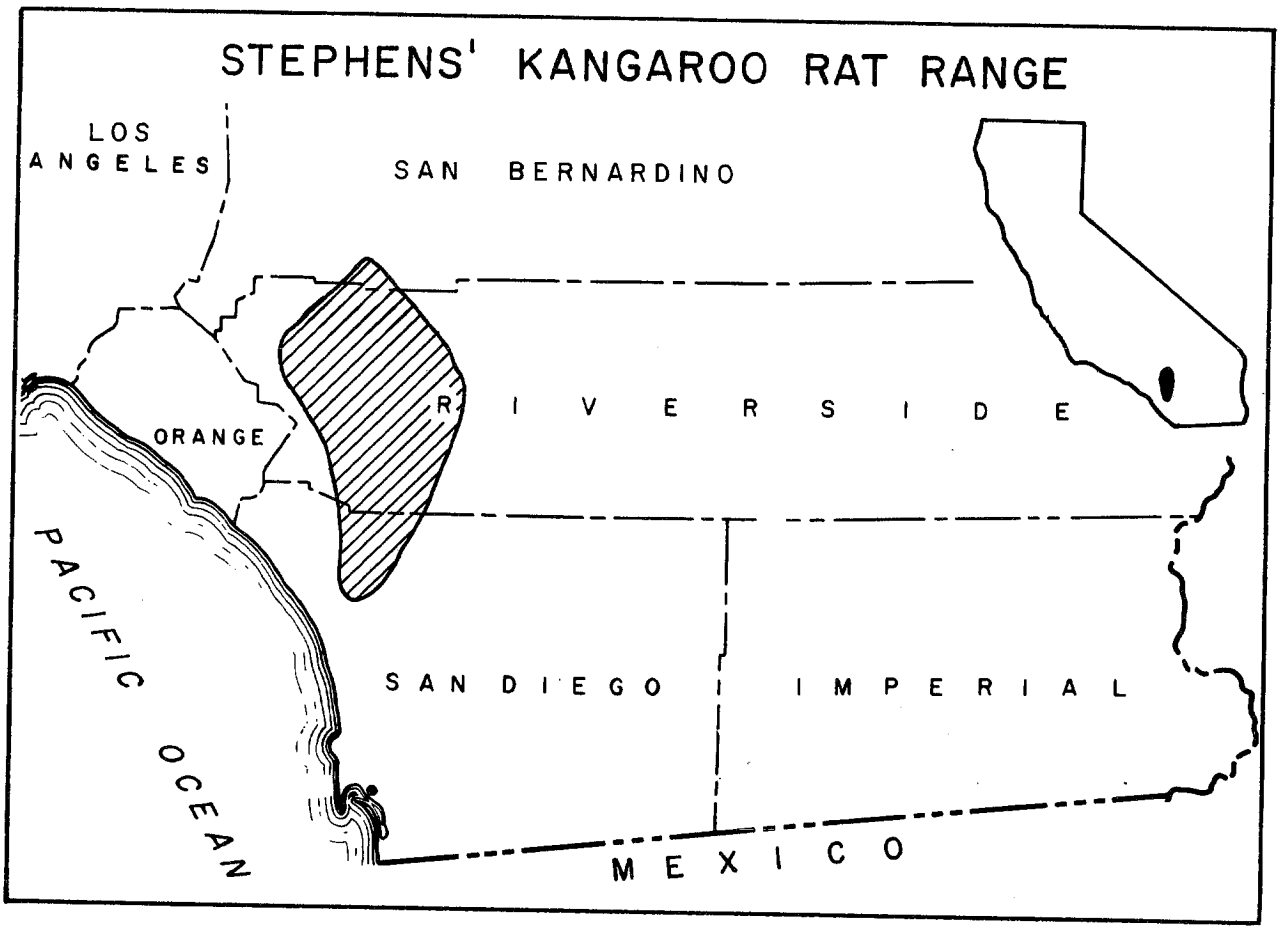

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

FRESNO KANGAROO RAT
(Dipodomys nitratoides exilis)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Fresno Kangaroo Rat is the smallest of three subspecies of the San Joaquin Kangaroo Rat. It is distinguished from the other subspecies by habitat and geographic range.

DISTRIBUTION: The Fresno Kangaroo Rat was considered extinct for a time after its first discovery near Fresno in 1891, but was "rediscovered" in 1943 near Kerman in Fresno County. Recent surveys conducted by the Department have shown that the range of this species has diminished from 6070 ha (15,000 acres) in 1975 to less than 2023 ha (5,000 acres) in 1980. This drastic loss of habitat prompted the California Fish and Game Commission to change the status of this subspecies from rare to endangered. Rapid agricultural development and urbanization have destroyed most of the historical habitat of the Fresno Kangaroo Rat. It is restricted to the few remaining alkali sink areas in Fresno County. Most of this remaining acreage is probably marginal for Fresno Kangaroo Rat habitation.

RECOVERY EFFORT: Four surveys have been conducted by the Department since 1973. The Department purchased a 180 ha (444 acres) parcel of kangaroo rat habitat and established the Alkali Sink Ecological Reserve in 1979.

FUTURE MANAGEMENT: Surveys of Fresno Kangaroo Rat population and habitat trends will continue. Additional areas essential to the survival of this kangaroo rat should be protected through acquisition or easement. The subspecies should be placed on the federal endangered species list and Critical Habitat should be declared.

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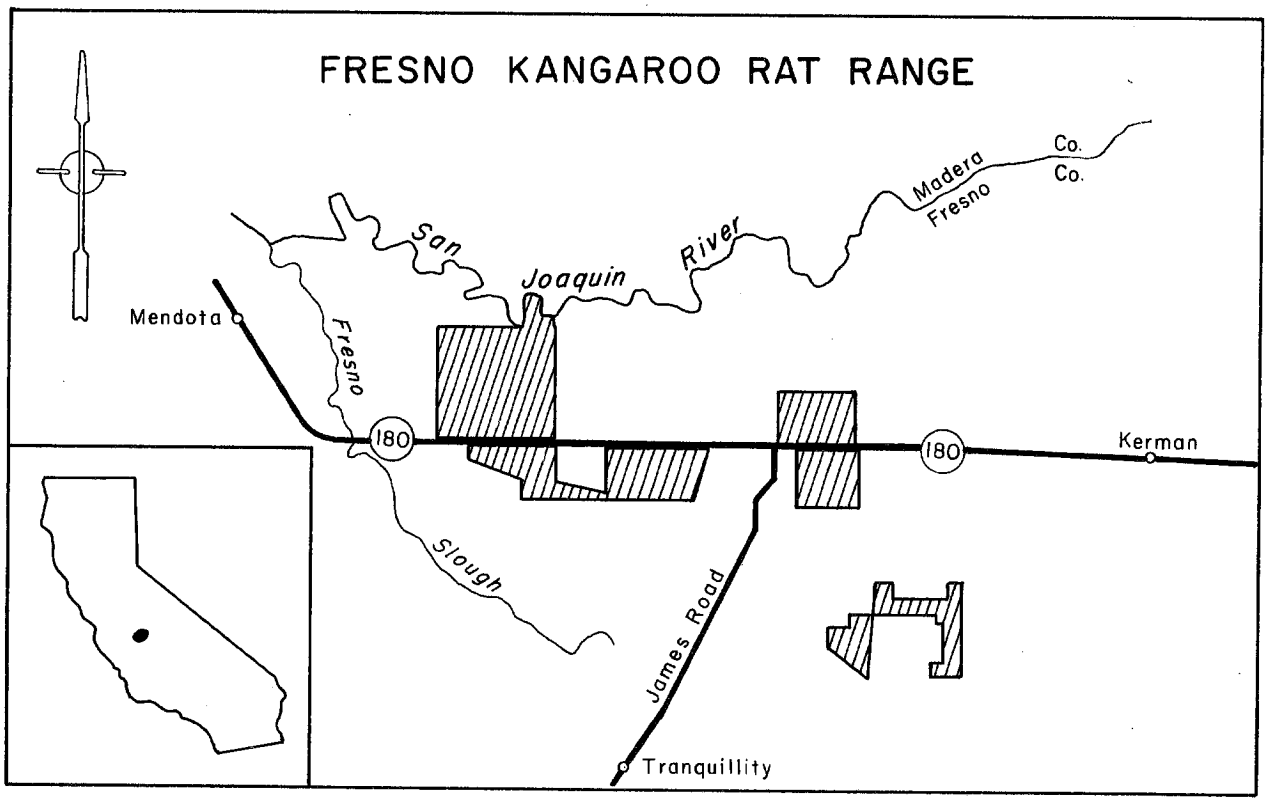

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SALT MARSH HARVEST MOUSE
(Reithrodontomys raviventris)

CLASSIFICATION: State - Endangered
Federal - Endangered

DESCRIPTION: The Salt Marsh Harvest Mouse is a small mouse with a rich brown back, cinnamon to buffy-white underparts and a unicolored tail. It is distinguished from the Western Harvest Mouse by color, anatomical, and behavioral differences. This species is one of the few mammals able to drink salt water.

DISTRIBUTION: Formerly found throughout the extensive marshes once bordering San Francisco, San Pablo, and Suisun bays, the Salt Marsh Harvest Mouse is now restricted to scattered, discontinuous salt marshes within its original range. This species is adapted to living in dense stands of pickleweed and rarely ventures out onto open ground. This dependence on cover prevents movement between marshes except during periods of extremely high tides. Although generally found in tidal marshes, it also occurs in diked-off, non-tidal marshes. Continual destruction of salt marsh habitat by bay fill and diking are major factors contributing to the decline of Salt Marsh Harvest Mouse populations. Discharge of fresh water from sewage treatment plants is causing loss of pickleweed habitat.

RECOVERY EFFORT: Preservation of habitat and study of the biology and habitat requirements of this species have been the major management actions. A 1980 survey of virtually the entire range of the species has given an up-to-date view of harvest mouse status. National wildlife refuges have been established in South San Francisco and San Pablo bays, and a National Audubon Society Sanctuary was established on Grecko Island and Mowry Slough in South San Francisco Bay. Several other marsh areas have been acquired by the state and The Nature Conservancy. Palo Alto Marsh has been preserved by the City of Palo Alto. Bay fill proposals are subject to approval by the Bay Conservation and Development Commission.

FUTURE MANAGEMENT: Preservation of habitat areas critical to Salt Marsh Harvest Mouse survival should continue. Programs of marsh restoration in areas adjacent to currently-occupied habitat should be initiated. A recovery team should be established and a single recovery plan written for all endangered vertebrate taxa which inhabit the salt marshes of the San Francisco Bay complex.

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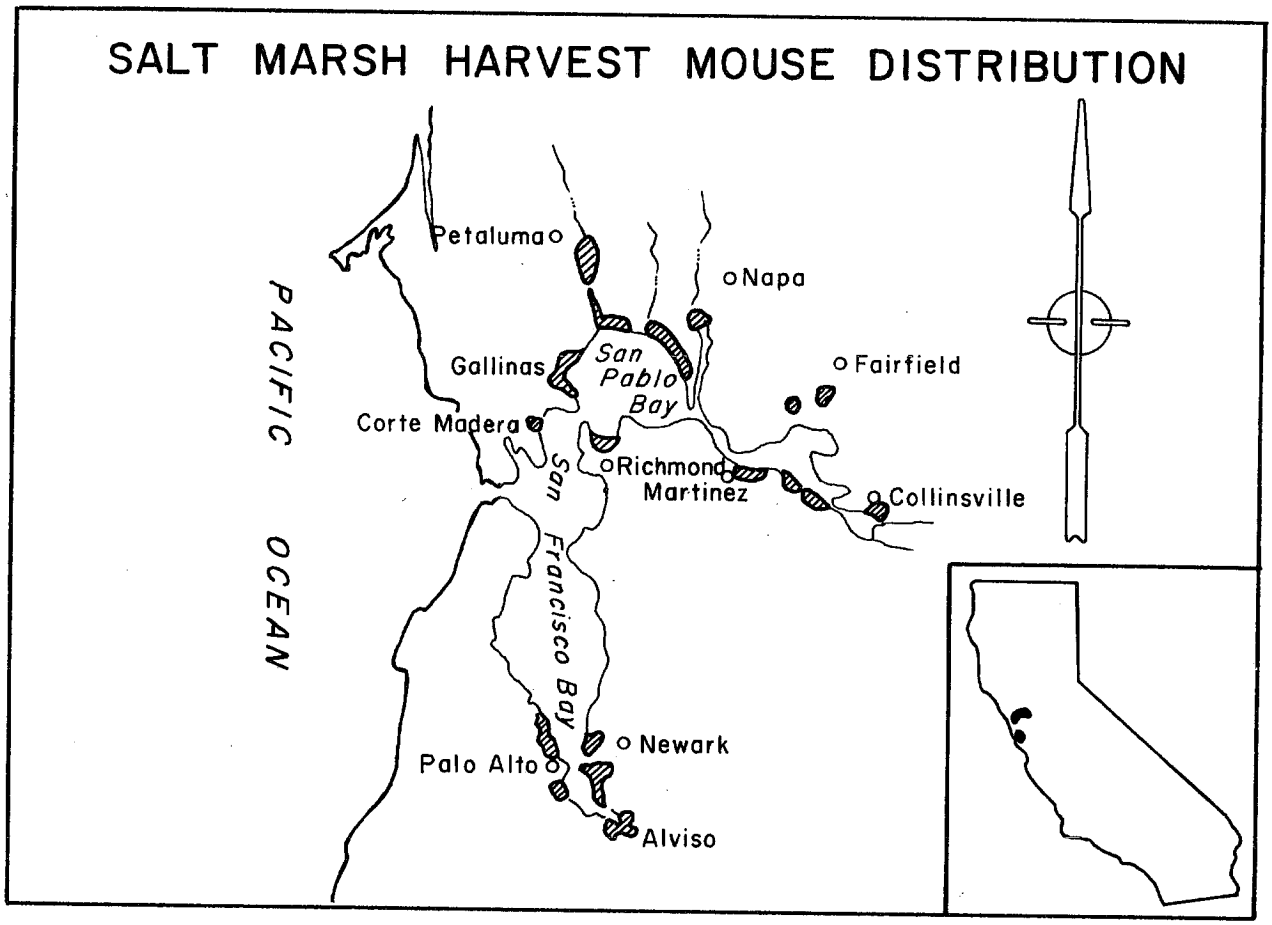

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

AMARGOSA VOLE
(Microtus californicus scirpensis)

CLASSIFICATION: State - Endangered
Federal - Not Listed

DESCRIPTION: The Amargosa Vole is a cinnamon-brown vole with pale feet and a bi-colored tail less than one-third the total length of the body. It is distinguished from other subspecies of the California Vole by geographic distribution.

DISTRIBUTION: The Amargosa Vole is known only from seven bulrush marshes in a 4.8 km (3 mile) stretch along the course of the Amargosa River near Tecopa in Inyo County. Other apparently suitable habitat exists near Shoshone north of Tecopa, in the Amargosa Canyon south of Tecopa, and at Saratoga Spring in Death Valley National Monument. All of these locations are along the water course of the Amargosa River. This species is endangered because of its limited distribution, small population size, and vulnerability to loss of critical marsh habitat by human encroachment and natural catastrophe such as fire and flood.

RECOVERY EFFORT: The Department conducted trapping surveys of marshes in the vicinity of Shoshone and Tecopa in Inyo County in April and December, 1977, for the presence of Amargosa Voles. Department and U. S. Fish and Wildlife Service personnel examined the course of the Amargosa River from the Nevada state line south through the Amargosa Canyon to Saratoga Spring by air, and examined the 20.9 km (13 mile) Amargosa Canyon by foot, in April, 1980. Apparently suitable habitat was found in the canyon at various sites. The U. S. Bureau of Land Management has officially closed the canyon to off-road vehicles, but the closure is not enforced at the southern end of the canyon. The Fish and Wildlife Service has indicated in the Federal Register its interest in considering the Amargosa Vole for federal endangered or threatened status.

FUTURE MANAGEMENT: The occurrence of the Amargosa Vole on private and Bureau of Land Management lands in the Amargosa Canyon will be investigated. Other areas of possible occurrence of the vole will be live-trapped to determine presence. A detailed ownership map for all lands known to support the vole will be prepared, so that acquisition of private holdings may proceed. An essential habitat recommendation will be made to the U. S. Fish and Wildlife Service, in the event that the vole is placed on the federal list. The U. S. Bureau of Land Management should be encouraged to enforce the closure of the Amargosa Canyon to off-road vehicles.

REFERENCES:

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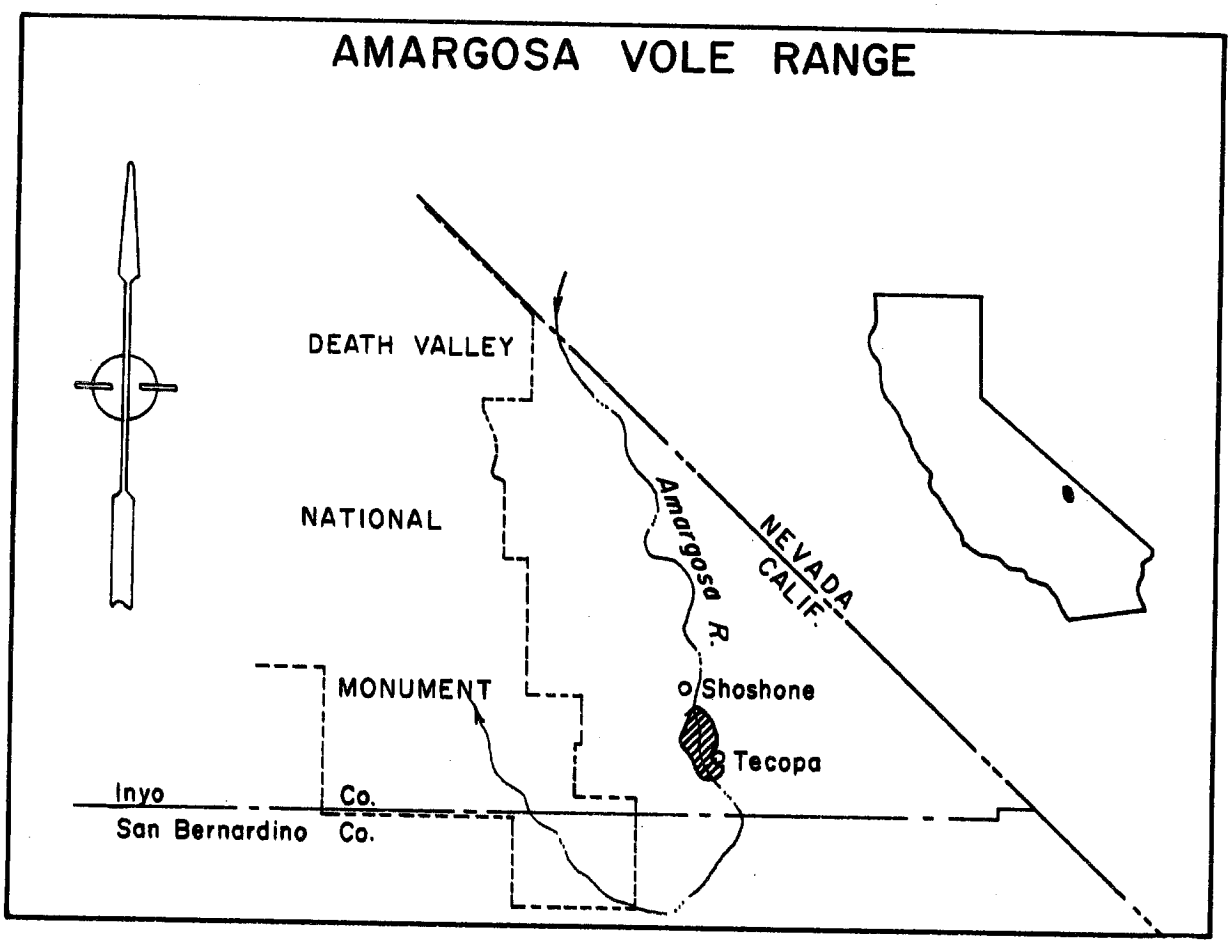

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SIERRA NEVADA RED FOX
(Vulpes vulpes necator)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The Sierra Nevada Red Fox is a large fox with yellowish-red fur, blackish legs, and a bushy, round, white-tipped tail. Black, silver, and cross color phases also occur.

DISTRIBUTION: The Sierra Nevada Red Fox is the only native subspecies of red fox occurring in California. It has been recorded from the Cascades of Siskiyou County south through the Sierra Nevada to southern Tulare County. Most sightings have been in the Lassen Peak Region and at elevations of 1524-2560 m (5000-8400 ft). Sierra Nevada Red Foxes typically inhabit Red Fir-Lodgepole Pine forest interspersed with alpine fell-fields and mountain meadows.

Despite its wide distribution, the Sierra Nevada Red Fox has never been common. Recent records are sparse, depsite considerable effort made to report and record sighting of this species. Logging and recreational use reduces the forest habitat of the red fox. Sheep and cattle grazing in high mountain meadows may serve to reduce Sierra Nevada Red Fox populations by reducing vegetation, thus affecting the fox's rodent food supply. Other red fox populations exist in the Sacramento Valley usually below 914 m (3000 ft) in elevation, and along the southern California coast. These populations are thought to have been introduced into California sometime prior to 1890. The boundaries of these red fox populations apparently do not overlap with that of the Sierra Nevada Red Fox.

RECOVERY EFFORT: The Department has funded studies on red fox distribution (1977) and taxonomy (1977), and has cooperated in red fox status investigations (1977) and a high altitude furbearer study (1979). The harvest of all red foxes is prohibited in California. Department personnel cooperate in a Carnivore Study Group with federal agency and university personnel.

FUTURE MANAGEMENT: The Department will cooperate with the U. S. National Park Service, and University of California, Berkeley in furbearer investigations on federal lands. The Department may initiate a study in or near Lassen National Park to determine winter activities of Sierra Nevada Red Foxes in an area of concentration.

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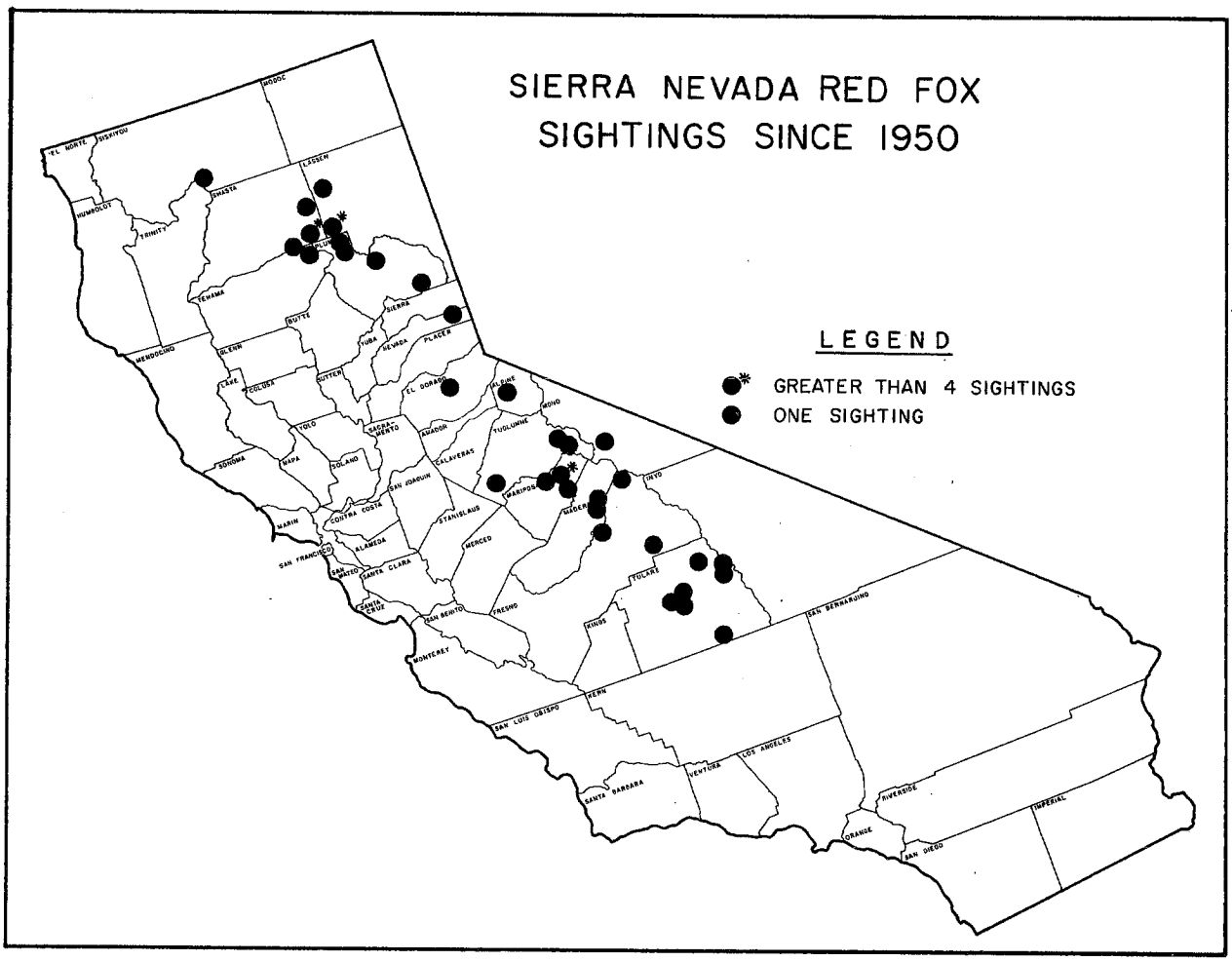

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

SAN JOAQUIN KIT FOX
(Vulpes macrotis mutica)

CLASSIFICATION: State - Rare
Federal - Endangered

DESCRIPTION: The San Joaquin Kit Fox is a small, pale gray fox with exceptionally large ears, long legs, and a black-tipped tail. Adult foxes weigh 1.8-2.7 kg (4-6 lb).

DISTRIBUTION: This subspecies of kit fox (two other subspecies are found in California) occurs from the foothills around the southern end of the San Joaquin Valley north along the valley floor and eastern foothills to the vicinity of Visalia in Tulare County, and north along the western foothills and interior coastal range valleys to the vicinity of the Concord Naval Weapons Station in Contra Costa County. The San Joaquin Kit Fox historically occurred in at least 14 California counties, and populations or occasional foxes still exist in each of these counties. However, habitat loss, which is the major cause of the decline of the kit fox, has practically eliminated this subspecies from the valley portions of Kings, Kern, and Tulare counties. Intensive agriculture is the primary land use practice in the latter counties, in which the greatest kit fox densities probably historically occurred. In these three counties, the fox inhabited primarily the alkali-sink plant association. Further north in the San Joaquin Valley and in the foothills and coast range valleys, the kit fox occupied annual grasslands (prairies). These grasslands exist today in a large portion of the historical acreage, but are threatened by conversion to agriculture, overgrazing, and off-road-vehicle use. Because the southern San Joaquin Valley, which was the center of the original distribution of the San Joaquin Kit Fox, has been largely converted to agriculture, the fox is basically now a creature of the foothills and interior coast range valleys. Elk Hills, Elkhorn Plain, and Carrizo Plain are centers of foothill/coast range kit fox abundance. The last vestiges of native vegetation on the San Joaquin Valley, as well as large acreages in the coast range valleys, may be lost to cultivation with the increased water delivery from the proposed Peripheral Canal project. Two San Joaquin Kit Foxes are on exhibit for educational purposes at Roeding Park Zoo in Fresno.

RECOVERY EFFORTS: A San Joaquin Kit Fox Recovery Team has been appointed by the Director of the U. S. Fish and Wildlife Service to prepare a plan for programs to restore the kit fox to nonendangered status. Night hunting has been prohibited within most of the range of the kit fox by the California Fish and Game Commission. An interagency policy has been established among the California departments of Fish and Game and Food and Agriculture, and the California Agricultural Commissioners Association, to review county rodent control programs in areas inhabited by endangered and rare species. An intensive study of San Joaquin Kit Fox distribution, density, and habitat use is underway at Elk Hills Naval Petroleum Reserve No. 1 in western Kern County, sponsored by the U. S. Department of Energy and the U. S. Navy. The U. S. Bureau of Land Management has recently funded surveys of kit fox den occurrence in the Bakersfield District.

FUTURE MANAGEMENT: A recovery plan will be prepared in 1981, and will include essential habitat recommendations so that land acquisition may proceed. The California Department of Water Resources will fund a study, beginning in 1981, to determine the status of the San Joaquin Kit Fox on the site of the Los Vaqueros

Reservoir project in Contra Costa County. Night hunting should be prohibited throughout San Joaquin Kit Fox range. Much field work is needed to answer questions about the distribution and biology of kit foxes, especially in Tulare County and the upper Salinas Valley of Monterey and San Luis Obispo counties.

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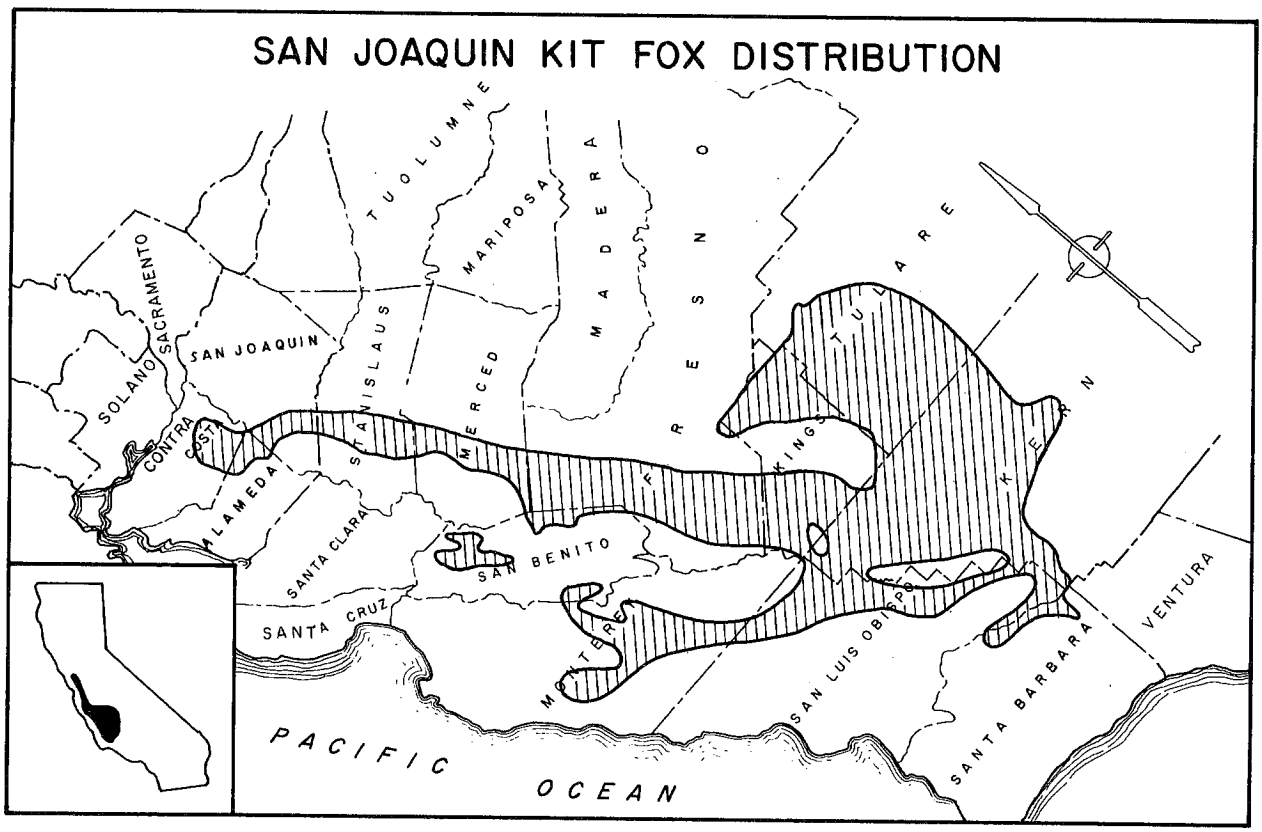

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

ISLAND FOX
(Urocyon littoralis)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The Island Fox is similar in coloration to the Gray Fox (pepper and salt dorsal coat with rufous to buffy underfur) of mainland California, but is smaller with a conspicuously short tail.

DISTRIBUTION: The Island Fox is confined to San Miguel, Santa Rosa, Santa Cruz, Santa Catalina, San Nicolas, and San Clemente islands off the coast of southern California. San Miguel Island (along with the Anacapa Islands and Santa Barbara Island, on which the fox is not found) is administered by the U. S. National Park Service as part of Channel Islands National Park. Santa Rosa, Santa Cruz, and Santa Catalina islands are privately owned; most of Santa Cruz is administered by The Nature Conservancy. San Nicolas and San Clemente islands are administered by the U. S. Navy. The Major threat to the Island Fox is competition by the larger feral Domestic Cat on San Nicolas and San Clemente islands. Habitat loss due to human development has occurred on Santa Catalina, San Nicolas, and San Clemente islands. The negative effects of feral Goats on native vegetation and landform are extensive on Santa Catalina and San Clemente islands. A threat of disease to the Island Fox through contact with the Black Rat exists on San Miguel Island.

RECOVERY EFFORTS: The Department is cooperating with the U. S. Navy to remove feral Domestic Cats from San Nicolas Island. The U. S. Navy, in the removal program conducted by its biologists, is also studying the Island Fox population. The U. S. Navy has prohibited importation of domestic animals by military and civilian personnel to San Nicolas Island, and has prohibited feeding of feral cats on the island. Feral Goats are being removed from San Clemente Island. The Department is cooperating with the Marine Science Institute at the University of California, Santa Barbara, to study Island Fox biology on Santa Cruz Island. The U. S. National Park Service has sponsored a study by the Santa Barbara Museum of Natural History on the natural resources of Channel Islands National Park, including the biology of the Island Fox on San Miguel Island.

FUTURE MANAGEMENT: The feral Domestic Cat removal program should be continued on San Nicolas Island, and a similar program should be initiated on San Clemente Island. A Black Rat eradication program should be initiated on San Miguel Island. Feral Goats should be removed from Santa Catalina Island.

REFERENCES:

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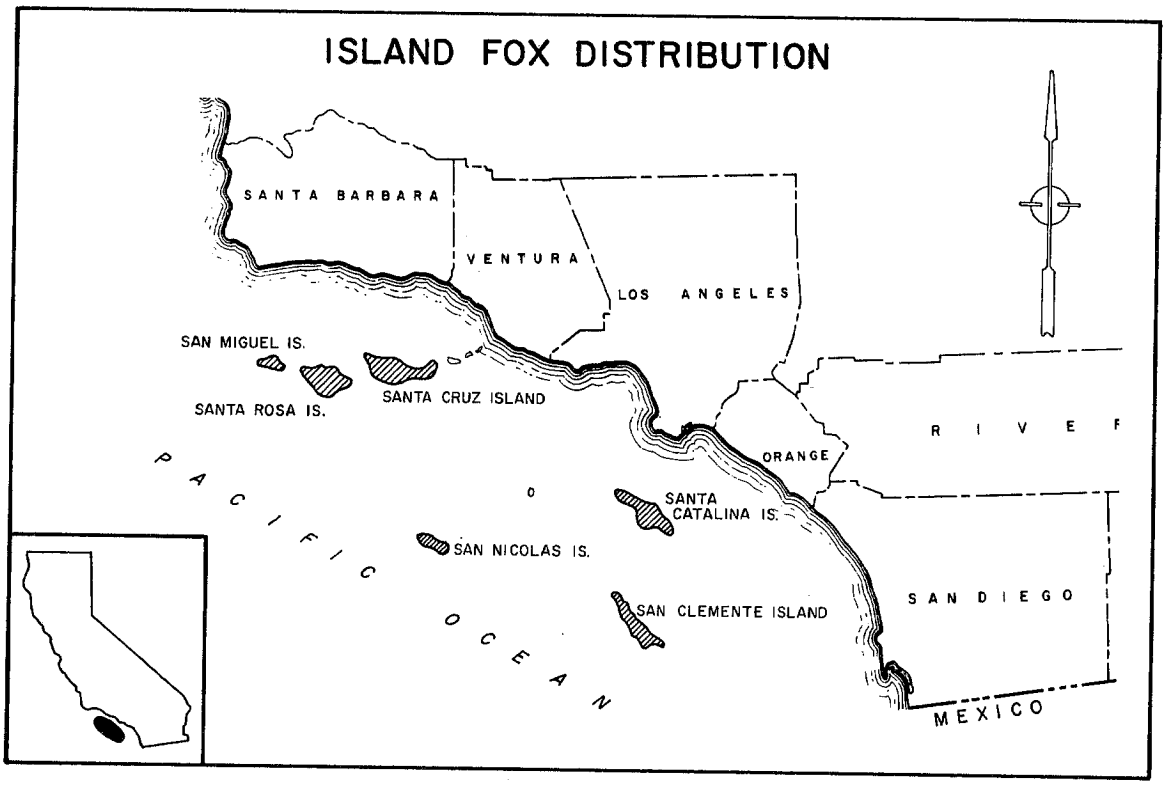

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

WOLVERINE
(Gulo gulo)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The Wolverine is the largest terrestrial member of the weasel family (Mustelidae). It is a small bear-like animal with a pale face and dark brown fur, and two broad yellowish stripes that start at the shoulders and join on the rump. The tail is short and bushy.

DISTRIBUTION: The Wolverine occurs in the Sierra Nevada from Tulare County north to Plumas County, in the Coast Range from Lake County north, and across California's northern tier of counties. Preferred habitat is alpine fell-fields and subalpine forests of Lodgepole Pine and Red Fir. Wolverine observations are at general altitude ranges of 488-1463 m (1600-4800 ft) in the coast range, and 1311-3292 m (4300-10,800 ft) in the Sierra Nevada. At least 65 observations of Wolverines have been reported to the Department since 1970.

Despite its wide distribution in California, the Wolverine has never been common. Like the Sierra Nevada Red Fox, which occupies much of the same range and habitat, the Wolverine is truly a rare animal in the biological sense. It occurs in small numbers over a wide range. Degradation of its habitat through high altitude timber harvesting, road construction and ski area construction, and human disturbance of this true wilderness species, are the threats to the maintenance of its population.

RECOVERY EFFORTS: The Department cooperated in a high-altitude furbearer study in 1979. It cooperates in a Carnivore Study Group with federal agency and university personnel. The Department records all observations of Wolverines in California by location, altitude, and vegetation type.

FUTURE MANAGEMENT: The Department will continue to cooperate with the U. S. National Park Service and the University of California, Berkeley, in furbearer investigations on national park lands. A thorough survey is needed to determine Wolverine distribution and density throughout its apparent range, but it is difficult to find these elusive creatures. Tracking in snow may be the only feasible method to find enough Wolverines, so that density estimates can be made.

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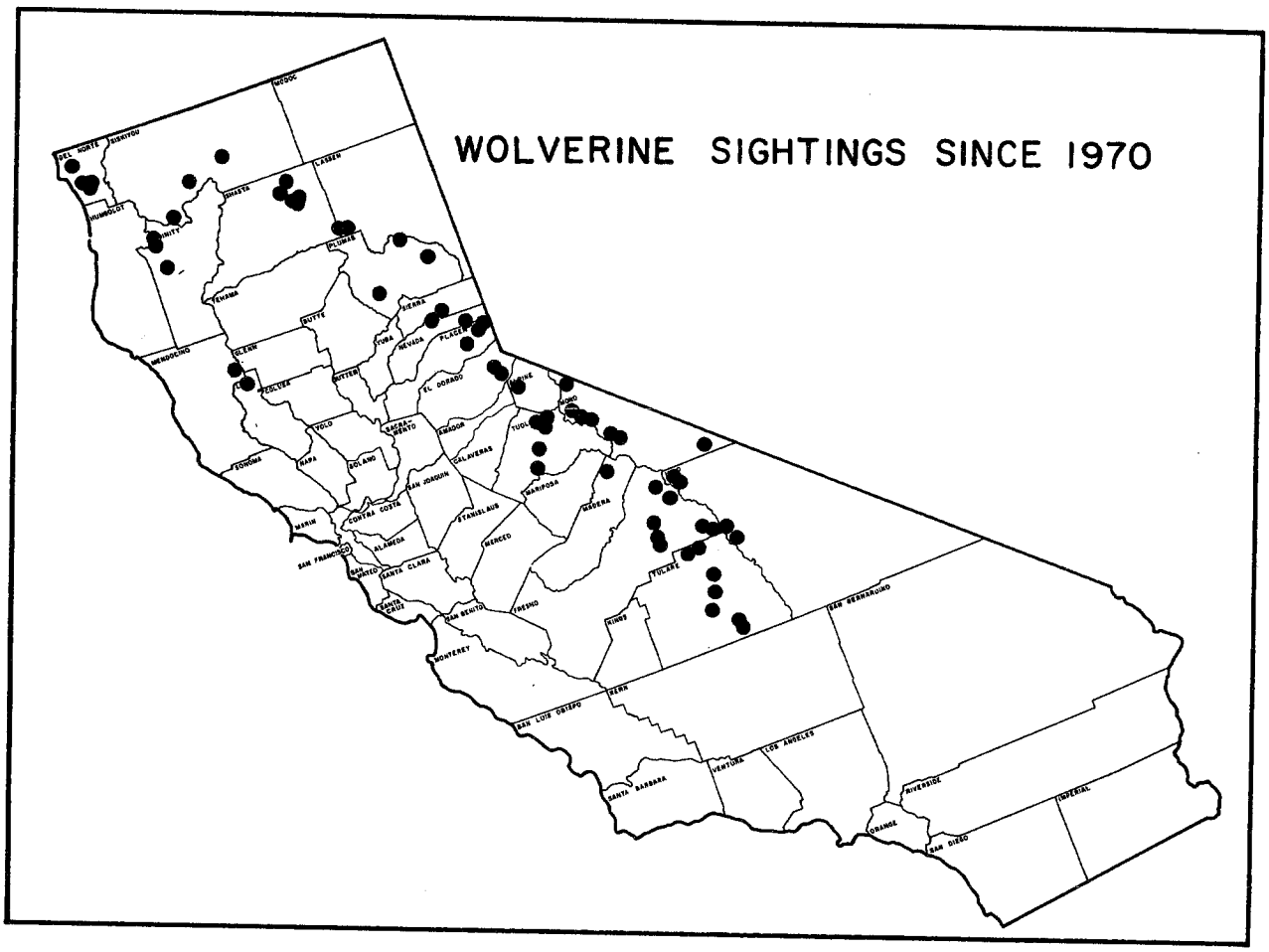

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

GUADALUPE FUR SEAL
(Arctocephalus townsendi)

CLASSIFICATION: State - Rare
Federal - Endangered

DESCRIPTION: The Guadalupe Fur Seal is distinguished from the slightly longer California Sea Lion and other eared seals by having a long pointed snout, low forehead, and soft, dense, plush, blackish-gray fur.

DISTRIBUTION: Before exploitation, the range of the Guadalupe Fur Seal extended from the Farallon Islands, west of San Francisco, south to San Benito Island, off Lower California, Mexico. The species was believed extinct during two periods (1895-1926; 1928-49).. This species breeds only on Guadalupe Island, Mexico, but its population is slowly increasing in numbers. One or more Guadalupe Fur Seals have been sighted on San Miguel Island each year since 1968. A small male was found beached in Monterey Bay during 1977. It subsequently died while undergoing rehabilitation. The total population is estimated to number slightly more than 1,000 animals.

RECOVERY EFFORTS: Guadalupe Island has been declared a marine mammal sanctuary and the species is fully protected by the Mexican government. Full protection has been extended the species in U. S. waters under regulations promulgated by the Marine Mammal Protection Act.

FUTURE MANAGEMENT: Initiate cooperative studies with Mexico to monitor the population and determine what measures can be taken to increase the numbers. The University of Washington and National Marine Fisheries Service, Marine Mammal Division, began a study of the species in 1976.

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At The Crossroads, 1980. Calif. Dep. of Fish and Game.

CALIFORNIA BIGHORN SHEEP
(Ovis canadensis californiana)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The California Bighorn Sheep is brown to grayish-brown with a white rump, and has massive coiled horns (small, not coiled in females) which spiral back, out, and then forward to complete an arc. In these characters, the California Bighorn Sheep closely resembles other bighorns, but has smaller horns.

DISTRIBUTION: The California Bighorn Sheep is one of three subspecies of bighorn sheep in California, and is restricted to the Sierra Nevada and Warner Mountains. Prior to reintroduction efforts beginning in 1979, this subspecies was found in the wild only in the vicinity of Mt. Baxter and Mt. Williamson in Inyo County. In 1979, sheep were successfully reintroduced to Wheeler Ridge in Inyo County from Mt. Baxter. In 1980, sheep were reintroduced from Mt. Baxter to Lubkin Creek in Inyo County and to the southern Warner Mountains (Raider Canyon) in Modoc County. The captive herd at Lava Beds National Monument in Siskiyou County, which was introduced from British Columbia in 1971, was decimated by pneumonia through contact with domestic sheep in summer 1980.

RECOVERY EFFORTS: The Department, in cooperation with the U. S. Forest Service, has transplanted bighorn sheep from the Mt.Baxter herd to three other historical sites in the Sierra Nevada (Wheeler Ridge and Lubkin Creek) and southern Warner Mountains (Raider Canyon). Thus, California Bighorn Sheep are occupying five sites, those above plus the Mt. Williamson site, within their former range. The Department has been represented in a five-agency team organized to manage the bighorn herd at Lava Beds National Monument. Several Lava Beds bighorns were moved to form a nucleus herd in the southern Warner Mountains in early 1980, and other sheep were added to this herd from Mt. Baxter later in the spring. However, the remainder of the penned Lava Beds herd died after contracting pneumonia. The U. S. Forest Service and U. S. National Park Service sponsored a recently completed study on the ecology of California Bighorn Sheep on the Inyo National Forest.

FUTURE MANAGEMENT: No reintroduction efforts are planned in 1981, but the reintroduced herd at Lubkin Creek will be studied and may be augmented in 1982. The Mt. Baxter herd will be under scrutiny to determine whether it can contribute more bighorns to future reintroduction efforts. The Department will prepare a management plan for California Bighorn Sheep so that any future reintroduction sites are fully assessed as to their relative value to bighorns. The Department will continue to cooperate with the U. S. Forest Service and U. S. National Park Service to manage California Bighorn Sheep in the Sierra Nevada.

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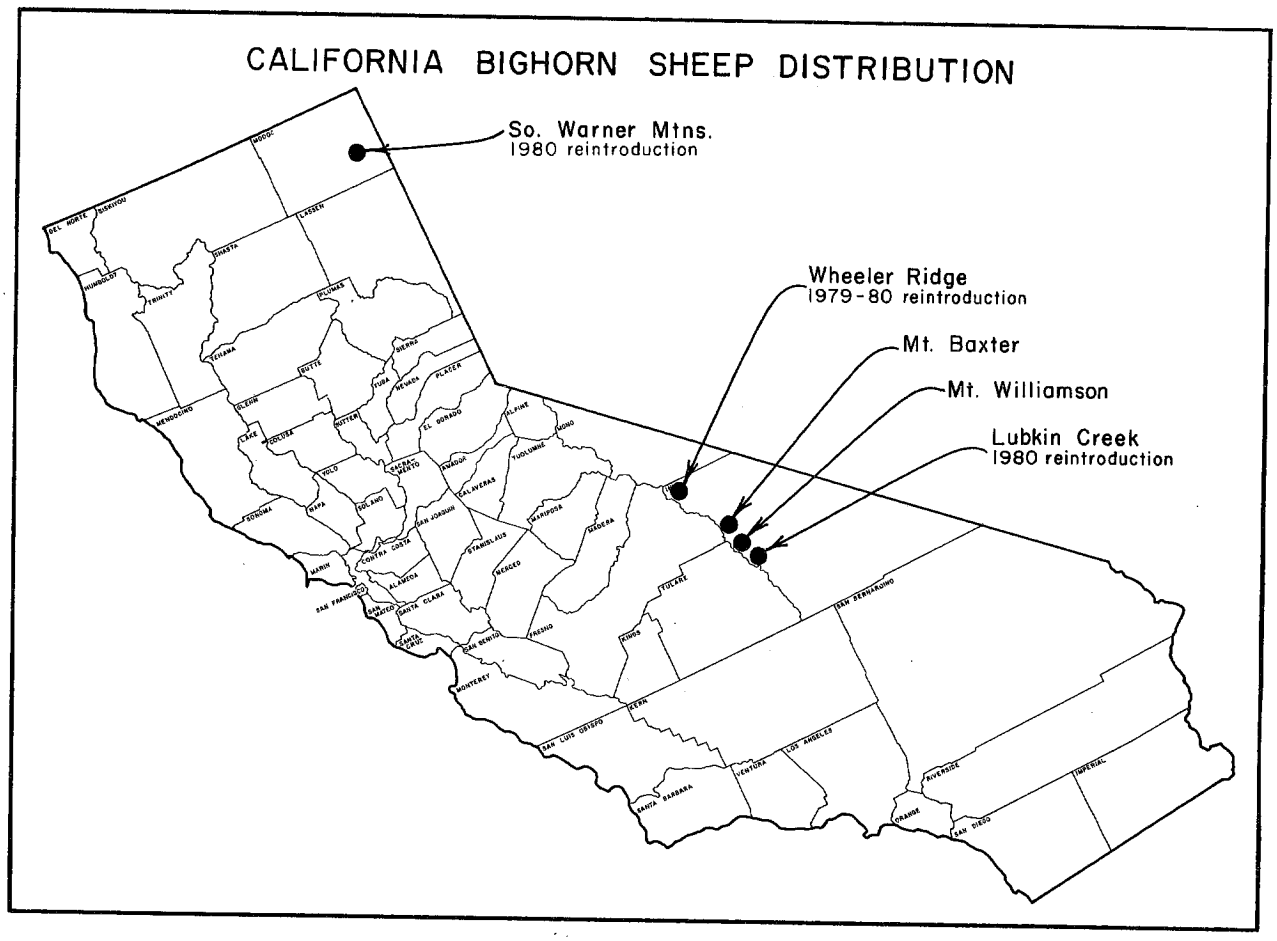

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

PENINSULAR BIGHORN SHEEP
(Ovis canadensis cremnobates)

CLASSIFICATION: State - Rare
Federal - Not Listed

DESCRIPTION: The Peninsular Bighorn Sheep is pale brown with a white rump, and has massive coiled horns (small, not coiled in females) which spiral back, out, and then forward to complete an arc.

DISTRIBUTION: The Peninsular Bighorn Sheep is one of three subspecies of bighorn sheep in California, and is found from the San Jacinto and Santa Rosa mountain ranges in Riverside County south through Anza-Borrego Desert State Park to the Jacumba Mountains in San Diego County. It also occurs in Mexico (Baja California). The major factors contributing to Peninsular Bighorn Sheep decline are habitat loss, human disturbance, lack of sufficient water sources, and disease. Disease is suspected as the cause of low lamb survival in the Santa Rosa Mountains, beginning in 1977.

RECOVERY EFFORTS: The Department conducts helicopter surveys of Peninsular Bighorns in the Santa Rosa Mountains twice a year. Waterhole counts of sheep are conducted every three years in these mountains. A waterhole count is conducted annually in Anza-Borrego Park. The Park has closed a major road near a critical bighorn water source during the summer. Several thousand acres of bighorn habitat have been recently acquired in Anza-Borrego Park. Over 10,117 ha (25,000 acres) of habitat have been acquired in the Santa Rosa Mountains by the California Wildlife Conservation Board. Three ecological reserves which protect bighorn habitat have been established by the California Fish and Game Commission. Two of the reserves (Carrizo Canyon and Magnesia Spring) were established primarily for bighorns, and the third (Hidden Palms) was established primarily for the Desert Slender Salamander. The Department develops water sources and recommends key habitat areas for public acquisition. Two habitat management plans have been developed jointly by the Department and the U. S. Bureau of Land Management.

FUTURE MANAGEMENT: Activities conducted by the Department, Department of Parks and Recreation, and U. S. Bureau of Land Management, as described above, will continue. In addition, a study to determine the extent of disease in the Santa Rosa Mountains bighorn population is needed.

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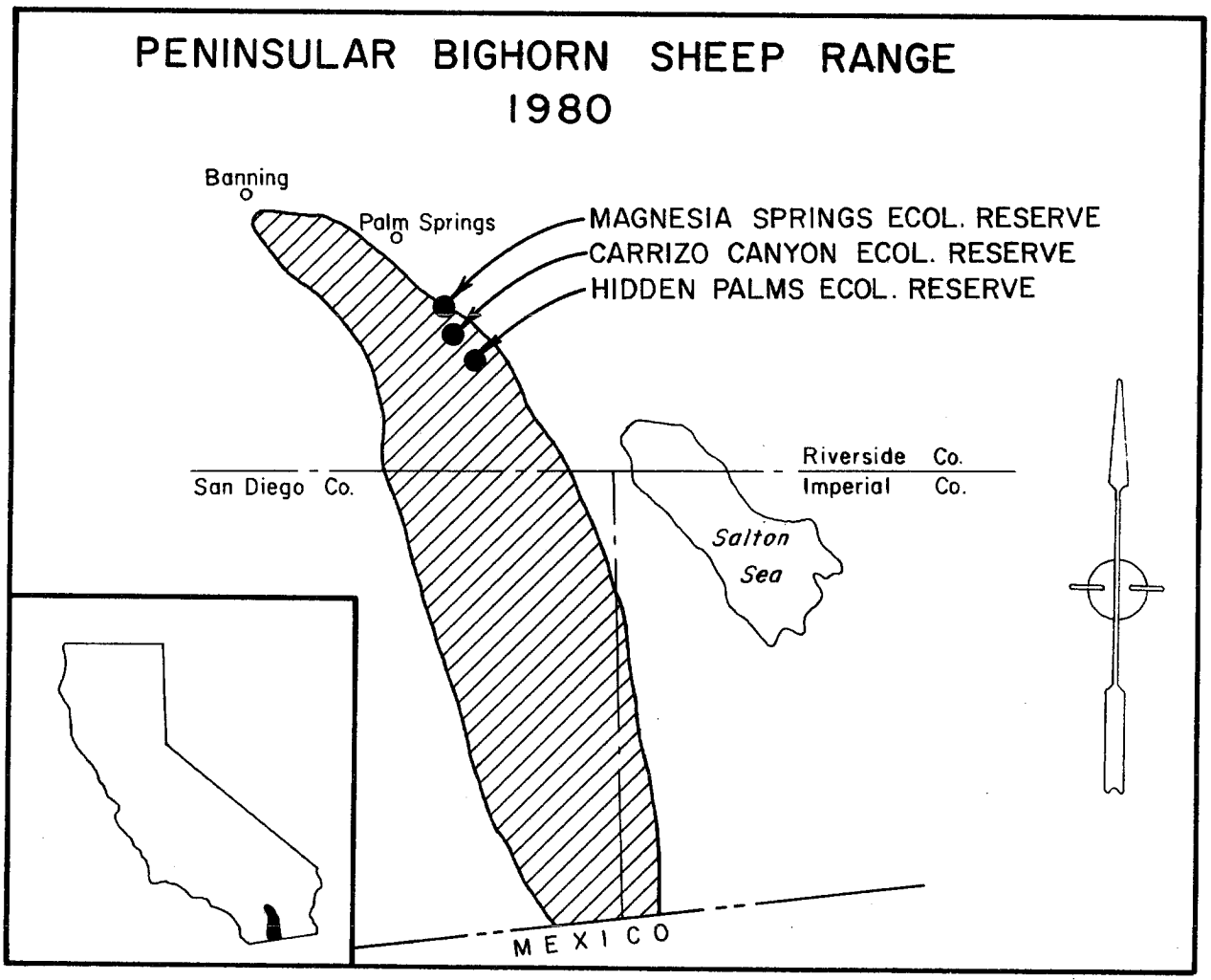

At The Crossroads, 1980. Calif. Dep. of Fish and Game.

EXTINCT AND EXTIRPATED WILDLIFE OF CALIFORNIA

Extinct

Several California animals are now extinct throughout their range:

- Pasadena Freshwater Shrimp
- Sooty Crayfish
- Xerces Blue*
- Sthenele Satyr*
- Strohbeen's Parnassius*
- Atossa Fritillary*
- Antioch Dunes Katydid*
- Shoshone Pupfish
- Clear Lake Splittail
- Thicktail Chub
- Santa Barbara Song Sparrow
- San Clemente Bewick's Wren
- Gray Wolf (Plains subspecies)
- Long-eared Kit Fox
- California Grizzly Bear

Extirpated

The following animals no longer exist in California, but they still exist outside the state:

- Woundfin**
- Flannelmouth Sucker**
- Columbian Sharp-tailed Grouse
- Gray Wolf (Cascade subspecies)
- Jaguar
- Whitetail Deer**

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*insects

**These do not occur in California today. They existed in California at one time, although there is no firm evidence of this for the fish species.