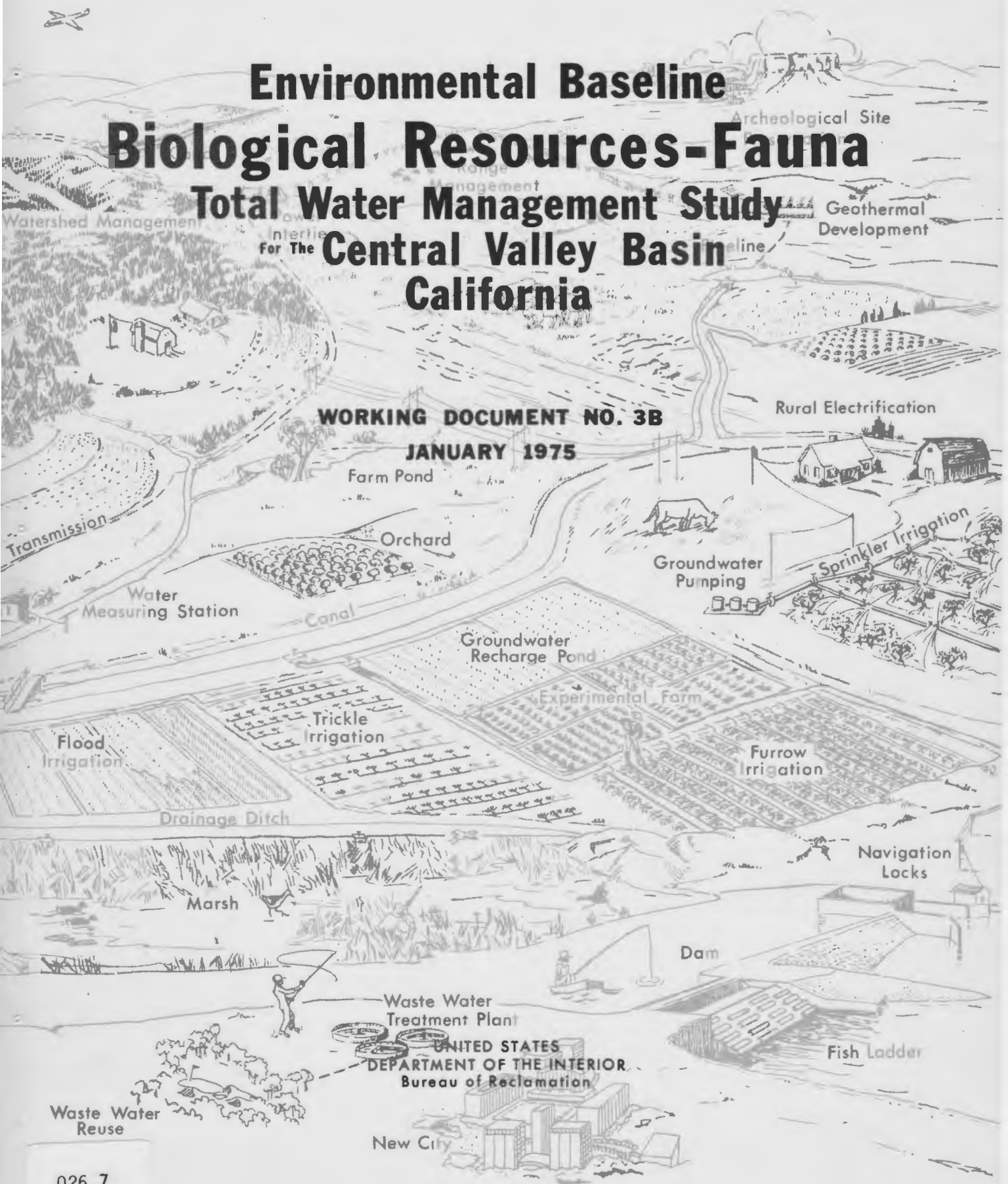


Environmental Baseline Biological Resources-Fauna Total Water Management Study For The Central Valley Basin California

WORKING DOCUMENT NO. 3B

JANUARY 1975



UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

Waste Water
Reuse

New City

TOTAL WATER MANAGEMENT STUDY
FOR THE
CENTRAL VALLEY BASIN, CALIFORNIA

ENVIRONMENTAL BASELINE
Biological Resources--Fauna

WORKING DOCUMENT NO. 3B

January 1975

THIS REPORT WAS PREPARED PURSUANT TO FEDERAL RECLAMATION LAWS (ACT OF JUNE 17, 1902, 32 STAT. 388 AND ACTS AMENDATORY THEREOF OR SUPPLEMENTARY THERETO). PUBLICATION OF THE FINDINGS AND RECOMMENDATIONS HEREIN SHOULD NOT BE CONSTRUED AS REPRESENTING EITHER THE APPROVAL OR DISAPPROVAL OF THE SECRETARY OF THE INTERIOR. THE PURPOSE OF THIS REPORT IS TO PROVIDE INFORMATION AND ALTERNATIVES FOR FURTHER CONSIDERATION BY THE BUREAU OF RECLAMATION, THE SECRETARY OF THE INTERIOR, AND OTHER FEDERAL AGENCIES.

Bureau of Reclamation
Mid-Pacific Region

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INTRODUCTION

This report is one of a series of reports being prepared on the cultural and environmental resources of the Central Valley Basin. These reports will provide data to help, in the planning process, to evaluate the impact of water resources development on the environment.

Fauna, especially species which are threatened with extinction, must be considered in any planning and development within the Central Valley Basin area. Recreation in the form of fishing and hunting has long been regarded as a primary benefit of fish and wildlife management. Environmental quality now is being given equal consideration in the multiobjective planning process¹ (see bibliography). To facilitate the planning process, information contained in this document should be updated periodically as needed in order to maintain its usefulness.

The importance of protecting nongame as well as game species was recognized in the Endangered Species Act of 1966. Prior to that time game species were a major concern of wildlife protection agencies, while nongame species, lacking sporting or economic value, were often neglected. In addition to fishing and hunting, such diversified activities as bird watching, wildlife photography, and nature study are also important wildlife uses.

Wildlife plays an important role in the total biotic community. All faunal species must be preserved and protected in their natural

Introduction

habitats because of their intrinsic ecological, esthetic, scientific, and education values. Although many of these values cannot be measured in economic terms, they do contribute substantially to environmental quality.

This document on the fauna in the Central Valley Basin area lists endangered and threatened species and discusses the major fish and wildlife groups. Most of the information available at this time on fauna is concerned with game species. As it becomes available, however, additional information on nongame species will be included in this document. Although wildlife and fishery resources are not covered in depth, references given will facilitate retrieval of more detailed information.

ENDANGERED AND THREATENED SPECIES

As a result of drastic habitat change, caused by increased urban and agricultural development, some species of fauna in the Central Valley Basin area are now in danger of extinction.

Terms defined by the Endangered Species Act of 1973² considered applicable to data presented in this document are:

"Endangered species is defined as any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection would present an overriding risk to man."

"Threatened species is defined as any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

Management of endangered and threatened species is not a function of the Bureau of Reclamation. Reclamation does, however, assure through its planning and design, that endangered and threatened species are not placed under further stress by future Reclamation projects or activities. To preserve these species, planning efforts of the Bureau of Reclamation, U.S. Fish and Wildlife Service, and the California Department of Fish and Game, are coordinated.

Protective Measures

The Endangered Species Act of 1973² sets forth extensive prohibitions relating to the taking, importation, and possession of endangered species. This Act also authorizes the Secretary of the Interior to issue such regulations as he deems necessary and advisable to provide for the conservation of threatened species.

Endangered and Threatened Species

States must adopt regulations and management plans concerning endangered and threatened species in conformance with this Act, or lose management authority to the Federal government. Cooperative agreements between States and the Federal government are established to assist in implementation of a State's program for the conservation of endangered and threatened species. Any State entering into a cooperative agreement will receive financial assistance from the Federal government in accordance with this Act. California laws and regulations regarding endangered and threatened species include the Endangered Species Act of 1970, the California Species Preservation Act of 1970, and Chapter 1.5, Section 2050-2055 of the Fish and Game Code.

Other Federal agencies must ensure that actions authorized, funded or carried out by them do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or modification of habitat which the Secretary, after consultation with affected States, has determined to be critical habitat.

Any person may initiate a civil suit to enjoin any other person, agency or governmental instrumentality who is alleged to be in violation of any provision of this Act or any implementing regulation of this Act.

The Central Valley Basin area contains numerous Federal refuges and State wildlife management areas which are shown on plate 1.

Endangered and Threatened Species

Many of these are used by endangered and threatened species; some have been established expressly for the preservation of a particular species.

Surveillance programs, habitat preservation, and other protective measures are discussed in the various reference sources cited in this report.

Data Presented

Faunal species are very dependent upon continued preservation of their particular habitat for survival. Although they require protection from wanton killing or capture, the most critical threat to their survival now is the destruction of habitat. The more exacting a species is in its requirements, the more likely it is to become extinct. Most species are adapted to only a few habitat types which meet all their necessary requirements. Within each habitat type, individual plant species are important. Table 1 lists the typical plant species associated with each habitat type.³

For this document the endangered and threatened species in the Central Valley Basin area are presented in four groups. Information on the habitat types, locations, and approximate populations of each of these groups--birds, mammals, reptiles and amphibians, and fish--is tabulated in tables 2, 3, 4, and 5, respectively.

To indicate their distribution within the Central Valley Basin, the ranges of these species are shown on plates 2, 3, and 4. Plate 2

Endangered and Threatened Species

shows the ranges of the birds and mammals, plate 3, reptiles and amphibians, and plate 4, fish. An appendix to this document containing vegetation maps on which the ranges of endangered and threatened species have been plotted is available for reference at the Mid-Pacific Regional Office of the Bureau of Reclamation.⁴ The legend on the vegetation maps was converted from the Weislander vegetation classification system⁵ to the Munz vegetation classification system, which is used throughout this study.³

Thirty-three rare and endangered species are included in this document. Of these, two mammal, four bird, two reptile and amphibian, and three fish species are classified as endangered. Five mammal, six bird, seven reptile and amphibian, and four fish species are classified as threatened. Material from Federal and State agencies was used in compiling species data.⁶⁻⁹ Where a conflict in the status of a particular species existed, the highest classification was used.

The scientific names of the flora and fauna listed in the text are shown in the appendix, page 39.



UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 TOTAL WATER MANAGEMENT STUDY
 CENTRAL VALLEY BASIN-CALIFORNIA
 ENVIRONMENTAL BASELINE
**FISH AND WILDLIFE CRITICAL HABITAT
 AND PROTECTED AREAS**

Table 1. Habitat types with typical plant species

<u>Habitat</u>	<u>Plant species</u>	<u>Habitat</u>	<u>Plant species</u>
Douglas fir forest	Often in pure stands of Douglas fir, with Madrone, Sugar Pine, and Tan oak.	Northern oak woodland	California white oak, Black oak, Golden oak, Interior live oak, Broad-leaf maple, California buckeye.
Yellow pine forest	Yellow pine, Sugar pine, Incense cedar, White fir, Douglas fir, Black oak.	Chaparral	Chamise, Toyon, Scrub oak, Mountain mahogany, Spanish bayonet, Flannel bush, Ceanothus.
Red fir forest	Red fir, Lodgepole pine, Silver pine, Jeffrey pine, Bush chinquapin, Mountain whitehorn.	Sagebrush scrub	Sagebrush, Shadscale, Bitterbrush, Rabbitbrush.
Lodgepole forest	Lodgepole pine, Mountain hemlock, Brewer cinquefoil.	Alkali sink	Greasewood, Iodine bush, Torrey seepweed, Saltbush.
Subalpine forest	Whitebark pine, Foxtail pine, Limber pine, Lodgepole pine, Mountain hemlock, Sierra eriogonum.	Valley grassland	Species of: bromegrass, fescue grass, oat grass.
Alpine fell-fields	Hellers sedge, Brewers sedge, Fescue, Pine bluegrass, Cushion eriogonum.	Freshwater marsh	Tule, Cattail, Rough Sedge.
Northern juniper woodland	Sierra juniper, Jeffrey pine, Pinon pine, Sagebrush.	Saltwater marsh	Pickleweed, Seepweed, Saltgrass, Arrow grass, Cordgrass, Marsh-rosemary.
Pinon juniper woodland	Pinon pine, California juniper, Desert bitterbrush.	Valley riparian	Fremont cottonwood, Interior live oak, White alder, California sycamore, Willows.
Foothill woodland	Digger pine, California buckeye, Blue oak, Buckbrush	Foothill riparian	Broad-leaf maple, California buckeye, White alder, Interior live oak, Fremont cottonwood, Willows.
Southern oak woodland	Evergreen oak, California walnut, Lemonade sumac.	Lakes and streams	Plant species varied, depending g greatly on substrata, turbidity, and velocity of streams.



- Birds**
- ↔ California condor
 - ★ Cal. yellow-billed cuckoo
 - ★ Southern bald eagle
 - ★ Aleutian Canada goose
 - ★ Col. black rail
 - ★ Spotted owl
 - ★ Tule white-fronted goose
 - ★ Greater sandhill crane
 - ★ Prairie falcon

- Mammals**
- [Pattern] Salt marsh harvest mouse
 - [Pattern] San Joaquin kit fox
 - [Pattern] Tule elk
 - [Pattern] California bighorn sheep
 - [Pattern] Fresno kangaroo rat
 - ↔ Spotted bat
 - ★ Wolverine
 - Central Valley Basin

★ Although rare, this species is too widely distributed to be plotted on this map. (See location description in text.)

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 CENTRAL VALLEY BASIN-CALIFORNIA
 ENVIRONMENTAL BASELINE

**RANGES OF ENDANGERED AND THREATENED
 BIRDS AND MAMMALS**

Table 2. Birds (endangered and threatened species)
by habitat type and specific location

	<u>Quantitative data</u>		<u>Habitat type</u>	<u>Specific location</u>
	<u>Approximate number</u>	<u>Approximate area</u>		
<u>ENDANGERED SPECIES</u>				
California condor	50	Not available	Chaparral Valley grassland	Southern coast ranges from Santa Clara County south to the Transverse Mountains, and north in the Sierra foothills to Fresno County. Major nesting sites are outside of basin in Ventura County.
American peregrine falcon	5 pairs	Extensive	Valley grassland Freshwater marsh	Sightings have occurred in the Basin, but population is too small to predict any specific location; more sightings have occurred in Nevada and Oregon.
Southern bald eagle	63	Not available	Yellow pine forest Northern juniper woodland Foothill woodland	The interior of California around large lakes and reservoirs from Fresno County northward. Sightings also in Nevada and Oregon.
Tule white-fronted goose	Not available	Not available	Valley grassland Freshwater marsh Valley riparian	Winters in the Sacramento-San Joaquin Delta.
<u>THREATENED SPECIES</u>				
Aleutian Canada goose	Not available	Not available	Valley grassland Freshwater marsh Valley riparian	Several sightings have been made during the winter at Grizzly Island, Suisun Bay and near Willows. Nesting confined to Bolder Island in the Aleutians.
California yellow-billed cuckoo	100 pairs in Sacramento Valley	2,964 acres	Valley riparian	Sparse breeding population along the Sacramento River from Red Bluff to Colusa. Also found outside the Basin along the Colorado River.
California black rail	Not available	Not available	Freshwater marsh Saltwater marsh	Coastal salt marshes of central and southern California and occasionally inland freshwater marshes. Also found along the Colorado River.
Spotted owl	41 pairs	Not available	Yellow pine forest Foothill woodland	May occur in northwestern California and the Sierra Nevadas.
Greater Sandhill crane	Not available	Not available	Valley grassland Freshwater marsh	Winters locally from central California east to southern Georgia and Florida.
Prairie falcon	Not available	Not available	Valley grassland	Most nesting records from northern Nevada, but this species has been sighted near Sacramento, California.

Table 3. Mammals (endangered and threatened species)
by habitat type and specific location

	<u>Quantitative data</u>		<u>Habitat type</u>	<u>Specific location</u>
	<u>Approximate number</u>	<u>Approximate area</u>		
<u>ENDANGERED SPECIES</u>				
Salt marsh harvest mouse	Not available	Not available	Saltwater marsh	Salt marshes bordering Suisun Bay.
San Joaquin kit fox	1,000-3,100	3,000 sq. miles	Alkali sink Valley grassland	Foothills area below 2,000 feet in areas of native vegetation on the west side of San Joaquin Valley in Merced, Fresno, Kings, Tulare, and Kern Counties
<u>THREATENED SPECIES</u>				
Wolverine	Not available	Not available	Alpine fell-fields	Formerly found in the high Sierra Nevadas from Lake Tahoe south to Mount Whitney--Current distribution not known due to too few sightings.
California bighorn sheep	200	Not available	Subalpine forest Alpine fell-fields	In the Sierra Nevada Mountains (4,000 ft. - 12,000 ft.) from the vicinity of Mammoth Lake south to Mount Langley.
Fresno kangaroo rat	Not available	Not available	Freshwater marsh	Small population near Raisin City, south of Fresno.
Spotted bat	Not available	Not available	Foothill woodland Valley grassland	Eastern fringes of San Joaquin Valley.
Tule elk	500	Not available	Foothill woodland Valley grassland Freshwater marsh	Cache Creek area in Colusa, Lake, and Yolo Counties and Tule Elk State Park, near Tupman, Kern County. The Owens Valley also has a population which is outside this region.



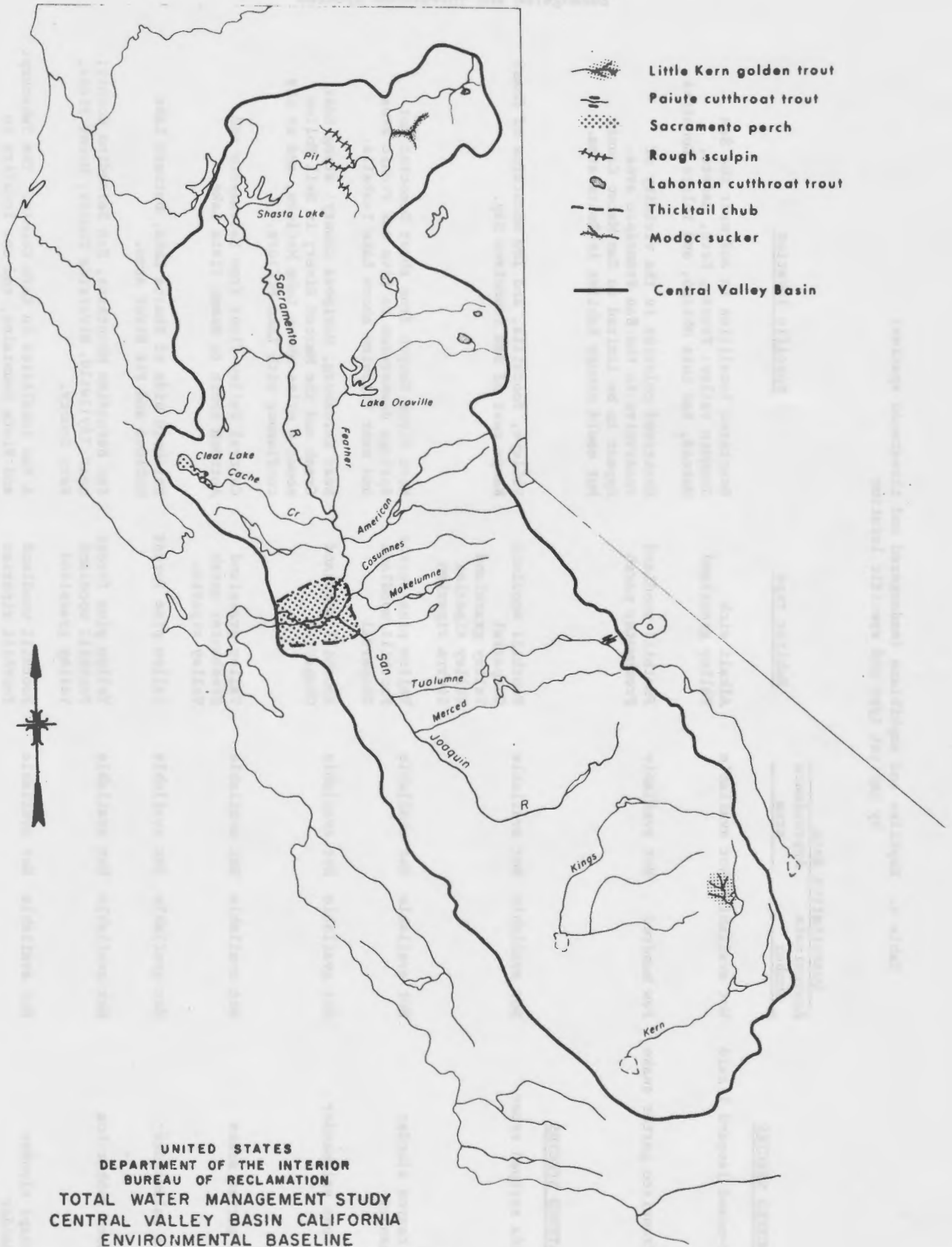
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 CENTRAL VALLEY BASIN-CALIFORNIA
 ENVIRONMENTAL BASELINE

**RANGES OF ENDANGERED AND THREATENED
 REPTILES AND AMPHIBIANS**

Table 4. Reptiles and amphibians (endangered and threatened species)
by habitat type and specific location

	<u>Quantitative data</u>		<u>Habitat type</u>	<u>Specific location</u>
	<u>Approximate number</u>	<u>Approximate area</u>		
<u>ENDANGERED SPECIES</u>				
Blunt-nosed leopard lizard	Not available	Not available	Alkali sink Valley grassland	Scattered localities in and near the San Joaquin Valley; Fresno, Kern, Madera, Merced, San Luis Obispo, and Tulare Counties
San Francisco garter snake	Few hundred	Not available	Foothill woodland Freshwater marsh	Scattered colonies in the vicinity of reservoirs in the San Francisco area. Appear to be limited to San Mateo County but could occupy habitat in Delta area.
<u>THREATENED SPECIES</u>				
Alameda striped racer	Not available	Not available	Foothill woodland Chaparral Valley grassland Valley riparian Sierra riparian	Valleys, foothills, and low mountains of Coast Range east of San Francisco Bay.
Kern canyon slender salamander	Not available	Not available	Yellow pine forest Foothill woodland Chaparral	Kern River Canyon from about Democrat Hot Springs downstream to Live Oak Picnic area; and near Fairview above Lake Isabella.
Limestone salamander	Not available	Not available	Foothill woodland Chaparral	Near Briceburg, Mariposa County; along Bear Creek and the Merced River; in Hell Hollow about 4 miles above Lake McClure, and at its confluence with Lake McClure.
Giant garter snake	Not available	Not available	Valley grassland Freshwater marsh Valley riparian	Central Valley floor from Sacramento and Antioch south to Bueno Vista Lake.
Shasta salamander	Not available	Not available	Yellow pine forest	Northern side of Shasta Lake, between Lake McCloud and Pit River arms.
Southern rubber boa	Not available	Not available	Yellow pine forest Foothill woodland Valley grassland	San Bernadino Mountains, San Bernadino County; near Idyllwild, Riverside County; Mount Pinos, Kern County.
Tehachapi slender salamander	Not available	Not available	Foothill woodland Foothill riparian	A few localities in Kern County. The Tehachapi and Piute Mountains, and one locality in Tulare County.

Endangered and Threatened Species



-  Little Kern golden trout
-  Paiute cutthroat trout
-  Sacramento perch
-  Rough sculpin
-  Lahontan cutthroat trout
-  Thicktail chub
-  Modoc sucker
-  Central Valley Basin

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 CENTRAL VALLEY BASIN CALIFORNIA
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ENDANGERED AND THREATENED FISH

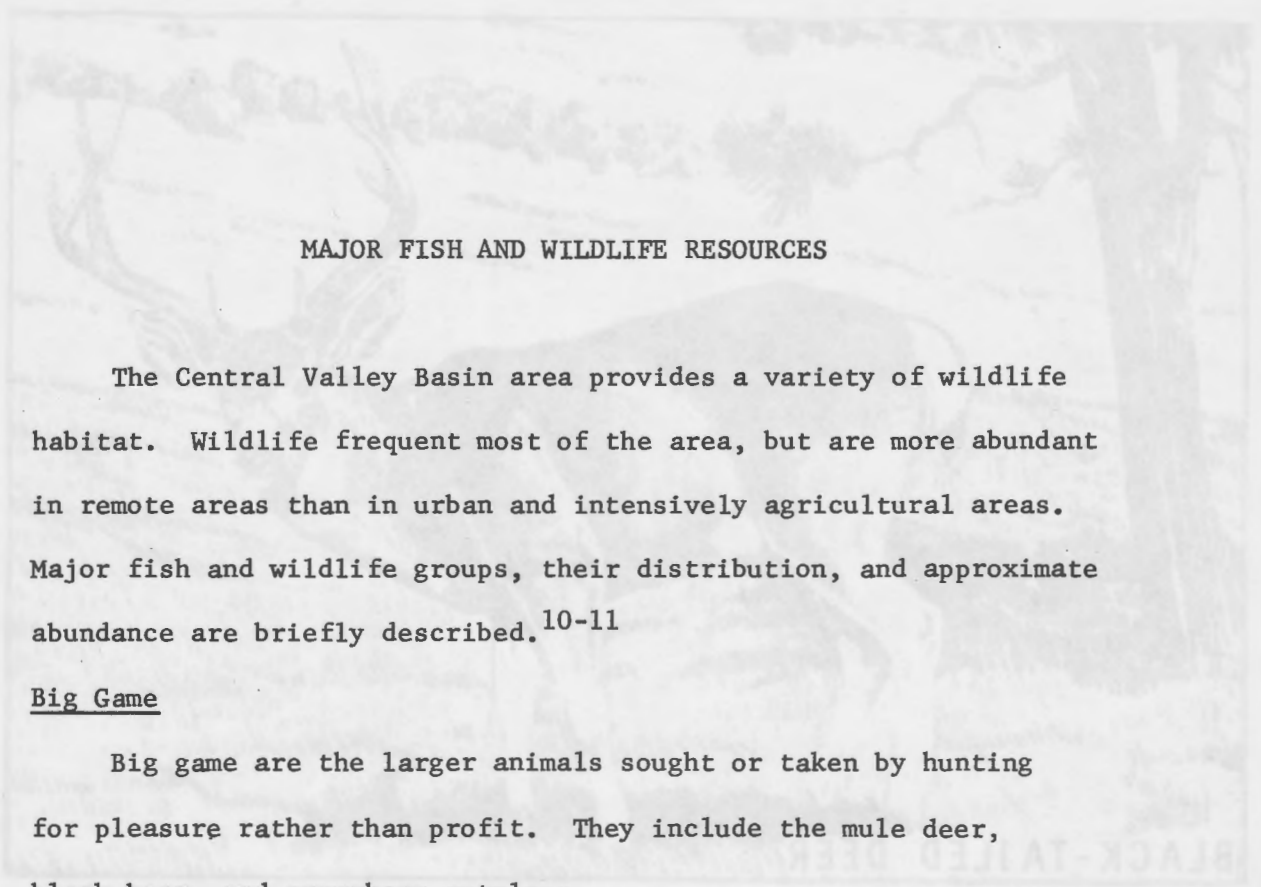
Table 5. Fish (endangered and threatened species)
by habitat type and specific location

	<u>Quantitative data</u>		<u>Habitat type</u>	<u>Specific location</u>
	<u>Approximate number</u>	<u>Approximate area</u>		
<u>ENDANGERED SPECIES</u>				
Thicktail chub	Not available	Not available	Lakes and streams	Known only from the lower San Joaquin-Sacramento River Slough areas and the Delta.
Paiute cut-throat trout	500	Limited	Lakes and streams	Delaney Creek, Yosemite National Park; Bull Lake, Alpine County; also found in Silver King Creek and its tributaries, Alpine County; Cottonwood Creek, Inyo County.
Lahontan cut-throat trout	Not available	Not available	Lakes and streams	Independence Lake, Sierra and Nevada County; introduced into Lake Davis and Frenchman Lake, Plumas County. Also found in Heenan Reservoir, California, and the Lahontan drainage system of west-central Nevada.
<u>THREATENED SPECIES</u>				
Modoc sucker	Abundant where present	Limited	Lakes and streams	Found in Rush Creek and in Ash Creek near Adin, Modoc County. Also in the Pit River drainage of the Sacramento River Basin and Dorris Reservoir near Alturas.
Rough sculpin	Not available	Not available	Lakes and streams	Found in the Pit River only for a short distance above and below the falls in Shasta County. It has also been taken in lower Hat Creek and in Fall River.
Sacramento perch	Not available	Not available	Lakes and streams	Clear Lake, Lake County. Sloughs and backwaters of the Delta. Sonte Lake and Brickyard Pond south of Sacramento. Recently established in San Luis Reservoir and O'Neill Forebay, Merced County; and Lake Almanor, Plumas County.
Little Kern golden trout	Not available	Not available	Lakes and streams	Little Kern River and its tributaries above falls near confluence with Soda Springs Creek; and upper Coyote Creek tributary to the main Kern River, Sequoia-Kings Canyon National Park.

Endangered and Threatened Species

ACKNOWLEDGMENT

The artwork depicting the major fish and wildlife resources originally appeared in Outdoor California, a publication of the California Department of Fish and Game. The artist is Paul B. Johnson.



MAJOR FISH AND WILDLIFE RESOURCES

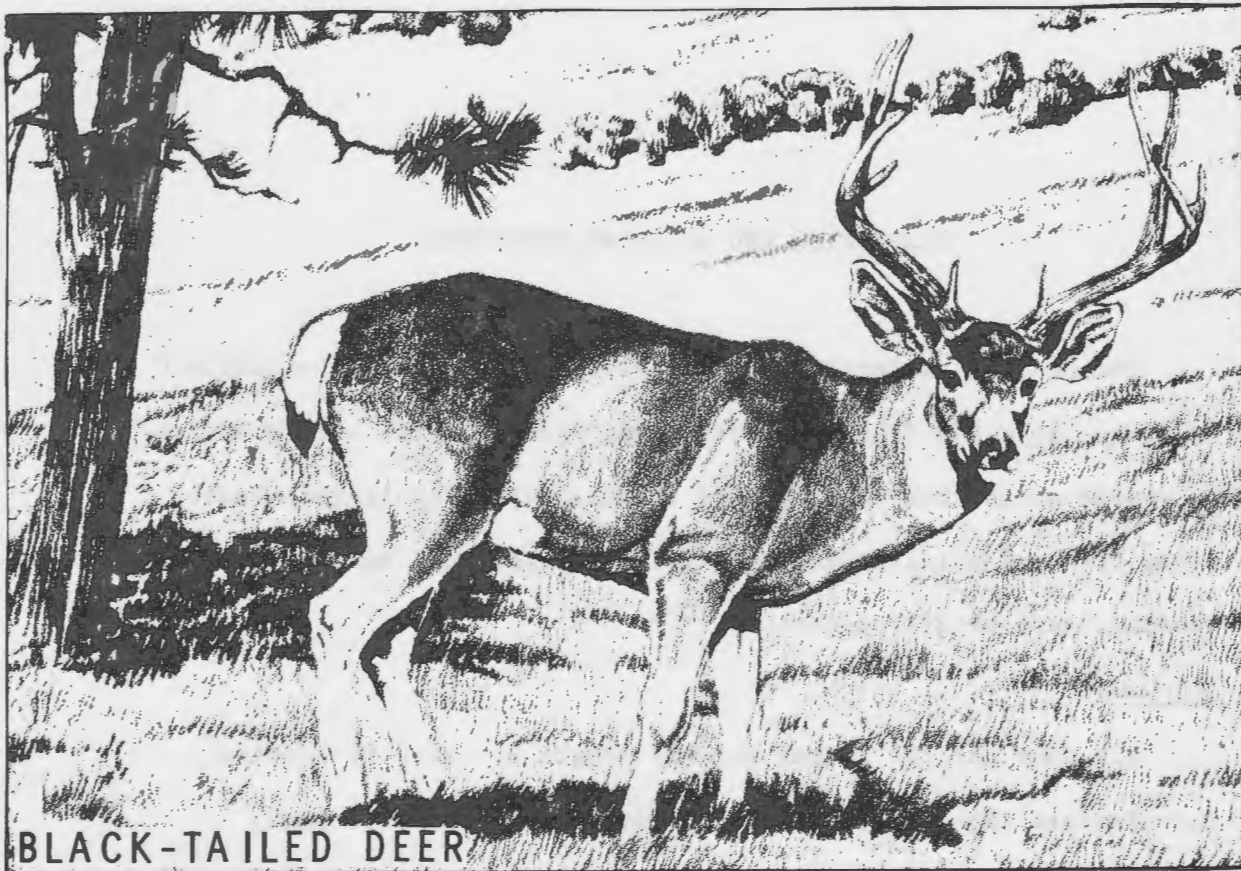
The Central Valley Basin area provides a variety of wildlife habitat. Wildlife frequent most of the area, but are more abundant in remote areas than in urban and intensively agricultural areas. Major fish and wildlife groups, their distribution, and approximate abundance are briefly described.¹⁰⁻¹¹

Big Game

Big game are the larger animals sought or taken by hunting for pleasure rather than profit. They include the mule deer, black bear, and pronghorn antelope.

Mule deer, *black bear*, and *pronghorn antelope* are the most abundant and important big game species in the basin. California mule deer, black-tailed deer and lady footed mule deer are the varieties of mule deer which occur in the area. While mule deer occupy several habitats, highest densities are generally in foothill woodland and riparian areas. Many deer herds are migratory, traveling considerable distances between summer and winter ranges to avoid heat stress. Preservation of summer and winter ranges, as well as migration routes, is essential to maintain this species at its present abundance. Deep degradation has occurred in agricultural areas where local deer population is high. Mule deer have lost considerable range to agriculture, urbanization and other types of development.

Major Fish and Wildlife Resources



Mule deer. Mule deer are the most abundant and important big game species in the basin. California mule deer, black-tailed deer and Rocky Mountain mule deer are the varieties of mule deer which occur in the area. While mule deer occupy several habitats, highest densities are generally in foothill woodland and chaparral areas. Many deer herds are migratory, traveling considerable distances between summer and winter ranges to avoid deep snows. Preservation of summer and winter ranges, as well as migration routes, is essential to maintain this species at its present abundance. Crop depredation has occurred in agricultural areas where local deer population is high. Mule deer have lost considerable range to agriculture, urbanization and other types of development.



Black bear. Also an important big game species in the area is the black bear. This species favors the coniferous forest habitat types and is relatively abundant in National forests and parks. Concentrations often occur near campgrounds, agricultural activity, and rural area developments. Black bear have recently increased in popularity as a game species. Except for nuisance and depredation problems, this species is adaptable to low density development.

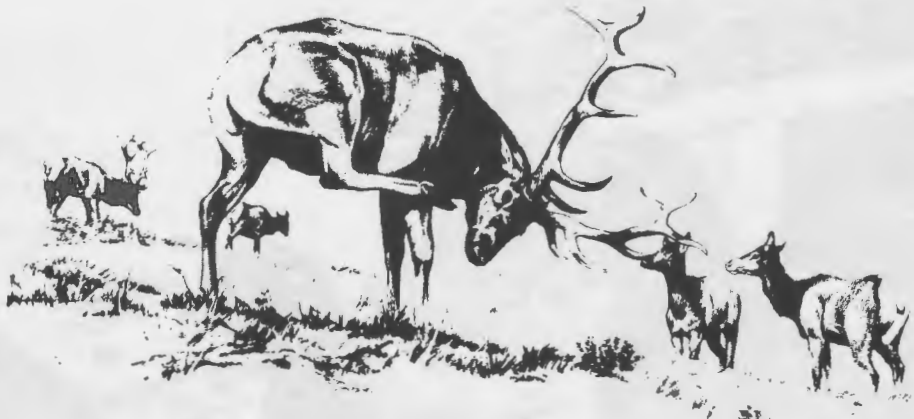


PRONGHORN ANTELOPE

Pronghorn antelope. A small population of pronghorn antelope occupies the extreme northeastern section of the Central Valley Basin area. This species requires large, open, unfenced grassland and sagebrush areas and provides only limited hunting opportunity. Their numbers should remain relatively stable with continued management.

Other big game species. Other species of big game already considered under threatened species are the Tule elk and bighorn sheep (table 3). These species are protected in the area and are therefore not hunted. Tule elk occupy available range to capacity, and with continued management, their numbers are likely to remain stable. Bighorn sheep require wild and remote high mountain conditions and may decline with further human encroachment. A rather small but stable population of Rocky Mountain elk has been established in Shasta County.

Major Fish and Wildlife Resources

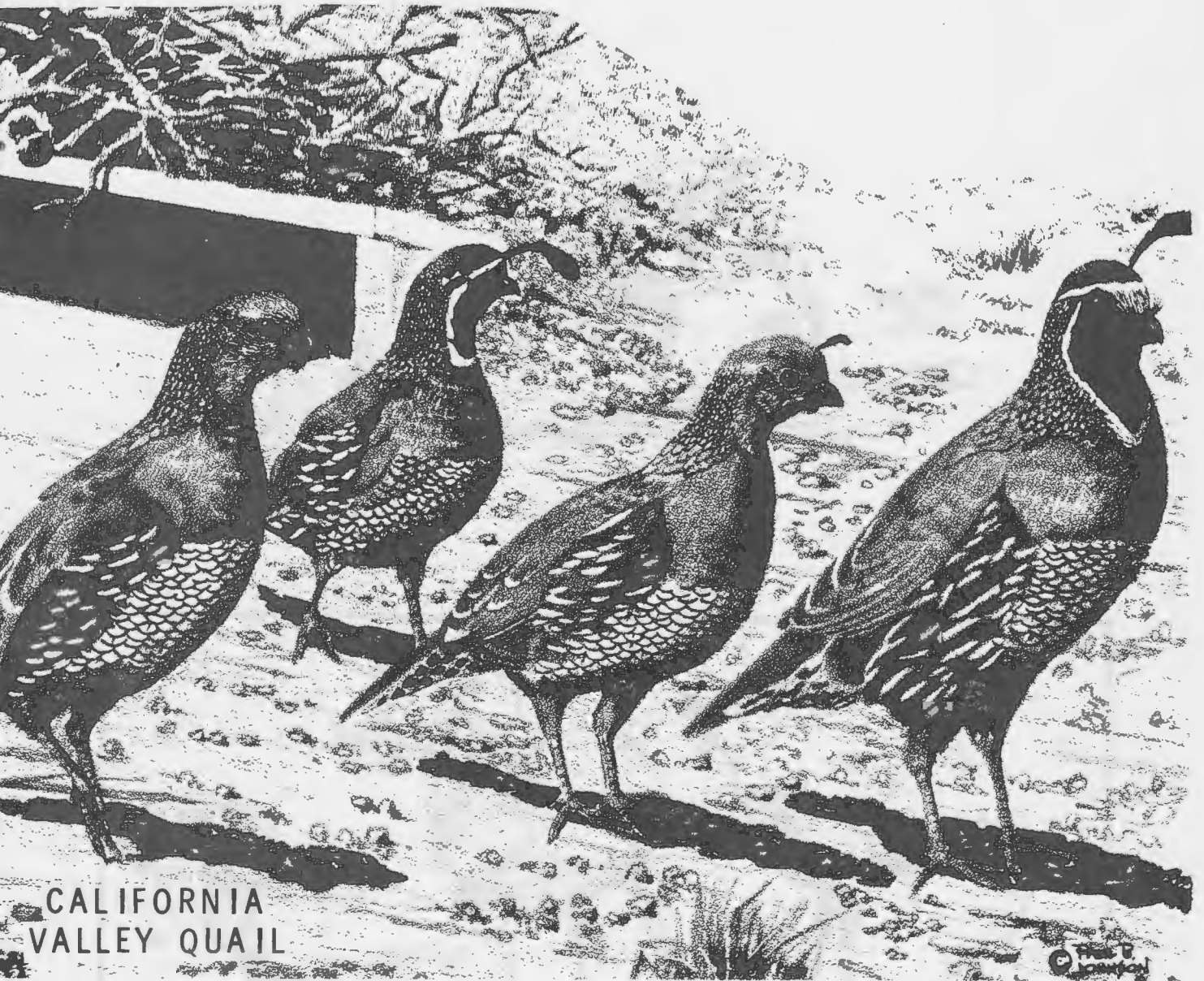


TULE ELK



BIGHORN
SHEEP

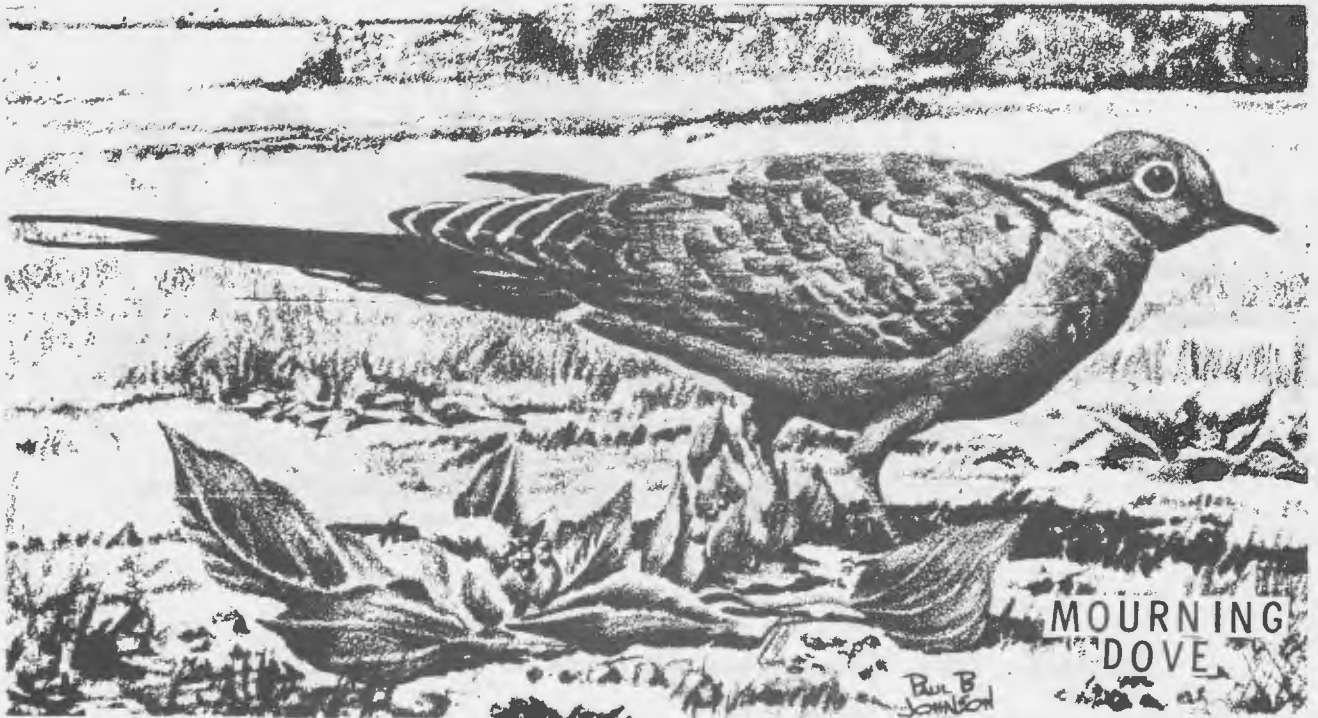
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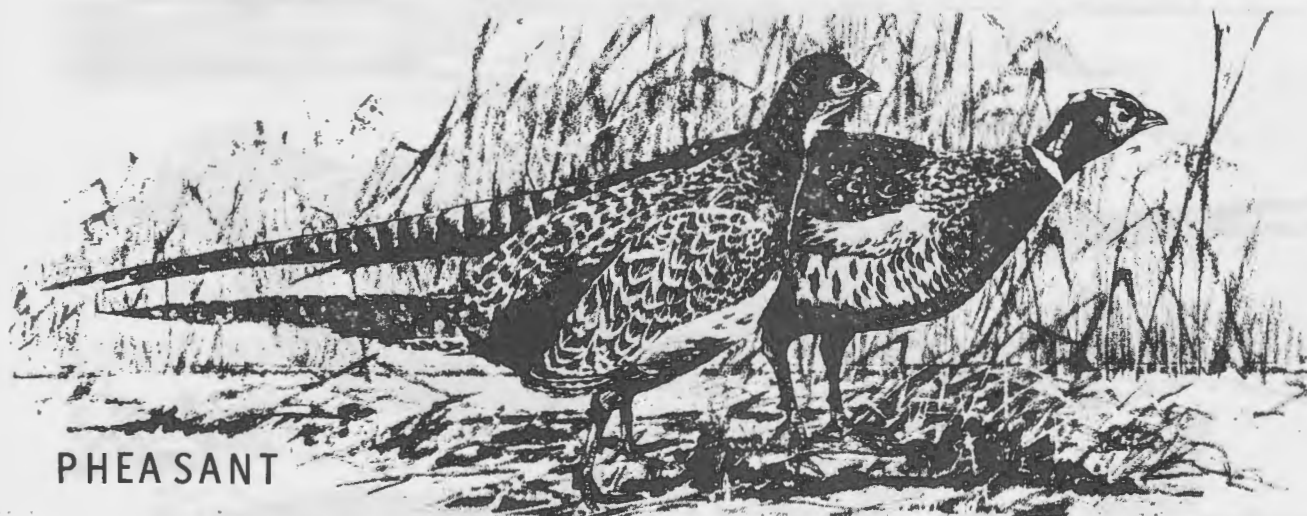
Upland Game

Quail. California quail and mountain quail together cover essentially the entire basin area and are important game species. Agriculture and urbanization have destroyed much of the original valley habitat of the California quail. Highest densities now occur in brushland of the coastal range and Sierra foothills. Clean farming practices and urban encroachment are detrimental to quail.

Major Fish and Wildlife Resources



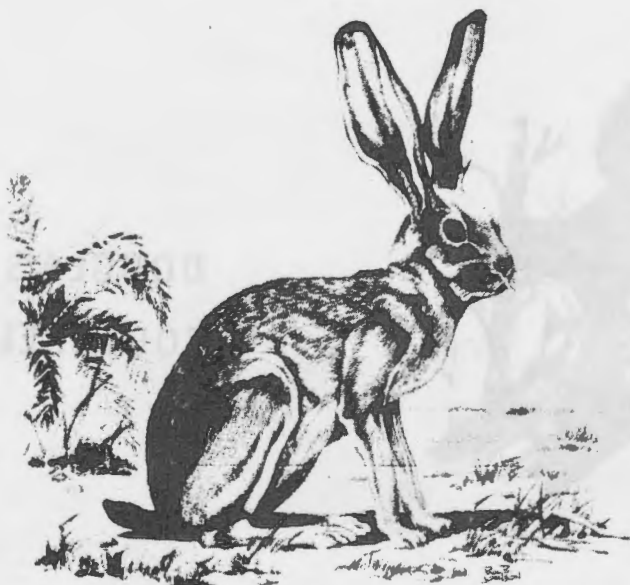
Doves. The mourning dove and band-tailed pigeon are important upland game bird species in the area. The most abundant game species in the area, the mourning dove has adapted well to changing land use patterns. It is distributed throughout the area but is more abundant in the southern section. The band-tailed pigeon, subjected to considerable hunting pressure, favors coniferous and hardwood forests. Resident populations are augmented during the winter with birds from more northerly areas. These species are expected to remain stable.



PHEASANT

Pheasant. Many valley areas which are no longer occupied by California quail are now occupied by ring-necked pheasant. This species is well adapted to agricultural production and has become a popular game species. Loss of wetland areas and clean farming practices are detrimental to this species.

Other upland game birds. Other upland game bird species found in limited numbers in the basin include: chukar partridge, blue grouse, sage grouse, and wild turkey.



BLACK-TAILED JACKRABBIT

Rabbits. Rabbits are common throughout the area. Except for the densely forested areas at higher elevations, the black-tailed jackrabbit is distributed throughout the area. This species is common in agricultural areas and can cause depredation problems. The white-tailed jackrabbit is found in the higher Sierra Nevada, but is not nearly as common. Except for the higher elevations, the Audubon cottontail also occupies the area and is a locally abundant and popular game species. Snowshoe rabbits, favoring the upper forested section of the area, and brush rabbits, found in the foothill areas, are locally abundant, but are lightly hunted. Urban development and clean farming practices have caused a decline in the numbers of these species.



DOUGLAS
SQUIRREL

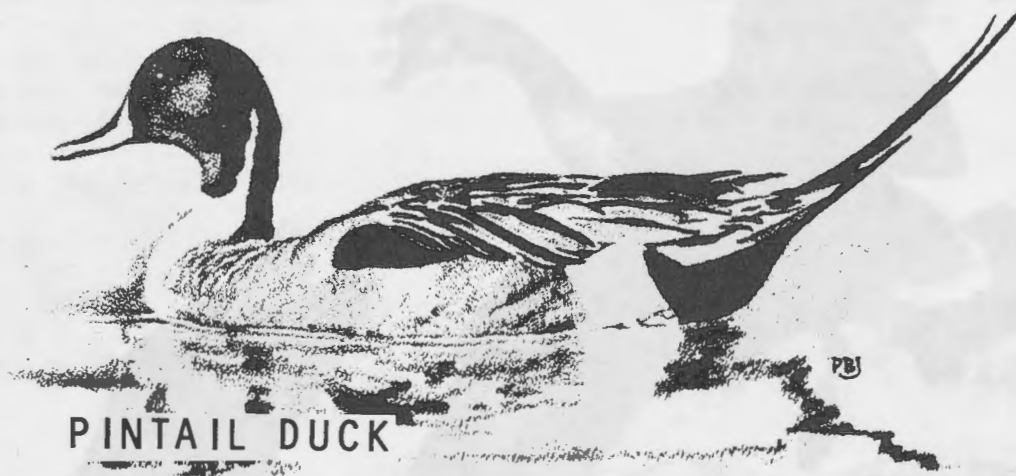
Squirrels. The western gray squirrel, distributed throughout the foothill woodlands and yellow pine forests of the Sierra, is also found in the foothill woodlands of the northern Coast Range. It is a favorite game species and is locally abundant, although disease and food supply cause fluctuations in its population. The chickaree ranges into higher country than does the gray squirrel, occupying the lodgepole and red fir forests of the Sierra and northern Coast Range. It is also locally abundant, but is little used as a game species. The eastern gray squirrel and eastern fox squirrel have been introduced into the area and have reached some abundance in the central Coast Range and the central Sierra foothills. These species favor the riparian habitats in the foothill woodlands and oak woodlands.

Major Fish and Wildlife Resources



General Waterfowl

Waterfowl include three groups of birds: swans, geese and ducks. The basin area is the principal wintering ground for Pacific Flyway waterfowl. The refuges, duck club lands, and rice production areas provide good wintering waterfowl habitat. Migrating



wintering duck populations vary from 7 to 15 million annually.

There are about one million geese. Pintails, mallards, and widgeons make up the bulk of the ducks wintering in the area; the lesser snow goose is the most abundant of the geese wintering in the area. The whistling swan is fairly common, while the trumpeter swan is an extremely rare visitor. Over 20 species of waterfowl are known to winter in the area. Waterfowl hunting is important in the area, accounting for a major portion of the 1-1/2 million hunter days in the state.

The decline in waterfowl habitat, due to drainage of wetland areas and other agricultural practices, has caused a decline in their total numbers. Habitat loss has also led to the problem of agricultural crop depredation which has been somewhat alleviated by the present system of refuges, waterfowl management areas, and private duck clubs.

Major Fish and Wildlife Resources



Other Species

Shorebirds. Shorebirds are another group of wetland-related species. Although most are not hunted, many have a high esthetic value. Many of the more common species are found in the same areas used by waterfowl.



Furbearers. Several species of furbearers are quite abundant in the Central Valley Basin area although commercial trapping of fur animals is of minor importance. Coyote, gray fox, bobcat, skunk, raccoon, and muskrat are the most common species. Others, including mountain lion, pine marten, weasels, mink, badgers, and beaver, are less abundant. The San Joaquin kit fox is considered endangered and the wolverine threatened (table 3). While some species have done favorably under increased urban and agricultural development, others have continually decreased in numbers, and these trends are expected to continue.

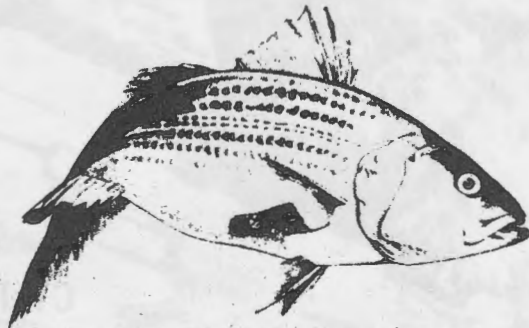


Other nongame species. Several hundred nongame bird species, including songbirds, raptors, and large wading birds, frequent the area. Except for those listed as endangered and threatened (table 2), most are fairly common birds. Over 100 species of nongame land mammals, including moles, shrews, bats, mice, rats, gophers, chipmunks, and ground squirrels, are found in the area. All of these mammals are of scientific interest; some are of great esthetic interest. A number are species which need to be controlled to prevent agricultural, forest, or domestic damage.

Major Fish and Wildlife Resources

Fishery Resources¹⁰⁻¹¹

Three major groups of fish occur within the Sacramento and San Joaquin drainage systems of the basin. Anadromous fish, resident trout, and warm-water fish can be found in varying abundance. The types of fish habitat are cold-water and warm-water streams, canals, lakes, and reservoirs. Sport fishing is an important recreational activity.



STRIPED BASS

Anadromous species. Anadromous fish include king salmon, steelhead trout, striped bass, American shad, and sturgeon. The Sacramento River system with its main tributaries, the Feather, Yuba, and American Rivers, provides spawning and year-round habitat for king salmon, steelhead, American shad, and sturgeon. A major portion of striped bass spawning takes place in the lower part of the Sacramento River. The Mokelumne River has both king salmon

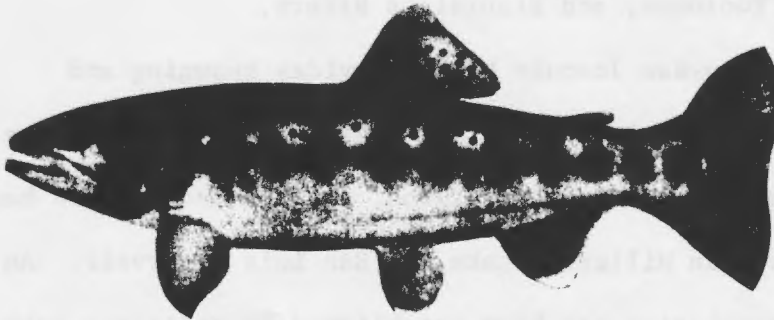
Major Fish and Wildlife Resources

and steelhead populations, while the Cosumnes has salmon only. The San Joaquin River system provides spawning habitat for king salmon in the Merced, Tuolumne, and Stanislaus Rivers.

The Sacramento-San Joaquin Delta provides spawning and nursery habitat for striped bass, and migration routes for steelhead trout, American shad, and sturgeon. Landlocked striped bass populations occur in Millerton Lake and San Luis Reservoir. An American shad population has been established in Millerton Lake. Kokanee salmon, the landlocked form of the sockeye salmon, have been successfully introduced in Lake Almanor, and Shasta, Whiskeytown, and Folsom Lakes.

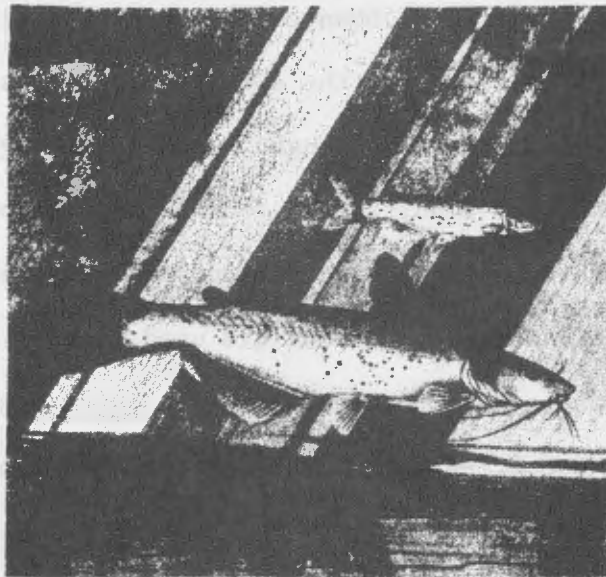
Dams, diversions, declining water quality and quantity, and mismanagement have seriously reduced anadromous fish runs in many stream systems, especially where fish mitigation facilities have not been installed. Examples of mitigation facilities which have alleviated the problem of serious declines are the Nimbus Salmon and Steelhead Hatchery and the Coleman Hatchery at Anderson. The recently built Tehama-Colusa salmon rearing facilities at Red Bluff will also protect and improve existing salmon runs in the lower Sacramento River. Fish screen facilities at the Tracy Pumping Plant return anadromous species, as well as other species, to the Sacramento-San Joaquin Delta at carefully chosen planting sites.

Major Fish and Wildlife Resources



GOLDEN TROUT

Resident trout species. This group includes rainbow, cut-throat, eastern brook, brown, golden, lake, and Dolly Varden trout. Trout are found in cooler streams, lakes, and reservoirs throughout the basin. They are widely distributed and are the fish most sought after by freshwater anglers. Rainbow trout are the most abundant species, followed by brook trout, brown trout, and golden trout. Three species of resident trout within the area are considered threatened (table 5). Many streams are supplementally stocked with hatchery-reared trout in order to meet the angling demand for these species. Water quality, adequate flows, and spawning habitat are critical management considerations for this group of fish.



CHANNEL CATFISH

Warm-water species. Common warm-water game fish in the basin include largemouth bass, smallmouth bass, bluegill, green and redear sunfish, black and white crappie, channel and white catfish, and brown bullheads. Other less common species, including the threatened Sacramento perch, also occur (table 5). While warm-water game fishing is not as popular as trout fishing from the sport angling standpoint, it accounts for a significant amount of angling. Although stream habitat has been reduced, dam construction has increased reservoir habitat which provides substantial angling opportunities for warm-water game fish.

Major Fish and Wildlife Resources

Nongame species. A wide variety of nongame fish species occurs in the area. These fish, however, because of their size, appeal neither to the appetite nor the sporting instincts of the anglers and hence are not commonly sought. Numerous nongame fish species, nevertheless, are important as food in the ecological food chain. Some provide limited recreation opportunities in the form of spearing and bowfishing; others are used as bait in sport angling. "Rough fish" are of concern because they compete with game fish for food, space, spawning area, and because they prey on the young of game fish.

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Scientific Names of Species Listed in the Text

PLANTS		ANIMALS	
<u>Common Name</u>	<u>Scientific Name</u>	<u>Common Name</u>	<u>Scientific Name</u>
<u>Conifers</u>		<u>Big Game</u>	
Incense cedar	<u>Libocedrus decurrens</u>	Black-tailed deer	<u>Odocoileus hemionus columbianus</u>
Red fir	<u>Abies magnifica</u>	California mule deer	<u>O. h. californicus</u>
White fir	<u>A. concolor</u>	Rock Mountain mule deer	<u>O. h. hemionus</u>
Douglas fir	<u>Pseudotsuga menziesii</u>	*Tule elk	<u>Cervus nanodes</u>
Digger pine	<u>Pinus sabiniana</u>	*California bighorn sheep	<u>Ovis canadensis californiana</u>
Foxtail pine	<u>P. balfouriana</u>	Pronghorn antelope	<u>Antilocapra americana</u>
Jeffrey pine	<u>P. jeffreyi</u>	Black bear	<u>Ursus americanus</u>
Limber pine	<u>P. flexilis</u>		
Lodgepole pine	<u>P. murrayana</u>		
Pinon pine	<u>P. monophylla</u>	<u>Upland Game Birds</u>	
Silver pine	<u>P. monticola</u>	California quail	<u>Lophortyx californicus</u>
Sugar pine	<u>P. lambertiana</u>	Ring-necked pheasant	<u>Phasianus colchicus</u>
Whitebark pine	<u>P. albicaulis</u>	Mourning dove	<u>Zenaidura macroura</u>
Yellow pine	<u>P. ponderosa</u>	Band-tailed pigeon	<u>Columba fasciata</u>
Mountain hemlock	<u>Tsuga mertensiana</u>	Chukar partridge	<u>Alectoris graeca</u>
California juniper	<u>Juniperus occidentalis</u>	Blue grouse	<u>Dendragapus fuliginosus</u>
Sierra juniper	<u>J. californica</u>	Sage grouse	<u>Centrocercus urophasianus</u>
		Wild turkey	<u>Meleagris gallopavo</u>
		<u>Upland Game Mammals</u>	
<u>Broad-leaf trees</u>		Black-tailed jackrabbit	<u>Lepus californicus</u>
Mountain alder	<u>Alnus tenuifolia</u>	White-tailed jackrabbit	<u>L. townsendii</u>
White alder	<u>A. rhombifolia</u>	Snowshoe rabbit	<u>L. washingtonii</u>
Quaking aspen	<u>Populus tremuloides</u>	Audubon cottontail	<u>Sylvilagus audubonii</u>
Black cottonwood	<u>P. trichocarpa</u>	Brush rabbit	<u>S. bachmani</u>
Fremont cottonwood	<u>P. fremontii</u>	Western gray squirrel	<u>Sciurus griseus</u>
California buckeye	<u>Aesculus californica</u>	Eastern gray squirrel	<u>S. carolinensis</u>
California dogwood	<u>Cornus nuttallii</u>	Eastern fox squirrel	<u>S. niger</u>
Madrone	<u>Arbutus menziesii</u>	Chickaree	<u>Tamiasciurus douglasii</u>
Broad-leaf maple	<u>Acer macrophyllum</u>		
Dwarf maple	<u>A. glabrum</u>	<u>Waterfowl</u>	
Black oak	<u>Quercus kelloggii</u>	Trumpeter swan	<u>Olor buccinator</u>
Blue oak	<u>Q. douglasii</u>	Whistling swan	<u>O. columbianus</u>
California white oak	<u>Q. garryana</u>	Snow goose	<u>Chen hyperborea</u>
Evergreen oak	<u>Q. agrifolia</u>	*Tule white-fronted goose	<u>Anser albifrons gambelli</u>
Golden oak	<u>Q. chrysolepis</u>	*Aleutian Canada goose	<u>Branta canadensis leucopareia</u>
Interior live oak	<u>Q. wislizenii</u>	Pintail	<u>Anas acuta</u>
Scrub oak	<u>Q. dumosa</u>	Mallard	<u>A. platyrhynchos</u>
Tan oak	<u>Lithocarpus densiflora</u>	Widgeon	<u>Mareca americana</u>
California sycamore	<u>Platanus racemosa</u>		
California walnut	<u>Juglans californica</u>		
Willows	<u>Salix</u> spp.		
		<u>Miscellaneous Waterbirds and Shorebirds</u>	
<u>Shrubs and small trees</u>		*California black rail	<u>Laterallus jamaicensis coturniculus</u>
Flannel bush	<u>Fremontia californica</u>	*Greater sandhill crane	<u>Grus canadensis tabida</u>
Bitterbrush	<u>Purshia tridentata</u>		
Desert bitterbrush	<u>P. glandulosa</u>	<u>Raptors</u>	
Buckbrush	<u>Ceanothus cuneatus</u>	*California condor	<u>Gymnogyps californianus</u>
Mountain whitehorn	<u>C. cordulatus</u>	*Southern bald eagle	<u>Haliaeetus leucocephalus</u>
Sagebrush	<u>Artemisia tridentata</u>		<u>leucocephalus</u>
Rabbitbrush	<u>Chrysothamnus</u> spp.	*American peregrine falcon	<u>Falco peregrinus anatum</u>
Chamise	<u>Adenostoma fasciculatum</u>	*Prairie falcon	<u>Falco mexicanus</u>
Bush chinquapin	<u>Castanopsis sempervirens</u>	*Spotted owl	<u>Strix occidentalis</u>
Manzanita	<u>Arctostaphylos</u> spp.		
Mountain mahogany	<u>Cercocarpus betuloides</u>	<u>Predators and Furbearers</u>	
Shadscale	<u>Atriplex confertifolia</u>	Coyote	<u>Canis latrans</u>
Saltbush	<u>Atriplex</u> spp.	Gray fox	<u>Urocyon cinereoargenteus</u>
Spanish bayonet	<u>Yucca whipplei</u>	*San Joaquin Kit fox	<u>Vulpes macrotis mutica</u>
Lemonade sumac	<u>Rhus integrifolia</u>	*Wolverine	<u>Gulo luscus luteus</u>
Toyon	<u>Heteromeles arbutifolia</u>	Raccoon	<u>Procyon lotor</u>
Greasewood	<u>Sarcobatus vermiculatus</u>	Spotted skunk	<u>Spilogale gracilis</u>
		Striped skunk	<u>Mephitis mephitis</u>
		Bobcat	<u>Lynx rufus</u>
<u>Grasses and Forbs</u>		Muskrat	<u>Ondatra zibethica</u>
Pine bluegrass	<u>Poa scabrella</u>	Mountain lion	<u>Felis concolor</u>
Cattail	<u>Typha latifolia</u>	Pine marten	<u>Martes caurina</u>
Brewer cinquefoil	<u>Potentilla breweri</u>	Weasel	<u>Mustela</u> spp.
Cushion eriogonum	<u>Eriogonum ovalifolium</u>	Mink	<u>Mustela vison</u>
Sierra eriogonum	<u>E. incanum</u>	Badger	<u>Taxidea taxus</u>
Fescue	<u>Festuca ovina</u>	Beaver	<u>Castor canadensis</u>
Bromegrass	<u>Bromus</u> spp.		
Oat grass	<u>Avena</u> spp.	<u>Miscellaneous Mammals</u>	
Pickleweed	<u>Salicornia</u> spp.	Moles	<u>Scapanus latimanus</u>
Brewers sedge	<u>Carex breweri</u>	Shrews	<u>Sorex</u> spp.
Hellers sedge	<u>C. helleri</u>	Bats	Numerous species of order
Rough sedge	<u>C. senta</u>		<u>Chiroptera</u>
Tule	<u>Scirpus oleyi</u>	Ground squirrels	<u>Citellus</u> spp.
Seepweed	<u>Suaeda californica</u>	Gophers	<u>Thomomys</u> spp.
Saltgrass	<u>Distichlis spicata</u>	*Salt marsh harvest mouse	<u>Reithrodontomys raviventris</u>
Cordgrass	<u>Spartina leiantha</u>	*Fresno kangaroo rat	<u>Dipodomys nitratoides exilis</u>
Arrow grass	<u>Triglochin maritima</u>	*Spotted bat	<u>Euderma maculata</u>
Marsh-rosemary	<u>Limonium californicum</u>	Chipmunk	<u>Eutamias</u> spp.

ANIMALS (Cont'd)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Common Name</u>	<u>Scientific Name</u>
<u>Miscellaneous Birds</u>		Striped bass	<u>Morone saxatilis</u>
*California yellow-billed cuckoo	<u>Coccyzus americanus occidentalis</u>	American shad	<u>Alosa sapidissima</u>
<u>Reptiles and Amphibians</u>		Sturgeon	<u>Acipenser</u> spp.
*Blunt-nosed leopard lizard	<u>Crotaphytus wislizenii silus</u>	Kokanee salmon	<u>Coregonus williamsoni</u>
*San Francisco garter snake	<u>Thamnophis sirtalis tetrataenia</u>	Eastern brook trout	<u>Salvelinus fontinalis</u>
*Giant garter snake	<u>T. couchi gigas</u>	Lake trout	<u>S. namaycush</u>
*Alameda striped racer	<u>Masticophis lateralis euryxanthus</u>	Largemouth bass	<u>Micropterus salmoides</u>
*Kern canyon slender salamander	<u>Batrachoseps simatus</u>	Smallmouth bass	<u>M. dolomieu</u>
*Tehachapi slender salamander	<u>B. stebbinsi</u>	Bluegill	<u>Lepomis macrochirus</u>
*Limestone salamander	<u>Hydromantes brunus</u>	Green sunfish	<u>L. cyanellus</u>
*Shasta salamander	<u>H. shastae</u>	Redear sunfish	<u>L. microlophus</u>
*Southern rubber boa	<u>Charina bottae umbratica</u>	Black crappie	<u>Pomoxis nigromaculatus</u>
		White crappie	<u>P. annularis</u>
		Channel catfish	<u>Ictalurus punctatus</u>
		White catfish	<u>I. catus</u>
		Brown bullhead	<u>I. nebulosus</u>
		*Thicktail chub	<u>Gila crassicauda</u>
		*Modoc sucker	<u>Catostomus microps</u>
		*Rough sculpin	<u>Cottus asperimus</u>
		*Sacramento perch	<u>Archoplites interruptus</u>
<u>Fish</u>			
King salmon	<u>Oncorhynchus tshawytscha</u>		
Rainbow trout	<u>Salmo gairdneri</u>		
Steelhead trout	<u>S. g. gairdneri</u>		
*Paiute cutthroat trout	<u>S. clarki seleniris</u>		
*Lahontan cutthroat trout	<u>S. c. henshawi</u>		
Brown trout	<u>S. trutta</u>		
Golden trout	<u>S. aguabonita</u>		
*Little Kern golden trout	<u>S. a. gilberti</u>		

* Endangered or threatened species.



ATMOSPHERIC WATER RESOURCES

Trans mountain Diversion

Debris Dam

For Pollution Control

Wildlife Refuge

Natural Area Preservation

MULTIPURPOSE RESERVOIR

Evaporation Studies

FLOOD CONTROL

RECREATION

Pump Storage Reservoir

Pumping Plant (Reversible Turbines)

MUNICIPAL & INDUSTRIAL WATER

POWER

Erosion Control

Underground

Regulating Reservoir

Diversion Dam

Historical Area Preservation

Fish Ladder

Port Facility

Wasteway

Sewage Treatment Plant

Fish Hatchery

Navigation

Public Beach

Nuclear Power Plant

Undersea

Aqueduct

DESALINATION PLANT (MUNICIPAL & INDUSTRIAL WATER)