WILDLIFE HABITAT MONITORING PROGRAM LOWER PUTAH CREEK, CALIFORNIA

Prepared for the
Solano County Water Agency
508 Elmira Road
Vacaville, California 95687

FINAL REPORT
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Submitted by
Michael A. Melanson, M.S.
STRATEGIC ENVIRONMENTAL
9040 Hazel Oak Court
Orangevale, California 95662-2723

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SUMMARY OF FINDINGS

1) The analyses of data collected during the first six years of this wildlife monitoring program indicate that the wildlife habitat values for the lower reaches of the Putah Creek Riparian Corridor (PCRC) are moderate to low in comparison to other similarly studied central California riparian habitats.

2) Observations obtained during 370 days of field surveys conducted from November 1994 through June 2001 recorded 215 vertebrate wildlife species (4 amphibians, 10 reptiles, 173 birds, and 29 mammals) along the lower PCRC. Museum specimens in the Department of Wildlife and Fisheries Biology at the University of California, Davis, and reliable reports of mountain lion (*Felis concolor*) occurrences, provided historical evidence of 5 additional mammal species for a total of 221 species of vertebrates known, or reliably reported, to occur in the lower PCRC.

3) The assemblage of vertebrate fauna is typical of most riparian habitats in the central coast region of California, though many species observed during the surveys for this study were recorded only occasionally and few utilized the PCRC for breeding or permanent residence.

4) The relatively low wildlife habitat values of the PCRC are demonstrated by the extremely low diversity and numbers of reptiles and amphibians. With the exception of the introduced bullfrog, which can be found all along the PCRC, other amphibians such as salamanders, treefrogs, and toads were rarely found during surveys. The western fence lizard, a reptile commonly encountered in great numbers throughout a wide variety of central California habitats, was seen only infrequently. Garter snakes, which usually abound in most aquatic habitats, were encountered only rarely near Lake Solano above the Putah Diversion Dam. No other species of reptile, except the western pond turtle, was recorded with any regularity.

5) Systematic live-trapping efforts show that the diversity and numbers of small mammals, especially rodents, is below that typically encountered in similar riparian habitats in central California.

6) The diversity of bird species, as measured by the Shannon-Weaver Diversity Index, was between that measured in very disturbed and relatively undisturbed riparian habitats in central California.

7) Applied as a multi-seasonal, functional assessment of overall wildlife habitat values along the PCRC, these data indicate that, at the present time, the wildlife habitats along the PCRC are not as severely impacted by the encroachment of agricultural or urban development as those in some other riparian habitats in central California.

8) No noticeable changes were observed in the assemblage of vertebrate fauna present in the study area over the six-year period of this monitoring program. Wildlife habitat values remained relatively constant over this period as well. The riparian habitats and wildlife habitat values documented by this study along the PCRC are likely to remain relatively unchanged as long as there continues to be a constant minimum supply of water throughout each year in Putah Creek and no significant changes in land use patterns and practices adjacent to the PCRC.

9) Increases in flow in Putah Creek are unlikely to result in any significant changes in the riparian habitats and corresponding wildlife habitat values along the PCRC due to the very narrow corridor to which the riparian vegetation is constrained by agricultural activities.

SECTION I
INTRODUCTION

1.0 Putah Creek Riparian Corridor Wildlife Monitoring Program

1.1 Purpose

Existing riparian vegetative communities and wildlife habitats along the lower Putah Creek Riparian Corridor (PCRC) are but remnants of what was once a valuable wildlife habitat. Agricultural development, urbanization, pollution, ground water pumping, and the construction of flood control and irrigation dams, have all contributed to a diminution of the capacity of the PCRC to support wildlife. Little information is presently available on the effects of each of these factors on wildlife or the extent to which the PCRC still supports wildlife.

Because of the proximity of the PCRC to the University of California at Davis (a portion of the creek passes through the campus), the best wildlife information available includes a wide variety of individual biological studies of high quality, but no single source of information on the ecology and wildlife of the PCRC is available. The most complete compilation of biological information is provided in the ***U.S. Fish and Wildlife Services' 1993 Reconnaissance Planning Report to Congress on the Fish and Wildlife Resource Management Options for Lower Putah Creek, California*** (FWS Report) which recognized that "There is no reliable data concerning the exact composition of the historical bird, mammal, amphibian and reptilian fauna of Putah Creek and environs.[1] Even this document, however, relied on the analysis of aerial photographs for the mapping of vegetation and "the best information available" for input for wildlife in the PCRC.

Recognizing the need for more reliable information, the Solano County Water Agency (SCWA), initiated a series of intensive field studies designed to obtain baseline data on the wildlife of the PCRC from the Putah Diversion Dam to the Yolo Causeway. It was their intention that all available information on the wildlife biology of Lower Putah Creek be verified by direct field observation, and, to the extent possible, the results provided in a single document. The information was to serve as a

basic tool with which the SCWA and other interested agencies could develop administrative policies to enhance and protect wildlife resources under their jurisdiction along the lower PCRC.

Beginning in the Fall of 1994, habitats along the lower PCRC were systematically surveyed on foot to record the occurrence and natural history of resident wildlife. Observations at regular intervals each month were organized to emphasize four periods of the annual cycle, Spring (March-May) when maximum wildlife activity occurs, Summer (June-August), the period of greatest agricultural influences on the PCRC, Fall (September-November), when agricultural activity subsides and wintering wildlife arrives, and Winter (December-February), the rainy season, when flooding episodes usually occur. More precise measurements of species diversity, the Shannon-Weaver Species Diversity Index (SDI) and Resident Species Analyses, using birds and small mammals as targeted wildlife components, were also used to assess the value to wildlife of habitats along the PCRC.[2] This Wildlife Monitoring Program Report presents the results of the first six years of these efforts.

2.0 Physical Setting

2.1 The Putah Creek Corridor

Study areas discussed in this report include that portion of the Putah Creek channel below Solano Lake from the Putah Diversion Dam to the Putah Creek Sinks area in the Yolo Causeway (Figure 1). Because of the varying habitats available and the extent of urban and agricultural development, the 25 mile corridor below the Putah Diversion Dam was arbitrarily divided into three sections, the "Upper Reach", extending eastward 5 miles from the Diversion Dam to the Highway I-505 overpass near Winters, the "Middle Reach", extending eastward 10 miles from Highway I-505 eastward to the Highway I-80 overpass near Davis, and the "Lower Reach", extending eastward approximately ten miles from Hwy I-80 to the Putah Creek Sinks in the Yolo Bypass. The precise location where Putah Creek "sinks" into the Yolo Causeway varies from year to year depending on rainfall and the amount of water allowed to pass through the PCRC.

FIGURE 1a

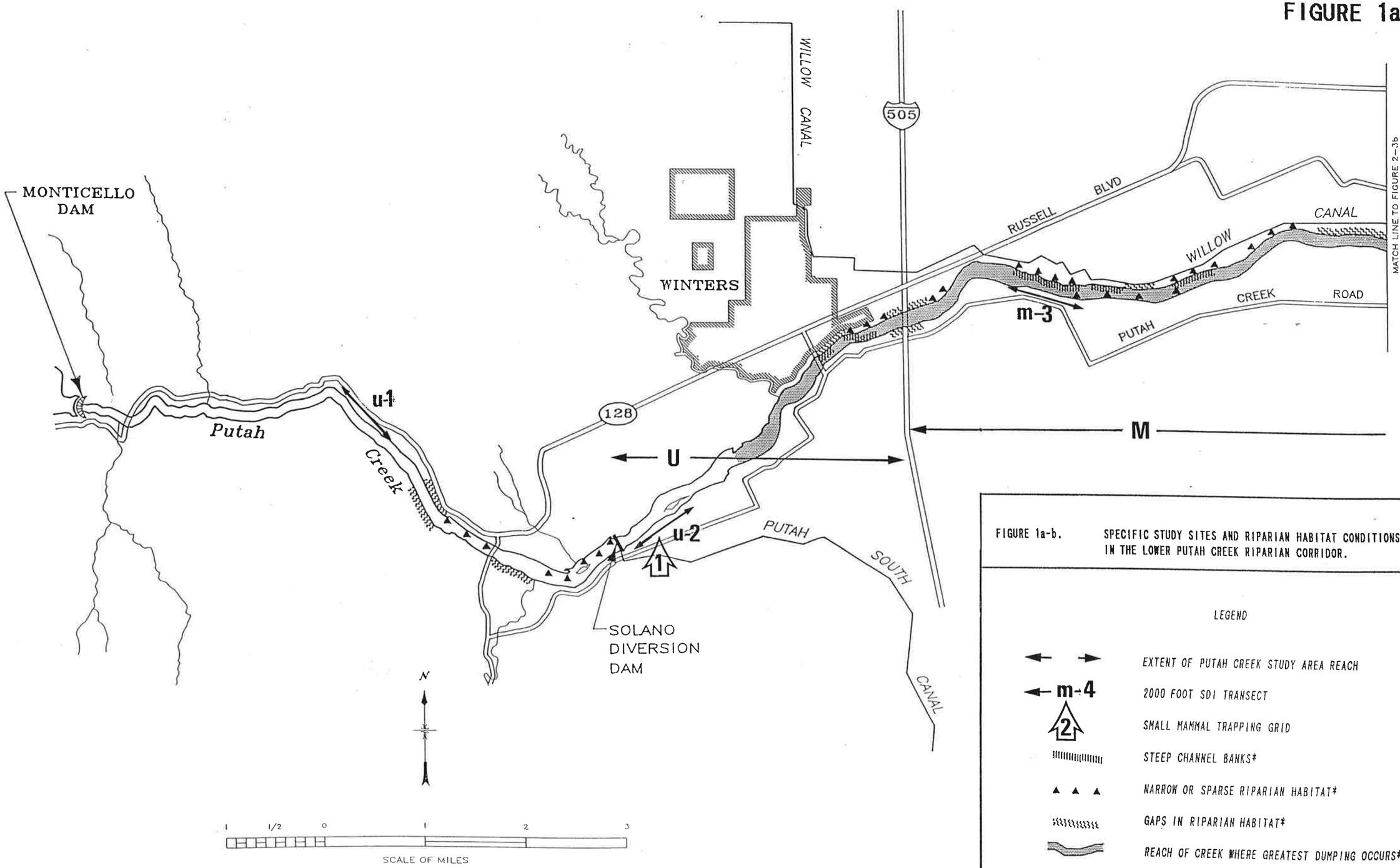


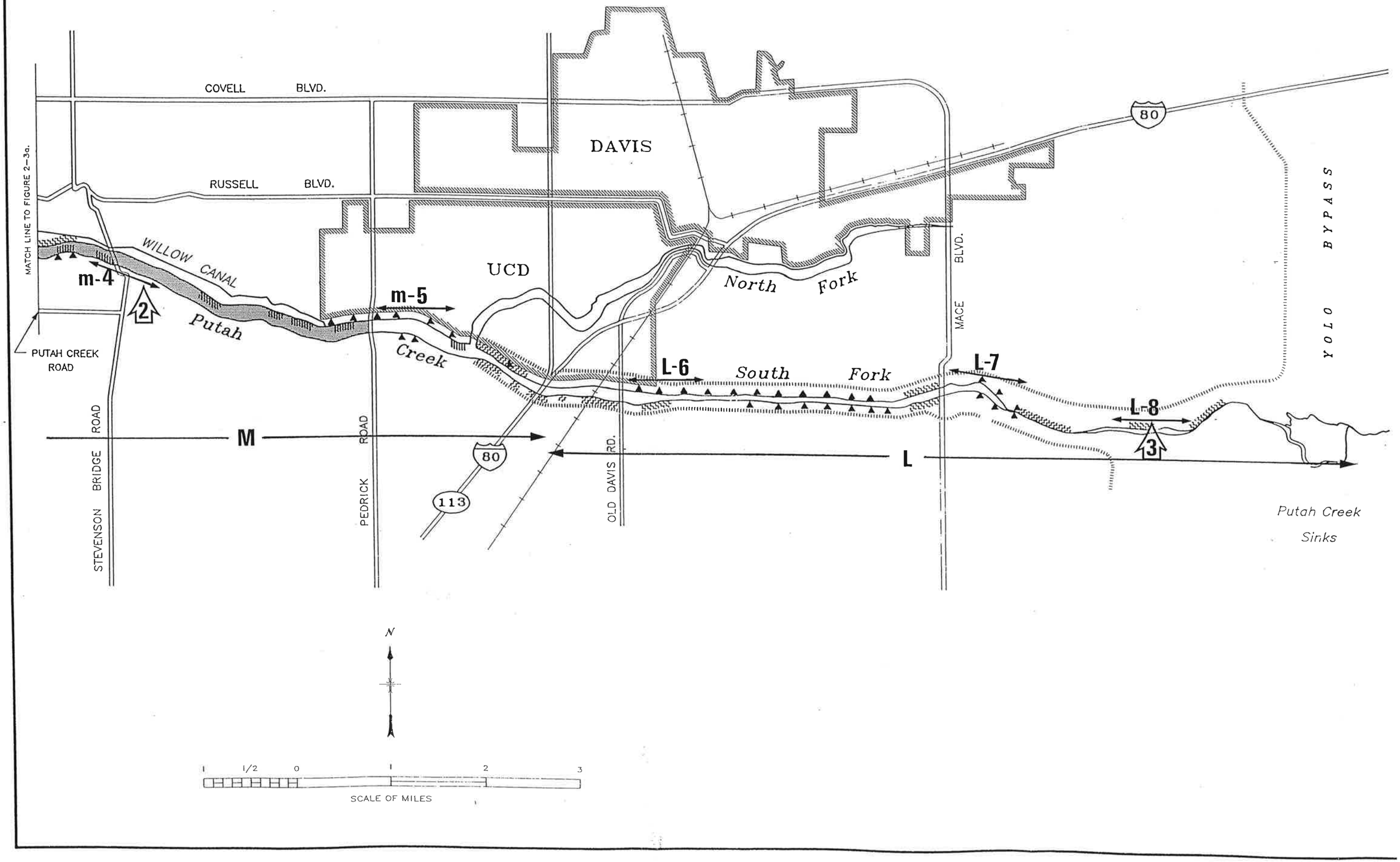
FIGURE 1a-b. SPECIFIC STUDY SITES AND RIPARIAN HABITAT CONDITIONS IN THE LOWER PUTAH CREEK RIPARIAN CORRIDOR.

LEGEND

- EXTENT OF PUTAH CREEK STUDY AREA REACH
- m-4 — 2000 FOOT SDI TRANSECT
- 2 — SMALL MAMMAL TRAPPING GRID
- STEEP CHANNEL BANKS*
- NARROW OR SPARSE RIPARIAN HABITAT*
- GAPS IN RIPARIAN HABITAT*
- REACH OF CREEK WHERE GREATEST DUMPING OCCURS*

GRAPHICS (*) SOURCE: FISH AND WILDLIFE RESOURCE MANAGEMENT OPTIONS FOR LOWER PUTAH CREEK, CALIFORNIA

FIGURE 1b


COVELL BLVD.
RUSSELL BLVD.
MATCH LINE TO FIGURE 2-3a.
DAVIS
UCD
WILLOW CANAL
m-4
m-5
2
Putah Creek
North Fork
MACE BLVD.
80
YOLO BYPASS
PUTAH CREEK ROAD
L-6
South Fork
L-7
L-8
3
M
L
STEVENSON BRIDGE ROAD
PEDRICK ROAD
OLD DAVIS RD.
113
Putah Creek Sinks
N
1 1/2 0 1 2 3
SCALE OF MILES

2.1.1 The Upper Reach contains the greatest diversity and expanse of riverine habitats anywhere along the PCRC. Orchards, which require little maintenance and harvesting activity, are the primary agricultural developments along this reach. Riparian woodlands and wetlands along the PCRC cover larger areas and are less impacted by human disturbance. Agriculture in this area extends to the top of the levee banks, but, because of its less intensive management requirements, areas of scrub and other upland habitats are able to develop and are available to wildlife. The City of Winters is set back from the creek and relatively little of the creek banks have been disturbed for housing or industry.

2.1.2 The Middle Reach is much narrower than the Upper, and most of its wildlife habitats are contained almost entirely within its deeply incised banks. Agricultural practices are more intense, stressing the production of irrigated row crops such as corn, barley, and safflower. Experimental row crops, vineyards, orchards and alfalfa are present on the University of California, Davis (UCD) campus. These crops require a great deal of maintenance and, therefore, probably cause greater disturbance to PCRC habitats and their wildlife than the less intensive management requirements of the orchards found along the Upper Reach.

Farming is conducted to the bank tops of the creek in many areas along this reach, leaving little room for the development of wildlife habitats or refugia. Intense agricultural practices often directly impact the PCRC. The dust and disturbances associated with soil preparation and the frequent aerial application of pesticides and herbicides near and over PCRC habitats, degrade their suitability for wildlife. Agricultural runoff, which typically carries a burden of chemicals and fertilizers, enters the PCRC at many locations in this reach.

The City of Davis and the UC Campus have developed many areas along the PCRC in this reach for residential, teaching and research facilities. The proximity of a large human population and the intense use of the area for jogging, bicycling, picnicking and other leisure activities, greatly limits the usefulness of PCRC habitats to wildlife. The noise of frequent flights by light planes and crop dusters to and from the UC Airport is also a constant disturbance.

2.1.3 The Lower Reach contains agricultural developments devoted entirely to the production of row

crops, mainly corn, barley, safflower, and tomatoes. Farming is very intensive and extends to the bank tops of the creek even inside of the flood control levees. Some cattle feeding yards are located within the PCRC in this reach. Cattle are also grazed when seasonally flooded portions of the eastern PCRC, in and near the Yolo Bypass, become sufficiently dry. Runoff from these types of operations is discharged directly into the PCRC.

Even more than in the middle reach, these intense agricultural practices directly impact the PCRC. The dust and disturbances associated with soil preparation and the application of pesticides and herbicides nearby and directly over the PCRC, greatly reduce its suitability to wildlife. Agricultural runoff, which typically carries a burden of chemicals and fertilizers, also enters the PCRC at many locations in this reach.

Unpaved roadways, developed each year to accommodate the movement of farm machinery and vehicles, parallel the PCRC along much of this reach and pass directly through it in several places, such as the crossing at County Road 106A. The constant use of these roads, during the growing season, disturbs wildlife and sends a heavy burden of dust to cover PCRC vegetation. While there are few areas along this reach which have been developed for residential or other purposes, impacts associated with human developments still occur with the illegal disposal of agricultural and urban refuse into the PCRC.

3.0 Biological Setting

3.1 Plant Communities and Wildlife Habitats

Ecological systems can be subdivided according to the needs of the investigator. Plant ecologists for instance, often divide plant communities into very fine units. The plant community system used by the California Natural Diversity Data Base (CNDDB) is an example.[3] This system uses a five-tier hierarchy in which only communities in the lowest tier are described and no descriptions of aquatic or man-made communities are given. Further, there are no quantitative methods for determining which of several possible, closely related communities may be present on any given site.

Wildlife ecologists, on the other hand, tend to look at the structure of the ecosystem and how it is used by wildlife. Ecosystem structure depends on the dominance of trees, shrubs, or herbaceous species. Tree dominated systems usually attract different wildlife species than shrub or herbaceous dominated systems, although some wildlife species move easily between the different systems. Some species may seek food in one habitat type and shelter in another. In addition, wildlife ecologists usually look at habitat on a much broader scale than do plant ecologists.

Riparian corridors are particularly valuable as wildlife habitat. Stream courses, with their perennial water flow and scouring from heavy winter runoff, maintain a healthy mixture of mature and successional vegetation, providing a wide variety of food sources for wildlife. Openings in the tree canopy permit light to reach the stream stimulating the growth of a luxuriant understory in some areas.

Riparian habitat types in the PCRC were provided in a series of schematic, scale drawings, maps #3 and #7 through #29, provided as Appendix A in the "Reconnaissance Planning Report Fish and Wildlife Resource Management Options for Lower Putah Creek, California".[4] These maps, each representing approximately 1000 feet of the PCRC, were used as basic references for this report.

Riparian vegetation in the PCRC is typical of waterways in the Central Valley region of California and shares the following features:

- dependency on a relatively constant supply of water from surface or groundwater;
- conspicuous zonation parallel to the waterways on gravel bars, and low and high terraces;
- marked contrast and abrupt transitions from riparian to adjacent terrestrial communities; and
- presence of an ecotonal edge (i.e., transition between ecosystems) due to the linear distribution of riparian communities along river channels, and the interwoven mosaic of various riparian community types.

Vegetation along the PCRC, below the Putah Diversion Dam, was classified in the **FWS Report** as riparian forest, oak woodland, riparian scrub/shrub, grassland, emergent wetland, agricultural land, and

urban/residential. These community names agree generally with those recommended by the California Department of Fish and Game (CDFG) and others.[5,6,7] Brief descriptions of these communities, their occurrence patterns in various reaches of the PCRC, and wildlife species associated with each, are provided below.

3.2 Tree Dominated Habitats

Trees form the dominant structural feature of this habitat where the tree canopy exceeds 10 percent of the cover.[8] Tree-dominated habitats may also have a shrub or herb understory. Forests and woodlands are the main tree-dominated habitats, although the distinction between them is not clear. Differences in canopy cover are sometimes used to distinguish between woodland and forest, but this division is arbitrary and difficult to use in the field.

Because riparian forests, woodlands and thickets are usually associated with a permanent or intermittent water supply, they provide food, water, and shelter for many wildlife species. As many as 50 amphibians and reptiles, 147 birds, and 55 species of mammals are known to use riparian communities either as permanent residents or seasonal visitors.[9]

The most important food source of tree dominated habitats is acorns and it has been reported that as many as 30 species of birds that live in oak woodlands use acorns for at least part of their diet. [10] Wildlife species most frequently observed in tree dominated habitats along the PCRC include the red-shouldered hawk, Nuttall's woodpecker, scrub jay, yellow-billed magpie, raccoon (*Procyon lotor*), Western gray squirrel (*Sciurus griseus*), and Pacific treefrog (*Hyla regilla*).

3.2.1 Riparian forest can be difficult to categorize because the species mix can vary greatly depending on a number of environmental factors. It occurs along rivers and streams, usually in areas of coarser, well-aerated soils, in the valleys and lower foothills throughout California. These communities typically develop on the alluvial fans and terraces associated with gentle topography and low velocity stream flow at elevations below 3,000 feet. Common riparian species include alder (*Alnus* spp.), box elder (*Acer negundo* ssp. *californicum*), cottonwood (*Populus* spp.), and willow (*Salix* spp.).

Riparian forest in the PCRC is dominated by large deciduous trees (30-60 feet tall) with overlapping canopies. The dominant tree species are black walnut (*Juglans* sp.), Fremont cottonwood (*Populus fremontii*), and valley oak (*Quercus lobata*). The understory varies from bare ground or low herbaceous cover to dense thickets of common brush species such as California wild rose (*Rosa californica),* blackberry (*Rubus* sp.), and poison oak (*Toxicodendron diversilobum*), 10-25 feet in height.

3.2.2 Valley Oak Woodland is the most common and extensive habitat type along the PCRC. A woodland is also dominated by large trees; however, unlike the forest type, the canopies do not overlap, and there is a wide range of tree densities. The dominant species in this community is the deciduous valley oak which grows on flatter, deeper alluvial soils.

The structure of valley oak woodland adjacent to the PCRC is relatively simple forming a savannah-like woodland in agricultural areas where some large, mature trees have been left. Within the PCRC the most common woodland understory consists of annual and perennial grassland species. Very little shrub layer is usually present. Common herbaceous understory species include a mixture of introduced species such as wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), and wild barley (*Hordeum* sp.), as well as native species of California fescue (*Festuca californica*) and oniongrass (*Melica californica*).

3.2.3 Thickets may be formed of both forest and woodland tree types when dense stands of one or two species, usually less than 20 feet in height, occur together. Willow thickets, the most common form of this habitat type in the PCRC, are composed of species such as sandbar (*Salix exigua*), Goodding's (*S. gooddingii*), red (*S. laevigata*), arroyo (*S. lasiolepis*), and yellow (*S. lucida* ssp. *lasiandra*) willows. Found along the margins of ponds, marshes, and seeps where drainage or siltation is too great for other riparian woodlands, thickets may represent early successional stages following disturbance, either natural or man-made. Other common species which tend to form thickets in the PCRC include cottonwood and box elder. There is a continuum of size and structural complexity between woodland and thicket types.

A number of introduced tree species are also found along the PCRC in scattered thicket and woodland situations. These include the tree-of-heaven (*Ailanthus altissima*), Tasmanian blue gum (*Eucalyptus globulus*), English walnut (*Juglans regia*), Monterey pine (*Pinus radiata*), black locust (*Robinia pseudo-acacia*), tamarisk (*Tamarix* sp.) and a variety of volunteer orchard species such as the almond (*Prunus amygdalus*), and common plum (*Prunus domestica*). While these trees would be considered by botanists to be invasive species in the PCRC, their presence does provide additional opportunities for wildlife use in the PCRC.

3.3 Shrub Dominated Habitats exhibit a shrub canopy of 10 percent or more of the total area where the tree canopy never exceeds more than 10 percent of the site.[11] This habitat type may have a herbaceous layer as an understory. These habitats are often called scrubs if they are dominated by species that are totally or partially deciduous, and chaparrals if they are dominated mostly by evergreen species.

Riparian scrub consists of a number of species that occur in washes and streambeds where there is often available groundwater. Tree and shrub species may include arroyo willow, red willow, sandbar willow, mule fat (*Baccharis salicifolia*), tree tobacco (*Nicotiana glauca*), and elderberry (*Sambucus mexicana*). Curly dock (*Rumex crispus*) and other herbaceous perennial species may be present, indicating the presence of water. Other understory species may include annual grasses and forbs from other nearby communities.

Wildlife species most frequently observed in shrub dominated habitats along the PCRC include the California quail, scrub jay, California towhee, golden-crowned sparrow, coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), raccoon, and western fence lizard (*Sceloporus occidentalis*).

3.3.1 Shrub/scrub habitat becomes more prevalent as a habitat type throughout the middle and lower reaches of the PCRC. It is most often limited in extent in any given area and is most common on

gravel and sand bars. Characteristic plant species include coyote bush (*Baccharis pilularis*), toyon (*Heteromeles arbutifolia*), California wild grape (*Vitis californica*), elderberry, blackberry, wild rose, and poison oak.

3.4. Herbaceous Habitats

In herb-dominated habitat types, herbaceous cover exceeds two percent and trees and shrubs do not exceed 10 percent of the site.[12] Such areas are generally considered barren if covered less than two percent by herbaceous species. Herbaceous habitats can be further subdivided into either upland or wetland types. Two herbaceous habitat types, annual grassland and emergent wetland, occur within the PCRC.

3.4.1 Grassland, sometimes called non-native or valley and foothill grassland, is dominated by a mix of introduced Mediterranean annual species and native annual and perennial species. Some of these same species occur as an understory in other communities discussed above. Although many species in annual grasslands are introduced and resulted from early disturbance, this community is now considered to be a more-or-less stable, naturalized community. If unnatural disturbance is removed, some of these species may disappear, but it is likely that the community would remain much as it is.

Annual grasslands vary in composition and cover depending upon soil nutrients, moisture content, aspect, and/or other special ecological factors such as grazing pressure. In general, areas dominated by forbs indicate an early successional stage of development, while a dense stand of tall grasses represents the climax stage. Annual grasslands may range from dense (100 percent) to sparse cover, and from 6 inches to 3 feet in height. The soils are generally medium to heavy in texture, granular in structure, moderate in organic content, and often 1-2 feet in depth.

Grassland occurs in various places along the PCRC where it forms the understory for the oak woodland and a mosaic within shrub/scrub and urbanized areas. This habitat is dominated by nonnative, annual grasses and forbs (wildflowers) which have effectively replaced native, perennial grassland communities in California. Native grasslands species have been significantly limited as a result of livestock grazing practices in the state and through the introduction of annual grasses and

forbs from other Mediterranean regions of the world. These "new natives" are now so extensive and well established in the state that it is now considered as a naturalized climax community in California.[13] The common and typical plant species include wild oats (*Avena* spp.), brome (*Bromus* spp.) filaree (*Erodium* spp.), California poppy (*Eschscholzia californica*), fescue grass (*Festuca* spp.), tarweed (*Hemizonia* spp.), barley (*Hordeum* spp.), rye grass (*Lolium* spp.), lupines (*Lupinus* spp.), sweet clover (*Medicago polymorpha*), and owls clover (*Orthocarpus* spp.).

Wildlife find an abundance of food and prey species in grasslands, but little shelter. Shelter may be provided by nearby tree and shrub dominated habitats. The immense seed crop produced by the annual grasses supports large populations of insect, bird and mammal granivores (grain-eaters). Mice such as the California vole (*Microtus californicus*), often plentiful in this habitat, form a large portion of the diet of coyotes, foxes, hawks, kestrels, kites and owls. A number of mammals that live in burrows or dens can be found there as well.

Wildlife most frequently observed in grasslands along the PCRC include American kestrel, red-tailed hawk, turkey vulture and western meadowlark, Botta's pocket gopher (*Thomomys bottae*), California vole, California ground squirrel (*Spermophilus beecheyi*), black-tailed jackrabbit (*Lepus californicus*), and gopher snake (*Pituophis melanoleucus*).

3.4.2 Emergent wetland occurs in and along the shallow borders of deep pools with permanent surface water. This habitat is found in every county in California where the soil is saturated or at least periodically flooded. Wetland soils are usually composed of clay or silt, but organic soils also support wetland vegetation. The boundary between fresh emergent wetland and aquatic habitats is typically the deep-water edge of the emergent vegetation; generally, this boundary occurs at a depth of about 6-1/2 feet.[14] This wetland occurs along Putah Creek, in various drainage ditches and in and around small ponds throughout the area.

Vegetation that lives in fresh emergent wetland must be adapted to saturated soils and low oxygen levels. Perennial species such as sedges (*Cyperus* spp), rushes (*Juncus* spp), bulrushes (*Scirpus spp)*, tules (*Scirpus* acutus), and cattails (*Typha* spp) are among those found in wetlands associated with the PCRC.

Wetland habitats provide abundant cover, food and breeding habitat for many resident and migratory wildlife species. These systems are among the most productive in California. A number of wildlife species require water for breeding, and several sensitive animal species use wetlands for most of their life cycle. The water in wetlands also attracts wildlife from neighboring areas, especially during the dry summer season.

Fish, amphibians, and waterfowl are the most recognized animals that use this habitat type. It is also home to a large number of invertebrates. River otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), and beaver (*Castor canadensis*) are mammals that use river and stream habitats for at least a portion of their life cycle. Wildlife species most frequently encountered in wetland habitats along the PCRC include the mallard, American coot, black phoebe, red-winged blackbird, song sparrow, California vole, raccoon, beaver, river otter, bullfrog (*Rana catesbeiana*), and northwestern pond turtle (*Clemmys marmorata*).

3.5 Anthropogenic Habitats

Three communities are important here, mainly because of the important influences they have on the vegetation and wildlife assemblages of the PCRC. They are Agricultural, Plantation and Urban/Residential developments in and near the PCRC and consist of vegetation that is maintained by man.[15]

3.5.1 Agricultural habitats are comprised of plowed cropland and associated weedy vegetation along irrigation channels, roadways and fallow areas. Agricultural practices on either side of the PCRC are intense in their production of irrigated row crops such as corn, barley, wheat, tomatoes and safflower.

Crops are rotated rapidly and little land is left uncultivated long enough to allow development of ruderal or successional, "old field" habitats. Farming occurs to the bank tops of the creek, leaving little room for wildlife habitats or refugia. Dust and disturbances associated with soil preparation and frequent aerial applications of pesticides and herbicides, nearby and over PCRC habitats, further

degrade their suitability for wildlife. Agricultural runoff probably degrades water qualities with its burdens of fertilizers and other chemicals. Installation and operation of seasonal diesel-powered irrigation pumps has been observed to disrupt behavior of nesting birds and even cause nest abandonment in Swainson's hawks.

Wildlife, such as birds adapted to agricultural activity, congregate in large numbers in and near the PCRC during periods of planting, irrigating or harvesting, to take advantage of food sources created in the adjacent fields. Species most frequently observed in agricultural habitats include several species of gulls, red-tailed hawk, northern harrier, American crow, European starling, American robin, red-winged and brewer's blackbirds, house finch, Botta's pocket gopher, and black-tailed jackrabbit.

3.5.2 Plantation habitats include vineyards, orchards, and other large-scale plantings of trees, shrubs, and vines. Plantation communities are becoming increasingly common along the PCRC as farmers plant orchards in areas historically used for row crops. This practice is particularly evident in the upper reaches of the PCRC where large acreages of row-crop land have been converted to the cultivation of almonds, cherries (*Prunus* sp.), plums, and English walnuts, in recent years.

Orchards often extend to the levee banks, but because this type of agriculture is less intensively managed, grasslands, scrub and other upland habitats are permitted to develop and are available to wildlife. In some areas, however, orchards have been planted in the flood plains of the PCRC. Because plantation agriculture requires less intensive management, disturbances to wildlife are less frequent than in row-crop agricultural areas.

Wildlife species most frequently observed in plantations along the PCRC include American crow, European starling, scrub jay, northern flicker, American robin, house finch, Botta's pocket gopher, western gray squirrel and black-tailed jackrabbit.

3.5.3 Urban/Residential habitats are landscaped or planted with trees maintained by man. These areas are dominated by introduced ruderal (unmaintained, weedy vegetation) species, adapted to human disturbance.[16] Most plant species are introduced annuals but a few native species, well adapted

to disturbance, may also be found in these communities. This ruderal condition is maintained by constant disturbance and interruption of natural successional tendencies. If the disturbances are removed, many of the introduced species would give way to other species in the process of succession from a pioneer, disturbed community to a more stable community. Ruderal communities bear a superficial resemblance to annual grassland, but the two are at different successional states, and provide different levels of wildlife habitat quality.

Along some reaches of the PCRC, native vegetation has been removed and replaced with nonnative vegetation near residences, farms and teaching and research facilities. Many of these developments have intruded directly into the PCRC. Eucalyptus groves, grass-covered banks and cleared picnicking areas are other examples of artificially maintained habitats. Developments of this type are most common in the middle reaches of the PCRC near the City of Davis.

Vegetation in urbanized areas includes a wide variety of ornamental trees, shrubs, and herbaceous species. Lawns in these situations represent artificial meadows. These are used by species such as robins that would typically use meadows in a natural environment. Wildlife habitat values vary depending on the diversity of plant species used in landscaping.

Wildlife species most frequently observed in anthropogenic habitats along the PCRC include the American crow, European starling, scrub jay, red-winged and Brewer's blackbirds, American robin, house finch, Botta's pocket gopher, opossum (*Didelphis marsupialis*), raccoon, feral house cat (*Felis domesticus*), and striped skunk.

SECTION II
METHODS

4.0 General Wildlife Studies

4.1 Systematic Species Surveys

Techniques of this nature were simple and labor intensive, requiring only experience with the identification and natural history of all of the species in the PCRC study area and sufficient time to observe and record subtle changes in the seasonal interactions of wildlife with their environment.

An average of 6 field days were spent each month to record seasonal changes in wildlife occurrence and activity along the PCRC. Different reaches were systematically examined each day so that the entire corridor was surveyed four to six times each year. During these efforts, all of the PCRC, from the Putah Diversion Dam to the Putah Creek Sinks in the Yolo Bypass, was carefully examined, on foot, to determine the types, quality and extent of suitable wildlife habitats and to identify and map the locations of as many wildlife species as possible. Zeiss 10X40 binoculars and tripod-mounted zoom-lens spotting scopes were used for this work.

In conformance with U.S. Fish and Wildlife Service criteria for success of wildlife monitoring programs, a literature search was used to generate a list of all wildlife species that could reasonably be expected to occur in the region.[17] Wildlife observations and general habitat conditions in the PCRC were detailed in daily field notes and seasonal and cumulative species lists. Environmental events with impacts on the PCRC, such as agricultural activities or flooding, were noted. The locations of artifacts of natural history such as animal tracks and scat, beaver dams, raptor nests, bat roosts, and the preferred basking sites of reptiles and amphibians were noted.

Searches for crepuscular bat species were made in likely open areas where the number, size, flight characteristics and habitats used by bats could be recorded in the waning sunlight and with the aid of a

hand-held, 500,000 candle power spotlight. Roadways near the PCRC were also driven at night, at speeds less than 5 mph, while creekside habitats were searched with a wide-beam, one million candle power lamp. Hand held lamps were also used where public access was possible, and creekside habitats could be entered without causing disturbance to residents. Spotlighting was performed between 9 p.m. and midnight, when most animal activity would be expected. When eye-shines were observed, positive identification was made with binoculars.

4.2 Sensitive Species Surveys

To comply with Section 7 (Consultation Procedures) of the Federal Endangered Species Act, a list of State and federally endangered, threatened and candidate wildlife species known to occur or which might possibly occur in the PCRC region was compiled.[18] This list was prepared using geographic distribution and habitat information obtained from a variety of literature sources.[19]

For the purposes of this report, an animal is considered a "sensitive species" if it fits into one or more of the following categories:

- It is listed as Endangered (FE) or Threatened (FT) according to the provisions of Section 4 of the Federal Endangered Species Act (FESA).[20] The U.S. Fish and Wildlife Service (USFWS) administers the federal act.

- It is listed as Endangered (SE) or Threatened (ST) according to the California Endangered Species Act (CESA).[21] The California Department of Fish and Game (CDFG) administers the State act.

- It is a proposed for federal listing as endangered (FPE) or threatened (FPT) or a candidate for state listing as endangered (SCE) or threatened (SCT). While not protected by either FESA or CESA, some state and federal agencies manage candidate species to prevent them from becoming listed.

- It is considered by the California Department of Fish and Game (CDFG) to be a California Species of Special Concern (CSC). The CDFG often requests that these animal species be considered in environmental documents.

- It is considered rare, threatened, or endangered under Section 15380(d) of the California Environmental Quality Act (CEQA) Guidelines. This section states, "A species not included in

any listing identified in subsection (c) shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b)." Thus, according to the CEQA, a species may be considered endangered if its survival is in jeopardy due to loss or change of habitat (CEQA Guidelines Section 15380(b)(1)).

By so defining sensitive species, confusion over the term *rare and endangered* is avoided because the terms *rare*, *threatened*, and *endangered* apply only to species listed as such by FESA or CESA. All Systematic Species Surveys described above were directed toward identifying the presence of any sensitive species.

Several species in special sensitivity categories received more detailed study. Special techniques, employed in these additional efforts, are described below.

Swainson's hawk (Buteo swainsoni)(SH). From 1994 through 1998, beginning in late March with the return of the first SH from wintering areas in South America, systematic surveys were made to identify and map potential nesting territories and the specific locations of active nests. These efforts required many hours of observation of potential nesting birds, those engaged in courtship, copulation and nest building, before nest trees could be located. Nests, identified in this way, were described in field notes. The species of tree where constructed, approximate height from the ground, size, construction materials, and whether newly constructed or reconstructed on an existing nest platform was noted. The location of all Swainson's hawk nests, entered onto FWS base maps and recorded in field notes, was provided in support of the 1998 version of this report.[22]

Nests were examined at least weekly through the nesting season, usually into early August, using a spotting scope or by climbing nearby trees to observe eggs or fledglings. Searches under active nests provided information on prey species provided to the nest and stages of fledgling development.

After 1998, these intensive nesting surveys were discontinued. However, a Swainsons' hawk count has been conducted since 1998 each year in July to document the number of individuals observed along the PCRC between Highway 505 and the Yolo Sinks. These counts record the locations of individuals observed and whether each individual is an adult, immature, or fledgling of the year. In addition,

information recording incidental observations on locations of probable nest sites are included in the field notes as observations are made during field surveys along the PCRC.

Northwestern pond turtle (Clemmys marmorata mormorata)(NPT). Searches for NPT involved slowly "sneaking" along the PCRC, especially in ponded areas, while carefully searching banks and other protected resting sites with binoculars as far ahead of the observer as possible. NPT frequently enter the water as much as 75 to 100 feet in advance of an approaching observer.

The shape of the carapace, whether low in profile (male characteristic) or domed (female characteristic) and an estimate of its length were recorded to measures the probable sex and age class (i.e., hatchling, subadult, adult) of each NPT. Behavior at the time of the encounter (i.e., basking, swimming, feeding) was also recorded. The location of all northwestern pond turtle sightings, entered onto FWS base maps and recorded in field notes, was provided in support of the 1998 version of this report.[23] Observations regarding the occurrences of this species have been recorded in field notes since 1998, but no detailed mapping efforts have been maintained since 1998.

5.0 Special Wildlife Studies

5.1 Avian Species Diversity

To better evaluate the quality of wildlife habitats available along the PCRC, beyond the subjective impressions obtained from the systematic observations described, required the application of more sophisticated wildlife techniques such as the Shannon-Weaver Species Diversity Index and systematic, small mammal, live trapping analyses.

The Shannon-Weaver Index of General Diversity (SDI) methodology as has been used for many years to evaluate and compare the occupation of various habitats by wildlife and, thereby, provide reliable and consistent indications of habitat quality.[24, 25, 26] This method of habitat analysis is employed by the California Department of Fish and Game, U.S. Fish and Wildlife Service, and other wildlife agencies, and is generally recognized by ecologists as a valuable tool in environmental studies.[27, 28]

The SDI can be applied to biotic communities as diverse as those in benthic sediments or riparian corridors. It involves the analyses of simple ratios between the number of species and the "importance values" (numbers, biomass, productivity, etc.) of the individuals within each species.[29] Its value as an environmental monitoring tool is indicated by its most basic tenet: **Species diversity tends to be low in physically controlled ecosystems (i.e., systems subjected to strong physiochemical limiting factors) and high in biologically controlled (natural) ecosystems**. In other words, species diversity tends to be high in older, well-established communities and low in newly established or disturbed communities.[30, 31, 32]

The SDI is based on the theory that of the total number of species in a habitat, a relatively small percent are usually abundant or common while a large percent are less common. The few common species (dominants) use most of the available resources in a particular habitat, but the richer the habitat, the more likely it will be to provide sufficient extra resources to permit the coexistence of greater numbers of less common species. It is the presence, therefore, of the less common species which most influences the SDI value and indicates the quality of the habitat.

Because birds have great mobility, they are excellent indicators of habitat quality. They remain in habitats which provide their requirements and avoid those which do not. Since they are readily observed, systematic surveys of birds species can be a useful tool with which to estimate the value to wildlife of habitats in which they are recorded.

As stated above, species diversity tends to be lower (fewer species present) in controlled or disturbed habitats (i.e., agriculture, urban) and higher in natural or more ecologically diverse habitats. SDI values near or below 2.00 usually indicates poor habitat value such as agricultural developments. SDI values near or above 3.00 are found in rich, naturally functioning habitats.

SDI analyses permit the comparison of animal populations in one site with those at other nearby sites for which SDI data are available. This statistical treatment minimizes the importance of variations in the methods of data collection and total effort between sites, and permits more equitable statements about habitat values in each.[33]

Permanent transects were established at eight locations along the PCRC during the Fall of 1994. These were located where the transect was 1) located entirely on public lands, 2) accessible by road during all seasons, and 3) the dominant vegetation types most typified the area.

Transects were approximately 2000 feet in length with a 15-minute observation station at its beginning point and three additional stations located at approximately 500-foot intervals thereafter. Transects were described in field notes so that observation stations could each be revisited precisely during subsequent data collections as follows:

U1 = East for 2000 feet along the northern bank of PCRC between Public Fishing Accesses 3&4, starting from 38°30.75 North, 122°03.63 West.

U2 = East from the Putah Diversion Dam for 2000 feet along the southern bank of the PCRC, starting from 38°29.36 North, 122°00.50 West.

M3 =East for 2000 feet along the south bank of the PCRC near Putah Creek Road, southeast of El Rio Villa, starting from 38°31.62 North, 121°56.21 West.

M4 = From a point 500 feet east of Stevenson Bridge to a point 1500 feet west of Stevenson Bridge on the south bank of the PCRC, starting from 38°31.94 north, 121°51.27 West.

M5 = East for 2000 feet along the north bank of the PCRC from the Pedrick Road Bridge, starting from 38°31.64 North, 121°48.16 West)

L6 = East along the north bank of the PCRC for 2000 feet from the Old Davis Road Bridge, starting from 38°31.05.North, 121°45.38 West.

L7 = East for 2000 feet along the north bank of the PCRC from the Mace Road Bridge, starting from 38°31.17.North, 121°41.71 West.

L8 = East for 2000 feet along the north bank of the PCRC from County Road 106A, starting from 38°30.79 North, 121°38.95 West.

Transect and observation station locations are shown Figures 1a-b. Appendix B includes a series of six color photographs of each of the four observation stations for each of the eight SDI transects.

All birds, identified by sight or sound during two 60-minute census periods during each season on each transect were recorded using a system which noted the species, numbers of each species, whether observations were by sight or sound, the time of day, and date of each observation period. Each census period was composed of four, 15-minute, time-constrained, observation periods at four fixed locations along each transect.

Individual birds may be recorded several times as they move along a wildlife corridor, such as Putah Creek, or remain in sight or continue to sing while the observer moves from station to station along a transect. Thus, the recorded numbers of more conspicuous birds, especially noisier species such as the American crow or scrub jay, will be somewhat elevated. The continued presence of a bird in a habitat, however, indicates the importance of that habitat to the species, and is accounted for in the SDI statistical analysis as the "importance value multiplier factor".

One morning and one afternoon census was conducted along each transect during each season so that most species present along each transect would be either seen or heard regardless of their preferred periods of diurnal activity. Transects were usually censused on two different days to minimize the effects of weather on SDI data collections. This amount of sampling effort has been found sufficient for other habitat evaluation studies. [34]

The optimum number of data samples required for the calculation of the Shannon Index has been shown to be 4 to 5 repetitions, even when only a small portion of the total species present may have been sampled.[35] Thus, the eight, 15 minute samples, taken over 2 hours of observation along each transect satisfies data requirements for statistically significant SDI calculations.

The SDI for a particular habitat is calculated as follows:

$$SDI = - \frac{ni}{N} \log_e \frac{ni}{N}$$

where: ni = total encounters with a particular species in the habitat.
N = total encounters with all species in the habitat.

5.3 Small Mammal Live-Trapping

One method of measuring activity within a wildlife community or habitat has been the study of small mammal populations. Rodents are usually an important link in the "food chain" of most terrestrial communities. Variations in their numbers and population dynamics may be affected by otherwise imperceptible environmental changes. Variations in habitat quality may be assessed through interpretations of data obtained from small mammal studies. Sudden rises or declines in rodent numbers may signal subtle changes in habitat qualities or the occurrence of environmental insults, such as pollution, which might not otherwise be perceived.

Information about the numbers of small mammals can also be useful in studies of predator-prey relationships. Since rodents usually occupy the base of the food chain in most terrestrial ecosystems, insights into the suitability of a particular habitat for occupation and successful breeding by predators, may also be ascertained.

The following is a brief description of small mammal, live-trapping methods used to collect information on the species composition, age structure, and population fluctuations of small mammals in the PCRC. Methods similar to those described here, have been used by biologists for many years to assess the status of small mammal populations and the suitability of particular habitats to support them.

Areas to be trapped, one each in the Upper, Middle, and Lower reaches of the PCRC, were established during the Fall of 1994, . Trapping areas were selected where the trap line was 1) entirely on public lands accessible during all seasons, 2) accessible by road, 1) located within vegetation types which most typified each reach, and 4) sufficiently removed from human activities, such as hiking or fishing, so that disturbance, vandalism, and theft was minimized.

Trapping areas, described in field notes so that they could be revisited precisely, were located as follows and are depicted on Figures 1a-1b.:

U-1 = Riparian woodland and grassland habitats along the southern levee terraces of the PCRC near the entrance to the Putah Diversion Dam.
(GPS coordinates: 38°29.36 north, 122°00.50 West)

M-2 =Riparian woodland and grassland habitats along the southern levee terraces of the PCRC, 300 feet east of the Stevenson Bridge.
(GPS coordinates: 38°31.94 North, 121°51.27 West)

L-3 = Riparian woodland and shrub/scrub habitats along the northern levee bank of the PCRC, 1000 feet east of County Road 106A.
(GPS coordinates: 38°30.97 N, 121°38.74 W)

Small mammals were trapped using 3"x3"x9", Sherman-type, solid metal, live traps baited with crushed walnuts and provided with cotton nesting material. Traps were set near rodent trails, burrows, and in other areas where small mammal sign indicated a maximum opportunity for captures. Care was taken to place traps in shaded and sheltered locations to minimize stress to captives.

Traps were hidden from view to minimize disturbance, vandalism, and theft. When set in sufficiently secluded areas "flagging", tied to nearby vegetation, aided the relocation of traps. Discarded beverage containers, plastic bags, and other litter were used to identify the location of traps in areas where flagging might be discovered by passersby.

Sixty traps, were operated for three consecutive nights to provide 180 trap-nights of effort during each trapping period at each site. One trap set for one night equals a trap-night. Three consecutive nights of trapping ensures that most small mammals in the area of a trap will have an opportunity to be captured at least once. In most live-trapping studies, the recapture rate rises to near 100 per cent by the third night and further trapping is usually unproductive.

Traps were examined early each morning to minimize stress to captives. Captives were identified, or, if necessary, body measurements were recorded, for identification using standardized keys for mammal

identification.[36, 37, 38] The sex, age class (juvenile, subadult or adult) and reproductive condition of each specimen were recorded. Captives were marked for later identification, if recaptured, and released immediately at the site of capture.

Seasonal and yearly capture rates for each rodent species and all small mammals captured at each trapping area were compared using, random sample, statistical methods.[39] Similar statistical approaches are employed by the California Department of Fish and Game, U.S. Fish and Wildlife Service, and other wildlife agencies in their analyses of wildlife data.

SECTION III
RESULTS

6.0 General Wildlife Studies

6.1 Systematic Wildlife Surveys

Table 1 lists all vertebrate wildlife species, which could reasonably be expected to occur in the lower PCRC area. It was prepared using geographic distribution and habitat information obtained from a variety of literature sources.[40] It was prepared in conformance with U.S. Fish and Wildlife Service criteria for success of wildlife monitoring programs.[41]

Observations obtained during 370 days of field surveys conducted from November 1994 through June 2001 recorded 215 vertebrate wildlife species (4 amphibians, 10 reptiles, 173 birds, and 29 mammals) along the lower PCRC. Museum specimens in the Department of Wildlife and Fisheries Biology at the University of California, Davis, and reliable reports of mountain lion (*Felis concolor*) occurrences, provided historical evidence of 5 additional mammal species for a total of 221 species of vertebrates known, or reliably reported, to occur in the lower PCRC.[42]

A list of "The Vertebrates of the Putah Creek Campus Reserve", prepared by the Department of Wildlife and Fisheries Biology, includes 2 amphibians, 11 reptiles (including 6 introduced turtle species), 6 birds, and 6 mammals (3 are bats) on the U.C. campus.[43] The presence of these additional vertebrates has not been verified during surveys for this report. In most cases, except for the bats, these species are listed as "uncommon to rare residents or visitors" to the campus. Because of their unknown status in the PCRC, in a region considered, in most cases, to be outside their usual ranges of occurrence, these species were not added to the cumulative total of vertebrates known to occur in the PCRC.

Table 1. Potential and Observed Wildlife Species in the Putah Creek Riparian Corridor, Solano and Yolo Counties, California, 1994-2000.

Common Name		Scientific Name
MAMMALS		
Opossum	U,M,L	*Didelphis marsupialis*
Ornate Shrew	U,M,L	*Sorex ornatus*
Broad-footed Mole	U,M,L	*Scapanus latamanus*
California Myotis	M,L	*Myotis californicus*
Little Brown Bat	*	*M. lucifigus*
Yuma Myotis	@	*M. yumahensis*
Western Pipistrelle	U	*Pipistrellus hesperus*
Big Brown Bat	*	*Eptesicus fuscus*
Red Bat	@	*Lasiurus borealis*
Hoary Bat	U	*L. cinereus*
Townsend's Big-eared Bat	@	*Plecotus townsendii*
Pallid Bat	*	*Antrozoas pallidus*
Brazilian Free-tailed Bat	M,L	*Tadarida braziliensis*
Ringtail		*Bassariscus astutus*
Raccoon	U,M,L	*Procyon lotor*
Mountain Lion	*	*Felis concolor*
Bobcat	@	*Lynx rufus*
Feral House Cat	U,M,L	*Felis domesticus*
Domestic Dog	U,M,L	*Canis domesticus*
Gray Fox	U,M,L	*Urocyon cinereoargenteus*
Red Fox	U,M	*Vulpes vulpes*
Coyote	U,M,L	*Canis latrans*
Long-tailed Weasel	@	*Mustela frenata*
Badger		*Taxidea taxus*
Mink	@	*M. vison*
Striped Skunk	U,M,L	*Mephitis mephitis*
Spotted Skunk	*	*Spilogale gracilis*
River Otter	U,M,L	*Lutra canadensis*
Sonoma Chipmunk		*Tamias sonomae*
California Ground Squirrel	U,M,L	*Spermophilus beecheyi*
Western Gray Squirrel	U,M,L	*Sciurus griseus*
Botta's Pocket Gopher	U,M,L	*Thomomys bottae*
Little Pocket Mouse		*Perognathus longimembris*
California Kangaroo Rat		*Dipodomys californicus*
Beaver	U,M,L	*Castor canadensis*
Western Harvest Mouse	U,M	*Reithrodontomys megalotis*
Deer Mouse	M,L	*Peromyscus maniculatus*
Brush Mouse		*P. boylii*
Pinon Mouse		*P. truei*
Dusky-footed Woodrat	U	*Neotoma fuscipes*
California Vole	U,M,L	*Microtus californicus*
Muskrat	U,M,L	*Ondatra zibethicus*

Table 1 (Continued)

Common Name		Scientific Name
Norway Rat		*Rattus norvegicus*
Black Rat	U,M,L	*R. rattus*
House Mouse	U,M,L	*Mus musculus*
Desert Cottontail	L	*Sylvilagus audubonii*
Brush Rabbit		*S. bachmani*
Black-tailed Jackrabbit	U,M,L	*Lepus californicus*
Black-tailed Mule Deer	U	*Odocoileus hemionus*
AMPHIBIANS AND REPTILES		
California Tiger Salamander		*Ambystoma californiense*
California Newt		*Taricha torosa*
Ensatina		*Ensatina eschscholtzi*
California Slender SalamanderU,M		*Batrachoseps attenuatus*
Arboreal Salamander		*Aneides lububris*
Western Spadefoot	@	*Scaphiopus hammondi*
California Toad	M	*Bufo boreas halophilus*
Pacific Treefrog	U,M,L	*Hyla regilla*
California Red-legged Frog		*Rana aurora draytoni*
Foothill Yellow-legged Frog		*R. boylii*
Northern Leopard Frog	@	*R. pipiens*
Bullfrog	U,M,L	*R. catesbeiana*
Common Snapping Turtle	@	*Chelydra serpentina*
Mud Turtle	@	*Kinosternon* spp.
Stinkpot Turtle	@	*Stenotharus* spp.
Northwestern Pond Turtle	U,M,L	*Clemmys marmorata marmorata*
Painted Turtle	M,L	*Chrysemys picta*
Red-eared Slider	U,M	*Pseudemys scripta elegans*
Mapturtle	@	*Graptemys* spp.
Western Box Turtle	@	*Terepene* spp.
Spiny Softshell	@	*Trionyx spiniferus*
Coast Horned Lizard	@	*Phrynosoma coronatum*
Western Fence Lizard	U,M,L	*Sceloporus occidentalis*
Western Skink	@	*Eumeces skiltonianus*
Gilbert's Skink	@	*E. gilberti*
Western Whiptail		*Cnemidophorus tigris*
Southern Alligator Lizard	U, L	*Gerrhonotus multicarinatus*
California Legless Lizard		*Anniella pulchra*
Ringneck Snake		*Diadophis punctatus*
Sharp-tailed Snake	@	*Contia tenuis*
Western Yellow-bellied Racer	M,L	*Coluber constrictor mormon*
Striped Racer		*Masticophis lateralis*
Coachwhip		*M. flagellum*
Pacific Gopher Snake	M,L	*Pituophis melanoleucus*

Table 1 (Continued)

Common Name		Scientific Name
Common Kingsnake	M	*Lampropeltis getulus*
Long-nosed Snake		*Rhinocheilus lecontei*
Western Aquatic Garter Snake	U	*Thamnophis couchi*
Giant Garter Snake		*T. c. gigas*
Valley Garter Snake	@	*T. sirtalis fitchi*
Western Rattlesnake	U	*Crotalus viridis*
BIRDS		
Pied-billed Grebe	U,M,L	*Podilymbus podiceps*
Eared Grebe (w)		*P. nigricollis*
Western Grebe (w)		*Aechmophorus occidentalis*
American White Pelican (w)	U,M,L	*Pelicanus erythrorhynchos*
Double-crested Cormorant (w)	U,M,L	*Phalacrocorax auritus*
Great Blue Heron	U,M,L	*Ardea herodias*
Green-backed Heron	U,M,L	*Butorides striatus*
Great Egret	U,M,L	*Casmerodius albus*
Snowy Egret (w)	U,M,L	*Egretta thula*
Cattle Egret (w)	M,L	*Bubulcus ibis*
Black-crowned Night Heron	M,L	*Nycticorax nycticorax*
White-faced Ibis	L	*Pegadis chihi*
American Bittern	L	*Botaurus lentiginosus*
Sandhill Crane (w)	L	*Grus canadensis*
Tundra Swan (w)	L	*Olor columbianus*
Canada Goose (w)	U,M,L	*Branta canadensis*
Snow Goose (w)	L	*Chen caerulescens*
Ross' Goose (w)		*C. rossii*
Greater White-fronted Goose(w)	M,L	*Anser albifrons*
Mallard	U,M,L	*Anas platyrhynchos*
Pintail (w)	L	*A. acuta*
Gadwall	L	*A. strepera*
Cinnamon Teal	L	*A. cyanoptera*
Green-winged Teal (w)	U, L	*A. carolinensis*
Northern Shoveler	U,M,L	*A. clypeat*
American Wigeon (w)	U, L	*Mareca americana*
Canvasback (w)	U, L	*Aythya valisineria*
Redhead		*A. americana*
Greater Scaup (w)	U	*A. marila*
Lesser Scaup (w)	U, L	*A. affinis*
Ring-necked Duck (w)	U, L	*A. collaris*
Wood Duck	U,M,L	*Aix sponsa*
Common Goldeneye (w)	U, L	*Bucephala clangula*
Bufflehead (w)	U	*B. albeola*
Ruddy Duck	U, L	*Oxyura jamaicensis*
Hooded Merganser (w)	U, L	*Lophodytes cuccullatus*

Table 1 (Continued)

Common Name		Scientific Name
Common Merganser (w)	U,M	*Mergus merganser*
Turkey Vulture	U,M,L	*Cathartes aura*
Black-shouldered Kite	U,M,L	*Elanus leucurus*
Cooper's Hawk	U,M	*Accipiter cooperi*
Sharp-shinned Hawk (w)	U,M,L	*A. striatus*
Rough-legged Hawk (w)	L	*Buteo lagopus*
Ferruginous Hawk (w)	L	*B. regalis*
Red-tailed Hawk	U,M,L	*B. jamaicensis*
Red-shouldered Hawk	U,M,L	*B. lineatus*
Swainson's Hawk	U,M,L	*B. swainsoni*
Golden Eagle (w)	U,M	*Aquila chrysaetos*
Bald Eagle (w)		*Haliaeetus leucocephalus*
Northern Harrier	U,M,L	*Circus cyaneus*
Osprey (w)	U, L	*Pandion haliaetus*
American Kestrel	U,M,L	*Falco sparverius*
Merlin (w)		*F. columbarius*
American Peregrine Falcon	U,M,L	*F. peregrinus anatum*
Prairie Falcon (w)		*F. mexicanus*
Wild Turkey	U	*Meleagris gallopavo*
California Quail	U,M,L	*Callipepla californica*
Ring-necked Pheasant	U,M,L	*Phasianus colchicus*
Virginia Rail	U	*Rallus limicola*
Sora Rail	L	*Porzana carolina*
Common Moorhen	L	*Gallinula chloropus*
American Coot	U,M,L	*Fulica americana*
Killdeer	U,M,L	*Charadrius vociferus*
Black-bellied Plover (w)		*Pluvialis squatarola*
California Gull	M,L	*Larus californicus*
Ring-billed Gull	M	*L. delawarensis*
Bonaparte's Gull (w)		*L. philadelphia*
Mew Gull (w)		*L. canus*
Herring Gull (w)	M,L	*L. argentatus*
Thayer's Gull (w)		*L. thayeri*
Glaucous-winged Gull (w)		*L. glaucescens*
Forster's Tern (s)	L	*Sterna forsteri*
Black Tern (s)		*Chilidonias niger*
Mourning Dove	U,M,L	*Zenaidura macroura*
Band-tailed Pigeon (s)		*Columba fasciata*
Ringed Turtle-dove	L	*Streptropelia "risoria"*
Rock Dove	U,M,L	*C. livia*
Wilson's Snipe (w)	U, L	*Capella gallinago*
Long-billed Dowitcher (w)	U L	*Limnodromus scolopaceus*
Long-billed Curlew (w)	L	*Numenius americanus*
Spotted Sandpiper (w)	U	*Actitus macularia*
Greater Yellowlegs (w)	U,M,L	*Totanus melanoleucus*
Wimbrel	@	*Numenius phaeopus*

Table 1 (Continued)

Common Name		Scientific Name
Least Sandpiper (w)	L	*Calidris minutilla*
Western Sandpiper (w)	U, L	*C. mauri*
Dunlin (w)		*C. alpina*
American Avocet (w)	L	*Recurvirostra americana*
Black-necked Stilt (s)	M	*Himantoppus mexicanus*
Western Screech Owl	M	*Otus asio*
Great Horned Owl	U,M,L	*Bubo virginianus*
Northern Pygmy-owl		*Glaucidium gnoma*
Barn Owl	M,L	*Tyto alba*
Burrowing Owl	M,L	*Athene cunicularia*
Long-eared Owl	L	*Asio otus*
Common Poorwill (s)		*Phalaenoptilus nuttallii*
White-throated Swift	U, L	*Aeronautes saxatalis*
Vaux's Swift	U,M	*Chaetura vauxi*
Black-chinned Hummingbird (s)	U	*Archilochus alexandri*
Anna's Hummingbird	U,M,L	*Calypte anna*
Costa's Hummingbird	U	*C. costae*
Allen's Hummingbird	U,M	*Selasphorus sasin*
Rufous Hummingbird	@	*S. rufus*
Belted Kingfisher	U,M,L	*Ceryle alcyon*
Northern Flicker	U,M,L	*Colaptes auratus*
Acorn Woodpecker	U,M	*Melanerpes formicivorus*
Lewis' Woodpecker	U,M	*M. lewis*
Red-breasted Sapsucker (w)	U,M	*Sphyrapicus varius daggetti*
Nuttall's Woodpecker	U,M,L	*Piciodes nuttalli*
Hairy Woodpecker	U	*P. villosus*
Downy Woodpecker	U,M,L	*P. pubescens*
Western Kingbird (s)	U,M,L	*Tyrannus verticalis*
Ash-throated Flycatcher (s)	U,M,L	*Myiarchus cinerascens*
Pacific-slope Flycatcher (s)	U,M,L	*Empidonax difficilis*
Western Wood-pewee (s)	U,M	*Contopus sordidulus*
Olive-sided Flycatcher (s)		*C. borealis*
Black Phoebe	U,M,L	*Sayornis nigricans*
Say's Phoebe (w)	U,M,L	*S. saya*
Willow Flycatcher (s)	U,M,L	*Empidonax traillii*
Hammond's Flycatcher (s)	@	*E. hammondii*
Dusky Flycatcher (s)	@	*E. olberholseri*
Horned Lark	U,M,L	*Eremphila alpestris*
Barn Swallow (s)	U,M,L	*Hirundo rustica*
Cliff Swallow (s)	U,M,L	*Petrochelidon pyrrhonota*
Violet-green Swallow	U,M,L	*Tachycineta thalassina*
Tree Swallow	U,M,L	*Iridoprocne bicolor*
N. Rough-winged Swallow (s)	U,M,L	*Stelgidopteryx serripennis*

Table 1 (Continued)

Common Name		Scientific Name
Scrub Jay	U,M,L	*Aphelocoma coerulescens*
Yellow-billed Magpie	U,M,L	*Pica nuttalli*
American Crow	U,M,L	*Corvus brachyrhynchos*
Common Raven	U L	*C. corax*
Common Bushtit	U,M,L	*Psaltriparus minimus*
Plain titmouse	U,M	*P. inornatus*
White-breasted Nuthatch	U,M	*Sitta carolinensis*
Red-breasted Nuthatch (w)	M,L	*S. canadensis*
Brown Creeper	@	*Certhia americana*
Wrentit	U	*Chamaea fasciata*
Bewick's Wren	U,M,L	*Thryomanes bewickii*
House Wren	U,M,L	*Troglodytes aedon*
Marsh Wren	U, L	*Cistothorus palustris*
Canyon Wren	U	*Catherpes mexicanus*
Rock Wren (w)	U, L	*Salpinctes obsoletus*
Northern Mockingbird	U,M,L	*Mimus polyglottos*
California Thrasher		*Toxostoma redivivum*
American Robin	U,M,L	*Turdus migratorius*
Varied Thrush (w)	U,M,L	*Ixoreus naaevius*
Swainson's Thrush (s)	U,M	*Catharus ustulatus*
Hermit Thrush (w)	U,M,L	*Catharus guttata*
Western Bluebird (w)	U,M,L	*Sialia mexicana*
Blue-gray Gnatcatcher (s)	U,M	*Polioptila caerulea*
Ruby-crowned Kinglet (w)	U,M,L	*Regulus calendula*
Golden-crowned Kinglet (w)	M,L	*R. satrapa*
American Pipit (w)	M,L	*Anthus spinoletta*
Cedar Waxwing (w)	U,M,L	*Bombycilla cedrorum*
Phainopepla	U,M	*Phainopepla nitens*
Loggerhead Shrike	U,M,L	*Lanius ludovicianus*
European Starling	U,M,L	*Sturnus vulgaris*
Solitary Vireo	U,M,L	*Vireo solitarius*
Hutton's Vireo	U	*Vireo huttoni*
Warbling Vireo (s)	U,M,L	*V. gilvus*
Orange-crowned Warbler	U,M,L	*Vermivora celata*
Nashville Warbler (s)	M,L	*V. ruficapilla*
Yellow-rumped Warbler (w)	U,M,L	*Dendroica coronata*
Black-throated Gray Warbler(s)	M,L	*D. migrescens*
Townsend's Warbler (w)	M	*D. townsendi*
Yellow Warbler (s)	L	*D. petechia*
Black-and-white Warbler (s)	M	*Mniotilta varia*
MacGillivray's Warbler (s)	U,M	*Oporormis tolmiei*
Wilson's Warbler	U,M,L	*Wilsonia pusilla*

Table 1 (Continued)

Common Name		Scientific Name
Western Tanager (s)	U,M,L	*Piranga ludoviciana*
Common Yellowthroat	L	*Geothlypis trichas*
Yellow-breasted Chat (s)	@	*Icteria virens*
House Sparrow	U,M,L	*Passer Domesticus*
Yellow-headed Blackbird	L	*Xanthocephalus xanthocephalus*
Red-winged Blackbird	U,M,L	*Agelaius phoeniceus*
Tricolored Blackbird		*A. tricolor*
Brewer's Blackbird	U,M,L	*Euphagus cyanocephalus*
Brown-headed Cowbird	U,M,L	*Molothrus ater*
Northern Oriole (s)	U,M,L	*Icterus galbula*
Western Meadowlark	U,M,L	*Sturnella neglecta*
Black-headed Grosbeak (s)	U,M,L	*Pheucticus melanocephalus*
Blue Grosbeak (s)	M,L	*Guiraca caerulea*
Lazuli Bunting (s)	L	*Passerina amoena*
Purple Finch	U	*Carpodacus purpureus*
House Finch	U,M,L	*C. mexicanus*
Pine Siskin (w)	U	*Carduelis pinus*
American Goldfinch	U,M,L	*C. tristis*
Lesser Goldfinch	U,M,L	*C. psaltria*
Rufous-sided Towhee	U,M,L	*Pipilo erythrophthalmus*
California Towhee	U,M,L	*P. fuscus*
Savannah Sparrow (w)	M,L	*Passerculus sandwichensis*
Vesper Sparrow (w)	L	*Pooecetes gramineus*
Lark Sparrow	U,M	*Chondestes garmmacus*
Rufous-crowned Sparrow		*Aimophila ruficeps*
Dark-eyed Junco (w)	U,M,L	*Junco hyemalis*
White-throated Sparrow (w)	U,M	*Zonotrichia albicollis*
White-crowned Sparrow (w)	U,M,L	*Z. leucophrys*
Golden-crowned Sparrow (w)	U,M,L	*Z. atricapilla*
Fox Sparrow (w)	U,M,L	*Passerella iliaca*
Lincoln's Sparrow (w)	U	*Melospiza lincolnii*
Song Sparrow	U,M,L	*M. Melodia*

U = Upper Reach, Putah Cr. Diversion Dam - Hwy 505
M = Middle Reach, Highway 505 to Highway 80
L = Lower Reach, Highway 80 to the Putah Creek Sink
* = Historic Records, Specimens maintained in the Wildlife & Fisheries Department Teaching Museum Collection, U. C. Davis Campus and reliably reported personal communications.
@ = Species listed as present on the U.C. Davis Campus in **The Vertebrates of the Putah Creek Campus Reserve**.

(w) = Winter range only
(s) = Summer range only

6.2 Sensitive Species Surveys

Searches of the CNDDB, lists of Species of Special Concern to the CDFG, and the Audubon Society's "Blue List" of declining bird species, indicated the potential for the existence of 1 amphibian, 2 reptile, 25 avian, and 5 mammal species in all categories of special concern in the PCRC region. Table 2 summarizes information available on the current status, habitat requirements and natural history of all sensitive vertebrate wildlife species, except fishes, observed or reported to occur in the Putah Creek Region of Solano and Yolo Counties, California. A list of State, federal and other agency sensitive species and status codes referred to in this report is provided at the end of Table 2.

Wildlife species in all categories of sensitivity, observed in the PCRC, include the northwestern pond turtle, American white pelican, double crested cormorant, great blue heron, great egret, snowy egret, black-crowned night heron, white-tailed kite, sharp-shinned hawk, Cooper's hawk, golden eagle, Swainson's hawk, ferruginous hawk, osprey, northern harrier, California gull, common barn owl, burrowing owl, California horned lark, loggerhead shrike, western bluebird and southwestern river otter. Brief summaries of any encounters with these species, in or near the PCRC, are provided in the "Notes" section of each species account in Table 2.

Table 2. Annotated list of endangered, threatened or candidate[1] wildlife species observed or reported[2] to occur in the vicinity of the Putah Creek region of Solano and Yolo Counties, California, 1994-2000.

MAMMALS

Plecotus townsendii
Pacific Western Big-eared Bat
STATUS: FSC/-/CSC,FSS
HABITAT: Mesic habitats in all but subalpine and alpine regions. Needs water. Gleans from brush or trees along habitat edges. Small moths are the principal food of this species.
NOTES: Potential roosting habitat in abandoned buildings or other man-made structures is available in the PCRC and its vicinity. Systematic daylight and evening searches of highway and railroad overcrossings, abandoned buildings and other structures in and near the PCRC, during spring and summer months, confirmed the presence of Brazilian free-tailed (*Tadarida braziliensis*) and California Myotis (*Myotis californicus*) bats, but none of this species has been found.

Antrozous pallidus
Pallid Bat
STATUS: -/-/CSC, FSS
HABITAT: An uncommon resident in the coast ranges from Monterey County southward. Occurs in many open semi-arid to arid habitats including conifer and deciduous woodland, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and residential-park habitats. Prefers rocky outcrops, cliffs and crevices with access to open habitats for foraging.
NOTES: A single specimen collected from the U.C. Davis campus in 1976 is included in the Wildlife and Fisheries Biology Teaching Museum on the U.C. Davis campus. Potential roosting habitat in abandoned buildings or other man-made structures is available in the PCRC and its vicinity. Systematic daylight and evening searches of highway and railroad overcrossings, abandoned buildings and other structures in and near the PCRC, during spring and summer months, confirmed the presence of Brazilian free-tailed (*Tadarida braziliensis*) and California Myotis (*Myotis californicus*) bats, but none of this species has been found.

Lutra canadensis
River Otter
STATUS: FSC/-/CSC
HABITAT: Uncommon to rare year-long resident strictly associated with aquatic habitats; rivers or large streams, lakes, marshes, estuaries, and coastal areas. Foothills areas are used more frequently than higher regions of river systems.
NOTES: The presence of this species in Lake Solano was been reported by Park Rangers (Shephard, J., 1994. Pers. Comm.). A group of three otters was observed foraging in Lake Solano on 9/27/99 near the Lake Solano Youth Picnic Area.

These animals were also reported to have occurred in the upper reaches of Putah Creek below the diversion as recently as the late 1980s. A fur-trapping permit was issued by the California

Table 2 (Continued)

Department of Fish and Game for otter and beaver in this area in the late 1980s. None of the required reports concerning this permit were ever received.

In general, otters have been observed throughout the length of the PCRC but more frequently in the upper reaches. Following is a brief summary of observations made during these surveys.

An otter was observed on two occasions in February and March of 1996 near the western levee of the Yolo Causeway, about 1 mile north of the terminus of the PCRC at the Putah Creek Sinks. Another was observed for more than 30 minutes in October 1997 as it "fished" for crayfish in a beaver pond just east of County Road 106A.

A family group of five otters was observed on 9/10/99 swimming in an irrigation canal east of and parallel to Putah Creek North Levee Road approximately 200 yards south of Interstate 80. This group was observed for approximately 20 minutes during which time it swam continuously south. A group of three otters was observed in this general area again on 10/1/99 while crossing a dirt road from north to south in this irrigation canal.

A single otter was observed on 9/17/99 in Putah Creek at SDI transect M3-1. This individual was observed for approximately 2 minutes, during which time it appeared to be playing with two different muskrats, swimming underneath the muskrats and obviously startling them into leaving the water for the relative protection of the bank.

A family group of five otters was observed in Putah Creek at SDI transect U1-1 on 12/16/99, swimming downstream and occasionally leaving the water to rummage around in the litter along the south bank of the creek. A single otter was observed downstream of this location at SDI transect U1-3 on 2/4/00, and another individual otter was observed at this site on 10/30/00. On 10/27/00, a family group of seven individuals was observed foraging at this site. This is the largest number of individuals observed simultaneously at any site along the PCRC during these surveys.

Taxidea taxus
American Badger
STATUS: -/-/*
HABITAT: This is an uncommon permanent resident found throughout the State except in the north coastal region. It typically occupies a wide variety of habitats but requires friable soils for burrowing.
NOTES: While this species probably inhabited the deeper soils throughout the study area, its habit of digging large, deep burrows in its search for rodents, pocket gophers and ground squirrels has probably led to its extirpation by agriculturalists. This species might still be present in areas near the eastern terminus of the PCRC if it still exists anywhere within the study area.

Table 2 (Continued)

Perognathus inornatus
San Joaquin Pocket Mouse
STATUS: -/-/FSC, FSS
HABITAT: Prefers desert riparian, coastal scrub and sagebrush. Occurs in grassland and blue oak savanna habitats along the eastern side of the San Joaquin Valley and possibly into the Sacramento Valley.
NOTES: Species could still be extant in the Putah Creek Sinks area of the Yolo Causeway if it exists anywhere within the study area. None of this species has been captured in more than 5000 trap-nights of live-trapping surveys along the PCRC since 1994.

BIRDS

Pelecanus erythrorhynchos
American White Pelican
STATUS: -/-/CSC, (Nesting Colony); CalWL
HABITAT: In California, the American White Pelican nests only at large lakes in the Lower Klamath and Clear Lake National Wildlife Refuges. From August to December it is commonly observed at salt ponds near San Francisco Bay and may be locally uncommon to common on large lakes and estuaries in the Central Valley and on the coastal slope from Sonoma County southward.
NOTES: Migrant flocks have been observed on several occasions in the lower reaches of the PCRC and the Yolo Causeway and in the Lake Solano area. No suitable nesting habitat exists anywhere within the study area.

Phalacrocorax auritus
Double-crested Cormorant
STATUS: -/-/CSC (Rookery Site)
HABITAT: Yearlong resident along the California coast and on inland lakes, in fresh, salt and estuarine waters. Requires undisturbed nest sites beside water on islands or the mainland. Feeds mainly on fish.
NOTES: Frequently observed, during field surveys for this report, while foraging on Lake Solano and along the Putah Creek Corridor. Limited nesting habitat may be available for this species at Lake Solano. No nests or nesting activity by this species were observed during surveys for this report.

Ardea herodias
Great Blue Heron
STATUS: -/-/* (Rookery Site)
HABITAT: Colonial nester in tall trees, cliffsides, and sequestered areas of marshes. Rookery sites in close proximity to foraging areas such as marshes, lake margins, tide-flats, rivers, streams, and wet meadows.
NOTES: Observed frequently, during field surveys for this report, while foraging at Lake Solano

Table 2 (Continued)

and along the PCRC. A rookery site has been located, approximately one mile east of the Putah Creek Diversion Dam, during surveys for this report. Two to three nests, with attendant adults, were observed in the tops of two large Cottonwood trees on a small island in the PCRC near the southern end of County Road 87E. In addition, a solitary nest in a *Eucalyptus spp*. tree was observed during 2000 and 2001 breeding seasons on the north bank of Putah Creek approximately one mile east of Highway 505, directly opposite SDI transect station M3-3.

Casmerodius albus
Great Egret
STATUS: -/-/* (Rookery Site)
HABITAT: Feeds in shallow water and along shores of estuaries, lakes, ditches, and slow-moving streams, salt ponds, mudflats and in irrigated croplands and pastures. Eats mainly fishes, amphibians, snakes, snails crustaceans and some small mammals. Nests in large trees at a height of 20-40 feet, usually near water.
NOTES: Observed frequently, during field surveys for this report, while foraging at Lake Solano and along the PCRC. Limited nesting habitat may be available for this species at Lake Solano. No nests or nesting activity by this species along the PCRC has observed during surveys for this report.

Egretta thula
Snowy Egret
STATUS: -/-/* (Rookery Site)
HABITAT: Feeds in shallow water and along shores of estuaries, lakes, ditches, and slow-moving streams, salt ponds, mudflats and in irrigation ditches, and flooded fields. Eats mainly fishes, amphibians, snakes, snails crustaceans and some small mammals. Nests in large trees at a height of 20-40 feet, usually near water.
NOTES: Observed frequently, during field surveys for this report, while foraging at Lake Solano and along the PCRC. Limited nesting habitat may be available for this species at Lake Solano. No nests or nesting activity by this species along the PCRC has observed during surveys for this report.

Nycticorax
Black-crowned Night Heron
STATUS: -/-/* (Rookery Site); FSS
HABITAT: Yearlong resident in lowlands and foothills where they feed along the margins of lacustrine, large riverine, and fresh and saline emergent habitats and, rarely, on kelp beds in marine subtidal habitats. Nests and roosts in dense-foliaged trees and dense emergent wetlands. Mostly crepuscular and nocturnal feeding on a wide variety of fish, crustaceans, amphibians, small mammals and insects associated with wetlands communities.
NOTES: Observed occasionally, during field surveys for this report, while foraging at Lake Solano and along the PCRC. Limited nesting habitat may be available for this colonial nesting species at Lake Solano or along the PCRC. No nests or nesting activity by this species along the

Table 2 (Continued)
PCRC has observed during surveys for this report. Non-breeding season, roost-sites have been located and mapped in the PCRC.

Elanus leucurus[3]
White-tailed Kite
STATUS: -/-/* (Nesting Site)
HABITAT: Low rolling foothills and valley margins with scattered oaks and river bottomlands or marshes adjacent to deciduous woodland. Open grasslands, meadows or marshes for foraging close to isolated, dense-topped trees for nesting and perching.
NOTES: Occasionally observed, during field surveys for this report, while foraging over agricultural lands, especially alfalfa crops in the lower reaches of the PCRC. Foraging opportunities are available in agricultural fields, grasslands, and marshes throughout the PCRC area. Potential nesting sites exist in taller trees on or in the vicinity of the PCRC. However, because of intense agricultural activities near the PCRC, the potential for successful nesting by this species is reduced. No nests of this species were found during surveys conducted as part of this study.

Accipiter striatus
Sharp-shinned Hawk
STATUS: -/-/CSC (Nesting)
HABITAT: Is found in all types of vegetation but frequently uses mixed-conifer, ponderosa pine and black oak. Prefers, but is not restricted to riparian habitats. North facing slopes with plucking perches are critical.
NOTES: Occasional birds of this species have been observed hunting in riparian woodland habitats along the PCRC. Most of the nesting requirements of this species are present at various locations along the PCRC. No nests have been found, however, the skill of this species in constructing nests that cannot be easily detected, is well known and they may have been overlooked. The species is not seen as regularly during the spring and summer breeding season, suggesting that reproduction occurs away from the study area. Human disturbances associated with intense agriculture are probably sufficient to discourage nesting by this very secretive species.

Accipiter cooperi
Cooper's Hawk
STATUS: -/-/CSC (Nesting)
HABITAT: Dense stands of live oak, riparian deciduous or other forest habitats near water. Principal diet items are small birds.
NOTES: Limited habitat of the type required by this species is available along the PCRC. It is rarely observed hunting small birds in orchards mainly in the middle reaches of Putah Creek, the Stevenson Bridge area, during the winter months. None of this species observed in the PCRC during the reproductive season or summer and no nests have been found anywhere in the vicinity of the PCRC. Human disturbances associated with intense agriculture are probably sufficient to discourage nesting by this very secretive species.

Table 2 (Continued)

Aquila chrysaetos
Golden Eagle
STATUS: -/-/CSC (Nesting and Wintering); FSS
HABITAT: Uncommon permanent resident and migrant throughout California except the Central Valley. Rolling foothills, coast range terrain, sage juniper flats or desert habitats chiefly in the upper Sonoran and transition life zones.
NOTES: Foothill habitats suitable for the maintenance and reproduction of this species are available near Lake Berryessa and the upper reaches of Putah Creek above Solano Lake. Adults have been observed rarely soaring (hunting) over Solano Lake and foothill grassland habitats in the foothill areas of the western PCRC. Observations during the spring and summer and the behavior of this species in the foothill areas indicate that nesting does occur near the upper PCRC, probably in the high cliffs near Lake Berryessa.

Haliaeetus leucocephalus
Bald Eagle
STATUS: FT/SE/- (Nesting and Wintering)
HABITAT: Uncommon winter migrant. Restricted to breeding since 1977 in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties. Require large bodies of water or free-flowing rivers containing fish, with adjacent snags or other perches. More common in lower elevations.
NOTES: Rare visitant to Lake Berryessa during the winter months. Rarely observed flying over the upper reaches of Putah Creek above Solano Lake. Habitats suitable for the maintenance and reproduction of this species are not available in the PCRC study area. None of this species has been observed during frequent surveys for this report.

Buteo swainsoni
Swainson's Hawk
STATUS: -/ST/- (Nesting)
HABITAT: Uncommon to rare breeding resident and migrant in the Central Valley, Klamath Basin, Modoc Plateau, Lassen County, Mojave Desert, and basin and range areas. Utilizes stands with few trees in juniper-sage flats, riparian systems, or oak in the savannah of the Central Valley for breeding. Has close tie to water in the Central Valley but nests in arid regions also. Water needs probably met by prey. Forages in grasslands, or suitable agricultural fields (e.g., grains, alfalfa, or livestock pastures).
NOTES: Thirty one historic nesting sites along the PCRC, identified in the California Natural Data Base, were visited, described and mapped. Between 1994 and 1998, from April through August, the courtship and/or nesting behavior of Swainson's hawks was recorded weekly in the PCRC and its vicinity and nests were located, mapped and their progress recorded. Details of these efforts were included in the 1998 version of this report. On July 22, 1999 a survey was conducted for this species from Highway 505 east to the Yolo Sinks by Dr. D.A. Mullen, Gary Beeman, and Michael Melanson. During that survey, 32 adults were observed and 5 birds of the

Table 2 (Continued)

year were confirmed. On July 17, 2000 a survey was conducted for this species from Highway 505 east to the Yolo Sinks by Michael Melanson. During this survey, 49 adults were observed and 5 birds of the year.

Buteo regalis
Ferruginous Hawk
STATUS: FSC/-/CSC (Wintering); CalWL;FSS
HABITAT: Rare to uncommon winter resident and migrant at lower elevations and open grasslands in the Modoc Plateau and Central Valley, however, only a winter resident in the open grasslands of the Coast Range. Prey on medium-sized and smaller mammals, especially lagomorphs and ground squirrels; also birds, reptiles, and amphibians.
NOTES: Species is occasionally observed in the study area where it is considered a casual migrant not expected in the region in all years. Three specimens from the Davis area, collected between 1937 and 1988, are included in the Wildlife and Fisheries Biology Teaching Museum on the U.C. Davis campus. Occasional observations have been made of this species hunting in fields near the lower PCRC during the fall and winter months of 1996, 1997, and 2000.

Pandion haliaetus
Osprey
STATUS: -/-/CSC (Nesting)
HABITAT: Ocean shores, bays, fresh-water lakes and larger streams. Builds large nests in tree tops within 15 miles of good fish producing bodies of water. Feeds on fish which it catches from large bodies of water.
NOTES: Frequently observed hunting over Solano Lake and the upper reach of the PCRC during winter and spring seasons. Because of the availability of large impoundments with plentiful fish stocks in the vicinity of the study area, it is likely that this species nests in the area. No evidence of nesting has been found anywhere in the PCRC. This species is observed during the late spring and summer breeding season, suggesting that reproduction occurs away from the study area.

Circus cyaneus
Northern Harrier
STATUS: -/-/CSC (Nesting)
HABITAT: Open areas such as meadows, rangeland, desert sinks and especially fresh and saltwater marshes. A ground nesting species which experiences high nest losses in agricultural settings when alfalfa or other crops are tilled.
NOTES: Commonly observed foraging over agricultural lands, especially alfalfa, grasslands and marshes near the PCRC. Because nesting occurs on the ground in open grassland and agriculturally developed areas, the constant disturbances associated with intense agricultural practices greatly reduce nesting success by this species. One nest of this species was found in the PCRC on the north bank of Putah Creek 100 yards east of Mace Blvd. on April 28, 2000. The nest was defended by two adult females and contained 5 eggs. On May 4, 2000 the nest **Table 2**

(Continued)

contained only empty shells and no adults or fledging birds were observed in the vicinity. There were no signs of predation and the eggs were assumed to have hatched normally.

Falco peregrinus anatum
American Peregrine Falcon
STATUS: Delisted/SE/-
HABITAT: Rare breeding and winter residents in Central California. Nesting sites known along the California coast north from Santa Barbara. Riparian areas and coastal and inland marshes are important habitats year-round but especially for foraging during nonbreeding seasons.
NOTES: Foraging habitat of the type required by this species is available in the vicinity of the PCRC. Suitable nesting habitat is not available anywhere within or in the vicinity of the study area. An adult male of this species was observed foraging over the PCRC sinks during the fall of 1997. Migrating or foraging birds have also been recorded infrequently in all reaches of the PCRC.

Larus californicus
California Gull
STATUS: -/-/CSC (Nesting Colony)
HABITAT: Winter visitant to coastal and interior lowlands during the nonbreeding season. Omnivorous. Adults roost in large concentrations along shorelines, in landfills, pastures and on islands.
NOTES: Species observed frequently along the PCRC, especially in the area of the U.C. Davis Campus and its refuse disposal site near Pedrick Road, during the winter months. Suitable nesting habitat is not available anywhere within or in the vicinity of the PCRC.

Charadrius alexandrinus nivosus
Western Snowy Plover
STATUS: -/-/CSC (Inland Breeding)
HABITAT: Preferred nesting habitat includes flat, dry sand above ordinary wash of the tide on ocean beaches and inland, shores of salt or alkaline lakes. Eggs are laid in areas strewn with shells, pebbles, and various bits of debris, providing camouflage for eggs and young.
NOTES: A nest with chicks was recorded near the City of Davis sewage treatment ponds in 1963. Foraging and potential nesting habitat may be present in the Putah Creek Sinks reach of the lower PCRC. None of this species have been observed during surveys for this report.

Numenius americanus
Long-billed Curlew
STATUS: -/-/CSC (Breeding); CalWL
HABITAT: Uncommon winter visitant from early July to early April along most of the California coast. The preferred winter habitats are large coastal estuaries and upland herbaceous and agricultural settings. Summers are spent in the northern great plains.
NOTES: Agricultural and grasslands foraging habitat in the vicinity of the PCRC make the

Table 2 (Continued)

curlew a probable winter visitor in the study area. Flocks of these birds have been observed in the lower reach of the PCRC during the fall and winter months during surveys for this report. Suitable nesting habitat is not available anywhere within or in the vicinity of the PCRC.

Tyto alba
Common Barn Owl
STATUS: -/-/*
HABITAT: Common residents in habitats such as open grassland, chaparral, deciduous riparian and wet meadows from sea level to 5,500 feet elevation. Usually nests on ledges, crevices, or other sheltered areas of cliffs and manmade structures.
NOTES: Roosting and nesting sites are available in abandoned farm buildings near the PCRC. Though believed to be common, this nocturnal species has been observed only infrequently in the middle and lower PCRC. Regurgitation boluses, feathers and other artifacts indicative of Barn Owl occupation have been found in several old buildings near Stevenson Bridge and the Old Davis Road Bridge and Southern Pacific Railroad trestle over Putah Creek. Birds have been flushed from trees in the PCRC.

Asio flammeus
Short-eared Owl
STATUS: -/-/CSC (Nesting); CalWL
HABITAT: Frequents fresh and salt water marsh lands, lowland meadows, and irrigated agricultural settings, especially alfalfa fields. Tule patches and tall grass are needed for nesting and daytime seclusion. Nests on dry ground in depression concealed in vegetation.
NOTES: The year to year occurrence of this diurnally active species varies from common to rare in this region. If present, it should be readily observed as it forages in the vicinity of the PCRC. None of this species has been observed during surveys for this report.

Athene cunicularia
Burrowing Owl
STATUS: FSC/-/CSC (Burrow Sites);FSS
HABITAT: Found in open, dry, nearly or quite level grassland, prairie, and desert floor. Subterranean nester, dependent upon large burrowing mammals, most notably, the California ground squirrel for suitable nest sites.
NOTES: The most recent and proximate occurrence to the study area was the observation of 8 pairs observed in 1988 on the west side of the University of California at Davis by B. Johnson. Sightings at this location declined from 22 pairs, observed in 1981 by J. Schultz, to 10 pairs each in 1986 and 1987. Nesting occurs in open grassland and agriculturally developed areas and this diurnally active species should be easily observable if present. Constant agricultural disturbances greatly reduce nesting success by this species. One individual of this species was observed near the U.C. Davis disposal site west of Pedrick Road in 1995. No burrow or nesting site was found during frequent revisits of the area. A nest burrow and attendant adults were found on the east

Table 2 (Continued)

side of Old Davis Road between Tremont and Becker Roads on July 21, 1995, during surveys for this report. The burrow, an abandoned California ground squirrel burrow was only 20 feet from the roadway in a small area which had not been developed for agriculture. These birds were seen on subsequent visits during August but were gone from the site, which had been disturbed by agricultural activities by August 21, 1995. Adults and two chicks were observed at the same burrow site during the 1996 breeding season and one individual remained in the vicinity of the burrow during the winter of that year. Though their original burrow was destroyed during the construction of an irrigation ditch in March of 1997, a pair of owls attempted to renest in another nearby burrow. Fate of this attempt was doubtful due to the nearby irrigation ditch which probably flooded the burrow.

Asio otus (nesting)
Long-eared owl
STATUS: -/-/CSC
HABITAT: Uncommon permanent resident throughout most of the northern part of the state, excluding the humid northern Coast Range, Cascade Range, and higher elevations of the Sierra Nevada. Riparian habitat is heavily utilized, riparian thickets with small densely canopied trees are required for roosting and nesting.
NOTES: A stick nest of this species was observed on March 16, 2001, near the top of a large cottonwood tree on the north bank of Putah Creek approximately ½ mile east of Road 106A. One adult observed on the nest, one adult flushed from trees on closer investigation of the site. Same conditions observed on March 20, 2001.

Empidonax traillii
Willow Flycatcher
STATUS: -/SE/- (nesting); FSS
HABITAT: Rare to locally uncommon summer resident in wet meadow and montane riparian habitats at 2000 to 8000 feet in the Sierra Nevada and Cascades. Most often occurs in broad, open river valleys or large mountain meadows with lush growths of shrubby willows. Fall (mid-August to early September) migrant at lower elevations, primarily in riparian habitats throughout the state exclusive of the north coast.
NOTES: None of this species was observed along the PCRC during the 1995 and 1996 field seasons. They were encountered regularly, however, during August and September in 1997 in all reaches of the PCRC.

Eremophila alpestris actia
California Horned Lark
STATUS: -/-/CSC
HABITAT: Forages in large flocks in open and grassy habitats along the coast and in desert habitats near sea level and into alpine dwarf shrub habitats above treeline. Low sparse vegetation typifies preferred habitats. Diet is mostly insects with some seeds and other vegetable matter. Nest is grass-lined cup on the ground in the open.

Table 2 (Continued)

NOTES: Flocks of these birds are observed during winter and spring seasons foraging along unimproved roadways, agricultural fields and open grasslands in the lower reaches of the PCRC.

Lanius ludovicianus
Loggerhead Shrike
STATUS: FSC/-/CSC; CalWL
HABITAT: Year-round residents of lowlands and foothills throughout much of California. Prefers open habitats with scattered shrubs, trees, fences, or other lookout posts. Highest densities occur in open-canopied, valley-foothill hardwood, hardwood-conifer and riparian habitats. Feeds on insects, small birds, mammals and reptiles but amphibians, fish, carrion and various invertebrates are also taken.
NOTES: Infrequently observed foraging over agricultural lands, grasslands and marshes especially along the lower reach of the PCRC. Nesting probably occurs in the vicinity of the PCRC, though no nests have been found. Constant agricultural disturbance greatly reduces nesting success by this species.

Sialia mexicana
Western Bluebird
STATUS: -/-/*
HABITAT: Year-round resident throughout much of California. Breed in open woodlands of oaks, riparian deciduous trees or conifers with herbaceous understories. Feed on insects which they capture in the air or on the ground from perches.
NOTES: Occasionally observed, during the winter and early spring, foraging in all reaches the PCRC. Though reported to nest in the region, no evidence of nesting has been found anywhere within the study area and none of this species is usually observed during the late spring and summer breeding season, suggesting that reproduction occurs away from the PCRC.

Agelaius tricolor
Tricolored Blackbird
STATUS: FSC/-/CSC; CalWl; FSS
HABITAT: Year-round residents throughout the Central Valley and coastal districts of California. They breed near fresh water, preferably in fresh emergent wetland with dense, tall cattails or tules, but also in thickets of willows, blackberry, wild rose and tall herbs. Forages on cultivated land, edges of water grown to dense emergent vegetation.
NOTES: Only limited nesting habitat of the type required by this species is available in the lower reaches of the PCRC. However, because of intense agricultural disturbance throughout the area this potential is limited. None of this species has been observed during surveys for this report.

Table 2 (Continued)

Icteria virens
Yellow-breasted Chat
STATUS: -/-/CSC; (Nesting Site)
HABITAT: Uncommon summer resident and migrant in coastal California and the foothills of the Sierra Nevada in valley-foothill riparian habitats between 4800 and 6500 feet elevations. In migration it may be found in lower elevations of the mountains in riparian habitats. Nest is usually located from 2 to 8 feet up in dense shrubs such as willow, blackberry and wild grape along streams and rivers.
NOTES: The most recent and proximate occurrence of this species was reported in 1987, 0.6 miles northwest on a dirt road that is 0.7 miles south of the junction of Highway 128 and Pleasants Valley Road. Only limited nesting habitat is available within the study area. None of this species has been encountered during surveys for this study.

REPTILES

Clemmys marmorata
Northwestern Pond Turtle
STATUS: FsC/-/CSC
HABITAT: Preferred habitats include ponds, marshes, rivers, streams and irrigation ditches with rocky or muddy bottoms. Food is mainly aquatic plants, insects, and carrion. Watercress, cattails and lillies are used for cover.
NOTES: Putah Creek is located on the northern boundary of the zone of hybridization between the Northwestern (*C. m. marmorata*) and Southwestern subspecies (*C. m. pallida*) of this genus. These turtles occur most commonly in the upper reaches of the PCRC with numbers diminishing toward the Putah Creek Sinks in the lower PCRC. Most observations are of large adults. Evidence of successful reproduction and recruitment within the Putah Creek Corridor, in the form of very small (less than 2 inch carapace) individuals, has been observed in the U.C. Davis area of the PCRC. The locations of all turtles, and their favored basking sites, were systematically recorded in all reaches of the PCRC from 1994 through 1998. Details of these efforts were included in support of the 1998 update of this report.

Thamnophis couchii gigas
Giant Garter Snake
STATUS: FT/ST/-
HABITAT: Restricted to the floor of the Central Valley, from Sacramento and Antioch south to Buena Vista Lake. Inhabits permanent and semi-permanent sources of water in a variety of habitats. Prefers freshwater and drainage canals and irrigation ditches. It is the most aquatic of the garter snakes in California, rarely being found more than a few feet from aquatic habitats.
NOTES: The most recent and proximate occurrence of this species was reported in 1976 on the south fork of Putah Creek near its crossing by the Old Davis Road Bridge. None of this species has been observed anywhere in the study area during surveys for this report.

Table 2 (Continued)

AMPHIBIANS

Ambystoma californiense
California Tiger Salamander
STATUS: FC/-/CSC
HABITAT:Annual grass habitat, also in grassy understory of valley-foothill hardwood habitats; uncommonly along stream courses. Breed and lay eggs in vernal pools. Open grassland habitats at elevations of less than 1,000 feet Requires large numbers of rodent burrows and other subterranean refugia. Aquatic larvae seek cover in turbid water or clumps of vegetation; juveniles and adults utilize small mammal burrows.
NOTES: Putah Creek is located north of the northern limits of the known range for this species of salamander in Solano County. Though reported to be historically common and to occur off the U.C. Davis campus no records of this species occurrence are reported in the CNDDB anywhere in the project region. Habitat of the type required for breeding and maintenance of this species is not present on or near the PCRC and none of this species was recorded during surveys for this report.

Rana aurora draytoni
California Red-legged Frog
STATUS: FT/-/CSC
HABITAT: Quiet pools of streams, marshes, and occasionally ponds, usually below 4000 feet. Highly aquatic; prefers shorelines with extensive vegetation. Usually escapes to water 3 feet deep or more. Red-legged frogs are generally absent from ponds and streams occupied by bullfrogs (*Rana catesbeiana*) which prey upon them.
NOTES: Though historically identified as a resident of Putah Creek and regional Coast Range drainages it is probably no longer present in the region due to the introduction of centrarchid fishes and bullfrogs which prey on it. Bullfrogs outcompete and eliminate Red-legged frogs wherever these two species occur together. No Red-legged frogs have been observed or recently reported to occur anywhere in the PCRC.

Table 2 (Continued)

[1] = Status Codes (Federal/State/Other):

Federal Status Codes

FE	=	Listed as endangered
FT	=	Listed as threatened
FPE	=	Federal Proposed (Endangered)
FPT	=	Federal Proposed (Threatened)
FC	=	Federal Candidate (formerly Category 1 candidates)
FSC	=	Federal Special Concern species (a "term-of-art" for former Candidate 2 candidates)

State of California Status Codes

SE	=	Endangered
ST	=	Threatened
SCE	=	State Candidate (Endangered)
SCT	=	State Candidate (Threatened)
CSC	=	California Department of Fish and Game Species of Special Concern

Other Status Codes

* = Taxa listed with an asterisk fall into one or more of the following categories:

- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines.
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range.
- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation in California.
- Taxa closely associated with habitat that is declining in California (e.g. wetlands, riparian, old growth forest, desert aquatic systems, native grasslands.)

FSS = Bureau of Land Management and U.S. Forest "Sensitive Species"
CalWL = Audubon Society's State Watchlist for California

Table 2 (Continued)

2

- Beeman & Associates, 1995. Report on Swainson's Hawk nesting activity observed between February 9 and August 12, 1995, along the Putah Creek Corridor. Report submitted to David A. Mullen, Environmental Consultant, 2546 Warring St., Suite 9, Berkeley, CA

- California Natural Diversity Data Base (CNDDB). 1995. Current computer printout for six surrounding 7.5 minute quadrangle USGS maps in the project region (Monticello Dam, Mt. Vaca, Winters, Allendale, Merritt and Davis). Data obtained June 30.

- California Department of Fish and Game, 1978. *Bird Species of Special Concern in California*, No. 78-1 (June).
- _____, 2001. State and Federally Listed Endangered and Threatened Animals of California. January.

- _____, 2001. Special Animals. January.

- California Department of Parks and Recreation, 1985. *Carmel River Lagoon and Wetland Resource Summary.* May.

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- Wildlife and Fisheries Biology Teaching Museum, University of California at Davis. September 1995.

7.0 Special Wildlife Studies

7.1 Avian Species Diversity (SDI)

Results obtained from time-constrained observations of birds along the PCRC are provided in Table 3. A sample data form, of the type used to summarize seasonal information, is provided as Appendix A.

Seasonal variations in the numbers of species and individuals indicates the importance of the PCRC as a wintering and breeding area for birds. Peaks in avian presence occur during the winter and spring months. The lowest numbers of species and individuals are present during the summer, after breeding has concluded and the hottest weather occurs, when many species migrate away from the region.

In comparison with other similar studies, SDI values were generally lower than expected for a riparian corridor in central California. Several statements can be made regarding the quality of habitats along the PCRC based on recorded SDI data. First, the ability of PCRC habitats to support bird life is relatively uniform from the Putah Diversion Dam to the Putah Sinks in the Yolo Bypass. SDI values ranged around the six year average of 2.50, with a low of 2.18 in the upper reach in 1999 and a high of 2.76 in the lower reach in 1998. No section of the study area appears better able to support bird life than any other.

Second, the PCRC appeared to provide a similar ability to support bird life each year. The highest values, annual SDI 2.65 in 1998, occurred during a year of nearly normal weather

Table 3. Birds encountered[1] during time constrained surveys[2] along selected reaches of the PCRC.

1995

	AVERAGE BY REACH			SEASONAL AVERAGE
	UPPER	MIDDLE	LOWER	
SPECIES ENCOUNTERED				
Winter (January 17-20)	32	33	31	32.0
Spring (April 18-21)	36	33	31	33.0
Summer (August 3-8)	28	25	24	25.1
Fall (November 6-9)	30	26	28	28.0
Annual Totals	**32**	**29**	**29**	**29.5**
TOTAL BIRDS COUNTED				
Winter	232	496	343	372.7
Spring	325	177	221	230.5
Summer	112	117	150	127.5
Fall	221	509	256	341.6
Annual Totals	**223**	**325**	**243**	**268.1**
SPECIES DIVERSITY INDEX				
Winter	2.63	2.28	2.68	2.52
Spring	2.21	2.89	2.74	2.66
Summer	2.67	2.71	2.63	2.67
Fall	2.34	2.00	2.43	2.25
Annual Totals	**2.46**	**2.47**	**2.62**	**2.52**

Table 3 (Continued)

1996

	AVERAGE BY REACH			SEASONAL AVERAGE
SPECIES ENCOUNTERED	UPPER	MIDDLE	LOWER	
Winter (January 22-29)	29	24	32	28.4
Spring (April 24-May 3)	33	30	33	31.6
Summer (July 31-August 5)	21	22	25	22.9
Fall (November 6-9)	25	31	32	30.0
Annual Totals	**27**	**27**	**31**	**28.2**
TOTAL BIRDS COUNTED				
Winter	208	388	421	368.1
Spring	292	261	220	253.4
Summer	147	136	263	186.2
Fall	208	493	466	411.5
Annual Totals	**214**	**320**	**343**	**304.8**
SPECIES DIVERSITY INDEX				
Winter	2.74	1.93	2.64	2.40
Spring	2.21	2.76	2.92	2.68
Summer	2.15	2.42	2.39	2.34
Fall	2.38	2.27	2.27	2.30
Annual Totals	**2.37**	**2.34**	**2.56**	**2.43**

Table 3 (Continued)

1997

	AVERAGE BY REACH			SEASONAL AVERAGE
SPECIES ENCOUNTERED	UPPER	MIDDLE	LOWER	
Winter (January 23-28)	24	27	32	28.0
Spring (April 21-24)	29	28	32	29.5
Summer (July 29 - Aug. 1)	30	27	26	27.1
Fall (November 4-7)	27	28	29	27.9
Annual Totals	**28**	**28**	**30**	**28.1**
TOTAL BIRDS COUNTED				
Winter	139	327	371	296.1
Spring	337	215	247	257.6
Summer	189	234	248	227.9
Fall	375	493*	271	379.5
Annual Totals	**260**	**317**	**284**	**290.3**
SPECIES DIVERSITY INDEX				
Winter	2.71	2.44	2.70	2.60
Spring	2.00	2.74	2.87	2.60
Summer	2.49	2.64	2.24	2.45
Fall	2.26	2.22*	2.44	2.31
Annual Totals	**2.36**	**2.51**	**2.56**	**2.49**

Table 3 (Continued)

1998

	AVERAGE BY REACH			SEASONAL AVERAGE
SPECIES ENCOUNTERED	UPPER	MIDDLE	LOWER	
Winter (February 9-18)	24	27	32	28.0
Spring (April 27-May 1)	30	32	40	34.1
Summer (July 28-31)	25	21	28	24.5
Fall (NO DATA)	-	-	-	-
Annual Totals	**26**	**27**	**33**	**28.1**
TOTAL BIRDS COUNTED				
Winter	139	327	371	296.1
Spring	218	240	252	236.7
Summer	203	154	293	218.6
Fall (NO DATA)	-	-	-	-
Annual Totals	**187**	**240**	**305**	**250.5**
SPECIES DIVERSITY INDEX				
Winter	2.71	2.44	2.70	2.62
Spring	2.61	2.81	3.14	2.85
Summer	2.45	2.56	2.44	2.48
Fall (NO DATA)	-	-	-	-
Annual Totals	**2.59**	**2.60**	**2.76**	**2.65**

Table 3 (Continued)

1999

	AVERAGE BY REACH			SEASONAL AVERAGE
	UPPER	MIDDLE	LOWER	
SPECIES ENCOUNTERED				
Winter (NO DATA)	-	-	-	-
Spring (NO DATA)	-	-	-	-
Summer (August 2-8)	20	21	23	21.6
Fall (Nov.28-Dec.16)	35	27	33	31.1
Annual Totals	**28**	**24**	**28**	**26.4**
TOTAL BIRDS COUNTED				
Winter (NO DATA)	-	-	-	-
Spring (NO DATA)	-	-	-	-
Summer	341	253	259	277.0
Fall	321	395	501	416.1
Annual Totals	**331**	**324**	**380**	**346.6**
SPECIES DIVERSITY INDEX				
Winter	-	-	-	-
Spring	-	-	-	-
Summer	1.60	2.40	2.54	2.25
Fall	2.76	2.18	2.77	2.54
Annual Totals	**2.18**	**2.29**	**2.66**	**2.40**

Table 3 (Continued)

2000

	AVERAGE BY REACH			SEASONAL AVERAGE
SPECIES ENCOUNTERED	UPPER	MIDDLE	LOWER	
Winter (February 3-14)	30	27	34	29.8
Spring (April 18-24)	32	33	34	32.7
Summer (Aug. 24-Sep. 16)	27	28	31	28.8
Fall (Oct.27-Nov. 16)	29	29	36	31.6
Annual Totals	**30**	**29**	**34**	**30.7**
TOTAL BIRDS COUNTED				
Winter	294	480	533	453.1
Spring	747	290	247	388.3
Summer	201	252	700	407.1
Fall	359	565	543	504.9
Annual Totals	**400**	**397**	**506**	**438.4**
SPECIES DIVERSITY INDEX				
Winter	2.75	2.27	2.53	2.49
Spring	1.86	2.78	2.95	2.44
Summer	2.72	2.44	2.19	2.42
Fall	2.48	2.51	2.55	2.52
Annual Totals	**2.45**	**2.50**	**2.56**	**2.47**

Table 3 (Continued)

2001

	AVERAGE BY REACH			SEASONAL AVERAGE
	UPPER	MIDDLE	LOWER	
SPECIES ENCOUNTERED				
Winter (January 2-11)	31	29	34	31.4
Spring (April 13-19)	35	33	36	34.4
Summer NO DATA				
Fall NO DATA				
Annual Totals	**33**	**31**	**35**	**32.9**
TOTAL BIRDS COUNTED				
Winter	434	613	462	511.6
Spring	683	390	283	422.9
Summer NO DATA				
Fall NO DATA				
Annual Totals	**559**	**502**	**373**	**467.3**
SPECIES DIVERSITY INDEX				
Winter	2.45	2.30	2.68	2.48
Spring	1.75	2.52	2.88	2.46
Summer NO DATA				
Fall NO DATA				
Annual Totals	**2.10**	**2.41**	**2.78**	**2.47**

Table 3 (Continued)

[1] = Total of all visual and auditory identifications.

[2] = Four 15-minute transect stations per 2,000-foot census line X two repetitions of each transect = 120 minutes of census time per habitat type.

* = Migrating flocks of approximately 15,000 European starlings were not included in this calculation. See text for discussion.

Upper Reach = Putah Cr. Diversion Dam - Hwy 505
Middle Reach = Highway 505 to Highway 80
Lower Reach = Highway 80 to the Putah Creek Sink

conditions, while one of the lowest, annual SDI 2.43 in 1996, was measured during a year of extremely heavy rainfall and flooding in the PCRC. That this apparent reduction in SDI values was probably not directly related to differences in rainfall is shown by the rise in annual SDI values to 2.49 in 1997, a year of record precipitation and flooding.

Third, the ability of habitats along the PCRC to support birds (wildlife) is similar to that found in other central California riparian corridors which pass through agriculturally developed lands. The six-year annual average SDI value of 2.50 obtained from the PCRC indicates that habitat values for birds along Putah Creek are better than those measured in riparian habitats at Mountain House Creek, San Joaquin County, and Tolay Creek, Sonoma County both heavily impacted by agricultural and other developments, but not as good as those obtained along the much more natural Carmel River riparian corridor in Monterey County. A comparison of PCRC, SDI values with those obtained from some other riparian corridors in central California is provided in Table 4.

7.2 Small Mammal Live-trapping

Three native rodents, western harvest mouse (*Reithrodontomys megalotus*), deer mouse (*Peromyscus maniculatus*) and California vole (*Microtus californicus*) were captured during these systematic trapping efforts. Western harvest mice were trapped only in the upper and middle reaches of the PCRC, deer mice only in middle and lower reaches and California voles in all trapping locations. Table 5 summarizes capture rates for all small mammals live-trapped from 1995 through 2000.

More than sixty per cent of all rodents captured along the PCRC were house mice (*Mus musculus*) and black rats (*Rattus rattus*). The capture rates for these introduced European species, ranged between 61% of all rodents captured in 1995 to 81% of all rodents captured in 1999, while the numbers of native rodent species captured ranged from 19% in 1999 to 39% in 1995.

One species of insectivore, the ornate shrew (*Sorex ornatus*), was captured at least once in all trapping locations during the winter and spring of 1995. None were trapped in 1996 and only

two were trapped in the lower reaches of the PCRC in the spring of 1997, and none have been trapped since 1997.

Table 4. Comparison of avian species diversity in the Putah Creek Riparian Corridor with other similarly studied central California riparian habitats.

	Species Diversity Index[1] (Number of Species Observed)				
Site /Hrs. Obs.	Winter	Spring	Summer	Fall	Annual Average
Mountain House Creek[2] / 24 hrs.	2.11 (52)	2.26 (34)	1.53 (35)	1.54 (47)	2.11 (75)
Tolay Creek[3], / 16 hrs.	2.45 (26)	2.09 (29)	1.59 (19)	2.46 (36)	2.15 (55)
Carmel River[4] /216 hrs.	2.62 (61)	3.09 (67)	2.68 (56)	N.A.	2.80 (91)
Putah Creek[5] /416 hrs.	2.53 (67)	2.65 (67)	2.44 (61)	2.38 (67)	2.50 (106)

1 = Effort and inventory phenology similar but not standardized between sites.

2 = Mountain House Wildlife Habitat Monitoring Program Final Report. Prepared for Trimark Communities. December 1989.

3 = Site 33 Wildlife Habitat Monitoring Program Final Report. Prepared for Golder Associates, Inc. August 1991.

4 = Carmel River Riparian Corridor Wildlife Habitat Monitoring Program. Prepared annually for the Monterey Peninsula Water Management District. February 1993-1997.

5 = Putah Creek Riparian Corridor Wildlife Habitat Monitoring Program. January 1995-2001.

N.A. = Information not available.

Table 5. Seasonal and annual results of small mammal live-trapping along three reaches of the PCRC.

			1995					
	Trap-	Captures/100	Captures by Species[2]					
Site	Nights[1]	Trap Nights	S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Winter	180	5.5	-	3	-	1	1	5
Spring	180	6.7	1	2	-	1	2	6
Summer	180	1.1	-	1	-	1	-	-
Fall	180	3.3	-	3	-	-	1	2
Subtotals	**720**	**4.2**	**1**	**9**	**-**	**3**	**4**	**13**
M-2								
Winter	180	1.7	1	1	-	1	-	-
Spring	180	1.1	-	1	-	1	-	-
Summer	180	5.0	-	2	-	1	5	1
Fall	180	6.1	-	1	-	1	7	2
Subtotals	**720**	**3.5**	**1**	**5**	**-**	**4**	**12**	**3**
L-3								
Winter	180	4.4	1	-	2	2	3	-
Spring	180	0.5	1	-	-	-	-	-
Summer	180	0.0	-	-	-	-	-	-
Fall	180	6.1	-	-	-	-	5	6
Subtotals	**720**	**2.8**	**2**	**-**	**2**	**2**	**8**	**6**
Annual Totals	**2160**	**3.5**	**4**	**14**	**2**	**9**	**22**	**22**

Table 5 (Continued)

1996

Site	Trap-Nights[1]	Captures/100 Trap Nights	Captures by Species[2] S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Winter	180	0.5	-	1	-	-	-	-
Spring	180	2.8	-	3	-	-	1	1
Summer	180	2.2	-	2	-	-	2	-
Fall	180	4.4	-	7	-	-	1	-
Totals	**720**	**2.5**	-	**13**	-	-	**4**	**1**
M-2								
Winter	180	5.6	-	-	-	2	8	-
Spring	180	6.7	-	-	3	-	9	-
Summer	90	6.7	-	-	-	-	6	-
Fall	180	3.9	-	-	-	2	2	3
Totals	**630**	**5.6**	-	-	**3**	**4**	**25**	**3**
L-3								
Winter	180	6.1	-	-	-	-	11	-
Spring	180	1.1	-	-	-	-	2	-
Summer	180	0	-	-	-	-	-	-
Fall	180	7.2	-	-	-	1	11	1
Totals	**720**	**3.6**	-	-	-	**1**	**24**	**1**
Annual Totals	**2070**	**3.8**	-	**13**	**3**	**5**	**53**	**5**

Table 5 (Continued)

1997

Site	Trap-Nights[1]	Captures/100 Trap Nights	Captures by Species[2] S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Winter	180	3.3	-	2	-	-	3	1
Spring	180	1.	-	-	-	-	2	1
Summer	180	1.1	-	-	-	-	1	1
Fall	180	0.6	-	-	-	-	-	1
Totals	**720**	**1.7**	-	**2**	-	-	**6**	**4**
M-2								
Winter	180	5.0	-	2	-	1	3	3
Spring	180	3.9	-	-	-	5	2	-
Summer	180	9.4	-	-	-	4	13	-
Fall	180	15.0	-	1	-	6	14	6
Totals	**630**	**9.5**	-	**3**	-	**16**	**32**	**9**
L-3								
Winter	*	*	-	-	-	-	-	-
Spring	180	5.0	2	-	1	-	2	4
Summer	180	0	-	-	-	-	-	-
Fall	180	5.6	-	-	4	-	2	4
Totals	**540**	**3.5**	**2**		**5**		**4**	**8**
Annual Totals	**1980**	**4.6**	**2**	**5**	**5**	**16**	**42**	**21**

* Site flooded - no trapping possible.

Table 5 (Continued)

1998

Site	Trap-Nights[1]	Captures/100 Trap Nights	Captures by Species[2] S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Winter	180	1.8	-	-	-	1	-	-
Spring	180	1.7	-	-	-	3	-	-
Summer	180	1.7	-	-	-	-	1	2
Totals	**540**	**1.3**	-	-	-	**1**	**4**	**2**
M-2								
Winter	180	8.9	-	-	-	6	4	6
Spring	180	3.3	-	-	-	2	3	1
Summer	180	10.0	-	-	-	2	14	2
Totals	**540**	**7.4**	-	-	-	**10**	**21**	**9**
L-3								
Winter	180	12.8	-	-	-	13	7	3
Spring	180	4.4	-	-	6	-	1	1
Summer	180	5.0	-	-	-	-	7	2
Totals	**540**	**7.4**	-	-	**6**	**13**	**15**	**6**
Annual Totals	**1620**	5.4	-	-	**6**	**24**	**40**	**17**

Table 5 (Continued)

1999

Site	Trap-Nights[1]	Captures/100 Trap Nights	Captures by Species[2] S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Fall	180	3.3	-	5	-	-	1	-
Totals	**180**	**3.3**	-	**5**	-	-	**1**	-
M-2								
Fall	180	2.7	-	2	-	1	1	1
Totals	**180**	**2.7**	-	**2**	-	**1**	**1**	**1**
L-3								
Fall	180	5.6	-	-	-	-	31	-
Totals	**180**	**17.2**	-		-	-	**31**	-
Annual Totals	**540**	**7.7**	-	**7**	-	**1**	**33**	**1**

Table 5 (Continued)

2000

Site	Trap-Nights[1]	Captures/100 Trap Nights	Captures by Species[2] S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Spring	180	0.0	-	-	-	-	-	-
Fall	180	1.7	-	3	-	-	-	-
Totals	**360**	**1.2**	-	**3**	-	-	-	-
M-2								
Spring	180	0.6	-	-	-	1	-	-
Fall	180	1.1	-	1	-	1	-	-
Totals	**360**	**1.7**	-	**1**	-	**2**	-	-
L-3								
Spring	180	0.6	-	-	-	-	1	-
Fall	180	22.2	-	1	7	2	29	1
Totals	**360**	**22.8**	-	**1**	**7**	**2**	**30**	**1**
Annual Totals	**1080**	**4.3**	-	**5**	**7**	**4**	**30**	**1**

Table 5 (Continued)

2001

Site	Trap-Nights[1]	Captures/100 Trap Nights	Captures by Species[2] S.o.	R.m.	P.m.	M.c.	M.m.	R.r.
U-1								
Spring	180	3.8	-	-	7	-	-	-
Totals	**180**	**3.8**	-	-	7	-	-	-
M-2								
Spring	180	1.1	-	-	-	2	-	-
Totals	**180**	**1.1**	-	-	-	**2**	-	-
L-3								
Spring	180	12.2	-	-	-	-	22	-
Totals	**180**	**12.2**	-	-	-	-	**22**	-
Annual Totals	**540**	**5.7**	-	-	7	**2**	**22**	-

Table 5 (Continued)

U-1 = Upper Putah Creek Riparian Woodland and Roadside/Grass Habitats east of the Putah Creek Diversion Dam; GPS coordinates 38°29.36 North, 122°00.50 West)
M-2 = Middle Putah Creek Riparian Woodland and Roadside/Grass Habitats east of the Stevenson Bridge; GPS coordinates 38°31.94 North, 121°51.27 West.
L-3 = Lower Putah Creek Riparian Woodland and Roadside/Grass Habitats east of County Road 106A; GPS coordinates 38°30.97N, 121°38.74 W

[1] = One trap set for one night

[2] = Species abbreviations

S.o. = *Sorex ornatus* - Ornate Shrew
R.m. = *Reithrodontomys megalotus* - Western Harvest Mouse
P.m. = *Peromyscsus maniculatus* - Deer Mouse
M.c. = *Microtus californicus* - California Vole
M.m. = *Mus musculus* - House Mouse
R.r. = *Rattus rattus* - Black Rat

NOTE: In 1995, 1996, and 1997, small mammal trapping was performed 4 times per year. In 1998, small mammal trapping was performed in winter, spring, and summer. In 1999, small mammal trapping was resumed again in the fall only. In 2000, small mammal trapping was performed in spring and fall, and in 2001 trapping was performed in the spring only.

Capture rates for small mammals were very low throughout the PCRC. The highest annual capture rate, 8.3 per 100 trap-nights (one trap set for one night equals one trap-night), was obtained near Stevenson Bridge in 1997. Seasonal capture rates ranged from no captures during the summers of 1995, 1996, and 1997 near the eastern end of the PCRC (trap line L-3) and in the spring of 2000 near the western end of the PCRC (trap line U-1) to 15.0 captures per 100 trap-nights near Stevenson Bridge (trap line U-2) in the Fall of 1997 and 22.2 captures per 100 trap nights east of Road 106A (trap line L-3) in the Fall of 2000. In both of the latter cases, non-native species comprised approximately 75% of all rodents captured, primarily attributable to large numbers of *M. musculus* at both sites.

Capture rates for small mammals were generally lower along the PCRC than were those obtained during similar trapping efforts in other central California riparian habitats. Table 6 compares PCRC small mammal capture data with those obtained from other central California, riparian habitats, using the same methods and protocol employed in this study. Even with the presence of a large cohort of European rodents in the PCRC study area, the capture rate for small mammals is the lowest of any similarly studied area.

When only native species are included in the tabulations, the already low PCRC capture rate of 4.4 per 100 trap nights is reduced to only 1.4 per 100 trap nights, a much lower capture rate than obtained anywhere else (Table 6). The Mountain House and Tolay Creek riparian corridors, both narrow drainages through heavily grazed agricultural areas, also yielded significant numbers of non-native rodents, 41 and 22 per cent of all captures, respectively.

Table 6. Small mammal live-trapping, capture rates in the Putah Creek Riparian Corridor and other, similarly trapped, central California riparian habitats.

Site	Trap-Nights	Captures/100 Trap Nights: All Species	Captures/100 Trap Nights: Native Species
Marsh Creek[1], Contra Costa County, 1988-89.	300	5.3	5.3
Mountain House Creek[2], San Joaquin County, 1989.	480	14.4	9.7
Tolay Creek tributary[3], Sonoma County, 1990-91.	480	6.9	5.6
Carmel River[4], Monterey County, 1992-93.	595	10.9	10.9
Putah Creek[5], Solano/Yolo Counties, 1995-2001.	9990	4.4	1.4

1 = Marsh Canyon Landfill Site Environmental Evaluation. Golder Assoc., Inc. April 1988.
2 = Mountain House Wildlife Habitat Monitoring Program Final Report. Prepared for Trimark Communities. December 1989.
3 = Site 33 Wildlife Habitat Monitoring Program Final Report. Prepared for Golder Associates, Inc. August 1991.
4 = Carmel River Riparian Corridor Wildlife Habitat Monitoring Program. Prepared annually for the Monterey Peninsula Water Management District. February 1993-1997.
5 = Putah Creek Riparian Corridor Wildlife Habitat Monitoring Program. January 1995-2001.

SECTION IV
DISCUSSION

The analyses of data collected during six years of this wildlife monitoring program suggest that the wildlife habitat values for the lower reaches of the Putah Creek Riparian Corridor are moderate to low. The assemblage of vertebrate fauna is typical of most riparian habitats in the Central Valley region of California, though many species observed during the surveys for this study were recorded only occasionally and few utilized the PCRC for breeding or permanent residence.

One sign of the low wildlife habitat values of the PCRC is the extremely low diversity and numbers of reptiles and amphibians encountered. Even the western fence lizard, a reptile commonly encountered in great numbers throughout a wide variety of central California habitats, was seen only infrequently. Garter snakes, which usually abound in most aquatic habitats, were encountered only rarely near Lake Solano above the Putah Diversion Dam. No other species of reptile, except the western pond turtle, was recorded with any regularity.

With the exception of the introduced bullfrog, which can be found all along the PCRC, few other amphibians such as salamanders, treefrogs, and toads were rarely found during surveys. The nearby use of agricultural pesticides and the burden of excess chemicals in agricultural runoff into PCRC habitats probably play significant roles in reducing these usually common wildlife components to levels well below those observed in other Central California riparian areas. Intense efforts to control insects, the small prey upon which most amphibians depend, and the pollution of aquatic breeding sites are the most probable factors limiting their numbers and diversity.

The diversity of small mammalian species is low in the PCRC. Native species are extremely rare while certain European rodents, those particularly well adapted for life in disturbed agricultural and urban developments, seem to be gradually increasing. Situations like this are often encountered in disturbed areas where introduced mice and rats successfully compete for resources in habitats that are otherwise only marginally suitable for native species.

Systematic live-trapping efforts show that the diversity and numbers of small mammals, especially rodents, is below that typically encountered in similar riparian habitats in Central California. The concentration of predators on this narrow corridor and the frequent, nearby use of large quantities of agricultural chemicals and poison baits observed to be used to control weeds, insects, and agricultural pests limit the ability of PCRC habitats to sustain expected population levels of small mammals. In turn, the paucity of small mammals, the base of the food chain in most ecosystems, limits the PCRC as suitable habitat for the reptiles, birds and larger mammals that prey on them.

The reduced availability of rodents limits foraging possibilities for larger mammals, birds of prey, and reptiles. This reduced prey availability is further accentuated by the more nocturnal activity patterns of the introduced European rodents, which makes them generally less available as prey than the more diurnally active native rodents.

Canids are also present in very low numbers. The native gray fox has been displaced from the eastern PCRC by competition from the introduced red fox. Only a few gray foxes remain in the PCRC west of Winters. Coyotes still forage mainly in the upper and lower reaches of the study area. These appear to be primarily scavengers of agricultural and residential waste and to hunt ground-nesting birds such as quail and pheasants. Domestic dogs from residences along the PCRC and strays from Winters and Davis also compete with native canids.

The diversity of bird species in the PCRC, as measured during this study by the Shannon-Weaver Species Diversity Index, was between that measured in very disturbed and relatively undisturbed riparian habitats in Central California. Applied as a multi-seasonal, functional, assessment of general wildlife habitat values along the PCRC, these data indicate that, at the present time, wildlife habitats along the PCRC are not as severely impacted by the encroachment of agricultural or urban development as habitats in some other riparian areas in central California.

The perennial creek, with its flow rarely less than 15 cubic feet per second, provides a stable water supply for terrestrial wildlife. The quantity of this water, even during the peak of the agricultural season when the creek is at its lowest, summer level, appears to be more than adequate to meet the

needs of wildlife, as evidenced by the activity of aquatic mammals such as the river otter, beaver, and muskrat in all seasons of the year.

Probably the most significant negative factor influencing wildlife use of the PCRC is its small size. Agricultural development, to the bank tops in most areas, while providing foraging possibilities for wildlife adapted to agricultural development (e.g., crows, blackbirds, and starlings), constricts the PCRC within a very narrow corridor. Where the corridor widens, west of Winters and east of Mace Road to the Putah Sinks area, wildlife activity increases.

Runoff from frequent, nearby applications of herbicides, insecticides, fertilizers and other agricultural chemicals, degrades the ability of PCRC habitats to maintain wildlife. Aerial application of these chemicals has been frequently observed during data collection activities and often results in their deposit directly into the PCRC when sprays drift with the wind or dusters fail to cut their sprays as they near or fly over the PCRC. The disposal of agricultural wastes and urban refuse directly into the PCRC further diminishes its capacity to support wildlife by reducing habitable areas and increasing toxic components which leach from these illegal deposits.

The increasing use of the PCRC for residential construction and the resulting disturbance to wildlife by residents and recreationists also impact wildlife. Domestic house cats from residences in and near the PCRC and unwanted pets which have survived to become feral were observed during almost every wildlife survey for this study. These skillful predators were observed while hunting or in possession of small reptiles, such as fence and alligator lizards, small mammals and a wide variety of birds.

No native predator with the particular hunting capabilities of the feral house cat, had yet evolved in North America prior to the recent introduction of this exotic predator. As a result, native species, especially small, ground nesting birds (e.g., quail, pheasants and the offspring of shorebirds and waterfowl) have not evolved behavioral and other defense mechanisms with which to avoid these efficient predators and become easy prey. One house cat was even observed in an unsuccessful attack on an adult male pheasant, hidden in tall grass.

Though impractical to implement, wildlife utilization of the PCRC would be most enhanced by the

development of a 100 to 200 foot buffer zone of undeveloped wildlands on either side of the creek. A buffer of this width would greatly reduce the amount of agricultural chemicals accidentally spread into wildlife habitats by aerial spraying and agricultural and urban runoff before they reach sensitive wildlife habitats. The addition of undisturbed breeding and foraging areas would permit many remnant wildlife populations to re-establish themselves and possibly flourish.

SECTION V
REPORT PREPARATION

The 1998 version of this report was prepared by David A. Mullen, Ph.D., an Environmental Consultant, P.O. Box 9087, Berkeley, CA 94709. Gary A. Beeman of Beeman & Associates, 777 Moraga Road, Lafayette, CA. 94549 provided valuable information and field assistance in the location and monitoring of Swainson's hawk and other raptor nests.

No field work or any other efforts associated with the Putah Creek Riparian Corridor Wildlife Monitoring Program were conducted from September 1998 to April 1999 due to the serious illness of the principal investigator, Dr. David A. Mullen. In the May of 1999, at the recommendation of Dr. Mullen and with the concurrence of Mr. Roland Sanford, Assistant General Manager of the Solano County Water Agency (SCWA), Dr. Mullen initiated a transition period to a new principal investigator for this study. Mr. Michael A. Melanson, M.S., earned his Master's Degree in Biology as a California State Graduate Fellow in Biology under the direction of Dr. Mullen at the University of San Francisco in 1974. Mr Melanson was, therefore, intimately acquainted with Dr. Mullen's approach to field biology investigations and methodology, being indebted to Dr. Mullen for most of his abilities in these techniques. Mr. Melanson commenced field survey work with Dr. Mullen in June of 1999 along the PCRC and assumed primary responsibility for the PCRC Wildlife Monitoring Program in August 1999 when Dr. Mullen was no longer able to continue with the work.

This current report was prepared by Mr. Michael A. Melanson, Environmental Consultant, 9040 Hazel Oak Court, Orangevale, California 95662-2723. Mr. Roland Sanford, Assistant General Manager of the SCWA, provided valuable information and direction for this summary report.

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APPENDIX A

SAMPLE SEASONAL SDI SUMMARY DATA SPREADSHEET

Avian SDI Counts:
Oct. 27-Nov. 16, 2000

Wil\dlife Habitat Monitoring Program
Lower Putah Creek, California

Species	U1 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))	U2 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))
Pied-billed Grebe								
Eared Grebe								
Western Grebe								
American White Pelican								
Double-crested Cormorant	3	0.00614754	-5.0917031	-0.031301454				
Great Blue Heron					1	0.00436681	-5.433722	-0.023728044
Green-backed Heron								
Great Egret	2	0.00409836	-5.4971682	-0.022529378				
Snowy Egret								
Cattle Egret								
Black-crowned Night Heron								
White-faced Ibis								
American Bittern								
Sandhill Crane								
Tundra Swan								
Canada Goose	188	0.3852459	-0.9538734	-0.367475835				
Snow Goose								
Ross' Goose								
Greater White-fronted Goose								
Mallard	30	0.06147541	-2.789118	-0.171462174				
Pintail								
Gadwall								
Cinnamon Teal								
Green-winged Teal								
Northern Shoveler								
American Wigeon								
Canvasback								
Redhead								
Greater Scaup								
Lesser Scaup								
Ring-necked scaup								
Wood Duck	8	0.01639344	-4.1108739	-0.067391375				
Common Goldeneye								
Bufflehead								

Avian SDI Counts:
Oct. 27-Nov. 16, 2000

Wil\dlife Habitat Monitoring Program
Lower Putah Creek, California

Species	U1 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))	U2 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))
Ruddy Duck Hooded Merganser Common Merganser	5	0.0102459	-4.5808775	-0.04693522				
Turkey Vulture White-tailed Kite Cooper's Hawk	1	0.00204918	-6.1903154	-0.012685073	5 1	0.02183406 0.00436681	-3.8242841 -5.433722	-0.083499653 -0.023728044
Sharp-shinned Hawk Rough-legged Hawk Ferruginous Hawk								
Red-tailed Hawk Red-shouldered Hawk Swainson's Hawk					2	0.00873362	-4.7405748	-0.0414024
Golden Eagle Bald Eagle Northern Harrier								
Osprey American Kestrel Merlin	1	0.00204918	-6.1903154	-0.012685073				
American Peregrine Falcon Prairie Falcon Wild Turkey								
California Quail Ring-necked Pheasant Virginia Rail								
Sora Rail Common Moorhen American Coot								
Killdeer Black-bellied Plover California Gull	1	0.00204918	-6.1903154	-0.012685073	1	0.00436681	-5.433722	-0.023728044
Ring-billed Gull Mew Gull Herring Gull								
Thayer's Gull Glaucous-winged Gull								

Avian SDI Counts:
Oct. 27-Nov. 16, 2000

Wil\dlife Habitat Monitoring Program
Lower Putah Creek, California

Species	U1 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))	U2 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))
Forster's Tern								
Black Tern								
Mourning Dove	1	0.00204918	-6.1903154	-0.012685073	1	0.00436681	-5.433722	-0.023728044
Band-tailed Pigeon								
Ringed Turtle-dove								
Rock Dove								
Common Snipe					1	0.00436681	-5.433722	-0.023728044
Long-billed Dowitcher								
Long-billed Curlew								
Spotted Sandpiper					2	0.00873362	-4.7405748	-0.0414024
Greater Yellowlegs								
Whimbrel								
Least Sandpiper								
Western Sandpiper								
Dunlin								
American Avocet								
Black-necked Stilt								
Western Screech Owl								
Great Horned Owl								
Northern Pygmy-owl								
Barn Owl								
Burrowing Owl								
Long-eared Owl								
Common Poorwill								
White-throated Swift								
Vaux's Swift								
Black-chinned Hummingbird								
Anna's Hummingbird	3	0.00614754	-5.0917031	-0.031301454	5	0.02183406	-3.8242841	-0.083499653
Costa's Hummingbird								
Allen's Hummingbird								
Rufous Hummingbird								
Belted Kingfisher	11	0.02254098	-3.7924201	-0.08548488	5	0.02183406	-3.8242841	-0.083499653
Northern Flicker	23	0.04713115	-3.0548212	-0.143977228	17	0.07423581	-2.6005087	-0.193050861
Acorn Woodpecker	8	0.01639344	-4.1108739	-0.067391375				
Lewis' Woodpecker								

Avian SDI Counts:
Oct. 27-Nov. 16, 2000

Wil\dlife Habitat Monitoring Program
Lower Putah Creek, California

Species	U1 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))	U2 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))
Red-breasted sapsucker								
Nuttall's Woodpecker	8	0.01639344	-4.1108739	-0.067391375	4	0.01746725	-4.0474276	-0.070697426
Hairy Woodpecker								
Downy Woodpecker								
Western Kingbird								
Ash-throated Flycatcher								
Pacific-slope Flycatcher								
Western Wood-pewee								
Olive-sided Flycatcher								
Black Phoebe	18	0.03688525	-3.2999436	-0.121719233	6	0.02620087	-3.6419625	-0.095422599
Say's Phoebe								
Willow Flycatcher								
Hammond's Flycatcher								
Dusky Flycatcher								
Horned Lark								
Barn Swallow								
Cliff Swallow								
Violet-green Swallow								
Tree Swallow								
Northern Rough-winged Swallow								
Scrub Jay	37	0.07581967	-2.5793975	-0.195569072	53	0.23144105	-1.4634301	-0.338697794
Yellow-billed Magpie	14	0.02868852	-3.5512581	-0.101880355				
American Crow					1	0.00436681	-5.433722	-0.023728044
Common Raven								
Common Bushtit	41	0.08401639	-2.4767433	-0.208087043				
Plain Titmouse	3	0.00614754	-5.0917031	-0.031301454	4	0.01746725	-4.0474276	-0.070697426
White-breasted Nuthach					1	0.00436681	-5.433722	-0.023728044
Red-breasted Nuthatch								
Brown Creeper								
Wrentit								
Bewick's Wren	4	0.00819672	-4.804021	-0.039377222	5	0.02183406	-3.8242841	-0.083499653
House Wren								
Marsh Wren								
Canyon Wren								
Rock Wren								

Avian SDI Counts:
Oct. 27-Nov. 16, 2000

Wil\dlife Habitat Monitoring Program
Lower Putah Creek, California

Species	U1 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))	U2 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))
Northern Mockingbird								
California Thrasher								
American Robin	6	0.01229508	-4.3985559	-0.054080606	37	0.16157205	-1.8228041	-0.294514198
Varied Thrush								
Swainson's Thrush								
Hemit Thrush								
Western Bluebird	3	0.00614754	-5.0917031	-0.031301454				
Blue-gray Gnatcatcher								
Ruby-crowned Kinglet	14	0.02868852	-3.5512581	-0.101880355	19	0.08296943	-2.489283	-0.206534399
Golden-crowned Kinglet								
American Pipit								
Cedar Waxwing								
Phainopepla								
Loggerhead Shrike								
European Starling								
Solitary Vireo								
Hutton's Vireo								
Warbling Vireo								
Orange-crowned Warbler								
Nashville Warbler								
Yellow-rumped Warbler	2	0.00409836	-5.4971682	-0.022529378	23	0.10043668	-2.2982278	-0.230826372
Black-throated Gray Warbler								
Townsend's Warbler								
Yellow Warbler								
Black-and-white Warbler								
MacGillivray's Warbler								
Wilson's Warbler								
Western Tanager								
Common Yellowthroat								
Yellow-breasted Chat								
House Sparrow								
Yellow-headed Blackbird								
Red-winged Blackbird	1	0.00204918	-6.1903154	-0.012685073				
Tricolored Blackbird								
Brewer's Blackbird								

Avian SDI Counts:
Oct. 27-Nov. 16, 2000

Wil\dlife Habitat Monitoring Program
Lower Putah Creek, California

Species	U1 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))	U2 (ni)	ni/N	Ln(ni/N)	(ni/N)(Ln(ni/N))
Brown-headed Cowbird								
Northern Oriole								
Western Meadowlark	7	0.01434426	-4.2444053	-0.060882862				
Black-headed Grosbeak								
Blue Grosbeak								
Lazuli Bunting								
Purple Finch								
House Finch (Linnet)					6	0.02620087	-3.6419625	-0.095422599
Pine Siskin								
American Goldfinch	1	0.00204918	-6.1903154	-0.012685073				
Lesser Goldfinch	36	0.07377049	-2.6067965	-0.192304657	3	0.01310044	-4.3351097	-0.05679183
Rufous-sided Towhee	1	0.00204918	-6.1903154	-0.012685073				
California Towhee	7	0.01434426	-4.2444053	-0.060882862	2	0.00873362	-4.7405748	-0.0414024
Savannah Sparrow								
Vesper Sparrow								
Lark Sparrow								
Rufous-crowned Sparrow								
Dark-eyed Junco								
White-throated Sparrow								
White-crowned Sparrow								
Golden-crowned Sparrow					21	0.09170306	-2.3891996	-0.219096903
Fox Sparrow								
Lincoln's Sparrow								
Song Sparrow					3	0.01310044	-4.3351097	-0.05679183
	31				26			

N (Total)	488	SDI U1 =	2.413233806	229	SDI U2 =	2.552846356

Total birds	4039	SDI Averages	
Seasonal Average	504.9	Upper	2.483040081
		Middle	2.507843905
Total Species	253	Lower	2.546023127
Seasonal Average	31.63	Seasonal Av	2.515960157

APPENDIX B

PHOTOGRAPHS OF THE EIGHT AVIAN SPECIES DIVERSITY INDEX TRANSECTS ALONG THE PCRC APRIL 2000

Putah Creek Wildlife Habitat Monitoring Program
Avian Species Diversity Index Transect U-1-1:
Date of Photograph: April 17, 2000

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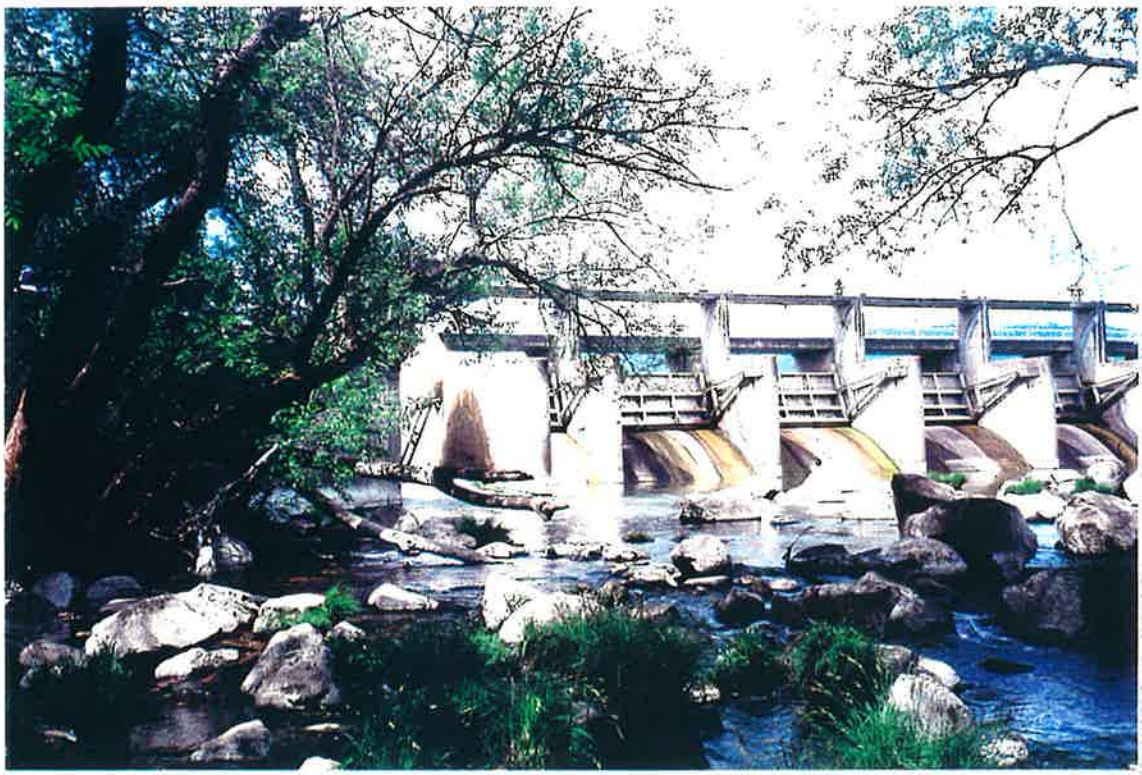

Putah Creek Wildlife Habitat Monitoring Program
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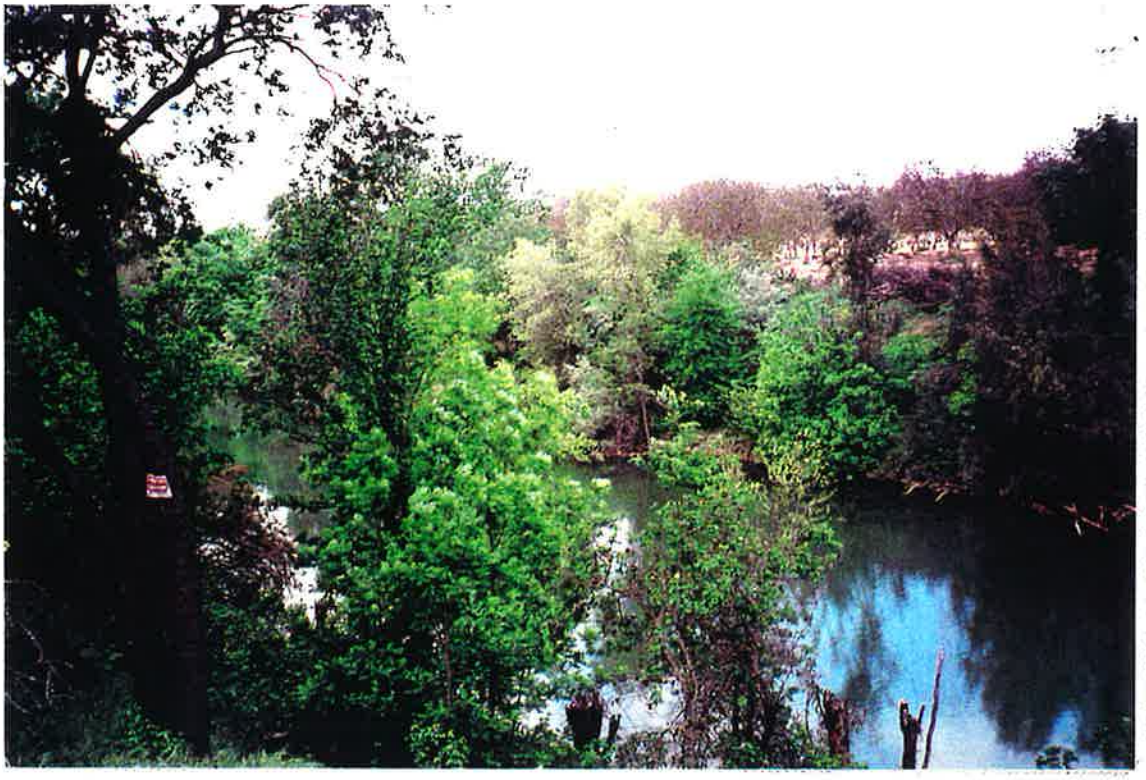

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Putah Creek Wildlife Habitat Monitoring Program
Avian Species Diversity Index Transect L-6-4:
Date of Photograph: April 16, 2000

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Putah Creek Wildlife Habitat Monitoring Program
Avian Species Diversity Index Transect L-7-1:
Date of Photograph: April 16, 2000

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Putah Creek Wildlife Habitat Monitoring Program
Avian Species Diversity Index Transect L-7-2:
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Putah Creek Wildlife Habitat Monitoring Program
Avian Species Diversity Index Transect L-7-2:
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Putah Creek Wildlife Habitat Monitoring Program
Avian Species Diversity Index Transect L-7-2:
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Putah Creek Wildlife Habitat Monitoring Program
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Putah Creek Wildlife Habitat Monitoring Program
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Putah Creek Wildlife Habitat Monitoring Program
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APPENDIX C

STATE AND FEDERALLY LISTED ENDANGERED AND THREATENED ANIMALS OF CALIFORNIA, CALIFORNIA DEPARTMENT OF FISH AND GAME JANUARY 2001

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME
Habitat Conservation Division
Wildlife and Habitat Data Analysis Branch
California Natural Diversity Database

STATE AND FEDERALLY LISTED ENDANGERED AND THREATENED ANIMALS OF CALIFORNIA

January 2001

This is a list of the animals found within California or off the coast of the State that have been classified as Endangered or Threatened by the California Fish and Game Commission (state list) or by the U. S. Secretary of the Interior or the U. S. Secretary of Commerce (federal list).

The official California listing of Endangered and Threatened animals is contained in the California Code of Regulations, Title 14, Section 670.5. The official federal listing of Endangered and Threatened animals is published in the Federal Register, 50 CFR 17.11.

Animals that are candidates for state listing and animals proposed for federal listing are also included on this list. A state candidate species is one that the Fish and Game Commission has formally noticed as being under review by the Department for addition to the State list. A federal proposed species is one for which a proposed regulation has been published in the Federal Register.

Code Designation:	Totals as of January 2001
SE = State-listed Endangered	47
ST = State-listed Threatened	30
FE = Federally listed Endangered	75
FT = Federally listed Threatened	41
SCE = State candidate (Endangered)	0
SCT = State candidate (Threatened)	0
FPE = Federally proposed (Endangered)	5
FPT = Federally proposed (Threatened)	1
FPD = Federally proposed (Delisting)	2

Total number of animals listed (includes subspecies & population segments)	145
Total number of candidate/proposed animals for listing	6
Number of animals State listed only	29
Number of animals Federally listed only	68
Number of animals listed under both State & Federal Acts	48

Common and scientific names are shown as they appear on the state or federal lists. If the nomenclature differs for a species that is included on both lists, the state nomenclature is given and the federal nomenclature is shown in a footnote. Synonyms, names changes, and other clarifying points are also footnoted.

Critical Habitat is defined in Section 3 of the federal Endangered Species Act as specific areas, both occupied and unoccupied, that are essential to the conservation of a listed species and that may require special management considerations or protection.

Changes to this update of the list are denoted by *

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	and Date
GASTROPODS						
Trinity bristle snail *(Monadenia setosa)*	ST[1]	10-2-80				
Morro shoulderband (= banded dune) snail *(Helminthoglypta walkeriana)*			FE	1-17-95	Proposed	7-12-00
White abalone *(Haliotis sorenseni)*			FPE	5-5-00		
CRUSTACEANS						
Riverside fairy shrimp *(Streptocephalus woottoni)*			FE	8-3-93	Proposed	9-21-00
Conservancy fairy shrimp *(Branchinecta conservatio)*			FE	9-19-94		
Longhorn fairy shrimp *(Branchinecta longiantenna)*			FE	9-19-94		
Vernal pool fairy shrimp *(Branchinecta lynchi)*			FT	9-19-94		
San Diego fairy shrimp *(Branchinecta sandiegoensis)*			FE	2-3-97	Final	10-23-00
Vernal pool tadpole shrimp *(Lepidurus packardi)*			FE	9-19-94		
Shasta crayfish[2] *(Pacifastacus fortis)*	SE ST	2-26-88 10-2-80	FE	9-30-88		
California freshwater shrimp *(Syncaris pacifica)*	SE	10-2-80	FE	10-31-88		
INSECTS						
Zayante band-winged grasshopper *(Trimerotropis infantilis)*			FE	2-24-97	Proposed	7-7-00
Mount Hermon June beetle *(Polyphylla barbata)*			FE	2-24-97		
Delta green ground beetle *(Elaphrus viridis)*			FT	8-8-80	Final	8-8-80
Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)*			FT	8-8-80	Final	8-8-80
Ohlone tiger beetle *(Cicindela ohlone)*			FPE	2-11-00		
Kern primrose sphinx moth *(Euproserpinus euterpe)*			FT	4-8-80	Proposed	7-3-78
Mission blue butterfly *(Icaricia icarioides missionensis)*			FE	6-1-76	Proposed	2-8-77
Lotis blue butterfly *(Lycaeides argyrognomon lotis)*			FE	6-1-76	Proposed	2-8-77

[1]On January 1, 1985, all species designated as "rare" were reclassified as "threatened", as stipulated by the California Endangered Species Act.

[2]Federal: Shasta (=placid) crayfish

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	and Date
INSECTS (continued)						
Palos Verdes blue butterfly *(Glaucopsyche lygdamus palosverdesensis)*			FE	7-2-80	Final	7-2-80
El Segundo blue butterfly *(Euphilotes battoides allyni)*			FE	6-1-76	Proposed	2-8-77
Smith's blue butterfly *(Euphilotes enoptes smithi)*			FE	6-1-76	Proposed	2-8-77
San Bruno elfin butterfly *(Incisalia mossii bayensis)*[3]			FE	6-1-76	Proposed	2-8-77
Lange's metalmark butterfly *(Apodemia mormo langei)*			FE	6-1-76	Proposed	2-8-77
Bay checkerspot butterfly *(Euphydryas editha bayensis)*			FT	10-18-87	Proposed	10-16-00
Quino checkerspot *(Euphydryas edüha quino)*			FE	1-16-97		
Laguna Mountains skipper *(Pyrgus ruralis lagunae)*			FE	1-16-97		
Callippe silverspot butterfly *(Speyeria callippe callippe)*			FE	12-5-97	Proposed	3-28-80
Behren's silverspot butterfly *(Speyeria zerene behrensii)*			FE	12-5-97		
Oregon silverspot butterfly *(Speyeria zerene hippolyta)*			FT	7-2-80	Final	7-2-80
Myrtle's silverspot butterfly *(Speyeria zerene myrtleae)*			FE	6-22-92		
Delhi Sands flower-loving fly *(Rhaphiomidas terminatus abdominalis)*			FE	9-23-93		
FISHES						
Winter-run chinook salmon[4] *(Oncorhynchus tshawytscha)*	SE	9-22-89	FE	2-3-94	Final	3-23-99
Chinook salmon-California coastal ESU[5] *(Oncorhynchus tshawytscha)*			FT[6]	11-15-99	Final	2-16-00
Spring-run chinook salmon *(Oncorhynchus tshawytscha)*	ST	2-5-99	FT[7]	11-15-99	Final	2-16-00

[3]Federal: *Callophrys mossii bayensis*

[4]Federal: Sacramento River winter run chinook salmon

[5]ESU = Evolutionarily Significant Unit

[6]Naturally spawned coastal spring & fall chinook salmon between Redwood Creek in Humboldt Co. & the Russian River in Sonoma Co.

[7]Federal: Central Valley Spring-Run ESU. Includes populations spawning in the Sacramento River & its tributaries

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation and Date	
FISHES (continued)						
Coho salmon-Central California ESU *(Oncorhynchus kisutch)*	SE[8]	12-31-95	FT[9]	12-2-96		
Coho salmon-So. Oregon/No. California ESU[10] *(Oncorhynchus kisutch)*			FT	6-5-97	Final	2-16-00
Little Kern golden trout *(Oncorhynchus mykiss whitei)*[11]			FT	4-13-78	Final	4-13-78
Lahontan cutthroat trout *(Oncorhynchus clarki henshawi)*[12]			FT FE	7-16-75 10-13-70		
Paiute cutthroat trout *(Oncorhynchus clarki seleniris)*[13]			FT FE	7-16-75 3-11-67		
Steelhead-Northern California ESU[14] *(Oncorhynchus mykiss)*			FT	8-7-00		
Steelhead-Central California Coast ESU[15] *(Oncorhynchus mykiss)*			FT	10-17-97	Final	2-16-00
Steelhead-South/Central California Coast ESU[16] *(Oncorhynchus mykiss)*			FT	10-17-97	Final	2-16-00
Steelhead-Southern California ESU[17] *(Oncorhynchus mykiss)*			FE	10-17-97	Final	2-16-00
Steelhead-Central Valley ESU[18] *(Oncorhynchus mykiss)*			FT	5-18-98	Final	2-16-00
Bull trout *(Salvelinus confluentus)*	SE	10-2-80	FT	12-1-99		

[8]The State listing is limited to Coho south of San Francisco Bay.

[9]The Federal listing is limited to naturally spawning populations in streams between Punta Gorda, Humboldt Co. & the San Lorenzo River, Santa Cruz Co.

[10]Populations between Cape Blanco, Oregon & Punta Gorda, California.

[11]Federal: *Oncorhynchus (=Salmo) aguabonita whitei*

[12]Federal: *Oncorhynchus (=Salmo) clarki henshawi*

[13]Federal: *Oncorhynchus (=Salmo) clarki seleniris*

[14]Naturally spawned populations residing below impassable barriers in coastal basins from Redwood Creek in Humboldt Co. to, and including, the Gualala River in Mendocino Co.

[15]Coastal basins from the Russian River, south to Soquel Creek, inclusive. Includes the San Francisco & San Pablo Bay basins, but excludes the Sacramento-San Joaquin River basins.

[16]Coastal basins from the Pajaro River south to, but not including, the Santa Maria River.

[17]Coastal basins from the Santa Maria River, south to the southern extent of the range (presently considered to be Malibu Creek. Proposed rulemaking 12-19-2000 to extend southern portion of the range to San Mateo Creek in San Diego Co.).

[18]The Sacramento and San Joaquin Rivers and their tributaries.

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	and Date
FISHES (continued)						
Delta smelt *(Hypomesus transpacificus)*	ST	12-9-93	FT	3-5-93	Final	12-19-94
Mohave tui chub *(Gila bicolor mohavensis)*	SE	6-27-71	FE	10-13-70		
Owens tui chub *(Gila bicolor snyderi)*	SE	1-10-74	FE	8-5-85	Final	8-5-85
Cowhead Lake tui chub *(Gila bicolor vaccaceps)*			FPE	3-30-98		
Tecopa pupfish **(EXTINCT)** *(Cyprinodon nevadensis calidae)*	Delisted 1987 SE	6-27-71				
Bonytail[19] *(Gila elegans)*	SE SR	1-10-74 6-27-71	FE	4-23-80	Final	3-21-94
Sacramento splittail *(Pogonichthys macrolepidotus)*			FT	3-10-99		
Colorado squawfish[20] *(Ptychocheilus lucius)*	SE	6-27-71	FE	3-11-67	Final	3-21-94
Lost River sucker *(Deltistes luxatus)*	SE SR	1-10-74 6-27-71	FE	7-18-88	Proposed	12-1-94
Modoc sucker *(Catostomus microps)*	SE SR	10-2-80 1-10-74	FE	6-11-85	Final	6-11-85
Santa Ana sucker *(Catostomus santaanae)*			FT	5-12-00		
Shortnose sucker *(Chasmistes brevirostris)*	SE SR	1-10-74 6-27-71	FE	7-18-88	Proposed	12-1-94
Razorback sucker *(Xyrauchen texanus)*	SE SR	1-10-74 6-27-71	FE	10-23-91	Final	3-21-94
Desert pupfish *(Cyprinodon macularius)*	SE	10-2-80	FE	3-31-86	Final	3-31-86
Cottonball Marsh pupfish *(Cyprinodon salinus milleri)*	ST	1-10-74				
Owens pupfish *(Cyprinodon radiosus)*	SE	6-27-71	FE	3-11-67		
Thicktail chub **(EXTINCT)** *(Gila crassicauda)*	Delisted 10-2-80 SE	1-10-74				
Unarmored threespine stickleback *(Gasterosteus aculeatus williamsoni)*	SE	6-27-71	FE	10-13-70	Proposed	11-17-80
Tidewater goby *(Eucyclogobius newberryi)*			FPD[21] FE	6-24-99 2-4-94	Final	11-20-00
Rough sculpin *(Cottus asperrimus)*	ST	1-10-74				

[19]Federal: Bonytail chub

[20]Current nomenclature and federal listing: Colorado pikeminnow

[21]Proposal to delist refers to populations north of Orange County only.

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	Date
AMPHIBIANS						
Calif. tiger salamander - Santa Barbara Co. DPS[22] *(Ambystoma californiense)*			FE[23]	9-15-00		
Santa Cruz long-toed salamander *(Ambystoma macrodactylum croceum)*	SE	6-27-71	FE	3-11-67	Proposed	6-22-78
Siskiyou Mountains salamander *(Plethodon stormi)*	ST	6-27-71				
Tehachapi slender salamander *(Batrachoseps stebbinsi)*	ST	6-27-71				
Kern Canyon slender salamander *(Batrachoseps simatus)*	ST	6-27-71				
Desert slender salamander *(Batrachoseps aridus)*	SE	6-27-71	FE	6-4-73		
Shasta salamander *(Hydromantes shastae)*	ST	6-27-71				
Limestone salamander *(Hydromantes brunus)*	ST	6-27-71				
Black toad *(Bufo exsul)*	ST	6-27-71				
Arroyo southwestern toad *(Bufo microscaphus californicus)*			FE	1-17-95	Proposed	6-8-00
California red-legged frog *(Rana aurora draytonii)*			FT[24]	5-20-96	Proposed	9-11-00
Mountain yellow-legged frog - So. Calif. Pop.[25] *(Rana muscosa)*			FPE	12-28-99		
REPTILES						
Desert tortoise *(Gopherus agassizii)*	ST	8-3-89	FT	4-2-90	Final	2-8-94
Green sea turtle *(Chelonia mydas)*			FT FE	7-28-78 10-13-70	Final	3-23-99
Loggerhead sea turtle *(Caretta caretta)*			FT	7-28-78	Proposed	3-19-80
Olive (=Pacific) Ridley sea turtle *(Lepidochelys olivacea)*			FT	7-28-78	Proposed	3-19-80
Leatherback sea turtle *(Dermochelys coriacea)*			FE	6-2-70	Final	3-23-99

[22]DPS = Distinct Vertebrate Population Segment.

[23]Federal listing refers to the Santa Barbara County DPS only.

[24]Federal listing does not include Humboldt, Trinity and Mendocino Counties; Glenn, Lake & Sonoma Counties west of the Central Valley Hydrologic Basin; Sonoma & Marin Counties north and west of the Napa River, Sonoma Creek & Petaluma River drainages which flow into San Francisco Bay, & north of the Walker Creek drainage which flows to the Pacific Ocean

[25]Federal listing proposal refers to populations in the San Gabriel, San Jacinto & San Bernardino Mountains only.

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	and Date
REPTILES (continued)						
Barefoot banded gecko[26] *(Coleonyx switaki)*	ST	10-2-80				
Coachella Valley fringe-toed lizard *(Uma inornata)*	SE	10-2-80	FT	9-25-80	Final	9-25-80
Blunt-nosed leopard lizard *(Gambelia silus)*[27]	SE	6-27-71	FE	3-11-67		
Island night lizard *(Xantusia riversiana)*			FT	8-11-67		
Southern rubber boa *(Charina bottae umbratica)*	ST	6-27-71				
Alameda whipsnake *(Masticophis lateralis euryxanthus)*	ST	6-27-71	FT	12-5-97	Final	10-3-00
San Francisco garter snake *(Thamnophis sirtalis tetrataenia)*	SE	6-27-71	FE	3-11-67		
Giant garter snake *(Thamnophis couchi gigas)*[28]	ST	6-27-71	FT	10-20-93		
BIRDS						
Short-tailed albatross *(Phoebastria albatrus)*			FE	8-30-00		
California brown pelican[29] *(Pelecanus occidentalis californicus)*	SE	6-27-71	FE	10-13-70		
Aleutian Canada goose *(Branta canadensis leucopareia)*			FT FE	12-12-90 3-11-67		
California condor *(Gymnogyps californianus)*	SE	6-27-71	FE	3-11-67	Final	9-22-77
Bald eagle *(Haliaeetus leucocephalus)*	SE(rev) SE	10-2-80 6-27-71	FPD FT FE(rev) FE	7-6-99 8-11-95 2-14-78 3-11-67		
Swainson's hawk *(Buteo swainsoni)*	ST	4-17-83				
American peregrine falcon *(Falco peregrinus anatum)*	SE	6-27-71	Delisted FE	8-25-99 10-13-70	Final	9-22-77
Arctic peregrine falcon **(RECOVERED)** *(Falco peregrinus tundrius)*			Delisted FT FE	10-5-94 3-20-84 10-13-70		

[26]Current nomenclature: Barefoot gecko

[27]Current taxonomy: *Gambelia sila*

[28]Current taxonomy and Federal listing: *Thamnophis gigas*

[29]Federal: Brown pelican, *Pelecanus occidentalis*

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	Date
BIRDS (continued)						
California black rail *(Laterallus jamaicensis coturniculus)*	ST	6-27-71				
California clapper rail *(Rallus longirostris obsoletus)*	SE	6-27-71	FE	10-13-70		
Light-footed clapper rail *(Rallus longirostris levipes)*	SE	6-27-71	FE	10-13-70		
Yuma clapper rail	ST	2-22-78	FE	3-11-67		
(Rallus longirostris yumanensis)	SR	6-27-71				
Greater sandhill crane *(Grus canadensis tabida)*	ST	4-17-83				
Western snowy plover[30] *(Charadrius alexandrinus nivosus)*			FT	4-5-93	Final	12-7-99
Mountain plover *(Charadrius montanus)*			FPT	2-16-99		
California least tern *(Sterna antillarum browni)*	SE	6-27-71	FE	10-13-70		
Marbled murrelet *(Brachyramphus marmoratus)*[31]	SE	3-12-92	FT	9-30-92	Final	5-24-96
Western yellow-billed cuckoo	SE	3-26-88				
(Coccyzus americanus occidentalis)	ST	6-27-71				
Elf owl *(Micrathene whitneyi)*	SE	10-2-80				
Northern spotted owl *(Strix occidentalis caurina)*			FT	6-22-90	Final	1-15-92
Great gray owl *(Strix nebulosa)*	SE	10-2-80				
Gila woodpecker *(Melanerpes uropygialis)*	SE	3-17-88				
Gilded northern flicker[32] *(Colaptes auratus chrysoides)*	SE	3-17-88				
Willow flycatcher *(Empidonax traillii)*	SE	1-2-91				
Southwestern willow flycatcher *(Empidonax traillii extimus)*			FE	3-29-95	Final	7-22-97
Bank swallow *(Riparia riparia)*	ST	6-11-89				
Coastal California gnatcatcher *(Polioptila californica californica)*			FT	3-30-93	Final	10-24-00
San Clemente loggerhead shrike *(Lanius ludovicianus mearnsi)*			FE	8-11-77		
Arizona Bell's vireo *(Vireo bellii arizonae)*	SE	3-17-88				
Least Bell's vireo *(Vireo bellii pusillus)*	SE	10-2-80	FE	5-2-86	Final	2-2-94

[30]Federal status applies only to the Pacific coastal population.

[31]Federal: *Brachyramphus marmoratus marmoratus*

[32]Current taxonomy: Gilded flicker *(Colaptes chrysoides)*

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation	and Date
BIRDS (continued)						
Inyo California towhee[33] *(Pipilo crissalis eremophilus)*	SE	10-2-80	FT	8-3-87	Final	8-3-87
San Clemente sage sparrow *(Amphispiza belli clementeae)*			FT	8-11-77		
Belding's savannah sparrow *(Passerculus sandwichensis beldingi)*	SE	1-10-74				
MAMMALS						
Buena Vista Lake shrew *(Sorex ornatus relictus)*			FPE	6-1-00		
Riparian brush rabbit *(Sylvilagus bachmani riparius)*	SE	5-29-94	FE	3-24-00		
Point Arena mountain beaver *(Aplodontia rufa nigra)*			FE	12-12-91		
San Joaquin antelope squirrel *(Ammospermophilus nelsoni)*	ST	10-2-80				
Mohave ground squirrel *(Spermophilus mohavensis)*	ST	6-27-71				
Pacific pocket mouse *(Perognathus longimembris pacificus)*			FE	9-26-94		
Morro Bay kangaroo rat *(Dipodomys heermanni morroensis)*	SE	6-27-71	FE	10-13-70	Final	8-11-77
Giant kangaroo rat *(Dipodomys ingens)*	SE	10-2-80	FE	1-5-87		
Stephens' kangaroo rat *(Dipodomys stephensi)*[34]	ST	6-27-71	FE	9-30-88		
San Bernardino kangaroo rat *(Dipodomys merriami parvus)*			FE	9-24-98	Proposed	12-8-00
Tipton kangaroo rat *(Dipodomys nitratoides nitratoides)*	SE	6-11-89	FE	7-8-88		
Fresno kangaroo rat	SE	10-2-80	FE	3-1-85	Final	1-30-85
(Dipodomys nitratoides exilis)	SR	6-27-71				
Salt-marsh harvest mouse *(Reithrodontomys raviventris)*	SE	6-27-71	FE	10-13-70		
Amargosa vole *(Microtus californicus scirpensis)*	SE	10-2-80	FE	11-15-84	Final	11-15-84
Riparian woodrat *(Neotoma fuscipes riparia)*			FE	3-24-00		
Sierra Nevada red fox *(Vulpes vulpes necator)*	ST	10-2-80				
San Joaquin kit fox *(Vulpes macrotis mutica)*	ST	6-27-71	FE	3-11-67		
Island fox *(Urocyon littoralis)*	ST	6-27-71				

[33]Federal: Inyo California (=brown) towhee

[34]Federal: includes *Dipodomys cascus*

	CLASSIFICATION				CRITICAL HABITAT	
	State	List Date	Federal	List Date	Designation and Date	
MAMMALS (continued)						
Guadalupe fur seal *(Arctocephalus townsendi)*	ST	6-27-71	FT	12-16-85		
Steller (=northern) sea lion *(Eumetopias jubatus)*			FT	4-5-90	Final	3-23-99
Wolverine *(Gulo gulo)*	ST	6-27-71				
Southern sea otter *(Enhydra lutris nereis)*			FT	1-14-77		
Gray whale **(RECOVERED)** *(Eschrichtius robustus)*			Delisted	6-15-94		
Sei whale *(Balaenoptera borealis)*			FE	6-2-70		
Blue whale (*Balaenoptera musculus*)			FE	6-2-70		
Finback whale[35] *(Balaenoptera physalus)*			FE	6-2-70		
Humpback whale[36] *(Megaptera novaeangliae)*			FE	6-2-70		
Right whale[37] *(Balaena glacialis* (includes *australis*))			FE	6-2-70		
Sperm whale *(Physeter macrocephalus (=catodon))*			FE	6-2-70		
California (=Sierra Nevada) bighorn sheep *(Ovis canadensis californiana)*	SE ST	8-27-99 6-27-71	FE	1-3-00		
Penninsular bighorn sheep *(Ovis canadensis cremnobates)*	ST	6-27-71	FE	3-18-98	Proposed	7-5-00

[35]Also known as Fin whale.

[36]Also known as Hump-backed whale.

[37]Also known as Black right whale.

APPENDIX D

SPECIAL ANIMALS OF CALIFORNIA, CALIFORNIA DEPARTMENT OF FISH AND GAME JANUARY 2001

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME
Wildlife and Habitat Data Analysis Branch
California Natural Diversity Data Base

SPECIAL ANIMALS

January 2001

The California Natural Diversity Data Base (CNDDB) is a continually refined and updated, computerized inventory of location information on the more rare animals, plants, and natural communities in California. The blueprint used to set up the CNDDB was developed by The Nature Conservancy (TNC) in the early 1970's. TNC has helped to set up similar programs in all 50 states and a number of foreign countries. Collectively these programs are known as the Natural Heritage Network. The "Heritage Methodology" used by all of these programs, sets the standards on the information we gather and the procedures we use. More information on the Natural Heritage Network is available on their Web site: **http://www.heritage.tnc.org/nhp/overview_nhp.html**

"Special Animals" is a general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. These taxa generally fall into one or more of the following categories:

- Officially listed or proposed for listing under the State and/or Federal Endangered Species Acts
- State or Federal candidate for possible listing
- Taxa which meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the CEQA Guidelines (more information on CEQA is available on the internet at: **http://ceres.ca.gov/topic/env_law/ceqa/guidelines/**)
- Taxa considered by the Department to be a Species of Special Concern
- Taxa that are biologically rare, very restricted in distribution, declining throughout their range, or have a critical, vulnerable stage in their life cycle that warrants monitoring
- Populations in California that may be on the periphery of a taxon's range, but are threatened with extirpation in California
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands, vernal pools, etc.)
- Taxa designated as a special status, sensitive, or declining species by other state or federal agencies, or non-governmental organization (NGO)

For most animal taxa, the CNDDB is interested in sightings that indicate the presence of a **resident population**. For many birds, however, the CNDDB tracks only nesting locations, (those species are so indicated on the list). It is not necessary to actually locate the nest to confirm breeding status. Any indication of breeding (territorial males, adults carrying nest material, adults carrying food, the presence of newly fledged young, etc.) is acceptable evidence of nesting. For other taxa where we track only a certain part of their range or life history, the area or life stage is indicated on the list.

Taxa marked with a "+" to the left of the scientific name are those for which there is location information in the CNDDB Geographic Information System (GIS), as of the date of this list.

CNDDB RANKS:

The CNDDB ranking codes are part of the "Heritage Methodology". It is a shorthand formula that provides information on how rare a taxa is, both throughout its entire range and within California. We use the best information available to assign these ranks and they are changed as new information becomes available. More detailed information on our ranks can be found in Appendix 1.

CALIFORNIA ENDANGERED SPECIES ACT (CESA) LISTING CODES: The listing status of each species is current as of the date of this list. The most current changes in listing status will be found in the list of "Endangered and Threatened Animals of California", which the CNDDB updates and prints quarterly (January, April, July, & October).

SE State-listed as Endangered
ST State-listed as Threatened
SCE State candidate for listing as Endangered
SCT State candidate for listing as Threatened

ENDANGERED SPECIES ACT (ESA) LISTING CODES: The listing status is current as of the date of this list. The most current changes in listing status will be found in the list of "Endangered and Threatened Animals of California", which the CNDDB updates and prints quarterly (January, April, July, & October).

FE Federally listed as Endangered
FT Federally listed as Threatened
FPE Federally proposed for listing as Endangered
FPT Federally proposed for listing as Threatened
FPD Federally proposed for delisting
FC Federal candidate species (former Category 1 candidates)
(FSC) Federal Special Concern species (a "term-of-art" for former Category 2 candidates). More information is available in Appendix 2.

IUCN CODES:

The World Conservation Union (formerly the International Union for the Conservation of Nature) was created in 1949. It is the world's largest conservation-related organization with over 900 governmental and non-governmental members from 181 countries. The IUCN is a storehouse of information and expertise, and as such, it advises and assists governments, organizations and local communities in developing and implementing conservation strategies. The Species Survival Commission, one of six global commissions within IUCN, has been publishing the "Red List of Threatened Species" for over 30 years. The Red List contains a roster of species that have been assessed against strict criteria. Detailed information on the IUCN codes can be found in Appendix 3. And at their Web site at: http://www.iucn.org/themes/ssc/redlists/ssc-rl-c.htm. The Red List itself is available at: http://www.redlist.org/.

OTHER CODES:

Audubon: CalWL: The Audubon Society's state WatchList for California. The state WatchLists were developed using the Partners in Flight (PIF) data and prioritization process. The state lists are an additional tool designed to help conserve local bird populations. More information is available on their Web site at: http://www.audubon.org/bird/watch/state2/ca.html.

BLM: Sensitive: Bureau of Land Management. BLM Manual §6840 defines sensitive species as "...those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that Federal listing may become necessary; or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." Existing California-BLM policy concerning the designation of sensitive species identifies two conditions that must be met before a species may be considered as BLM sensitive: (1) a significant population of the species must occur on BLM-administered lands, and (2) the potential must exist for improvement of the species' condition through BLM management. The "Sensitive Species" designation is not meant to include federally listed species, proposed species, candidate species or State-listed species. It is BLM policy to provide sensitive species with the same level of protection that is given federal candidate species.

CDF: Sensitive: California Department of Forestry and Fire Protection. The Board of Forestry classifies as "sensitive species" those species that warrant special protection during timber operations. The list of "sensitive species" is given in §895.1 (Definitions) of the California Forest Practice Rules. The Forest Practice Rules are available on CDF's Web site at: **http://www.fire.ca.gov/ResourceManagement/PDF/2000RULEi197.pdf.**

DFG: CSC: California Special Concern species. It is the goal and responsibility of the Department of Fish and Game to maintain viable populations of all native species. To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as "Species of Special Concern" is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long term viability. Not all "Species of Special Concern have declined equally; some species may be just starting to decline, while others may have already reached the point where they meet the criteria for listing as a "Threatened" or "Endangered" species under the State and/or Federal Endangered Species Acts. More information on the Department's species of special concern reports can be found in Appendix 4.

DFG: Fully protected and Protected: Fully protected and Protected species may not be taken or possessed without a permit from the Fish and Game Commission and/or the Department of Fish and Game. Information on Fully protected species can be found in the Fish and Game Code, (birds at §3511, mammals at §4700, reptiles and amphibians at §5050, and fish at §5515). Information on Fully Protected fish can be found in the California Code of Regulations, Title 14, Division 1, Chapter 2, Article 4, §5.93. Information on Protected native amphibians can be found in Chapter 5, §41 and Protected native reptiles at §42. The Fish and Game Code is available on the internet at: **http://www.leginfo.ca.gov/calaw.html**. Title 14 is available on the internet at: **http://www.dfg.ca.gov/title/contents.html**

FS: Sensitive: The Forest Service participates in recovery programs with the California Department of Fish and Game and the U.S. Fish and Wildlife Service to restore declining populations and protect habitats. A Forest Service "Sensitive Species" program identifies and manages species whose populations are declining. More information is available on their Web site at: **http://www.r5.fs.fed.us/forestmanagement/html/endangered_species.html**

FWS: MNBMC: Fish and Wildlife Service: Migratory Nongame Birds of Management Concern: Species of migratory nongame birds that are considered to be of concern in the United States because of (1) documented or apparent population declines, (2) small or restricted populations, or (3) dependence on restricted or vulnerable habitats. More information is available on their Web site at: **http://migratorybirds.fws.gov/reports/speccon/tblconts.html**

PIF: WatchList: The WatchList is compiled by Partners in Flight, a coalition of state, federal, and private sector organizations working together to protect the birds of the western hemisphere. The WatchList identifies North American bird species in need of help. WatchList species are those faced with population decline, limited geographic range, and/or threats such as habitat loss on their breeding and wintering grounds. The WatchList is an early warning system that focuses attention on at-risk bird species before they become endangered. Saving species pushed to the edge of extinction is difficult, costly and politically charged. The WatchList shifts the agenda from reactive, last-minute rescue attempts to preventive action. More information on the WatchList and the PIF prioritization process can be found on their Web site at: **http://www.audubon.org/bird/watch/list.html**

WBWG: High Priority: The Western Bat Working Group is comprised of agencies, organizations and individuals interested in bat research, management and conservation from the 13 western states and provinces. The goals are (1) to facilitate communication among interested parties and reduce risks of species decline or extinction; (2) to provide a mechanism by which current information on bat ecology, distribution and research techniques can be readily accessed; and (3) to develop a forum to discuss conservation strategies, provide technical assistance and encourage education programs. Species designated as "High Priority" are imperiled or are at high risk of imperilment based on available information on distribution, status, ecology and known threats.

OTHER DATABASES

In addition to the CNDDB, the Department of Fish and Game maintains other databases which may be of interest to CNDDB users. Some of these databases are listed in Appendix 5.

INVERTEBRATES

	CNDDB RANK	CESA	ESA	IUCN	OTHER
PELECYPODA (clams and mussels)					
Anodonta californiensis California floater (mussel)	G3S2?		(FSC)		FS: Sensitive
Pisidium ultramontanum Fingernail clam	G1S1		(FSC)		FS: Sensitive
GASTROPODA (snails and slugs)					
+*Haliotis cracherodii* Black abalone	G3G4S3?		FC		
Haliotis sorenseni White abalone	G1S1		FPE		
Algamorda newcombiana Newcomb's littorine snail	G1G2S1S2		(FSC)		
-*Ammonitella yatesi* Tight coin (=Yates' snail)	G1S1		(FSC)	VU/D2	
+*Assiminea infima* Badwater snail	G1S1		(FSC)	VU/B1+2c	
+*Binneya notabilis* Santa Barbara shelled slug (=slug snail)	G1S1		(FSC)	DD	
Discus shemeki cockerelli Cockerell's striate disc (snail)	G?T?S?		(FSC)		
-*Eremarionta (=Micrarionta) immaculata* White desertsnail	G1S1		(FSC)	VU/D2	
Eremarionta (=Micrarionta) millepalmarum Thousand Palms desertsnail	G?S?		(FSC)	VU/D2	
+*Eremarionta (=Micrarionta) morongoana* Morongo (=Colorado) desertsnail	G1G3S1		(FSC)	LRnt	
+*Eremarionta (=Micrarionta) rowelli bakerensis* Baker desertsnail	G1T1S1		(FSC)	DD	
+*Eremarionta (=Micrarionta) rowelli mccoiana* California McCoy snail (=McCoy dessertsnail)	G1T1S1		(FSC)	DD	
+*Fontelicella* sp. Deep Springs Fontelicella	G1S1				
+*Haplotrema catalinense* Santa Catalina lancetooth	G1S1				
+*Haplotrema duranti* Durant's snail	G2G3S2S3				
Helisoma newberryi Great Basin rams-horn	G1?S1				FS: Sensitive
+*Helminthoglypta allynsmithi* Merced Canyon shoulderband (snail)	G1S1		(FSC)	VU/D2	
+*Helminthoglypta arrosa pomoensis* Pomo bronze shoulderband (snail)	G2T1S1		(FSC)	DD	
+*Helminthoglypta arrosa williamsi* Williams' bronze shoulderband (snail)	G2T1S1		(FSC)		

	CNDDB RANK	CESA	ESA	IUCN	OTHER
+*Helminthoglypta ayresiana sanctaecrucis* Ayer's snail	G1G2S1S2				
+*Helminthoglypta callistoderma* Kern shoulderband (snail)	G1S1		(FSC)	EN/B1+2c	
Helminthoglypta coelata Mesa shoulderband	G?S?			VU/B1-2c	
+*Helminthoglypta mohaveana* Victorville shoulderband (snail)	G1S1		(FSC)	LRnt	
+*Helminthoglypta nicklinianа awania* Peninsula Coast Range shoulderband (snail) (=Nicklin'S peninsula snail)	G1T1S1		(FSC)	DD	
+*Helminthoglypta nickliniana bridgesi* Bridges' Coast Range shoulderband (snail)	G2T1S1		(FSC)	DD	
+*Helminthoglypta sequoicola consors* Redwood shoulderband (snail)	G1G2T1S1		(FSC)	DD	
+*Helminthoglypta traski coelata* Peninsular Range shoulderband (snail)	G1G2T1S1		(FSC)		
+*Helminthoglypta walkeriana* Morro shoulderband (snail)	G1S1		FE	CR/Alce, B1+2bc	
Juga acutifilosa Topaz juga	G2S2				FS: Sensitive
Juga occata Scalloped juga	G1S1				FS: Sensitive
+*Micrarionta facta* Santa Barbara island snail	G1G2S1S2		(FSC)	VU/D2	
+*Micrarionta feralis* San Nicolas islandsnail	G1S1		(FSC)	CR/B1+2d	
+*Micrarionta gabbi* San Clemente islandsnail	G1S1		(FSC)	VU/D2	
+*Micrarionta opuntia* Pricklypear islandsnail	G1S1		(FSC)	VU/D2	
+*Monadenia circumcarinata* Keeled sideband (snail)	G1S1		(FSC)	VU/D2	BLM: Sensitive
+*Monadenia fidelis pronotis* Rocky coast Pacific sideband (snail) (=Rocky coast sideband)	G1S1		(FSC)	DD	
+*Monadenia yosemitensis* Yosemite mariposa sideband (snail)	G1S1		(FSC)		
+*Monadenia mormonum buttoni* Button's Sierra sideband (snail)	G1G2T1S1		(FSC)	DD	
+*Monadenia mormonum hirsuta* Hirsute Sierra sideband (snail)	G1G2T1S1		(FSC)	DD	BLM: Sensitive
+*Monadenia setosa* Trinity bristle snail	G2S2	ST	(FSC)	VU/D2	
+*Monadenia troglodytes* Shasta sideband (snail)	G2S2		(FSC)	DD	
+*Monadenia tuolumneana* Tuolumne sideband (snail)	G1S1				
+*Pristiloma shepardae* Shepard's snail	G1S1				

	CNDDB RANK	CESA	ESA	IUCN	OTHER
+*Pyrgulopsis aardahli* Benton Valley (=Aahrdahl's) springsnail	G1S1		(FSC)		
+*Pyrgulopsis owensensis* Owens Valley springsnail	G1G2S1S2		(FSC)		FS: Sensitive
+*Pyrgulopsis perturbata* Fish Slough springsnail	G1G2S1S2		(FSC)		
+*Pyrgulopsis wongi* Wong's springsnail	G1G2S1S2		(FSC)		FS: Sensitive
+*Radiocentrum (=Oreohelix) avalonense* Catalina mountainsnail	G1S1		(FSC)	CR/B1+2c	
+*Sterkia clementina* San Clemente Island blunt-top snail	G1S1			LRnt	
+*Tryonia imitator* Mimic Tryonia (=California brackishwater snail)	G2G3S2S3		(FSC)	DD	
Tryonia margae Grapevine Springs elongate tryonia	G1S1		(FSC)		
Tryonia robusta Robust tryonia	G1G2S1S2		(FSC)		
Tryonia rowlandsi Grapevine Springs squat tryonia	G1S1		(FSC)		
+*Vespericola karokorum* Karok hesperian (=Karok Indian snail)	G2G3S2S3		(FSC)	DD	
+*Xerarionta intercisa* Horseshoe snail (=Plain cactussnail)	G1S1			VU/D2	
+*Xerarionta redimita* Wreathed cactussnail	G1S1			VU/D2	
Xerarionta tryoni Bicolor cactussnail	G1S1			VU/D2	
ARACHNIDA (spiders and relatives)					
Aphrastochthonius grubbsi Grubbs' Cave pseudoscorpion	G1G2S?		(FSC)		
Aphrastochthonius similis Carlow's Cave pseudoscorpion	G?S?		(FSC)		
Archeolarca aalbui Aalbu's Cave pseudoscorpion	G1G2S?		(FSC)		
+*Banksula melones* Melones Cave harvestman	G2S2			VU/A2c	
+*Calicina (=Sitalcina) minor* Edgewood blind harvestman	G1S1		(FSC)		
+*Fissilicreagris (=Microcreagris) imperialis* Empire Cave pseudoscorpion	G1S1		(FSC)	VU/D2	
Larca laceyi Lacey's Cave pseudoscorpion	G1G2S?		(FSC)		
+*Meta dolloff* Dolloff Cave spider	G1S1		(FSC)	VU/D2	
Microcina edgewoodensis Edgewood Park micro-blind harvestman	G?S?		(FSC)		
Microcina homi Hom's micro-blind harvestman	G?S?		(FSC)		

	CNDDB RANK	CESA	ESA	IUCN	OTHER
Microcina jungi Jung's micro-blind harvestman	G?S?		(FSC)		
Microcina leei Lee's micro-blind harvestman	G?S?		(FSC)		
Microcina lumi Fairmont (=Lum's) micro-blind harvestman	G?S?		(FSC)		
+*Microcina tiburona* Tiburon micro-blind harvestman	G1S1		(FSC)		
Pauroctonus maritimus Monterey Dunes scorpion	G?S?		(FSC)		
Pseudogarypus orpheus Music Hall Cave pseudoscorpion	G1G2S?		(FSC)		
Telema sp. Santa Cruz telemid spider	G1S1		(FSC)		
+*Trithyreus shoshonensis* Shoshone Cave whip-scorpion	G1S1				BLM: Sensitive
CRUSTACEA, Order Anostraca (fairy shrimp)					
+*Artemia monica* Mono brine shrimp	G1S1			LRcd	
+*Branchinecta conservatio* Conservancy fairy shrimp	G1S1		FE	EN/A2c	
+*Branchinecta longiantenna* Longhorn fairy shrimp	G1S1		FE	EN/A2c	
+*Branchinecta lynchi* Vernal pool fairy shrimp	G2G3S2S3		FT	VU/A2c	
+*Branchinecta mesovalliensis* Midvalley fairy shrimp	G2S2				
+*Branchinecta sandiegonensis* San Diego fairy shrimp	G1S1		FE	EN/A2c	
+*Lepidurus packardi* Vernal pool tadpole shrimp	G2G3S2S3		FE	VU/A2c	
+*Linderiella occidentalis* California linderiella	G2G3S2S3			LRnt	
Linderiella santarosae Santa Rosa Plateau fairy shrimp	G1G2S1S2				
+*Streptocephalus woottoni* Riverside fairy shrimp	G1S1		FE	EN/A2c	
CRUSTACEA, Order Isopoda (isopods)					
+*Caecidotea tomalensis* Tomales isopod	G2S2		(FSC)		
CRUSTACEA, Order Amphipoda (amphipods)					
+*Stygobromus gradyi* Grady's Cave amphipod	G1S1		(FSC)	VU/D2	
+*Stygobromus harai* Hara's Cave amphipod	G1S1		(FSC)	VU/D2	

	CNDDB RANK	CESA	ESA	IUCN	OTHER
-*Stygobromus mackenziei* MacKenzie's Cave amphipod	G1S1		(FSC)	VU/D2	
-*Stygobromus wengerorum* Wengerors' Cave amphipod	G1S1		(FSC)	VU/D2	
CRUSTACEA, Order Decapoda (crayfish and shrimp)					
+*Pacifastacus fortis* Shasta crayfish	G1S1	SE	FE	CR/B1+2c	
+*Syncaris pacifica* California freshwater shrimp	G1S1	SE	FE	EN/A1ce	
INSECTA, Order Plecoptera (stoneflies)					
+*Capnia lacustra* Lake Tahoe benthic stonefly	G1S1		(FSC)		
Megaleuctra sierra Shirttail Creek stonefly	G?S?		(FSC)		
INSECTA, Order Orthoptera (grasshoppers, katydids, and crickets)					
-*Ammopelmatus kelsoensis* Kelso Jerusalem cricket	G1G3S1S2		(FSC)	VU/B1+2bd	
Ammopelmatus muwu Point Conception Jerusalem cricket	G1G3S1S3		(FSC)	VU/B1+2bd	
Idiostatus kathleenae Pinnacles shieldback katydid	G1G3S1S3		(FSC)		
+*Idiostatus middlekaufi* Middlekauf's shieldback katydid	G1G2S1		(FSC)	CR/B1+2bd	
-*Macrobaenetes kelsoensis* Kelso giant sand treader cricket	G1S1		(FSC)	VU/B1+2bd	
-*Macrobaenetes valgum* Coachella giant sand treader cricket	G1G2S1S2		(FSC)	VU/B1+2bd	
+*Neduba longipennis* Santa Monica shieldback katydid	G1G2S1S2		(FSC)	CR/B1+2bd	
Pristoceuthophilus sp. Samwell Cave cricket	G1G3S1S3		(FSC)	VU/D1+2	
+*Psychomastix deserticola* Desert monkey grasshopper	G1G3S1S2		(FSC)	VU/B1+2bd	
+*Stenopelmatus cahuilaensis* Coachella Valley Jerusalem cricket	G1G2S1S2		(FSC)	VU/B1+2bd	
-*Tetrix sierrana* Sierra pygmy grasshopper	G1G2S1S2		(FSC)	VU/D2	
+*Trimerotropis infantilis* Zayante band-winged grasshopper	G1S1		FE	EN/A1c	
Trimerotropis occidentaloide Santa Monica Mountains Grasshopper	G1G2S1S2			EN/A1c	
Trimerotropis occulens Lompoc Grasshopper	G1G2S1S2			EN/A1c	

	CNDDB RANK	CESA	ESA	IUCN	OTHER
INSECTA, Order Hemiptera (true bugs)					
Ambrysus funebris (No common name)	G?S?		(FSC)		
+*Belostoma saratogae* Saratoga Springs belostoman bug	G1S1		(FSC)		
+*Oravelia pege* Dry Creek cliff strider bug	G1S1		(FSC)		
+*Pelocoris shoshone* Amargosa naucorid bug	G1G3S1S2		(FSC)		
+*Saldula usingeri* Wilbur Springs shorebug	G1S1				
INSECTA, Order Neutoptera (lacewings)					
Nothochrysa californica San Francisco lacewing	G?S?		(FSC)		
+*Oliarces clara* Cheeseweed moth lacewing	G1G3S1S3		(FSC)		
INSECTA, Order Coleoptera (beetles)					
+*Aegialia concinna* Ciervo aegialian scarab beetle	G1S1			VU/D2	BLM: Sensitive
+*Agabus rumppi* Death Valley agabus diving beetle	G1G3S1		(FSC)		
+*Anomala carlsoni* Carlson's dune beetle	G2S2				
+*Anomala hardyorum* Hardy's dune beetle	G2S2				
+*Anthicus sacramento* Sacramento anthicid beetle	G1S1		(FSC)	EN/B1+2c	
Atractelmis wawona Wawona riffle beetle	G1G3S1S3		(FSC)		
+*Chaetarthria leechi* Leech's chaetarthrian water scavenger beetle	G1?S1?		(FSC)		
Cicindela hirticollis abrupta Sacramento Valley tiger beetle	G?S?		(FSC)		
+*Cicindela hirticollis gravida* Sandy beach tiger beetle	G5T4S1		(FSC)		
+*Cicindela ohlone* Ohlone tiger beetle	G1S1		FPE		
Cicindela tranquebarica viridissima Greenest tiger beetle	G5T2QS1		(FSC)		
+*Coelus globosus* Globose dune beetle	G1S1		(FSC)	VU/A1c	
+*Coelus gracilis* San Joaquin dune beetle	G1S1		(FSC)	VU/A1c,D2	BLM:Sensitive
Coelus pacificus Channel Islands dune beetle	G?S?		(FSC)		

	CNDDB RANK	CESA	ESA	IUCN	OTHER
Coenonycha clementia San Clemente Island coenonycha beetle	G1?S1?		(FSC)		
+*Desmocerus californicus dimorphus* Valley elderberry longhorn beetle	G3T2S2		FT		
Dubiraphia brunnescens Brownish dubiraphian riffle beetle	G1G3S1S3		(FSC)		
Dubiraphia giulianii Giuliani's dubiraphian riffle beetle	G1G3S1S3		(FSC)		
+*Elaphrus viridis* Delta green ground beetle	G1S1		FT	CR/B1+2abc+3a	
Glaresis arenata Kelso Dune glaresis scarab beetle	G1G3S1S3		(FSC)		
+*Hydrochara ricksecker* Ricksecker's water scavenger beetle	G1G2S1S2		(FSC)		
Hydroporus hirsutus Woolly hydroporus diving beetle	G1G3S1S3		(FSC)		
Hydroporus leechi Leech's skyline diving beetle	G1?S1?		(FSC)		
+*Hydroporus simplex* Simple hydroporus diving beetle	G1?S1?		(FSC)		
+*Hygrotus curvipes* Curved-foot hygrotus diving beetle	G1S1		(FSC)		
+*Hygrotus fontinalis* Travertine band-thigh diving beetle	G1S1		(FSC)		
+*Lichnanthe albipilosa* White sand bear scarab beetle	G1S1		(FSC)		
+*Lichnanthe ursina* Bumblebee scarab beetle	G2S2		(FSC)		
+*Lytta hoppingi* Hopping's blister beetle	G1G2S1S2		(FSC)		
Lytta insperata Mojave Desert blister beetle	G1G2S1S2		(FSC)		
+*Lytta moesta* Moestan blister beetle	G2S2		(FSC)		
+*Lytta molesta* Molestan blister beetle	G2S2		(FSC)		
+*Lytta morrisoni* Morrison's blister beetle	G1G2S1S2		(FSC)		
Microcylleopus fomicoideus (No common name)	G?S?		(FSC)		
Microcylleopus similis (No common name)	G?S?		(FSC)		
Miloderes nelsoni Nelson's miloderes weevil	G1G3S1S3		(FSC)		
Nebria darlingtoni South Forks ground beetle	G?S?		(FSC)		
Nebria gebleri siskiyouensis Siskiyou ground beetle	G?T?S?		(FSC)		
Nebria sahlbergii triad Trinity Alps ground beetle	G?T?S?		(FSC)		

	CNDDB RANK	CESA	ESA	IUCN	OTHER
Necydalis rudei Rude's longhorn beetle	G1G3S1S3		(FSC)		
Ochthebius crassalus Wing-shoulder minute moss beetle	G1G3S1S3		(FSC)		
+*Ochthebius reticulatus* Wilbur Springs minute moss beetle	G1S1		(FSC)		
-*Onychobaris langei* Lange's El Segundo dune weevil	G1S1		(FSC)		
+*Optioservus canus* Pinnacles optioservus riffle beetle	G1S1		(FSC)		
Paleoxenus dohrni Dohrn's elegant eucnemid beetle	GHSH		(FSC)		
-*Polyphylla anteronivea* Saline Valley snow-front June beetle	G1S1		(FSC)		
-*Polyphylla barbata* Mount Hermon (=barbate) June beetle	G1S1		FE		
-*Polyphylla erratica* Death Valley June beetle	G1S1		(FSC)		
-*Polyphylla nubila* Atascadero June beetle	G1S1		(FSC)		
Polyphylla stellata Delta June beetle	G?S?		(FSC)		
+*Pseudocotalpa andrewsi* Andrew's dune scarab (beetle)	G2G3S2S3		(FSC)		
Scaphinotus behrensi (Ground beetle, no common name)	G?S?		(FSC)		
Scaphinotus longiceps Humboldt ground beetle	G?S?		(FSC)		
Trigonoscuta blaisdelli Blaisdell trigonoscuta weevil	G?S?		(FSC)		
Trigonoscuta brunnotasselata Brown-tassel trigonoscuta weevil	G1G2S1S2		(FSC)		
Trigonoscuta catalina Santa Catalina Island trigonoscuta weevil	G?S?		(FSC)		
+*Trigonoscuta dorothea dorothea* Dorothy's El Segundo dune weevil	G1T1S1		(FSC)		
Trigonoscuta stantoni Santa Cruz Island shore weevil	G1?S1?		(FSC)		
Trigonoscuta sp. Doyen's trigonoscuta dune weevil	G1S1		(FSC)		
INSECTA, Order Mecoptera (scorpionflies)					
Orbittacus obscurus Gold rush hanging fly	G?S?		(FSC)		
INSECTA, Order Diptera (flies)					
Ablautus schlingeri Oso Flaco robberfly	G?S?		(FSC)		

	CNDDB RANK	CESA	ESA	IUCN	OTHER
+*Gila elegans* Bonytail	G1S1	SE	FE	EN/B1+2ac	
+*Gila orcutti* Arroyo chub	G2S2		(FSC)		DFG: CSC FS: Sensitive
Lavinia exilicauda chi Clear Lake hitch	G5T2S2				DFG: CSC FS: Sensitive
+*Lavinia symmetricus mitrulus* Pit roach	G5T2?S2?		(FSC)		DFG: CSC
+*Lavinia symmetricus navarroensis* Navarro roach	G5T1T2S1S2				DFG: CSC
+*Lavinia symmetricus parvipinnis* Gualala roach	G5T1T2S1S2		(FSC)		DFG: CSC
Lavinia symmetricus subditus Monterey roach	G5T2T3S2S3				DFG: CSC
+*Lavinia symmetricus* ssp.1 San Joaquin roach	G5T3?QS3?				DFG: CSC
+*Lavinia symmetricus* ssp.2 Tomales roach	G5T2T3S2S3				DFG: CSC
+*Lavinia symmetricus* ssp.3 Red Hills roach	G5T1?S1?				DFG: CSC BLM: Sensitive
+*Mylopharadon conocephalus* Hardhead	-G3S3				DFG: CSC FS: Sensitive
+*Pogonichthys macrolepidotus* Sacramento splittail	G2S2		FT	EN/A1c	DFG: CSC
+*Ptychocheilus lucius* Colorado pikeminnow	G1SX	SE	FE	VU/D2	DFG: Fully protected
+*Rhinichthys osculus* ssp.1 Amargosa Canyon speckled dace	G5T1S1		(FSC)		DFG: CSC BLM: Sensitive
+*Rhinichthys osculus* ssp.2 Owens speckled dace	G5T1T2QS1S2		(FSC)		DFG: CSC
+*Rhinichthys osculus* ssp.3 Santa Ana speckled dace	G5T1S1		(FSC)		DFG: CSC FS: Sensitive
Rhinichthys osculus ssp.4 Benton Valley speckled dace	G5T1QS1		(FSC)		
Rhinichthys osculus ssp.5 Long Valley speckled dace	G5T1S1		(FSC)		
CATOSTOMIDAE (suckers)					
+*Catostomus fumeiventris* Owens sucker	G3S3				DFG: CSC
+*Catostomus latipinnis* Flannelmouth sucker	G3G4S1		(FSC)		
+*Catostomus microps* Modoc sucker	G1S1	SE	FE	EN/B1+2c, C1	DFG: Fully protected
+*Catostomus occidentalis lacusanserinus* Goose Lake sucker	G4T2T3S1		(FSC)		DFG: CSC FS: Sensitive
Catostomus platyrhynchus Mountain sucker	G5S2S3				DFG: CSC
Catostomus rimiculus ssp.1 Jenny Creek sucker	G4?T1?S1?		(FSC)		

	CNDDB RANK	CESA	ESA	IUCN	OTHER
+*Catostomus santaanae* Santa Ana sucker	G1S1		FT	VU/B1+2c, D2	DFG: CSC FS: Sensitive
+*Catostomus snyderi* Klamath largescale sucker	G3S2		(FSC)	LRnt	DFG: CSC
+*Chasmistes brevirostris* Shortnose sucker	G1S1	SE	FE	EN/B1+2c	DFG: Fully protected
+*Deltistes luxatus* Lost River sucker	G1S1	SE	FE	EN/B1+2cd	DFG:Fully protected
+*Xyrauchen texanus* Razorback sucker	G1S1	SE	FE	EN/A1bc	DFG: Fully protected
CYPRINODONTIDAE (killifishes)					
+*Cyprinodon macularius* Desert pupfish	G1S1	SE	FE		
+*Cyprinodon nevadensis amargosae* Amargosa pupfish	G2T1S1				DFG: CSC FS: Sensitive BLM: Sensitive
+*Cyprinodon nevadensis nevadensis* Saratoga Springs pupfish	G2T1S1				DFG: CSC
+*Cyprinodon nevadensis shoshone* Shoshone pupfish	G2T1S1		(FSC)		DFG: CSC
+*Cyprinodon radiosus* Owens pupfish	G1S1	SE	FE	EN/A2ce	DFG: Fully protected
+*Cyprinodon salinus milleri* Cottonball Marsh pupfish	G1T1S1	ST			
+*Cyprinodon salinus salinus* Salt Creek pupfish	G1T1S1				DFG: CSC
GASTEROSTEIDAE (sticklebacks)					
+*Gasterosteus aculeatus williamsoni* Unarmored threespine stickleback	G5T1S1	SE	FE		DFG: Fully protected
Gasterosteus aculeatus santaanae Santa Ana threespine stickleback	G5T1S1				
Gasterosteus aculeatus ssp. Shay Creek threespine stickleback	G5T1S1				DFG: CSC
PERCICHTHYIDAE (temperate basses)					
Stereolepis gigas (spawning grounds) Giant sea bass	G3?S1S2			CR/A1bd	
CENTRARCHIDAE (sunfishes)					
+*Archoplites interruptus* (within native range) Sacramento perch	G3S1		(FSC)		DFG: CSC

	CNDDB RANK	CESA	ESA	IUCN	OTHER
EMBIOTOCIDAE (surfperches)					
+*Hysterocarpus traskii pomo* Russian River tule perch	G5T2?S2?		(FSC)		DFG: CSC
GOBIIDAE (gobies)					
+*Eucyclogobius newberryi* Tidewater goby	G2G3S2S3		FPD[17] FE	VU/A1c+2c	DFG: CSC
COTTIDAE (sculpins)					
+*Cottus asperrimus* Rough sculpin	G2S2	ST	(FSC)	VU/D2	DFG: Fully protected
+*Cottus klamathensis macrops* Bigeye marbled sculpin	G4T3S3				DFG: CSC
Cottus perplexus Reticulate sculpin	G4G5S2S3				DFG: CSC

[17]Proposal to delist refers to populations north of Orange County only.

AMPHIBIANS

	CNDDB RANK	CESA	ESA	IUCN	OTHER
AMBYSTOMATIDAE (mole salamanders)					
–*Ambystoma macrodactylum croceum* Santa Cruz long-toed salamander	G5T1S1	SE	FE		DFG: Fully protected DFG: Protected
+*Ambystoma californiense* California tiger salamander	G2G3S2S3		FC	VU/A2c	DFG: CSC DFG: Protected
Santa Barbara Co. DPS[18]			FE[19]		
RHYACOTRITONIDAE (Olympic salamanders)					
+*Rhyacotriton variegatus (=olympicus)* Southern torrent (=seep) salamander	G4S2S3		(FSC)		DFG: CSC DFG: Protected FS: Sensitive
SALAMANDRIDAE (newts)					
Taricha torosa torosa Coast Range newt (SLO south)	G3G4T3S3				DFG: CSC
PLETHODONTIDAE (lungless salamanders)					
–*Batrachoseps aridus* Desert slender salamander	G1S1	SE	FE	CR/A2cd	DFG: Protected
–*Batrachoseps campi* Inyo Mountains slender salamander	G2S2		(FSC)	EN/B1+2a	DFG: CSC DFG: Protected FS: Sensitive BLM: Sensitive
+*Batrachoseps gabrieli* San Gabriel slender salamander	G1S1				FS: Sensitive
–*Batrachoseps pacificus pacificus* Channel Islands slender salamander	G3QT2S2		(FSC)		
Batrachoseps relictus (=pacificus) Relictual slender salamander	G2?S2?		(FSC)		DFG: CSC FS: Sensitive
–*Batrachoseps simatus* Kern Canyon slender salamander	G2S2	ST	(FSC)	VU/D2	DFG: Protected FS: Sensitive
+*Batrachoseps stebbinsi* Tehachapi slender salamander	G2S2	ST	(FSC)	VU/D2	DFG: Protected FS: Sensitive BLM: Sensitive
+*Batrachoseps* sp.1 Breckenridge Mountain slender salamander	G1S1		(FSC)		DFG: CSC FS: Sensitive
+*Batrachoseps* sp.2 (No common name)	G1S1?				

[18]DPS = Distinct Vertebrate Population Segment.

[19]Federal listing refers to the Santa Barbara County DPS only.

	CNDDB RANK	CESA	ESA	IUCN	OTHER
–*Batrachoseps* sp.3 Scodie Mountains slender salamander	G1S1?				
+*Batrachoseps* sp.4 Kern Plateau slender salamander	G2S2				FS: Sensitive
+*Batrachoseps* sp.5 Guadalupe Creek slender salamander	G1S1				
+*Ensatina eschscholtzi croceator* Yellow-blotched salamander	G5T2T3S2S3		(FSC)		DFG: CSC FS: Sensitive BLM: Sensitive
+*Ensatina eschscholtzi klauberi* Large-blotched salamander	G5T2T3S2S3		(FSC)		DFG: CSC FS: Sensitive
–*Hydromantes brunus* Limestone salamander	G1S1	ST	(FSC)	VU/D2	DFG: Fully protected DFG: Protected FS: Sensitive
+*Hydromantes platycephalus* Mount Lyell salamander	G3G4S3S4		(FSC)		DFG: CSC DFG: Protected
+*Hydromantes shastae* Shasta salamander	G1G2S1S2	ST	(FSC)	VU/D2	DFG: Protected
+*Hydromantes* sp.1 (No common name)	G1?S1?				
Hydromantes sp.2 Owens Valley web-toed salamander	G2?S2?		(FSC)		DFG: CSC
+*Plethodon elongatus* Del Norte salamander	G3S3		(FSC)		DFG: CSC DFG: Protected
–*Plethodon stormi* Siskiyou Mountains salamander	G3QS1S2	ST	(FSC)	VU/D2	DFG: Protected
ASCAPHIDAE (tailed frogs)					
+*Ascaphus truei* Tailed frog	G3G4S2S3		(FSC)		DFG: CSC DFG: Protected
PELOBATIDAE (spadefoot toads)					
+*Scaphiopus couchii* Couch's spadefoot	G5S2S3				DFG: CSC BLM: Sensitive
+*Scaphiopus (= Spea) hammondii* Western spadefoot	G3?S3?		(FSC)		DFG: CSC DFG: Protected BLM: Sensitive
BUFONIDAE (true toads)					
+*Bufo alvarius* Colorado River toad	G5SH				DFG: CSC DFG: Protected
+*Bufo canorus* Yosemite toad	G1G2S1S2		(FSC)	EN/A1a, B2be+3b	DFG: CSC DFG: Protected FS: Sensitive
–*Bufo exsul* Black toad	G1S1	ST	(FSC)	VU/D2	DFG: Fully protected DFG: Protected

	CNDDB RANK	CESA	ESA	IUCN	OTHER
-*Bufo microscaphus californicus* Arroyo toad	G4T3?S2S3		FE		DFG: CSC DFG: Protected (Full species)
Bufo microscaphus microscaphus Arizona toad	G4T3S1?		(FSC)		DFG: Protected (Full species)
RANIDAE (true frogs)					
+*Rana aurora aurora* Northern red-legged frog	G4T2?S2?		(FSC)		DFG: CSC DFG: Protected (Full species) FS: Sensitive
+*Rana aurora draytonii* California red-legged frog	G4T2T3S2S3		FT[20]		DFG: CSC DFG: Protected (Full species)
-*Rana boylii* Foothill yellow-legged frog	G3S2S3		(FSC)		DFG: CSC DFG: Protected FS: Sensitive BLM: Sensitive
+*Rana cascadae* Cascades frog	G4S3		(FSC)	VU A1a	DFG: CSC DFG: Protected FS: Sensitive
+*Rana muscosa* Mountain yellow-legged frog	G2S2		FPE[21]	VU/A1a	DFG: CSC DFG: Protected FS: Sensitive
+*Rana pipiens* Northern leopard frog	G5S2				DFG: CSC FS: Sensitive
+*Rana pretiosa* Spotted frog	G5S1		FC		DFG: CSC DFG: Protected FS: Sensitive
Rana yavapaiensis Lowland (=Yavapai & San Felipe) leopard frog	G3SX		(FSC)		DFG: CSC DFG: Protected BLM: Sensitive

[20]Federal listing does not include Humboldt, Trinity & Mendocino Counties; Glenn, Lake & Sonoma Counties west of the Central Valley Hydrologic Basin; Sonoma & Marin Counties north and west of the Napa River, Sonoma Creek & Petaluma River drainages which flow into San Francisco Bay, & north of the Walker Creek drainage which flows to the Pacific Ocean.

[21]Federal listing proposal refers to populations in the San Gabriel, San Jacinto & San Bernardino Mountains only.

REPTILES

	CNDDB RANK	CESA	ESA	IUCN	OTHER
KINOSTERNIDAE (musk and mud turtles)					
Kinosternon sonoriense Sonoran mud turtle	G4G5SH			VU/A1c	DFG: CSC DFG: Protected
EMYDIDAE (box and water turtles)					
+*Clemmys marmorata* Western pond turtle	G4S3		(FSC)	VU/A1cd	DFG: CSC DFG: Protected
+*Clemmys marmorata marmorata* Northwestern pond turtle	G4T4S3		(FSC)		DFG: CSC DFG: Protected (Full species) FS: Sensitive BLM: Sensitive
+*Clemmys marmorata pallida* Southwestern pond turtle	G4T2T3S2		(FSC)		DFG: CSC DFG: Protected (Full species) FS: Sensitive BLM: Sensitive
TESTUDINIDAE (land tortoises)					
+*Gopherus (=Xerobates) agassizi* Desert tortoise	G3S2	ST	FT	VU/A1acde +2cde, E	DFG: Protected
GEKKONIDAE (geckos)					
+*Coleonyx switaki* Barefoot gecko	G1S1	ST	(FSC)		DFG: Protected
Coleonyx variegatus abbotti San Diego banded gecko	G5T3T4S2S3		(FSC)		
IGUANIDAE (iguanids)					
+*Sauromalus obesus* Chuckwalla	G5S4		(FSC)		BLM: Sensitive
CROTAPHYTIDAE					
+*Gambelia sila (=silus)* Blunt-nosed leopard lizard	G1S1	SE	FE	EN/A1ce	DFG: Fully protected DFG: Protected

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
PHRYNOSOMATIDAE					
–*Phrynosoma coronatum blainvillei* San Diego horned lizard	G4T3T4S2S3		(FSC)		DFG: CSC DFG: Protected (Full species) FS: Sensitive
–*Phrynosoma coronatum frontale* California horned lizard	G4T3T4S3S4		(FSC)		DFG: CSC DFG: Protected (Full species) BLM: Sensitive
+*Phrynosoma mcalli* Flat-tailed horned lizard	G2S2				DFG: CSC DFG: Protected BLM: Sensitive
Sceloporus graciosus graciosus Northern sagebrush lizard	G5T5S3		(FSC)		BLM: Sensitive
+*Uma inornata* Coachella Valley fringe-toed lizard	G1S1	SE	FT	EN/A1a, B1+2c	DFG: Protected
Uma notata notata Colorado Desert fringe-toed lizard	G3QT3S2?		(FSC)		DFG: CSC BLM: Sensitive
Uma scoparia Mojave fringe-toed lizard	G3G4S3S4				DFG: CSC BLM: Sensitive
XANTUSIIDAE (night lizards)					
Xantusia henshawi gracilis Sandstone night lizard	G3G4T1S1		(FSC)		DFG: CSC DFG: Protected (Full species)
+*Xantusia riversiana* Island night lizard	G1S1		FT	VU/D2	DFG: Protected
Xantusia vigilis sierrae Sierra night lizard	G4G5T1S1		(FSC)		DFG: CSC FS: Sensitive
SCINCIDAE (skinks)					
+*Eumeces skiltonianus interparietalis* Coronado skink	G5T2T3S1S2		(FSC)		DFG: CSC BLM: Sensitive
TEIIDAE (whiptails and relatives)					
+*Cnemidophorus hyperythrus beldingi* Beldings orange-throated whiptail	G5T2S2		(FSC) (Full Species)	DD (Full species)	DFG: CSC DFG: Protected (Full species)
+*Cnemidophorus tigris multiscutatus* Coastal western whiptail	G5T3?S2S3		(FSC)		
ANGUIDAE (alligator lizards)					
+*Elgaria (=Gerrhonotus) panamintinus* Panamint alligator lizard	G1G2S1S2		(FSC)	VU/D2	DFG: CSC DFG: Protected FS: Sensitive BLM: Sensitive

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
ANNIELLIDAE (legless lizards)					
-*Anniella pulchra pulchra* Silvery legless lizard	G4QT3S3		(FSC)		DFG: CSC FS: Sensitive
+*Anniella pulchra nigra* Black legless lizard	G4QT2S2				DFG: CSC DFG: Protected FS: Sensitive
HELODERMATIDAE (venomous lizards)					
-*Heloderma suspectum cinctum* Banded gila monster (population west of Colorado River)	G3G4T1S1		(FSC)	VU/A2cd (Full species)	DFG: CSC DFG: Protected BLM: Sensitive (Full species)
BOIDAE (boas)					
+*Charina bottae umbratica* Southern rubber boa	G5T2T3S2S3	ST	(FSC)		FS: Sensitive DFG: Protected
+*Charina (=Lichanura) trivirgata* Rosy boa	G5S3S4		(FSC)		BLM: Sensitive
COLUBRIDAE (colubrids)					
Bogertiphis (=Elaphe) rosaliae Baja California rat snake	G4?S1				DFG: CSC
- *Diadiphis punctatus modestus* San Bernardino ringneck snake	G5T2?S2		(FSC)		FS: Sensitive
+*Diadiphis punctatus similis* San Diego ringneck snake	G5T2?S2?				FS: Sensitive
+*Lampropeltis zonata parvirubra* San Bernardino mountain kingsnake	G4T2?S2?		(FSC)		DFG: CSC FS: Sensitive
+*Lampropeltis zonata pulchra* San Diego mountain kingsnake	G4T1T2S1S2		(FSC)		DFG: CSC DFG: Protected FS: Sensitive
+*Masticophis flagellum ruddocki* San Joaquin whipsnake	G5T2?S2?		(FSC)		DFG: CSC DFG: Protected
+*Masticophis lateralis euryxanthus* Alameda whipsnake (=striped racer)	G4T2S2	ST	FT		DFG: Protected
Pituophis melanoleucus pumilus Santa Cruz gopher snake	G5T1?S1?		(FSC)		DFG: CSC
+*Salvadora hexalepis virgultea* Coast patch-nosed snake	G5T3S2S3		(FSC)		DFG: CSC
+*Thamnophis gigas* Giant garter snake	G2G3S2S3	ST	FT	VU/A1cde +2cde	DFG: Protected
+*Thamnophis hammondii* Two-striped garter snake	G3?S2			DD	DFG: CSC DFG: Protected FS: Sensitive BLM: Sensitive
+*Thamnophis sirtalis tetrataenia* San Francisco garter snake	G5T2S2	SE	FE		DFG: Fully protected DFG: Protected

	CNDDB RANKS	CESA	ESA	IUCN		OTHER
Thamnophis sirtalis ssp. South Coast garter snake	G5T1T2S1S2		(FSC)			DFG: CSC
VIPERIDAE (vipers)						
–*Crotalus ruber ruber* Northern red-diamond rattlesnake	G4T3T4S2?		(FSC)			DFG: CSC

BIRDS

	CNDDB RANK	CESA	ESA	IUCN	OTHER
GAVIIDAE (loons)					
Gavia immer (nesting) Common loon	G5S1				DFG: CSC FWS: MNBMC
HYDROBATIDAE (storm petrels)					
+*Oceanodroma furcata* (rookery site) Fork-tailed storm-petrel	G5S1				DFG: CSC
+*Oceanodroma homochroa* (rookery site) Ashy storm-petrel	G2S2		(FSC)	LRnt	DFG: CSC FWS: MNBMC PIF: Watch list
-*Oceanodroma melania* (rookery site) Black storm-petrel	G3S1				DFG: CSC PIF: Watch list
PELECANIDAE (pelicans)					
+*Pelecanus erythrorhynchos* (nesting colony) American white pelican	G3S1				DFG: CSC Audubon: Cal WL
-*Pelecanus occidentalis californicus* California brown pelican (nesting colony)	G4T3S1S2	SE	FE		FWS: MNBMC DFG: Fully protected
PHALACROCORACIDAE (cormorants)					
+*Phalacrocorax auritus* (rookery site) Double-crested cormorant	G5S3				DFG: CSC
ARDEIDAE (herons, egrets, and bitterns)					
+*Ardea alba* (rookery) Great egret	G5S4				CDF: Sensitive
+*Ardea herodias* (rookery) Great blue heron	G5S4				CDF: Sensitive
Botaurus lentiginosus American bittern	G5S3				FWS: MNBMC
+*Egretta thula* (rookery) Snowy egret	G5S4				
+*Ixobrychus exilis hesperis* (nesting) Western least bittern	G5T1S1			(FSC)	DFG: CSC FWS: MNBMC (Full species)
+*Nycticorax nycticorax* (rookery) Black-crowned night heron	G5S3				BLM: Sensitive

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
THRESKIORNITHIDAE (ibises and spoonbills)					
+*Plegadis chihi* (rookery site) White-faced ibis	G5S1		(FSC)		DFG: CSC FWS: MNBMC
CICONIIDAE (storks)					
Mycteria americana Wood stork					DFG: CSC
CATHARTIDAE (New World vultures)					
+*Gymnogyps californianus* California condor	G1S1	SE	FE	CR/D	CDF: Sensitive DFG: Fully protected
ANATIDAE (ducks, geese, and swans)					
Aythya valisineria (nesting) Canvasback	G5S2?				
+*Branta canadensis leucopareia* (wintering) Aleutian Canada goose	G5T2S2		FT		
Bucephala islandica (nesting) Barrow's goldeneye	G5S1				DFG: CSC Audubon: Cal WL
Dendrocygna bicolor (nesting) Fulvous whistling duck	G5S1S3		(FSC)		DFG: CSC
+*Histrionicus histrionicus* (nesting) Harlequin duck	G5S2		(FSC)		DFG: CSC BLM: Sensitive
ACCIPITRIDAE (hawks, kites, harriers, and eagles)					
+*Accipiter cooperi* (nesting) Cooper's hawk	G4S3				DFG: CSC
+*Accipiter gentilis* (nesting) Northern goshawk	G4S3		(FSC)		DFG: CSC FWS: MNBMC FS: Sensitive CDF: Sensitive
+*Accipiter striatus* (nesting) Sharp-shinned hawk	G4S3				DFG: CSC
+*Aquila chrysaetos* (nesting and wintering) Golden eagle	G4S3				DFG: CSC DFG: Fully protected CDF: Sensitive BLM: Sensitive
Buteo regalis (wintering) Ferruginous hawk	G4S3S4		(FSC)	LRnt	DFG: CSC Audubon: Cal WL FWS: MNBMC BLM: Sensitive
+*Buteo swainsoni* (nesting) Swainson's hawk	G4S2	ST			
+*Circus cyaneus* (nesting) Northern harrier	G5S3				DFG: CSC

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
+*Elanus leucurus* (nesting) White-tailed kite	G5S3				FWS: MNBMC DFG: Fully protected
+*Haliaeetus leucocephalus* (nesting and wintering) Bald eagle	G4S2	SE	FPD FT		CDF: Sensitive DFG: Fully protected
+*Pandion haliaetus* (nesting) Osprey	G5S3				DFG: CSC CDF: Sensitive
Parabuteo unicinctus (nesting) Harris' hawk	G5SH				DFG: CSC
FALCONIDAE (falcons)					
Falco columbarius (wintering) Merlin	G5S3				DFG: CSC
+*Falco mexicanus* (nesting) Prairie falcon	G5S3				DFG: CSC Audubon: Cal WL
+*Falco peregrinus anatum* (nesting) American peregrine falcon	G3T2S2	SE	Delisted		FWS: MNBMC (Full species) CDF: Sensitive DFG: Fully protected
PHASIANIDAE (grouse and ptarmigan)					
Bonasa umbellus Ruffed grouse	G5S4				DFG: CSC
+*Centrocercus urophasianus* (nesting) Greater Sage-grouse	G4S3				DFG: CSC Audubon: Cal WL BLM: Sensitive
Tympanuchus phasianellus columbianus Columbian sharp-tailed grouse	G4T2SX		(FSC)		DFG: CSC
RALLIDAE (rails, coots, and gallinules)					
+*Coturnicops noveboracensis* Yellow rail	G4S1S2				DFG: CSC FWS: MNBMC PIF: Watch list Audubon: Cal WL
+*Laterallus jamaicensis cotumiculus* California black rail	G4T1S1	ST	(FSC)	LRnt (Full species)	PIF: Watch list (Full species) DFG: Fully protected Audubon: Cal WL FWS: MNBMC (Full species)
-*Rallus longirostris levipes* Light-footed clapper rail	G5T1S1	SE	FE		DFG: Fully protected
+*Rallus longirostris obsoletus* California clapper rail	G5T1S1	SE	FE		DFG: Fully protected
+*Rallus longirostris yumanensis* Yuma clapper rail	G5T3S1	ST	FE		DFG: Fully protected

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
GRUIDAE (cranes)					
+*Grus canadensis tabida* (nesting and wintering) Greater sandhill crane	G5T2S2	ST			DFG: Fully protected Audubon: Cal WL
CHARADRIIDAE (plovers and relatives)					
+*Charadrius alexandrinus nivosus* (nesting) Western snowy plover (coastal population)	G4T2S2		FT		DFG: CSC FWS: MNBMC (Full species) PIF: Watch list (Full species)
+*Charadrius alexandrinus nivosus* (nesting) Western snowy plover (inland populations)	G4T2S2				DFG: CSC FWS: MNBMC (Full species) PIF: Watch list (Full species)
+*Charadrius montanus* (wintering) Mountain plover	G3S2?		FPT	VU:A1bc+ 2bc, C1	DFG:CSC PIF: Watch list FWS: MNBMC
HAEMATOPODIDAE (oystercatchers)					
Haematopus bachmani (nesting) Black oystercatcher	G5S2				PIF: Watch list Audubon: Cal WL
SCOLOPACIDAE (sandpipers and relatives)					
Numenius americanus (nestng) Long-billed curlew	G5S2			LRnt	DFG: CSC Audubon: Cal WL FWS: MNBMC PIF: Watch list
LARIDAE (gulls and terns)					
+*Chlidonias niger* (nesting colony) Black tern	G5S2		(FSC)		DFG: CSC FWS: MNBMC
Larus atricilla (nesting colony) Laughing gull	G?SH				DFG: CSC
+*Larus californicus* (nesting colony) California gull	G5S2				DFG: CSC
+*Rynchops niger* (nesting colony) Black skimmer	G5S1S3				DFG: CSC
+*Sterna antillarum browni* (nesting colony) California least tern	G4T2T3S2S3	SE	FE		FWS: MNBMC (Full species) DFG: Fully protected
+*Sterna caspia* (nesting colony) Caspian tern	G5S4				
Sterna elegans (nesting colony) Elegant tern	G5S1		(FSC)	LRnt	DFG: CSC FWS: MNBMC

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
Sterna forsteri (nesting colony) Forster's tern	G5S4				Audubon: Cal WL
+*Sterna nilotica vanrossemi* (nesting colony) Van Rossem's gull-billed tern	G5T1S1		(FSC)		DFG: CSC
ALCIDAE (auklets, puffins, and relatives)					
+*Brachyramphus marmoratus* (nesting) Marbled murrelet	G3S1	SE	FT	VU/A1abcde +2bcde	FWS: MNBMC CDF: Sensitive
+*Cerorhinca monocerata* (nesting colony) Rhinoceros auklet	G5S3				DFG: CSC
+*Fratercula cirrhata* (nesting colony) Tufted puffin	G5S2				DFG: CSC
+*Synthliboramphus hypoleucus* (nesting colony) Xantus' murrelet	G4?S3		(FSC)	VU/B1+ 2de, C1	DFG: CSC FWS: MNBMC PIF: Watch list
CUCULIDAE (cuckoos and relatives)					
+*Coccyzus americanus occidentalis* (nesting) Western yellow-billed cuckoo	G5T2T3S1	SE			FWS: MNBMC (Full species)
STRIGIDAE (owls)					
+*Asio flammeus* (nesting) Short-eared owl	G5S3				DFG: CSC Audubon: Cal WL FWS: MNBMC PIF: Watch list
+*Asio otus* (nesting) Long-eared owl	G5S3				DFG: CSC
+*Athene cunicularia hypugea* (burrow sites) Burrowing owl	G4T2S2		(FSC)		DFG: CSC FWS: MNBMC (Full species) BLM: Sensitive
+*Micrathene whitneyi* (nesting) Elf owl	G5S1	SE			Audubon: Cal WL PIF: Watch list
+*Strix nebulosa* (nesting) Great gray owl	G5S1	SE			FS: Sensitive CDF: Sensitive
+*Strix occidentalis caurina* Northern spotted owl	G3T2T3S2S3		FT	LRnt (Full species)	CDF: Sensitive FWS: MNBMC (Full species)
Strix occidentalis occidentalis California spotted owl	G3T3S3		(FSC)	LRnt (Full species)	DFG: CSC FS: Sensitive FWS: MNBMC (Full species) BLM: Sensitive

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
APODIDAE (swifts)					
Chaetura vauxi (nesting) Vaux's swift	G5S3				DFG: CSC FWS: MNBMC Audubon: Cal WL
+*Cypseloides niger* (nesting) Black swift	G4S2				DFG: CSC FWS: MNBMC PIF: Watch list Audubon: Cal WL
TROCHILIDAE (hummingbirds)					
Selasphorus rufus (nesting) Rufous hummingbird	G5S1S2				FWS: MNBMC PIF: Watch list Audubon: Cal WL
PICIDAE (woodpeckers)					
+*Colaptes chrysoides* Gilded flicker	G5S1	SE			PIF: Watch list Audubon: Cal WL
+*Melanerpes uropygialis* Gila woodpecker	G5S1S2	SE			FWS: MNBMC
TYRANNIDAE (tyrant flycatchers)					
Contopus borealis (nesting) Olive-sided flycatcher	G5S4				Audubon: Cal WL FWS: MNBMC
+*Empidonax trailii* (nesting) Willow flycatcher	G5S1S2	SE[22]			FS: Sensitive
Empidonax trailii brewsteri (nesting) Little willow flycatcher	G5T1T2S1S2		(FSC)		
+*Empidonax trailii extimus* (nesting) Southwestern willow flycatcher	G5T1S1		FE		
+*Myiarchus tyrannulus* (nesting) Brown-crested flycatcher	G5S2S3				DFG: CSC
+*Pyrocephalus rubinus* (nesting) Vermilion flycatcher	G5S2S3				DFG: CSC
LANIIDAE (shrikes)					
Lanius ludovicianus Loggerhead shrike	G4S4		(FSC)		DFG: CSC Audubon: Cal WL FWS: MNBMC
+*Lanius ludovicianus mearnsi* San Clemente loggerhead shrike	G4T1S1		FE		
Lanius ludovicianus anthonyi Island loggerhead shrike	G4T1?S1?				DFG: CSC

[22]State listing includes all subspecies.

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
VIREONIDAE (vireos)					
+*Vireo bellii arizonae* (nesting) Arizona Bell's vireo	G5T1S1	SE			PIF: Watch list (Full species) FWS: MNBMC (Full species)
+*Vireo bellii pusillus* (nesting) Least Bell's vireo	G5T2S2	SE	FE		PIF: Watch list (Full species) FWS: MNBMC (Full species)
+*Vireo vicinior* (nesting) Gray vireo	G5S2				DFG: CSC PIF: Watch list Audubon: Cal WL BLM: Sensitive
CORVIDAE (jays, crows, and magpies)					
Aphelocoma californica cana Eagle Mountain scrub jay	G5T1T2S1S2		(FSC)		DFG: CSC
Aphelocoma insularis Santa Cruz Island scrub jay	G1S1			LRnt	PIF: Watch list
ALAUDIDAE (larks)					
+*Eremophila alpestris actia* California horned lark	G4G5T3S3				DFG: CSC
HIRUNDINIDAE (swallows)					
+*Progne subis* (nesting) Purple martin	G5S3				DFG: CSC
+*Riparia riparia* (nesting) Bank swallow	G5S2S3	ST			
PARIDAE (titmice and relatives)					
Parus atricapillus Black-capped chickadee	G5S3				DFG: CSC
TROGLODYTIDAE (wrens)					
+*Campylorhynchus brunneicapillus couesi* Coastal cactus wren	G5T2?S2?				DFG: CSC
SYLVIIDAE (gnatcatchers)					
+*Polioptila californica* California gnatcatcher	G2S2		FT		DFG: CSC
+*Polioptila melanura* Black-tailed gnatcatcher	G5S4				Audubon: Cal WL

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
MIMIDAE (mockingbirds and thrashers)					
+*Toxostoma bendirei* Bendire's thrasher	G5S3				DFG: CSC PIF: Watch list FWS: MNBMC Audubon: Cal WL BLM: Sensitive
+*Toxostoma crissale (=dorsale)* Crissale thrasher	G5S3				DFG: CSC Audubon: Cal WL
-*Toxostoma lecontei* Le Conte's thrasher	G4S3		(FSC)		DFG: CSC PIF: Watch list Audubon: Cal WL BLM: Sensitive
Toxostoma lecontei macmillanorum San Joaquin Le Conte's thrasher	G4T1S1				DFG: CSC PIF: Watch list . (Full species) Audubon: Cal WL (Full species)
PARULIDAE (wood-warblers)					
Dendroica occidentalis (nesting) Hermit warbler	G4G5S3?				PIF: Watch list Audubon: Cal WL
+*Dendroica petechia brewsteri* (nesting) Yellow warbler	G5T2S2				DFG: CSC
+*Dendroica petechia sonorana* (nesting) Sonoran yellow warbler	G5T1S1				DFG: CSC
-*Geothlypis trichas sinuosa* Saltmarsh common yellowthroat	G5T2S2		(FSC)		DFG: CSC
+*Icteria virens* (nesting) Yellow-breasted chat	G5S3				DFG: CSC FWS: MNBMC
Vermivora luciae (nesting) Lucy's warbler	G4S2S3				PIF: Watch list FWS: MNBMC Audubon: Cal WL
+*Vermivora virginiae* (nesting) Virginia's warbler	G4S2S3				DFG: CSC PIF: Watch list
THRAUPIDAE (tanagers)					
+*Piranga flava* (nesting) Hepatic tanager	G5S1				DFG: CSC
+*Piranga rubra* (nesting) Summer tanager	G5S2				DFG: CSC
EMBERIZIDAE (sparrows, buntings, warblers, and relatives)					
+*Aimophila ruficeps canescens* Southern California rufous-crowned sparrow	G4T2T3S2S3		(FSC)		DFG: CSC Audubon: Cal WL (Full species)
Ammodramus savannarum (nesting) Grasshopper sparrow	G5S2				FWS: MNBMC

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
+*Amphispiza belli belli* (nesting) Bell's sage sparrow	G5T2?S2?		(FSC)		DFG: CSC PIF: Watch list (Full species) Audubon: Cal WL (Full species) FWS: MNBMC (Full species)
+*Amphispiza belli clementeae* San Clemente sage sparrow	G5T1S1		FT		PIF: Watch list (Full species) Audubon: Cal WL (Full species) FWS: MNBMC (Full species)
+*Junco hyemalis caniceps* (nesting) California gray-headed junco	G5T5S1				DFG: CSC
+*Melospiza melodia maxillaris* Suisun song sparrow	G5T2S2		(FSC)		DFG: CSC
Melospiza melodia pusillula Alameda (South Bay) song sparrow	G5T2?S2?		(FSC)		DFG: CSC
–*Melospiza melodia samuelis* San Pablo (=Samuel's) song sparrow	G5T2?S2?		(FSC)		DFG: CSC
+*Passerculus sandwichensis beldingi* Belding's savannah sparrow	G5T3S3	SE	(FSC)		
Passerculus sandwichensis rostratus (wintering) Large-billed savannah sparrow	G5T2?S2?		(FSC)		DFG: CSC
Pipilo aberti Abert's towhee	G4S2?				PIF: Watch list Audubon:Cal WL
+*Pipilo crissalis eremophilus* Inyo California towhee	G4G5T1S1	SE	FT		Audubon: Cal WL (Full species)
Pipilo maculatus clementae San Clemente towhee	G5T1S1		(FSC)		DFG: CSC
Spizella atrogularis (nesting) Black-chinned sparrow	G5S3				PIF: Watch list Audubon: Cal WL
Spizella breweri (nesting) Brewer's sparrow	G5S3				PIF: Watch list FWS: MNBMC
Spizella passerina (nesting) Chipping sparrow	G5S3S4				
CARDINALIDAE (cardinals)					
+*Cardinalis cardinalis* Northern cardinal	G5S1				DFG: CSC
ICTERIDAE (blackbirds)					
+*Agelaius tricolor* (nesting colony) Tricolored blackbird	G2S2		(FSC)		DFG: CSC FWS: MNBMC Audubon: Cal WL BLM: Sensitive
Xanthocephalus xanthocephalus (nesting) Yellow-headed blackbird	G4G5S3S4				

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
FRINGILLIDAE (finches and relatives)					
Carduelis lawrencei (nesting) Lawrence's goldfinch	G3S3				PIF: Watch list FWS: MNBMC Audubon: Cal WL

MAMMALS

	CNDDB RANK	CESA	ESA	IUCN		OTHER
TALPIDAE (moles)						
Scapanus latimanus parvus Alameda Island mole	G5T1S1		(FSC)			DFG: CSC
+*Scapanus latimanus insularis* Angel Island mole	G5T1S1					
SORICIDAE (shrews)						
Sorex lyelli Mount Lyell shrew	G3S2S3					DFG: CSC
+*Sorex ornatus relictus* Buena Vista Lake shrew	G5T1S1		FPE			DFG: CSC
Sorex ornatus salarius Monterey shrew (AKA Salinas ornate shrew)	G5T1T2S1S2		(FSC)			DFG: CSC
Sorex ornatus salicornicus Southern California saltmarsh shrew	G5T1?S1?		(FSC)			DFG: CSC
+*Sorex ornatus sinuosus* Suisun shrew	G5T1S1		(FSC)			DFG: CSC
+*Sorex ornatus willetti* Santa Catalina shrew	G5T1S1		(FSC)			DFG: CSC
+*Sorex vagrans halicoetes* Salt-marsh wandering shrew	G5T1S1		(FSC)			DFG: CSC
Sorex vagrans paludivagus No common name	G5T1S1					
PHYLLOSTOMIDAE (leaf-nosed bats)						
+*Choeronycteris mexicana* Mexican long-tongued bat	G2S1		(FSC)	LRnt		DFG: CSC WBW G: High priority
+*Macrotus californicus* California leaf-nosed bat	G4S2S3		(FSC)	VU/A2c		DFG: CSC FS: Sensitive BLM: Sensitive WBW G: High priority
VESPERTILIONIDAE (mouse-eared bats)						
+*Antrozous pallidus* Pallid bat	G5S3					DFG: CSC FS: Sensitive BLM: Sensitive WBW G: High priority

MAMMALS

	CNDDB RANK	CESA	ESA	IUCN	____	OTHER
TALPIDAE (moles)						
Scapanus latimanus parvus Alameda Island mole	G5T1S1		(FSC)			DFG: CSC
+*Scapanus latimanus insularis* Angel Island mole	G5T1S1					
SORICIDAE (shrews)						
Sorex lyelli Mount Lyell shrew	G3S2S3					DFG: CSC
+*Sorex ornatus relictus* Buena Vista Lake shrew	G5T1S1		FPE			DFG: CSC
Sorex ornatus salarius Monterey shrew (AKA Salinas ornate shrew)	G5T1T2S1S2		(FSC)			DFG: CSC
Sorex ornatus salicornicus Southern California saltmarsh shrew	G5T1?S1?		(FSC)			DFG: CSC
+*Sorex ornatus sinuosus* Suisun shrew	G5T1S1		(FSC)			DFG: CSC
+*Sorex ornatus willetti* Santa Catalina shrew	G5T1S1		(FSC)			DFG: CSC
+*Sorex vagrans halicoetes* Salt-marsh wandering shrew	G5T1S1		(FSC)			DFG: CSC
Sorex vagrans paludivagus No common name	G5T1S1					
PHYLLOSTOMIDAE (leaf-nosed bats)						
+*Choeronycteris mexicana* Mexican long-tongued bat	G2S1		(FSC)	LRnt		DFG: CSC WBW G: High priority
+*Macrotus californicus* California leaf-nosed bat	G4S2S3		(FSC)	VU/A2c		DFG: CSC FS: Sensitive BLM: Sensitive WBW G: High priority
VESPERTILIONIDAE (mouse-eared bats)						
+*Antrozous pallidus* Pallid bat	G5S3					DFG: CSC FS: Sensitive BLM: Sensitive WBW G: High priority

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
+*Corynorhinus (=Plecotus) townsendii pallescens* Pale big-eared bat	G5T3T4S2S3		(FSC) (Full species)	VU/A2c (Full species)	DFG: CSC (Full species) FS: Sensitive (Full species) BLM: Sensitive (Full species) WBW G: High priority
+*Corynorhinus (=Plecotus) townsendii townsendii* Townsend's western big-eared bat	G5T3T4S2S3		(FSC) (Full species)	VU/A2c (Full species)	DFG: CSC (Full species) FS: Sensitive (Full species) BLM: Sensitive (Full species) WBW G: High priority
-*Euderma maculatum* Spotted bat	G4S2S3		(FSC)		DFG: CSC BLM: Sensitive WBW G: High priority
- *Myotis ciliolabrum* Small-footed myotis	G5S?		(FSC)		BLM: Sensitive
+ *Myotis evotis* Long-eared myotis	G5S4?		(FSC)		BLM: Sensitive
Myotis occultus (=Myotis lucifugus occultus) Occult little brown bat (AKA Arizona myotis)	G5T3T4S2S3		(FSC)		DFG: CSC BLM: Sensitive
- *Myotis thysanodes* Fringed myotis	G5S4		(FSC)		BLM: Sensitive WBW G: High priority
- *Myotis velifer* Cave myotis	G5S1		(FSC)		DFG: CSC BLM: Sensitive
- *Myotis volans* Long-legged myotis	G5S4?		(FSC)		WBW G: High priority BLM: Sensitive
- *Myotis yumanensis* Yuma myotis (AKA San Joaquin myotis)	G5S4?		(FSC)		DFG: CSC BLM: Sensitive
MOLOSSIDAE (free-tailed bats)					
-*Eumops perotis* Western mastiff bat	G5S3?		(FSC) (Ssp *californicus*)		DFG: CSC BLM: Sensitive WBW G: High priority
+*Nyctinomops (=Tadarida) femorosaccus* Pocketed free-tailed bat	G4S2S3				DFG: CSC
Nyctinomops (=Tadarida) macrotis Big free-tailed bat	G5S2				DFG: CSC
OCHOTONIDAE (pikas)					
Ochotona princeps sheltoni White Mountains pika	G5T1T2S1S2				
LEPORIDAE (rabbits and hares)					
Brachylagus idahoensis Pygmy rabbit	G5S3		(FSC)	LRnt	DFG: CSC

	CNDDB RANKS	CESA	ESA	IUCN	OTHER
Lepus americanus klamathensis Oregon snowshoe hare	G5T2T3S2?				DFG: CSC
Lepus americanus tahoensis Sierra Nevada snowshoe hare	G5T2T3S2?		(FSC)		DFG: CSC
+*Lepus californicus bennettii* San Diego black-tailed jackrabbit	G5T3?S3?		(FSC)		DFG: CSC
Lepus townsendii White-tailed hare	G5S3?				DFG: CSC
+*Sylvilagus bachmani riparius* Riparian brush rabbit	G5T1S1	SE	FE		
APLODONTIDAE (mountain beavers)					
+*Aplodontia rufa californica* Sierra Nevada mountain beaver	G5T3?S3?		(FSC)	LRnt	DFG: CSC
+*Aplodontia rufa nigra* Point Arena mountain beaver	G5T1S1		FE	VU/B1+2de	DFG: CSC
+*Aplodontia rufa phaea* Point Reyes mountain beaver	G5T2S2		(FSC)	VU/B1+2e	DFG: CSC
SCIURIDAE (squirrels and relatives)					
+*Ammospermophilus nelsoni* San Joaquin antelope squirrel	G2S2	ST	(FSC)	EN/A1a, B1+2c	
Glaucomys sabrinus californicus San Bernardino flying squirrel	G5T3?S3?		(FSC)	DD	DFG: CSC FS: Sensitive
Spermophilus laterlis bernardinus San Bernardino ground squirrel	G5T1S1				
+*Spermophilus mohavensis* Mohave ground squirrel	G2?S2?	ST	(FSC)	VU/B1+3d	
+*Spermophilus tereticaudus chlorus* Palm Springs round-tailed ground squirrel	G5T1T2S1S2		FC	DD	DFG: CSC
+*Tamias panamintinus acrus* Kingston Mountain chipmunk	G5T1T2S1S2				
Tamias speciosus callipeplas Mount Pinos chipmunk	G5T1T2S1S2				FS: Sensitive
Tamias speciosus speciosus Lodgepole chipmunk	G5T3?S3?		(FSC)		
GEOMYIDAE (pocket gophers)					
Thomomys umbrinus (=bottae) amargosae Amargosa pocket gopher	G5T1?S1?				
Thomomys umbrinus (=bottae) operarius Owens Lake pocket gopher	G5T1?S1?				
HETEROMYIDAE (kangaroo rats, pocket mice, and kangaroo mice)					
+*Chaetodipus (=Perognathus) californicus femoralis* Dulzura (California) pocket mouse	G4T2T3S2?		(FSC)	DD	DFG: CSC

to clarify that the term "candidate species" only applies to those species the Service expects to propose for listing based on the available scientific information.

Q: The Service has issued a variety of memoranda and other documents that state that Category 2 candidates should now be called "Species of Concern" or "Species at Risk". Is this merely a term-of-art, or is the old Category 2 list being maintained under a different name?

A: The Service is *not* maintaining a list of Category 2 species, under that name or any other name, nor is anyone maintaining a list for the Service. The terms "Species at Risk" or Species of Concern" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the Service, but neither term has official status. The species in former Category 2 would generally fit this description, as would those on the Service's list of Migratory Nongame Birds of Management Concern in the United States, the American Fisheries Society's list of Protected Fished of the United States and Canada, State lists of protected species, and species identified as imperiled or vulnerable by the State Natural Heritage Programs and The Nature Conservancy.

APPENDIX 4 - SPECIES OF SPECIAL CONCERN REPORTS

Jennings, M. R. and M. P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report submitted to the Department of Fish and Game Inland Fisheries Division under contract No. 8023. 255 pp.

The status of 80 amphibian and reptile taxa was reviewed. Individual accounts are presented for 48 declining taxa in need of some level of protection. This report is available for $20.00 plus tax and shipping. Call Information Services at (916) 324-0563

Moyle, P. B., R. M. Yoshiyama, J. E. Williams, & E. D. Wikramanayake. 1995. Fish Species of Special Concern in California. Final Report submitted to the Department of Fish and Game Inland Fisheries Division under contract No. 2128IF. 272 pp.

This report is a second edition. It treats 54 taxa of native fish and gives detailed accounts for 49 taxa. This report is available for $16.00 plus tax and shipping. Call Information Services at (916) 324-0563.

Remsen, J. V. Jr. 1978. Bird Species of Special Concern in California, An Annotated List of Declining or Vulnerable Bird Species. Wildlife Management Branch Administrative Report No. 78-1. 54 pp.

This was the first species of special concern report produced. Of the 61 taxa presented, 11 are now state and/or federally listed. This report is out of print.; a new bird species of special concern report is currently in preparation.

Williams, D. F. 1986. Mammalian Species of Special Concern in California. Wildlife Management Division Administrative Report 86-1. 112 pp.

Of the 36 taxa presented, 5 are now state and/or federally listed, and another is proposed for federal listing. This report is now out of print; a new mammalian species of special concern report is currently in preparation.

APPENDIX 5 - OTHER DATABASES

California Wildlife Habitat Relationships Program (CWHR): A computerized information system and predictive model for 675 of California's amphibians, reptiles, birds, and mammals. It contains information on taxonomy, legal status, geographic distribution, and habitat relationships. It can be used for activities involving wildlife species and habitat management, impact assessment, biodiversity conservation, and land use planning. Version 7.0 software comes compiled in visual dbase on CD-ROM for use in Windows 95, 98 or NT environments. This database is available for sale. More information is available on the Department's web site: http://www.dfg.ca.gov/whdab/html/cwhr.html The web site also contains the text of "California's Wildlife" Volumes I-III. This on-line resource contains information on life history and distribution.

Habitat Conservation Division Databases: The Bay-Delta Branch makes the results of some of their research projects available on their Web site: http://www.delta.dfg.ca.gov/

SPECIES	DATA TYPE
Splittail *Pogonichthys macrolepidotus*	Abundance and distribution data
Chinook Salmon *Oncorhynchus tshawytscha*	Monitoring summary for fall, late-fall, spring and winter runs
Delta smelt *Hypomesus transpacificus*	2000 Survey results