

Section 9

WILDLIFE RESOURCES

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Section 9 WILDLIFE RESOURCES

SOURCES OF DATA

Information used to produce this section was derived from documents pertaining to the natural resources of the watershed area and California Natural Diversity Data Base maps and GIS data layers. A complete list of references is found at the end of this chapter. Documents and databases that were reviewed include:

- Digital sources, including: California Wildlife Habitat Relationship System (WHR); U.S. Forest Service (USFS) Calveg data; California Department of Forestry and Fire Protection Land Cover Mapping and Monitoring Program (LCMMP); California Department of Fish and Game Natural Diversity Database and Website (CNDDDB); U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps; California Spatial Information Library; maps of public land ownership; and critical habitat maps from the USFWS
- Various reference books and documents, including the Tehama County Soils Survey; historical accounts of Tehama County natural resources; and the Draft Tehama County Voluntary Oak Woodland Management Plan

Several reviewers alluded to biological studies that have been completed regarding potential dam sites in the watershed. Late in the review process, one of these studies, CALFED's North of the Delta Offstream Storage Investigation (CALFED 2000), was provided to the author. This study contains much information regarding the wildlife resources of two relatively small portions of the Tehama West Watershed, the Thomes-Newville and Upper Red Bank Creek areas. Although a document of earlier studies for these and other dam sites could not be obtained CALFED 2000, this document summarizes the results of these earlier assessments.

HISTORICAL CONTEXT

The overall history of the watershed is presented in Section 2, "Watershed History," and known or suspected historical changes to vegetation communities are described in Section 8, "Vegetation Resources." Vegetation patterns over the landscape provide wildlife habitat, therefore wildlife populations are particularly dependant upon changes to the vegetation. The historical changes to vegetation described in Section 8 have undoubtedly affected wildlife populations in the Tehama West Watershed.

In general, the greatest historical impacts have been to wildlife species that require specialized habitats ("niches") that have been altered. Examples are the wildlife species requiring vernal pool, valley oak, or riparian habitats, as these habitats have been greatly reduced and fragmented (see Section 8, "Vegetation Resources"). On the other hand, wildlife species that require habitats that have not significantly changed during the past 150 years probably have not been seriously affected. Following this logic, those wildlife species requiring habitats that have increased in abundance, such as urban habitats, have greatly benefited by the changes.

In many situations the link between habitat abundance and wildlife species' welfare is not always clear. For instance, if a wildlife species is a habitat generalist and exists in a variety of habitats, changes to a specific habitat type may not have a significant effect on the species. To complicate it even further, many wildlife species found in the Tehama West Watershed are only here for a portion of the year; the other times they are far to the south and possibly in tropical areas. Any local changes to these species' populations may be more attributable to alterations that have occurred in distant locations than habitat changes in the local area. Changes in habitat can also result in non-intuitive impacts on wildlife species. For instance, it is possible that alterations of one habitat may enhance prey populations, resulting in an increase in a predator's population, which in turn may prey more heavily on wildlife species living in adjacent habitats.

European and American settlement in the watershed entailed many direct and indirect effects on wildlife resources. Examples of direct impacts are from historical trapping and hunting. During the nineteenth and early twentieth centuries, fur trapping for beaver (*Castor canadensis*), mink (*Mustela vison*), otter (*Lutra canadensis*), red fox (*Vulpes vulpes*), marten (*Martes americana*), fisher (*Martes pennanti*), and wolverines (*Gulo gulo*) reduced all of these populations. At the time of European settlement, large herds of tule elk (*Cervus elaphus*) and pronghorn antelope (*Antilocapra americana*) were documented in the interior valley, and black-tailed deer (*Odocoileus hemionus*) dominated the foothills. All three ungulates were hunted heavily by early European settlers, which greatly reduced populations. Focused hunting for grizzly bear (*Ursus arctos*) and grey wolf (*Canis lupus*), known by the ranchers for their aggressiveness toward humans or livestock, led to the extinction of these species in the state.

In California considerable effort has been placed on testing the relationship between fire and wildlife habitat (Biswell et al. 1952; Grifantini et al. 1991; Leopold 1950; Taber and Dasmann 1958). These studies showed that some habitat can be improved by disturbances. Depending upon local environmental factors and the conditions under which fire takes place, increased deer populations have been documented:

An area of prescribe-burned chamise and chaparral was compared with a similar unburned area as a control. Counts of deer in the burned area showed a summer population density of about 98 per square mile after the initial burning treatment. This rose to 131 in the second year, and dropped to 84 in the fifth and sixth years. In the dense, untreated brush the summer density was only 30 deer per square mile. Ovulation rate in adult deer was 175 percent in treated brush and only 82 percent in untreated brush. Deer weights were higher in prescribed-burned brush than in the untreated area. (Biswell et al. 1952)

Small-game populations have also been documented to be affected by fire changes to vegetation. Studies in chaparral regions (Biswell et al. 1952) have shown that valley quail (*Callipepla californica*) were two and one-half times more abundant in burned areas than in unburned areas; black-tailed jackrabbit (*Lepus californicus*) densities were two to four and one-half times greater; and the number of mourning doves (*Zenaida macroura*) also increased after fire.

Tehama County contrasts with many of the agricultural counties in California in that grazing has been of greater relative importance than row crops. The result is that much of the low elevation landscape has been grazed over long periods, but has not been physically altered. Of the assessment

area's landbase, only 5.5 percent (see Section 8, "Vegetation Resources") has been totally altered from natural conditions, including areas currently in intense agricultural production (row crops, orchards, and vineyards) or urban areas. As a result, much of the hummocky land and low spots, coniferous forests, and annual grasslands have been retained. This has allowed small vernal pools and seasonal wetlands to persist in areas where the subsoils and topography allow for the seasonal ponding of water. These vernal pool landscapes provide remnants of habitat for fauna that have adapted to these unique environments. However, the overall quality and number of vernal pools has declined, both in Tehama County and in California as a whole (U.C. Extension 2005).

The devastating impact of alien plant species to habitats has been described in Section 8, "Vegetation Resources"; however, introduced animal species have also caused significant problems. These will be discussed in later portions of this section.

Other changes to habitats, including excessive grazing, stream channelization, gravel mining, and habitat fragmentation have all undoubtedly had a role in affecting wildlife populations. Each has the potential to eliminate or degrade habitat. The degree and extent of these impacts can not be quantified due to a lack of data pertaining to the pre-disturbance period of time, as well as the lack of a comprehensive program to determine populations today, following the habitat changes.

HABITAT TYPES

It is impossible to discuss wildlife without addressing their habitat. Habitat is the type of environment in which an organism or group of organisms normally lives or occurs. Wildlife populations are dependent on the habitat in which they live and the quality of that habitat. Habitat fragmentation is common within the Tehama West area, in part due to natural climate changes, soil, and elevation factors, and in part because of changes caused by humans. Because of this, there are many areas where two or more vegetation types meet or merge: areas known as a habitat "edge". These edges have been well documented as sites where tremendous diversity and densities of wildlife can occur. This is because they exhibit a combination of habitat values from each of the individual habitats, plus values unique to the edge. This biological concept is known as "edge effect" (Thomas 1979).

An example of edge effect and its biological importance is in the Coast Range where woodland-oak forest, chaparral, and grassland habitats meet. Leopold (1950) described these edges and their importance for wildlife and native people in the following manner:

"Prior to settlement, deer seem to have occurred principally along "edges" where forest and grassland met or on recent burns in the forest. Neither dense timber nor extensive prairie supported many deer. The woody shrubs and tree reproduction which constitute staple items of deer diet are characteristic of sub-climax ecological conditions (in other words, of early stages in a forest successional cycle), such as occur even today on prairie borders where woody plants encroach on the grass only to be pushed back periodically by drought or fire . . . the borders of the Sacramento Valley were maintained in young brush by recurrent fires, some of them probably set by Indians for the specific purpose of producing more game."

While edge habitats do benefit some species, it has a negative effect on others. An increase in edge in riparian forests, for example, is known to increase the potential for cowbird parasitism, and predation on Neotropical migratory birds.

The existing plant communities in the watershed were classified by CalVeg according to Wildlife Habitat Relationship (WHR) type (Mayer and Laudenslayer 1988). These types are described in Section 8, “Vegetation Resources,” and their physical distribution within the watershed is shown on associated maps. Besides allowing the classification of California’s vegetation communities, the WHR program has computer models that help users predict which wildlife species occur in different habitats and what changes to the wildlife complement might occur if habitats were altered. The various Tehama West Watershed habitats currently existing, and described in Section 8, “Vegetation Resources”, will be discussed as they pertain to wildlife. The diversity of wildlife species predicted to use the various habitats in the watershed, at some time of the year, is shown on Figure 9-1. The predicted number of wildlife species deriving a high degree of hiding, forage, and reproductive values for the various watershed habitats are included in Figure 9-2.

Conifer-Dominated Habitats

Conifer-associated habitats cover approximately 18.33 percent of the watershed, or 122,447 acres (see Section 8, “Vegetation Resources”). These habitats are ones that are either dominated by coniferous trees or those in which conifers make up a significant component of the vegetation. These habitats are found in the Coast Range from approximately 2,000 feet elevation upward to the crest of the range. Their habitat attributes are described below:

Red Fir (WHR:RFR)

Only 1,301 acres of RFR habitats have been mapped within the watershed, 0.19 percent of the total assessment area. These habitats only exist in the highest elevations, near the Coast Range crest. Red fir habitats in Tehama County are estimated to provide food or cover for at least one season to a total of 159 wildlife species (0 amphibians, 4 reptiles, 100 birds, and 55 mammals). These high elevation forest stands offer a high degree of feeding, cover, and reproduction habitat for 26 species, including 1 reptile, 18 bird, and 7 mammal species. Wildlife usage of RFR habitats is greatly affected by the high elevations and the long winter season, with many species only using these areas seasonally. Species of note that make use of this habitat most, if not all of the year, include northern goshawk (*Accipiter gentilis*), blue grouse (*Dendragapus obscurus*), grey jay (*Perisoreus canadensis*), and pine marten (*Martes americana*) (DFG 2005d).

White Fir (WHR:WFR)

WFR stands also occur in locations where long winters and constant snowpacks exist in the extreme western edge of the Tehama West Watershed. They are generally found immediately downslope from RFR stands and generally intergrade with them. In total, 1.78 percent of the watershed is comprised of this habitat (11,904 acres; Section 8, “Vegetation Resources”). However, considerably more total wildlife species are predicted to use this habitat than RFR, including 14 amphibian, 20 reptile, 111 bird, and 70 mammal taxa, for a total of 215 species. WFR stands are considered to provide high feeding, cover, and forage values for 60 species, or more than twice the number provided for in RFR habitat. This total includes 2 reptile, 45 bird, and 13 mammal species. WFR stands, as they mature, are known to have high numbers of defective trees from a variety of factors, including heart rot fungus. This results in relatively high densities of snags and resulting down log

concentrations (Hopkins 1982). The snags provide excellent nesting cavity habitat, for both birds and mammals, especially when breaks occur between 50 and 100 feet in height. Forest carnivores, including fisher (*Martes pennanti*) and pine marten use concentrations of large, down logs for denning and foraging.

Species commonly found in this habitat during the summer include insect-gleaning birds, such as mountain chickadee (*Parus gambeli*), chestnut-backed chickadee, (*P. rufescens*) and golden-crowned kinglet (*Regulus satrapa*) (Airola and Barrett 1985). As in the case of the RFR habitat, many species that use this habitat during the warm season move downslope or to southern latitudes with the onset of harsh, wintertime conditions.

Klamath Mixed Conifer (WHR:KMC)

The KMC habitat zone covers large areas in the mountains of northwestern California, in the elevation range of 2,500 to 4,500 feet. It is the most widely spread and abundant of conifer types in the watershed, covering 7.11 percent of the total area (47,508 acres; Section 8, “Vegetation Resources”). This habitat type is predicted to support 225 total species in this area at some time of the year, including 15 amphibian, 20 reptile, 113 bird, and 73 mammal taxa. Sixty-one species are believed to accrue high degrees of cover, forage, and reproductive value from this habitat, including 2 reptile, 44 bird, and 15 mammal species, but no amphibians.

This habitat includes a mix of four or five conifer species, along with a minor hardwood element (usually black oak). The mix of tree species is a factor likely responsible for the relatively high diversity of species using the habitat. Following fire in these stands, a diverse mix of shrub and herbaceous species quickly develops and creates excellent habitat for many early-seral species, including black-tailed deer (*Odocoileus hemionus columbianus*) and spotted towhee (*Pipilo erythrophthalmus*).

Douglas-Fir (WHR:DFR)

There are 209 total species thought to use this habitat at some time of the year. These include 13 amphibian, 17 reptile, 114 birds, and 65 mammal species. Of all the species potentially using DFR habitats, 48 taxa acquire high values for reproduction, feeding, and cover, including 1 amphibian, 3 reptiles, 29 bird, and 15 mammal species. Bird species typical of this habitat include the northern spotted owl, western flycatcher (*Empidonax difficilis*), Hutton’s vireo (*Vireo huttoni*), and varied thrush (*Ixoreus naevius*).

DFR stands are the second most common conifer-associated habitat in the drainage, covering 38,293 acres (5.72 percent of the total area; Section 8, “Vegetation Resources”). These habitats often are near monocultures of Douglas-fir, often with scant understory growth. They exist at moderate elevations (2,500 to 4,000 feet) and are often adjacent to KMC, chaparral, or hardwood-dominated habitats that occur on slightly different aspects or soil types.

Ponderosa Pine (WHR:PPN)

PPN stands, dominated by Ponderosa pine, cover approximately 5,023 acres, or 0.75 percent of the drainage. These habitats exist near the lower elevation of conifer-dominated habitats in the Coast Range (generally from 2,000 to 3,500 feet).

Ponderosa pine habitats are believed to provide habitat for 232 wildlife species in western Tehama County, which includes 14 amphibian, 20 reptile, 136 bird, and 62 mammal species. Fifty-three species gain high values for cover, forage, and reproduction from PPN stands, including 2 reptile, 40

bird, and 11 mammal species (however, no amphibian species). The PPN habitat is sometimes a transitional or migratory habitat for black-tailed deer, as the animals move from wintering areas in the foothills to higher elevation summering and fawning areas. During the migrations the deer often “hold” in these areas until vegetation develops in higher elevations that annually received appreciable quantities of snow. Pygmy and red-breasted nuthatches (*Sitta pygmaea* and *S. canadensis*) often are seen in and use this habitat

Jeffrey Pine (WHR:JPN)

Jeffrey Pine stands are uncommon in the Tehama West Watershed, with only 20 acres identified in the CalVeg typing effort (see Section 8, “Vegetation Resources”). Oftentimes these habitats, comprised of a Jeffrey pine overstory extending over a scant understory, only exist on serpentine soils.

The value of the Jeffrey pine forest type as a habitat for wildlife is due in large part to the food value of the Jeffrey pine seeds. Pine seeds are included in the diet of more wildlife species than any other genus except oak (Light 1973). The total number of wildlife species that are likely to use this habitat is 195, including 7 amphibian, 13 reptile, 113 bird, and 62 mammal species. However, of these only 38 species gain high lifelong (cover, forage, and reproductive) values, including 1 reptile, 24 birds, and 11 mammal species. Both the total number of wildlife species predicted to occur in this habitat and the number of species that receive high year-round habitat values is lower than for PPN habitats. This disparity may be because even though Jeffrey pine is a very similar species to ponderosa pine, JPN habitats, due to their association with serpentine soils, have much less diverse understory tree and shrub layers. Typical species of this habitat include brown creeper (*Certhia americana*) and white-headed woodpecker (*Picoides albolarvatus*).

Montane Hardwood-Conifer (WHR:MHC)

Montane Hardwood-Conifer habitats exist near the lower elevational limit of stands having conifers; are often located on steep and rocky terrain; and frequently are found adjacent to hardwood-dominated or chaparral stands. The drainage contains approximately 17,673 acres of this habitat, equating to 2.64 percent of the total area (see Section 8, “Vegetation Resources”).

MHC habitats are used by a wider variety of wildlife species than any other stand type with a significant conifer tree component. Two hundred and forty total species are considered to use these habitats in Tehama County during some time of the year, which includes 13 amphibian, 21 reptile, 137 bird, and 69 mammal species. Similarly, there are more species that derive high lifecycle values, including forage, cover, and reproductive values, than any other conifer-associated habitat (a total of 65 species). Although no amphibian fall in this category, there are 2 reptiles, 50 bird, and 13 mammal species.

The habitat diversity provided by this vegetation type is likely due to the presence of both conifer and hardwood species, as well as the stands’ frequent juxtaposition (and therefore “edge-effect”) with hardwood and chaparral stands’. The stands’ conifers provide a form of high level cover and diversity of foliage heights, while the black or canyon live oak always present in these stands provide mast, an important food source for many birds as well as mammals. Some typical wildlife species include Steller’s jay (*Cyanositta stelleri*) and dusky-footed woodrat (*Neotoma fuscipes*).

Closed-Cone Pine-Cypress (WHR:CCP)

Very little of this habitat type occurs in the Tehama West Watershed, only 725 acres (0.11 percent of the drainage; see Section 8, “Vegetation Resources”). Where it exists it is found on severe southern aspects with very poor soil and often associated with chaparral stands.

Of all the habitat types with significant conifer presence, CCP stands provide the least diverse use, with only 147 wildlife species predicted to utilize it at some time of the year. Of these, 8 species are amphibian, 16 reptile, 94 bird, and 29 mammal species. There are 28 species deriving high cover, forage, and reproductive values from this habitat, the second lowest of all conifer-associated habitats (next to RFR). Only 4 reptile, 21 bird, and 3 mammal taxa (28 total species) receive high lifecycle (forage, cover, and reproductive) values from the CCP type. The monotypic nature of the stands, along with their tendency to be located on severe site locations, are likely contributing factors for its relatively low contribution to wildlife diversity. Two species commonly found in this vegetation type are western skink (*Eumeces skiltonianus*) and western wood peewee (*Contopus sordidulus*).

When considering all of the conifer-associated habitats within the Tehama West Watershed, both stand elevation and diversity of tree and shrub species appear to be important in determining the number of wildlife species they potentially hold. The habitats that are located highest and lowest in elevation (RFR and CCP) have the least wildlife diversity. In addition, these same stand types tend to be the least structural and floristically diverse. The mid-elevation habitats, specifically MHC and KMC habitats, have a greater diversity of trees and shrubs and also have the greatest diversity of wildlife species.

The forested portion of the Thomes Creek drainage has been considered in light of potential seral stage changes between 1913 and 1991 (USFS 1997). The authors theorize that barren and water habitats have not changed during that time-span, but there has been a slight decline in the proportion of grass/forb and moderate decline in large tree seral stages. During this time, they also predict that the relative presence of shrub/seedling/sapling and pole/medium-sized tree stands have increased slightly or moderately. If this analysis is correct and it holds for the rest of the Tehama West’s Coast Range conifer zone, there is a more even distribution of seral stages in the assessment area today than nearly a century ago, when 49 to 69 percent of the forested habitat acreage was dominated by large trees.

Habitat of the northern spotted owl, a federally-listed species, has also been assessed in the upper Thomes Creek drainage (USFS 1997). Suitable nesting habitat for the species is provided by approximately 16.7 percent of the federally-administered timberland. The birds can use an additional 29 percent of the federal land for dispersal. There are 34 known activity centers (historic nests or repeated roost sites) located in the Thomes Creek drainage, probably distributed among several of the conifer-associated habitat types previously described.

Hardwood-Dominated Habitats

Hardwood-dominated habitats exist adjacent to waterways, scattered throughout the elevational zone dominated by conifer stands, and in the Coast Range foothills. In total, they cover almost one-quarter of the drainage’s area (163,650 acres; see Section 8, “Vegetation Resources”). Their values to wildlife taxa are described below:

Montane Hardwood (WHR:MHW)

MHW stands are dominated by a variety of tree-form hardwood species and are often intermixed over the Tehama West landscape with conifer-dominated stands and chaparral. These habitats cover 18,228 acres in the watershed, 2.73 percent of the landbase (see Section 8, “Vegetation Resources”).

Bird and animal species characteristic of the MHW habitat include disseminators of acorns: scrub (*Aphelocoma coerulescens*) and Steller's jays, acorn woodpecker (*Melanerpes formicivorus*), and western gray squirrel (*Sciurus griseus*). Black-tailed deer also forage upon the foliage of several hardwoods to a moderate extent, and relish the acorns. A total of 222 wildlife species use this habitat seasonally, including 12 amphibian, 21 reptile, 132 bird, and 57 mammal species. Fifty-nine species receive high forage, cover, and reproduction habitat values from MHW stands, including 1 reptile, 45 bird, and 13 mammal taxa.

Montane Riparian (WHR:MRP)

Montane riparian habitats usually exist in narrow corridors adjacent to Coast Range streams. Only 83 acres are mapped by the CalVeg typing project (0.01 percent of the land); however, these habitats are likely more abundant because aerial mapping processes often overlook them due to their small size.

Riparian habitats have been repeatedly documented to have an exceptionally high value for many wildlife species (Thomas 1979; Marcot 1979; Sands 1977). These areas provide water, thermal cover, migration corridors and diverse nesting and feeding opportunities. The shape of many riparian zones, particularly the linear nature fringing streams, maximizes the development of habitat edge, which is so highly productive for wildlife (Thomas 1979). In Tehama County 263 wildlife species may potentially use this habitat (16 amphibian, 20 reptile, 150 bird, and 77 mammalian species), a number higher than any of the conifer-associated habitats. These habitats also provide high values for reproduction, foraging, and hiding for more wildlife species than any conifer-associated habitat. In total, 87 species, including 2 amphibians, 4 reptiles, 60 bird, and 21 mammal taxa receive these high habitat values. Black salamander (*Aneides flavipunctatus*) and downy woodpeckers (*Picoides pubescens*) are species that can be typically found in this habitat type.

Valley Foothill Riparian (WHR:VFR)

Satellite imagery (CalVeg typing) does not detect any of this habitat type within the watershed (see Chapter 8, “Vegetation Resources”); however, observations made during preparing this assessment suggest that small amounts exist along assessment area streams in the foothills and Sacramento Valley. This habitat is believed to be used by a total of 271 species, a total greater than any other habitat that exists within the watershed. Based on these observations, 12 amphibians, 19 reptiles, 179 birds, and 61 mammal Species make use of this vegetation. VFR stands provide high value, year-round habitat to include a total of 91 wildlife species; 1 amphibian, 9 reptiles, 60 birds, and 21 mammals. The fact that this habitat has been greatly reduced by human activities over the past 150 years (see Section 8, “Vegetation Resources”) is particularly distressing, considering its extremely high importance to wildlife species.



Osprey Nest on Nesting Platform, Valley Foothill Riparian Habitat, Southern Tehama County

Likely, the presence of water and the edge effect mentioned previously are important contributors to the density of wildlife species using this habitat. Violet-green (*Tachycineta thalassina*) and tree swallows (*T. bicolor*), both cavity-nesters, and yellow-billed magpies (*Pica nuttalli*), a species that constructs stick-nests, are frequently noted in the VFR habitat. The few significant patches of this habitat remaining in the Sacramento Valley also harbor the rare yellow-billed cuckoo (*Coccyzus americanus*).

Blue Oak Foothill Pine (WHR:BOP)

The BOP habitat has foothill pine, blue oak, and shrub species in variable amounts and combinations. The habitat covers 19,931 acres (2.98 percent of the watershed; see Section 8, “Vegetation Resources”) and is generally found in the foothill zone where the Coast Range transitions into the Sacramento Valley.

Blue Oak Foothill Pine woodlands provide breeding habitats for a large variety of wildlife species, although no species is totally dependent on them for breeding, feeding, or cover (DFG 2005d). In Tehama County 236 species likely use the habitat at some time, including 11 amphibians, 19 reptiles, 151 birds, and 55 mammals. In addition, 99 species are thought to gain high values from this habitat for cover, forage, and reproductive needs, more than any other habitat found in the watershed. These species include 5 reptile, 80 bird, and 14 mammal taxa. The structural diversity of trees and combination of conifers and blue oaks in this habitat, along with patches of grassland and chaparral intermixed, is likely responsible for this density of wildlife species usage (Barrett 1980). Communally nesting acorn woodpeckers and brown towhees (*Pipilo fuscus*) can be considered characteristic of the BOP habitat.

Blue Oak Woodland (WHR:BOW)

Approximately 110,923 acres of the watershed consist of this habitat, which is 16.60 percent of the entire assessment area (see Section 8, “Vegetation Resources”). This makes it the most abundant tree-associated habitat in the Tehama West Watershed. BOW habitats are generally found on sites with relatively poor soil conditions near the Sacramento Valley.

Oak woodlands support a wide diversity of wildlife species and are highly productive. The trees provide mast (acorns) and foliage, which provide food for many species during various times of the year. The oaks form many cavities, which provide nesting and resting sites for birds and mammals. In addition, the grass and forb understory provides forage and seeds for a variety of taxa. Partly because of the mild wintertime climate, many wildlife species are able to thrive in oak woodlands on a year-round basis, and the habitat also provides important winter cover and forage for migratory species that live at higher elevations during the summers. BOW stands afford habitat to 228 species, almost as many species as BOP stands. This includes 12 amphibians, 20 reptiles, 137 birds, and 59 mammals. BOW also yields high lifecycle values for 99 species. These include 5 reptiles, 79 birds, and 15 mammals. The California endemic yellow-billed magpie is often found in this habitat, or along its edge, as well as the California ground squirrel (*Spermophilus beecheyi*).

Tehama County (2004) has prepared a voluntary oak woodland management plan that addresses the values of blue oak woodlands, and other oak habitats, and provides management guidelines for landowners and developers. These include:

- Maintain an average leaf canopy of 30 percent

- Retain trees of all size classes and species represented
- Retain hollow trees, if safety allows
- Seek professional advice if extensive harvest is planned
- Cluster proposed homesites and protect existing oaks during home and road construction
- Avoid landscaping in which irrigation occurs within 10 feet of the trunk of an oak
- Replace trees for which removal during construction is unavoidable

Valley Oak Woodland (WHR:VOW)

VOW habitats, in contrast to BOW woodlands, often occur in the Sacramento Valley or adjacent slopes, where soils are deep. Approximately 1 percent, or 6,739 acres, of the watershed contains this habitat (see Section 8, “Vegetation Resources”).

Oaks have long been considered important to many birds and mammals as a food resource (i.e., acorns and browse). Verner (1980) reported that 30 bird species known to use oak habitats in California include acorns in their diet. An average of 24 species of breeding birds were recorded on a study plot at Ancil Hoffman Park, near Carmichael, in Sacramento County from 1971 to 1973 (Gaines 1977). At one time of the year or another, there are predicted to be 224 wildlife species that use the VOW habitat in Tehama County. These include 12 amphibian, 20 reptile, 132 bird, and 55 mammal species. 98 species with high reproduction, feeding, and cover values, provide this habitat one of the highest of any hardwood habitat. These species include 5 reptile, 78 bird, and 15 mammal species. Gray fox (*Urocyon cinereoargenteus*), house finch (*Carpodacus mexicanus*), and Nuttall’s woodpecker (*Picoides nuttallii*) often use this habitat year-round.



Valley Oak Woodland

Eucalyptus (WHR:EUC)

Eucalyptus habitats are solely human-made and exist in the Sacramento Valley, generally on poorer soils. These hardwood plantations were planned to be a source of wood chips for local mills or as windbreaks. The EUC habitats cover 7,746 acres, 1.16 percent of the watershed (see Section 8, “Vegetation Resources”).

Eucalyptus groves are non-native monocultures in which the trees are grown quite densely. In addition to the lack of plant species variety in the stands, the trees tend to be all the same height; hence, little structural (height) diversity exists. Even so, a total of 240 wildlife species are suspected of making some use of these habitats, a high number relative to all of the watershed’s vegetation types. However, only three species acquire high year-round values for foraging, cover, and reproduction. This is by far the lowest number for any habitat found in the Tehama West Watershed. Some of the species that do use this habitat in good numbers are the American crow (*Corvus brachyrhynchos*) and yellow-billed magpie.

When considered as a whole, the hardwood-dominated habitats within the watershed harbor a greater diversity of wildlife species than conifer-associated stands. In addition, most of the hardwood habitats provide lifelong values for many more wildlife species than conifer stands. The notable exception is the human-created EUC stands, which very few species use for all of their needs. The heavy use of most hardwood habitats can likely be attributed to a variety of reasons, including the frequent existence of oaks, which produce nutritious acorns; abundant cavities for nesting and structures for other nest-types and perching; and foliage that has high insect densities, which provide a prey base for many species. The decline in a number of these habitats during historical times is particularly unfortunate due to their importance to wildlife.

Chaparral-Dominated Habitats

Chaparral habitats generally exist in the elevational zone between coniferous stands in the mid- and upper portions of the Coast Range and the Sacramento Valley. Oftentimes, they exist on severe sites, with poor and shallow soil and southern exposure. In total, the assessment area contains 45,972 acres of these habitats, about 6.88 percent of the drainage.

Montane Chaparral (WHR:MCP)

MCP habitats cover approximately 3,084 acres, 0.46 percent of the entire area (see Section 8, “Vegetation Resources”). These habitats exist in the mid- to upper-elevation conifer zone and often are a seral condition resulting from wildfires that burned the pre-existing conifer forests. Given enough time, if further disturbances do not occur, these stands often will revert back to coniferous stands.

The MCP stands provide seeds, fruits, insects, protection from predators and climate, as well as singing, roosting and nesting sites (Verner et al 1980). MCP stands also provide critical summer range foraging areas, escape cover and fawning habitat for deer. A total of 189 wildlife species are thought to use this habitat during some time of the year, including 8 amphibian, 21 reptile, 96 birds, and 64 mammal taxa. Wildlife species that gain high value forage, reproduction, and cover values from this habitat include 2 reptile, 28 bird, and 10 mammal species, for a total of 40 taxa. Characteristic species of this habitat include green-tailed towhee (*Pipilo chlorurus*) and mountain quail (*Oreortyx pictus*).

Mixed Chaparral (WHR:MCH)

MCH stands usually occur in the watershed at lower elevations than MCP stands and characteristically contain a greater diversity of chaparral shrub species than the montane chaparral habitats. This habitat is the most abundant chaparral type, contributing 31,632 acres in the watershed (4.73 percent of the landbase, see Section 8, “Vegetation Resources”).

MCH stands are predicted to provide habitat for more wildlife than any of the shrub-dominated types, for a total of 219 species. This list includes 11 amphibian, 20 reptile, 129 bird, and 59 mammal species. However, a lower number of species are considered to derive high forage, cover, and reproductive values from this habitat than the MCP stands (only 34 taxa). These include 6 reptile, 17 bird, and 11 mammal species. Species that typify this habitat include brown towhee, black-tailed deer, and wrentit (*Chamaea fasciata*).

Chamise-Redshank Chaparral (WHR:CRC)

The CRC habitats exist on the lowest elevations and most severe sites of all chaparral types. The Tehama West Watershed contains 11,256 acres of the type (1.68 percent of the landbase) usually in the 1,500 to 2,500 foot elevation zone.

These habitats burn quite easily and likely burned frequently both in pre-historic as well as historical times. Most animal populations that use this habitat reach peak densities in the first decade after fire. During this time annual grasses and forbs flourish and the re-sprouting chamise is more nutritious and palatable. In the past, some of these stands have been seeded with grasses following wildfire, but populations of most small vertebrates decline sharply or are eliminated when chaparral is converted to grassland (Lillywhite 1977). Of all the shrub-dominated habitats, the CRC stands have the fewest total species that use it, as well as species that gain high year-round habitat values. There are 167 wildlife species predicted to use the habitat during some portion of the year, including 5 amphibian, 16 reptile, 104 birds, and 42 mammals. Only 24 species are considered to gain high values from the habitat for forage, cover, and reproductive purposes, including 3 reptile, 13 bird, and 8 mammal species. The severe slopes upon which this habitat is found, the denseness of the shrub layer a few years after burning, and the relative homogeneity of the shrub makeup are likely factors responsible for the relatively low wildlife diversity. Black-tailed deer, wren-tit, and California thrasher (*Toxostoma redivivum*) are frequently found in this habitat.

In general, the chaparral-dominated stands that occur within the Tehama West Watershed tend to support fewer wildlife species than either the conifer-associated or hardwood-dominated habitats. Their relative homogeneous nature and tendency to rapidly form dense canopy structures following disturbances are probably factors limiting wildlife use. However, these habitats are considered to be very valuable for many species, including black-tailed deer. When the chaparral habitats exist in a landscape supporting a variety of other habitats, they certainly contribute significantly to the area's diversity.

Herbaceous-Dominated Habitats

Approximately 31.09 percent of the Tehama West Watershed landscape consists of habitats dominated by herbaceous growth (grass and forbs). These habitats exist in both seasonally-dry and perennially-wet conditions and in a large range of elevational zones.

Wet Meadow (WHR:WTM)

This habitat exists in small amounts and in small patches from the high elevations of the watershed all the way to the valley floor. Satellite imagery has only detected 81 acres of this vegetation type; however, because it often occurs in small patches, survey techniques can easily miss these meadows. Consequently, it is likely more abundant than suggested by the acreage figures (see Section 8, "Vegetation Resources").

Wildlife species that use this habitat for some time of the year total 233, including 15 amphibian, 16 reptile, 137 bird, and 65 mammal species—a moderate number relative to the watershed's other habitats (see Figure 9-1). In contrast, the species that potentially use the habitat and can acquire high forage, hiding, and reproductive values total 108, including 4 amphibian, 6 reptile, 79 bird, and 19 mammal species. This is the second highest value for any habitat within the watershed.

Given the Mediterranean climate of the Tehama West Watershed, with long, hot and dry summers, wet meadows provide an essential function by providing water and succulent forage to wildlife species found nearby. As an example, in summer black-tailed deer often feed in WTM stands, seeking their nutritious forbs and palatable grasses. Many of their fawning areas occur at high elevations near WTM stands. Waterfowl, especially mallards (*Anas platyrhynchos*), frequent streams flowing through these meadows. Yellow-headed (*Xanthocephalus xanthocephalus*) and red-winged blackbirds (*Agelaius phoeniceus*) occasionally nest in lower elevation WTM habitats that have adjacent tall vegetation and with adequate water depth to discourage predators. Various frog species can be abundant in WTM stands.



Seasonal Wetlands,
Central Valley

Annual Grassland (WHR:AGS)

AGS habitats are the most common of all vegetation types existing within the Tehama West Watershed. Slightly over 31 percent of the watershed (207,668 acres) consists of this habitat. These habitats exist in flat or gently-sloping areas near the Sacramento Valley. Introduced grass and forb species dominate these habitats. In some cases areas that were originally covered with blue oak stands have been converted to AGS habitats due to cutting of the trees for firewood or for improved forage yields for livestock.

There are 194 wildlife species predicted to use this Tehama West habitat during some time of the year, including 10 amphibian, 18 reptile, 109 bird, and 57 mammal species. Of these, 98 taxa gain high values for reproduction, feeding, and cover, including 2 amphibian, 3 reptile, 74 bird, and 19 mammal species. These diversity values are less than those for the wet meadow (WTM) habitats.

Many wildlife species use annual grasslands for foraging and some nest on the ground or in associated burrows. However, many of the species that seasonally used these grasslands require special habitat features such as cliffs, caves, ponds, or wooded habitats for breeding, resting, and escape cover. If these features do not exist locally, the AGS habitats might not be able to support some species. Wildlife commonly noted in this habitat include the California vole (*Microtus californicus*), coyote (*Canis latrans*), Western meadow lark (*Sturnella neglecta*), and black-tailed jackrabbit.

The two herbaceous-dominated habitats that exist in the Tehama West Watershed (WTM and AGS) provide seasonal habitat for a moderate number of wildlife species relative to other Tehama West Watershed habitats. However, they provide high year-round values (forage, hiding, and reproductive needs) for more wildlife species than nearly any other available habitats. Following the concept of edge-effect, it is likely that zones where these herbaceous-dominated habitats abut other habitat types, especially ones dominated by trees very high wildlife diversity exists.

Miscellaneous Habitats

Agriculture-Crops (WHR:Various)

Agriculture and croplands cover 4.93 percent of the Tehama West Watershed (32,926 acres); all 32,926 acres exist in the Sacramento Valley. This habitat includes a number of agricultural crops, including row crops, irrigated fields, rice, and orchards. These croplands were established on the watershed's most fertile soils, which historically supported an abundance of wildlife in a variety of

native habitats. Agricultural development has reduced the wildlife richness of California; on the other hand, many species of rodents and birds have adapted to living in croplands and do quite well. In addition, many introduced species that are highly prized for hunting prefer these habitats.

Prior to establishing State and Federal wildlife refuges, waterfowl depredation of crops was widespread in the Sacramento Valley. That problem has been greatly reduced, but still some species of waterfowl depend on waste rice and corn that remain in the fields after harvesting. Black-tailed deer, American crow, and wild pigs also forage in alfalfa and grain fields and can cause depredation problems.

There are 236 wildlife species predicted to use the area's various croplands at some time of the year. These species include 6 amphibian, 10 reptile, 163 bird, and 57 mammal taxa. Of this, 83 species acquire high reproduction, foraging, and cover values, including 1 amphibian, 1 reptile, 65 bird, and 16 mammal species. Yellow-billed magpie, many species of waterfowl and shorebirds, and American crow are very common in this habitat.

Urban (WHR:URB)

Urban habitats cover 3,596 acres of the assessment area (0.54 percent, see Section 8, "Vegetation Resources"). Three urban zones relevant to wildlife can be distinguished in the American West: downtown, urban residential, and suburbia. The heavily-developed downtown zone is usually at the center, followed by concentric zones of urban residential and suburb habitats. There is a progression outward of decreasing development and increasing vegetative cover. Species richness and diversity is extremely low in the inner zone, where vegetation cover and diversity is least. The European-introduced rock dove (*Columba livia*), house sparrow (*Passer domesticus*), and starling (*Sturnus vulgaris*) comprise over 90 percent of all avian density and biomass (Emlen 1974). The urban residential zone has a denser and more varied mosaic of vegetation, including shade trees, lawns, hedges, planted gardens, small parks, and remnant riparian areas. Oftentimes, approximately 40 percent of the land's surface is covered by impervious material in this urban zone. This region is characterized by species including tree swallow, brush rabbit (*Sylvilagus bachmani*), Norway rat (*Rattus norvegicus*), Bullock's oriole (*Icterus bullockii*), and raccoon (*Procyon lotor*).

Suburban areas serve similar roles as native grasslands and woodlands in terms of wildlife habitat functions. In addition to landscaped gardens and lawns, relatively large tracts of adjacent natural vegetation such as chaparral, grasslands, riparian stringers, and oak woodland often exist. Bird species include wrentits, bushtits (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*), and California quail. A total of 190 species are predicted to make use of this habitat for some portion of the year, including 3 amphibian, 7 reptile, 145 bird, and 35 mammal species. Of this total number an amazingly high 61 percent (115 species) gain high value for all their life requirements (forage, cover, and reproduction). This is a greater number of species than for any other habitat occurring in the watershed and includes 106 bird and 9 mammal species. The large number of species that achieve high year-round values from URB habitats is likely due to the presence of water, a large variety of trees and plants that provide food and cover, and a unique intermix of these elements within the drainage.

Barren (WHR:BAR)

Barren habitats exist throughout the Tehama West Watershed and are estimated to cover 2,870 acres (0.43 percent of the land base). Because these habitats often are related to unusual soil or geological features and can be quite small in size, the acreage figure may under-estimate the actual amount.

Where there is little or no vegetation, as in the case of BAR habitats, the structure of the substrate becomes a critical component of the habitat. Many birds-of-prey nest on rock ledges and shorebirds, gulls and terns, common nighthawks (*Chordeiles minor*) and common poorwills (*Phalaenoptilus nuttallii*) rely on open ground covered with sand or gravel for their small scrape nests. The rare bank swallow (*Riparia riparia*) uses barren vertical cliffs with friable soils along river corridors to dig nest holes. Rocky river canyon walls above open water are preferred foraging habitat for many bats, and many birds-of-prey can use cliffs for nesting. BAR habitats provided some use during the year for approximately 79 species, including 1 reptile, 55 bird, and 23 mammal species. This is by far the lowest species number for habitats within the watershed (see Figure 9-1). However, of this total number, 55 taxa (an extremely high proportion of 70 percent), derive high year-round (forage, cover, reproduction) values from the habitat. This list includes 44 bird and 11 mammal species. As in the case of urban habitats, the BAR habitat is quite unique and distinctive and likely offers habitat characteristics that few other areas exhibit.

Water and Aquatic Habitats (WHR:Various)

These habitats only exist in lowland areas of the Sacramento Valley. The open water zones of large rivers provide resting and escape cover for many species of waterfowl. Gulls, terns, osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*) hunt over open water. Near-shore waters provide food for waterfowl and belted kingfisher (*Ceryle alcyon*). Many species of insectivorous birds (including swallows, swifts, and flycatchers) capture their insect prey over water. Some of the more common mammals found in riverine habitats include river otter (*Lutra canadensis*), mink (*Mustela vison*), muskrat (*Ondatra zibberthicus*), and American beaver (*Castor canadensis*).



Fairy Shrimp

There are 120 species of wildlife predicted to use the open water or aquatic habitat some time of year, including 13 amphibian, 4 reptile, 79 bird, and 24 mammal species. Of these, 54 species use the habitat year-round for all their needs, including 5 amphibian, 3 reptile, 42 bird, and 4 mammal species. These seasonal and year-round use numbers are moderate, relative to the other habitats that exist in the watershed (see Figures 9-1 and 9-2).

A very valuable and interesting wetland habitat found in the watershed is vernal pools, existing in a band west from Interstate 5 from Red Bluff south to Glenn County (see Section 8, “Vegetation Resources”) (USFWS Various; USFWS 2004). Vernal pools are small freshwater wetlands that are inundated for a few days to a few months during the spring. They typically form in small depressions that are underlain by impermeable subsoils (see Section 4, “Geology, Geomorphology, and Soils,” and Section 8, “Vegetation Resources”). They provide a unique habitat for both plant and animal species, particularly invertebrates. Some of these species are endemics, meaning they are found nowhere else in the world, and the federal and state government has listed some of these taxa as either threatened or endangered.



**Vernal Pool,
Central Valley**

The U.S. Fish and Wildlife Service (2004) has described the following factors to be major threats to vernal pool endemics (both animals and plants):

- historical and current habitat loss and fragmentation
- gravel mining
- habitat degradation
- altered hydrology
- water quality degradation
- human waste, recreational use, and vandalism
- loss of insect pollinator species
- inappropriate grazing
- inappropriate management and monitoring
- random, naturally occurring events
- over-utilization (including collection by collectors); disease
- inadequate regulations

THREATENED, ENDANGERED, AND RARE SPECIES

The Tehama West Watershed has had relatively little work completed to determine the wildlife species present and their densities. However, a wealth of data exists for the Thomes-Newville and Upper Red Bank Creek areas, where proposed dams have been studied during the past several decades. Late in the writing of this section, the North of the Delta Offstream Storage Investigation (CALFED 2000) was provided to the author. In addition to summarizing the findings of the 1997-1998 wildlife surveys, it also referred to the results of previous work that had been completed in the same two vicinities in the 1980s.

Because wildlife survey data could not be found for other portions of the drainage, a CNDDDB (2005) query was made. This resulted in a list of 23 special status species that had been observed in the Tehama West assessment area and for which a database entry had been made. These species include federal or state level endangered or threatened species, candidates for such listing, or are on the list of California Species of Special Concern. Unfortunately, many of the special status species observations made in dam studies and summarized in CALFED (2000) are not included in the CNDDDB. By combining the CNDDDB (2005) database query and the results of surveys done in the past several decades at dam sites (reported in CALFED (2000)), Table 9-1 has been compiled. This table includes each specie's regulatory status and the locations where they have been recorded within the watershed.



Swainson's Hawk

These CNDDDB occurrences are mapped on Figure 9-3; however, the dam study observations are not shown because their exact locations are not known. Because the CNDDDB is based on voluntary data submission, it is likely that important wildlife observations have occurred elsewhere in the watershed, but have never been submitted to the database. The location of the CNDDDB observations (Figure 9-3) suggests that a majority of the rare wildlife species exist in the Sacramento Valley portion of the watershed. This may be true; however, it may only be because the Sacramento Valley has had many more observers than other portions of the watershed. If this is so, large portions of the Tehama West Watershed may have rare species that have never been surveyed for, or if seen, never reported.

Table 9-1

SPECIAL STATUS WILDLIFE SPECIES KNOWN TO EXIST IN THE TEHAMA WEST WATERSHED

Common Name Scientific Name	Regulatory Status (Federal/ State)	Habitat Requirements	Occurrence in Watershed (CNDDDB Occurrences in Normal Font, CALFED, 2000 Observations in Bold)
Invertebrates			
Vernal pool fairy shrimp <i>Branchinecta hynchi</i>	FT	Vernal pools, swales, and ephemeral freshwater habitat	Thomes Creek, 5 miles NW of Corning; Truckee Creek; vernal pools S of Red Bluff
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	FE	Vernal pools, swales, and ephemeral freshwater habitat	Annual grassland habitat, with vernal pools S of Red Bluff.
Valley elderberry longhorn beetle <i>Desmoceris californicus dimorphus</i>	FT	Riparian habitats with blue elderberry shrubs	Along Sacramento River, in elderberry shrubs; Thomes Creek E of Paskenta
Amphibians/ Reptiles			
California red-legged frog <i>Rana aurora draytonii</i>	FT CSC	Perennial, slow moving streams; ponds; or marsh communities with emergent vegetation	Sunflower Gulch (Red Bank Creek tributary) in 1986; Sunflower Gulch in 1998
Foothill yellow-legged frog <i>Rana boylei</i>	FSC	Sunny shallow streams with cobble and boulder edges	Coast Range foothill stream reaches; Red Bank Creek and tributaries in 1997-98; Thomes Creek in 1997-98
Western spadefoot toad <i>Spea hammondi</i>	CSC	Vernal pools and associated uplands	Rice Creek; Paskenta area in 1997-98
Northwestern pond turtle <i>Clemmys marmorata marmorata</i>	CSC	Wetlands; low gradient streams; marshes; ponds and nearby uplands.	Thomes Creek; Red Bank Creek in 1997-98
Birds			
Bald eagle <i>Haliaeetus leucocephalus</i>	FT CE	Stick nests near permanent water sources with fish and waterfowl; winters near lakes and rivers	Along Sacramento River; winter use along Thomes Creek in 1980s and 1997-98; Upper Red Bank Creek
Golden eagle <i>Aquila chrysaetos</i>	CSC	Nests on cliffs or in large trees on steep slopes; hunts relatively open habitats	Paskenta area winter, spring of 1997-98; year-round on Upper Red Bank Creek
Northern goshawk <i>Accipiter gentilis</i>	CSC	Mature conifer forests; may move downslope during winters	Upper McClure Creek and Doll Ridge.
Northern spotted owl <i>Strix occidentalis caurina</i>	FT	Mature coniferous forests	Coast Range forests above 3,000' elevation
Osprey <i>Pandion haliaetus</i>	CSC	Stick nests in snags or other open perches near lakes and rivers having fish	Sacramento River S of Tehama; likely near other streams and lakes; Upper Red Bank Creek (1997-98)

Table 9-1 (cont.)

SPECIAL STATUS WILDLIFE SPECIES KNOWN TO EXIST IN THE TEHAMA WEST WATERSHED			
Common Name Scientific Name	Regulatory Status (Federal/ State)	Habitat Requirements	Occurrence in Watershed (CNDDDB Occurrences in Normal Font, CALFED, 2000 Observations in Bold)
Cooper's Hawk <i>Accipiter cooperii</i>	CSC	Constructs stick nest; various habitats, including woodlands; riparian stringers; and coniferous forests	Paskenta area winter, 1997-98; Upper Red Bank Creek fall, winter, spring 1997-98
Sharp-shinned hawk <i>Accipiter striatus</i>	CSC	Constructs stick nest; various habitats, including woodlands; riparian stringers; and coniferous forests	Upper Red Bank Creek fall, winter, spring 1997-98
Northern harrier <i>Circus cyaneus</i>	CSC	Nests on the ground; hunts over fields, marshes, and grasslands	Paskenta area winter, spring 1997-98; Upper Red Bank Creek fall, winter, spring 1997-98
Swainson's hawk <i>Buteo Swainsoni</i>	CT	Stick nest in isolated trees or riparian woodlands adjacent to agricultural fields or grasslands	McClure Creek; Burch Creek; and Thomes Creek W of Richfield
Western burrowing owl <i>Athene unicinctaria hypugaea</i>	CSC	Nests in burrows in the ground within open dry grassland and desert habitat	S of Red Bluff; Hall Creek; Jewett Creek; and N of Elder Creek.
White-tailed kite <i>Elanus leucurus</i>	CFP	Stick nest in isolated trees or woodland areas with surrounding open foraging habitat	Elder Creek; NNW of Gerber
Prairie falcon <i>Falco mexicanus</i>	CSC	Nests on cliffs and forages for avian prey over extensive areas	Sensitive locations—not stated in CNDDDB; Paskenta area winter and spring, 1997-98; Upper Red Bank Creek spring, 1997-98
Peregrine falcon <i>Falco peregrinus anatum</i>	Federal Delisted CE	Nests on cliffs near water and forages for avian prey over extensive areas	Sensitive locations—not stated
Merlin <i>Falco columbarius</i>	CSC	Winter use of Sacramento Valley and adjacent open habitats	Paskenta area in winter, 1997-98; Upper Red Bank Creek spring of 1997-98
Tri-colored blackbird <i>Agelaius tricolor</i>	CSC	Emergent wetlands with nearby open water	Scattered Sacramento Valley locations;
Bank swallow <i>Riparia riparia</i>	CT	Nests in vertical stream banks and forages over nearby streams and riparian areas	Paskenta area winter and spring, 1997-98 Along Sacramento River near Vina and Tehama; Table Mt.; Thomes Creek near Henleyville; Thomes Creek near Paskenta
Loggerhead shrike <i>Lanius ludovicianus</i>	CSC	Hunts for insects on perches in open terrain	Paskenta area winter and spring, 1997-98
California horned lark <i>Eremophila alpestris acia</i>	CSC	Open areas dominated by herbaceous growth	Paskenta area in winter and spring, 1997-98
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	FC CE	Nests in large, mature riparian forests with dense canopy	Sacramento River, near Foster Island, Burch, Jewett, and Deer Creeks

Table 9-1 (cont.)

SPECIAL STATUS WILDLIFE SPECIES KNOWN TO EXIST IN THE TEHAMA WEST WATERSHED			
Common Name Scientific Name	Common Name Scientific Name	Common Name Scientific Name	Common Name Scientific Name
Lark sparrow <i>Chondestes grammacus</i>	MNBMC	Found in grasslands with scattered shrubs	Paskenta area, winter and spring of 1997-98; Upper Red Bank Creek winter and spring of 1978-98
Lawrence's goldfinch <i>Carduelis lawrencei</i>	MNBMC	Open oak and chaparral areas, near water	Upper Red Bank Creek winter and spring of 1997-98
Yellow warbler <i>Dendroica petechia brewsteri</i>	CSC	Nests in dense riparian vegetation	Sunflower Gulch and Red Bank Creek
Yellow-breasted chat <i>Icteria virens</i>	CSC	Nests in dense riparian thickets	No records for Tehama West; however, likely along major streams
Mammals			
American badger <i>Taxidea taxus</i>	CSC	Constructs burrows in friable soils of grasslands and open conifer forests	Upper Coast Range; Paskenta area 1997-98
Ringtail <i>Basilarisicus astutus</i>	CFP	Low to mid-elevation shrub and riparian habitats	Paskenta area, 1997-98
Yuma myotis Myotis yumanensis	CSC	Many habitats, near water	Paskenta area, 1997-98; Upper Red Bank Creek, 1997-98
Pallid bat <i>Antrozous pallidus</i>	CSC	Forage in relatively open habitats with rocky areas where roosting occurs	Paskenta area and Upper Red Bank Creek, 1997-98
Pale big-eared bat <i>Corynorhinus townsendii pallasiensis</i>	CSC	Variety of habitats near water	Upper Coast Range
Federally Listed and Management Concern Species:			
FE = federal endangered			
FT = federal threatened			
FC = candidate			
PT = proposed threatened			
MNBMC = Migratory Nongame Birds of Management Concern (USFWS)			
California State Listed Species:			
CE = California state endangered			
CT = California state threatened			
CSC = California Species of Special Concern			
CFP = California Fully Protected			
Source: CNDDB 2005 and Barron, F. Pers. Communications; CALFED 2000 (Dam study observations are included in bold)			

The 35 rare species (or those on watch lists) known to exist in the assessment area, as shown on Table 9-1, tend to be found in several general habitat categories. This break-down is shown in Table 9-2:

Table 9-2 HABITAT TYPES HARBORING KNOWN RARE SPECIES IN THE TEHAMA WEST WATERSHED	
Habitat	Number of Species
Vernal Pools	2
Other Wetlands	1
Riparian Habitats (foothill and montane)	6
River, Pond, or Stream-associated	6
Forest/Woodlands	4
Grasslands/Fields	9
Chaparral	1
Miscellaneous/varied	5

A full 15 of the 35 rare species (43 percent) have a direct or linked-association with some form of wetland or near-stream habitat. This is striking, considering the rather limited extent of these habitats within the watershed. Also, 14 of the 35 taxa on this list (40 percent) are birds-of-prey.

By considering the habitats that exist within the Tehama West assessment area, and the known distribution of wildlife species found in northern California, many additional rare species have the potential to exist. These potentially occurring species are shown on Table 9-3, along with their habitat requirements and possible locations where they might exist. (A larger list would result if species on the Bureau of Land Management and U.S. Forest Service watch lists were included.)

A majority of the potentially existing special status species listed on Table 9-3 would only occur for part of the year in the Sacramento Valley. In addition, most are classified as California Species of Special Concern (CSC). Because the CSC status is less restrictive, from a regulatory status, than federally- or state-listed species, observers of these species often fail to submit their findings to the CNDDDB database. In addition, many casual wildlife observers may not realize that some of these species have a regulatory status. For this reason, it is possible that some of these special status species may be wide spread or common in the watershed, even though no state database entries exist for them.

CRITICAL HABITAT

Critical habitat areas are designated by the USFWS as part of an overall plan designed to facilitate the recovery of listed species. Critical habitat areas in the Tehama West Watershed are located in the areas having vernal pools and along the Sacramento River at Table Mountain.

Table 9-3

SPECIAL STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO EXIST IN THE TEHAMA WEST WATERSHED			
Common Name Scientific Name	Regulatory Status (Federal/ State)	Habitat Requirements	Areas of Potential Occurrence in Watershed
Invertebrates			
Conservancy Fairy Shrimp <i>Branchinecta conservation</i>	FE	Vernal pools, swales, and ephemeral freshwater habitat	Sacramento Valley
Birds			
Common loon <i>Gavia immer</i>	CSC	Winter use of interior California lakes	Sacramento Valley lakes and larger ponds
American white pelican <i>Pelecanus erythrorhynchos</i>	CSC (Nesting colonies)	Winter use of interior California lakes	Sacramento Valley lakes and larger ponds
Double-crested cormorant <i>Phalacrocorax auritus</i>	CSC (Rookery sites)	Winter use of interior California lakes	Sacramento River and valley lakes and larger ponds
White-faced ibis <i>Plegadis chihi</i>	CSC (Rookery sites)	Winter use of fields and marshes	Sacramento Valley
Barrow's goldeneye <i>Bucephala islandica</i>	CSC	Winter use of ponds and lakes	Sacramento Valley lakes and larger ponds
Ferruginous hawk <i>Buteo regalis</i>	CSC	Winter use of Sacramento Valley	Open areas in Sacramento Valley
Long-billed curlew <i>Numenius americanus</i>	CSC (Nesting)	Winter use of Sacramento Valley	Sacramento Valley fields and marshes
Black tern <i>Chlidonias niger</i>	CSC (Nesting colony)	Winter use of Sacramento Valley	Sacramento Valley marshes and ponds
California gull <i>Larus californicus</i>	CSC (Nesting colony)	Winter use of Sacramento Valley	Sacramento Valley fields, marshes, and potentially urban areas
Short-eared owl <i>Asio flammeus</i>	CSC	Grassy areas; nests on the ground	Sacramento Valley fields and marshes, possibly extending into the annual grasslands and blue oak woodlands
Long-eared owl <i>Asio otus</i>	CSC	Nests in dense trees; hunts in nearby open areas	Sacramento fields and marshes, riparian areas, and lower elevation coniferous forests of Coast Range
Vaux's swift <i>Chaetura nauxi</i>	CSC	Nests in cavities of large trees; makes long, insect capturing forays	Coniferous forests of the Coast Range
Black swift <i>Cypseloides niger</i>	CSC	Very localized nesting sites, usually on cliffs near waterfalls; makes long, insect capturing forays	Coniferous forests (canyons) of the Coast Range, near waterfalls

Table 9-3 (cont.)

SPECIAL STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO EXIST IN THE TEHAMA WEST WATERSHED

Common Name Scientific Name	Regulatory Status (Federal/ State)	Habitat Requirements	Areas of Potential Occurrence in Watershed
Purple martin <i>Progne subis</i>	CSC	Nests in tree cavities; makes long, insect capturing forays	Low elevation wooded habitats, including riparian, oak woodland, and lower coniferous stands of the Coast Range
Yellow-breasted chat <i>Icteria virens</i>	CSC	Nests in riparian thickets	Sacramento Valley and foothill riparian zones
Bell's sage sparrow <i>Amphispiza belli belli</i>	CSC	Breeds and forages in shrub communities	Coast Range shrub communities, possibly in chamise and mixed chaparral stands
Mammals			
California wolverine <i>Gulo gulo</i>	CT	Feeds upon small mammals; forest habitats with large down wood	Mid- to upper elevation forest habitats of Coast Range
Pine martin <i>Martes americana humboldtensis</i>	CSC	Feeds upon small mammals; high elevation forests with rocky areas and large down wood	Upper-elevation forest habitats of Coast Range
Pacific fisher <i>Martes pennanti</i>	CSC FC	Feeds upon small mammals; mid-elevation forests, with large down wood, near streams	Mid-elevation coniferous forests habitats of Coast Range
Federally Listed Species: FE = federal endangered FT = federal threatened FC = candidate PT = proposed threatened California State Listed Species: CE = California state endangered CT = California state threatened CSC = California Species of Special Concern CFP = California Fully Protected			

Source: Zeiner et al 1988; Zeiner et al 1990a; Zeiner et al 1990b; Zeiner et al 1990c; CDFG 2005; DFG 2005d

Section 4(f) of the Endangered Species Act of 1973, as amended, directs the Secretary of the Interior and the Secretary of Commerce to develop and implement recovery plans for species of animals and plants listed as endangered or threatened unless such plans will not promote the conservation of the species. The USFWS and the National Marine Fisheries Service have been delegated the responsibility of administering the Federal Endangered Species Act. Such a plan has been drafted for vernal pool habitats of the Sacramento Valley (USFWS 2004).



California Red-Legged Frog

Recovery is the process by which the decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival in nature can be ensured. The goal of this process is the maintenance of secure, self-sustaining wild populations of species with the minimum necessary investment of resources. A recovery plan delineates, justifies, and schedules the research and management actions necessary to support recovery of a species. Recovery plans do not, of themselves, commit manpower or funds, but are used in setting regional and national funding priorities and providing direction to local, regional, and state planning efforts. Means within the Endangered Species Act to achieve recovery goals include the responsibility of all Federal agencies to seek to conserve endangered and threatened species; the Secretary's ability to designate critical habitat, enter into cooperative agreements with the states, to provide financial assistance to the respective state agencies, acquire land, and develop Habitat Conservation Plans with applicants.



Bank Swallow—A Rare Species Found Along Rivers and Streams of Tehama County

The Endangered Species Act mandates the preparation of recovery plans for listed species unless such a plan would not contribute to their conservation. Recovery plans detail the actions necessary to achieve self-sustaining, wild populations of listed species so they will no longer require protection under the Endangered Species Act. Species of concern are not required to have recovery plans, however, they are included in draft recovery plans because a community-level strategy provides opportunities for pre-listing conservation of species with needs similar to those of listed species (USFWS 2004).



Valley Elderberry Longhorn Beetle (photo by Ted Gantenbein)

The CNDDDB (2005) also includes a listing of habitats that experts have considered to be rare and important, several of these exist in the Tehama West Watershed. Project proponents are required by the California Environmental Quality Act (CEQA) to assess whether their actions might impact these habitats, and in some cases to mitigate the impacts. The designated special habitats known to exist within the assessment area include:

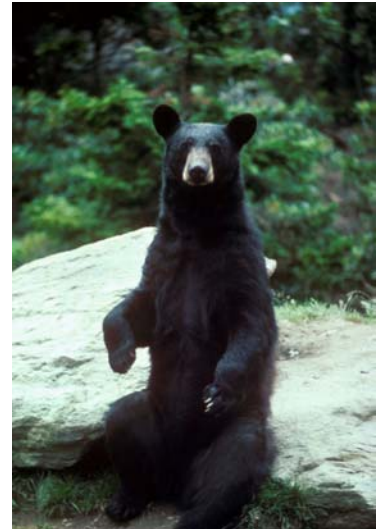
- Great Valley Mixed Riparian Forest (located along the Sacramento River and possibly along some tributaries)
- Great Valley Willow Scrub (located along Sacramento River)
- Northern Hardpan Vernal Pool (located southwest of Red Bluff, along Paskenta Road, other locations)
- Valley Needlegrass Grassland (located 3 miles north of Black Butte Reservoir)
- Coastal and Valley Freshwater Marsh (located along Sacramento River in vicinity of Merrill's Landing).

PREDATOR SPECIES

The large mammal predators are among the best-known wildlife species in the watershed. These predators include black bear (*Ursus americanus*), mountain lion (*Felis concolor*), and coyote. Each species has been known, at least on occasion, to prey on livestock and cause other human concerns.

Black Bear

Adult black bear females weigh 100-200 pounds whereas adult males are larger, at 150-350 pounds, though individuals over 600 pounds have been taken by hunters in California. Black bears are omnivorous and opportunist and have teeth adapted for feeding on both plant and animal matter. Bear commonly consume ants and other insects in summer, but prefer nut crops, especially acorns and manzanita berries in the fall. As omnivores, black bears will eat whatever is available and can become adept at catching young deer fawns. Bears frequently adapt to human presence, often because bears are attracted to human garbage, pet food and other food items. In suburban areas and mountain communities, bears may damage private property while foraging. These events are most likely to occur in spring if natural foods are scarce, or in late summer and fall, especially during years of poor berry and acorn yields.



In California black bear are relatively common with a population estimate of about 30,000. Since 1985 there has been an annual harvest ranging from 1,000-1,800 animals per year (CDFG 2004c). Black bears "thrive" in some habitats, while gaining only marginal or seasonal benefits from other habitat types. For instance, black bears are known to use annual grasslands (AGS) and valley foothill hardwood habitats (BOW, BOP, VFR, VOW) sporadically during the year; however, self-sustaining bear populations are not usually found in these habitats. In contrast, montane hardwood (MHW), montane chaparral (MCP), and Klamath mixed conifer (KMC) forests sustain high bear populations because they supply sufficient food, cover, and water. Habitats with both vegetative and structural diversity provide alternate food resources when other foods are in short supply. An important feature for successful reproduction is secure, dry den sites where the female bears give birth to the cubs. While black bears have been found to den in slash piles,

under large rocks, and even on open ground, the most secure and thermally protective den sites are located in large, down logs or in hollowed-out bases of large trees.

Habitat loss is a leading threat to most wildlife species in California. In the case of the wide-ranging black bear, over half of the state's suitable habitat is in public ownership, of which an estimated 10 percent is managed as either wilderness or park. This allows for large blocks of habitat to remain undeveloped and for core areas within these blocks to exist, where bears encounter few humans; however, land management activities on these public lands can affect the capability of an area to support bear populations. For instance, many of the important food plants such as manzanita berries and acorns grow from plants (manzanita shrubs and oaks) that require full sunlight. Therefore, controlled burns or other management strategies, aimed at creating a mosaic of forest openings where manzanita and the various oak species thrive, can be especially beneficial for black bears by providing abundant food resources in close proximity to cover. Additionally, retention and recruitment of snags and large woody debris provide den sites and potential food sources (colonial insects). Conversely, management practices which result in densely grown, even-aged stands without structural and vegetational diversity decrease habitat value for black bears (CDFG 2004c).

An ongoing issue relating to black bear is the illegal hunting and trade in bear gall bladders. These body-parts are considered important in Asian markets and many animals are killed for this purpose throughout California (Castle 2005).

Mountain Lion

Another important predator in the watershed is the mountain lion. The current population of mountain lions in California is estimated between 4,000 and 6,000 (CDFG 2005b; CDFG 2005c). Mountain lions live an average of 12 years in the wild and up to 25 years in captivity. They often have three kittens in the winter or spring. On average, two of these live for 1 year after birth.



The highest density of lions in California is in the western slope of the Sierra Nevada and northwestern California, including the Tehama West Watershed, where up to 10 animals can live per 100 square miles of habitat (CDFG 2005c). Generally speaking, mountain lions can be found wherever black-tailed deer are present, as they are the predator's main food source. Foothills and mountains are most suitable mountain lion habitat, while valleys are considered much less suitable.

California residents have seen a variety of management approaches for this species. In 1907 bounties were first placed on lions, with 12,500 individuals taken in the following 57 years, in some years the harvest exceeding 350. In the 1960s the species's legal status was changed to a game animal and in 1969 a record 4,953 animals were taken. Environmental pressures increased to restrict or halt hunting and in 1972 a law was enacted that ended recreational harvest. Figure 9-4 shows the summary of mountain lion depredation incidents from 1972 through 1999. Following this action, in the period from 1986 to 1995, there were 10 verified attacks by mountain lions on humans. To put this in perspective, prior to 1986 there had only been two verified lion attacks in Californian history, in 1890 and 1909 (CDFG 2005c).

Following the expression of public concern regarding mountain lion attacks, the California Department of Fish and Game placed considerable time into researching the species and the condition under which these attacks have occurred. They have found that the species is more widespread and abundant than it was 25 years ago. With regards to why there are more human attacks, CDFG conjectures that most good lion habitat is taken up by existing territorial animals. When animals without territories (young animals or ones forced out by stronger animals) seek their own area, they must go to the habitats with less quality—in many cases this is where humans also exist (CDFG 2004a; CDFG 2005c).

Usually, there is no apparent explanation for why a mountain lion seems to abandon its instinctive wariness of humans. Mountain lions are typically solitary and elusive. Studies of collared mountain lions show that they often co-exist around people, unseen and unheard. People who live in mountain lion habitat can take precautions to reduce the risk of encountering a mountain lion, including: deer-proofing the landscape so that less of the predator's time will be spent near the dwelling, removing dense vegetation from around rural homes, and installing outdoor lighting to make it difficult for mountain lions to approach unseen.

Although biologists have generally thought that predators have little role in limiting prey populations, recent research with mountain lions suggest that this may not be the case. In some situations, predation upon mountain sheep (*Ovis canadensis*) and mule deer has been a factor, along with disease and drought, in keeping the prey populations low (CDFG 2005c).

Coyote

The last of the three well-known mammalian predators in the Tehama West Watershed is the coyote. Their range now extends from Central America to the Arctic. In spite of being hunted and trapped for more than 200 years, more coyotes likely exist today than when the U.S. Constitution was signed (CDFG 2004d).



Adult coyotes weigh between 20 and 45 pounds. Females are generally smaller than males and individuals look similar to small collie dogs. They have erect pointed ears, slender muzzle, and a bushy tail. The coyote's color varies, depending upon the geographic region and the time of year. Most coyotes have dark or black hairs over their back and tail.

Coyotes are highly adaptable, and are found in deserts, swamps, tundra, grasslands, brush, and dense forests, from below sea level to the high mountains. A true scavenger, omnivore, and opportunist, the coyote will eat just about anything. Identified as a killer of sheep, poultry and deer, the coyote will also eat snakes and foxes, rodents and rabbits, fruits and vegetables, birds, frogs, grass and grasshoppers, pet cats and cat food, pet dogs and dog food, carrion, and just plain garbage.

Part of the reason for the coyote's success has been a high reproductive rate, rapid growth of offspring and its ability to adapt to a wide variety of environments. Coyotes breed in February and March and pups are born about 60 days later. An average coyote litter contains four or five pups, which are born in dens. In urban environments, coyotes use dens in storm drains, under storage sheds, in holes dug in vacant lots, parks, or golf courses, or any other dark, dry place (APHIS 2002).

In areas where they are hunted or trapped, coyotes are extremely wary of human beings. However, in urban areas, where they are less likely to be harmed and more likely to associate people with an easy and dependable source of food, they can become very bold. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service, Wildlife Services suggests (and offers technical assistance for) the following non-lethal methods to reduce coyote damages (CDFG 2004d):

- Use net-wire or electric fencing to keep coyotes away from livestock
- Shorten the length of calving or lambing seasons
- Confine livestock in a coyote-proof corral at night when coyotes are most likely to attack livestock
- Use lights above corrals
- Remove dead livestock so coyotes won't be attracted to scavenge
- Remove habitats that provide homes to natural prey of coyotes, like rabbits, from lambing and calving areas
- Use strobe lights and sirens to scare coyotes away
- Use guard animals, such as dogs, donkeys, and llamas, to protect livestock

California Department of Fish and Game (2004d) espouses the notion that the best way to avoid problems with coyotes is to avoid feeding them so that they will not be encouraged to spend time near habitations.

HARVESTED SPECIES

A large number of wildlife species can be legally harvested in California, primarily through hunting and trapping. Species considered to be nuisances, such as feral pigs (*Sus scrofa*) and American crows (*Corvus brachyrhynchos*), have unlimited seasons and bag limits, while many hunters must adhere to strict seasons and bag limits for other species. Black-tailed deer, waterfowl, and upland game birds are typically the most popular game species. Many of the species that provide hunting opportunities are introduced species, including the ring-necked pheasant (*Phasianus colchicus*), turkey (*Meleagris gallopavo*), and feral pigs.

Black-Tailed Deer

Columbian black-tailed deer are found in virtually all habitats within the Tehama West Watershed. However, the preferred habitats are those with abundant sources of high quality browse species, including a variety of shrubs. These prime habitats include chaparral-dominated habitats, the conifer zone, where fires have burned recently and shrubs and herbaceous plants have quickly become established. Seasonally, acorn mast crops are heavily used and animals will concentrate in these areas in late summer and the autumn.

Although there are resident black-tailed deer that spend all year in the Sacramento Valley, many of the deer in Tehama West move upslope during the spring, to take advantage of developing vegetation and to access traditional fawning areas. The fawning areas are often near water, where an abundance of lush herbaceous growth exists, which helps the doe produce an abundance of milk. Following fawning the animals will stay in the general area and then slowly begin to move downslope during the autumn. If acorns are in abundance in a given year, deer will often stage or hold in these areas for a period of time. Before the winter snows arrive, the deer generally reach the lower foothill habitats dominated by blue oak, foothill pine, and chaparral stands. This is where they will winter and breed and move from in the following spring to complete the yearly cycle.



Deer summering in the higher elevations of the Coast Range face the same dilemma as they do in most regions of the State. Their winter ranges, along the base of the mountains and at an elevation below the deep and persistent snow level, are frequently heavily impacted by man's actions and developments. In some cases, critical winter ranges have been degraded to the point that they can not support the deer populations that would normally use the summer habitats; consequently, the herd populations have declined or crashed (Loveless 1967).

Due to the historical importance of deer hunting to California, much study has gone into both their biology and habitat needs. Early-on researchers determined that deer were an early-seral species, meaning that they did best shortly after vegetation disturbances, primarily fire. There were many examples of where California deer populations exploded following large fires. Because of the correlation between fires and high deer populations, many researchers collaborated to determine techniques to burn forest and chaparral stands in a controlled manner, to improve deer habitat (Biswell et al 1952; Dasmann 1956; Taber 1956). A generalized, historical representation of deer population densities for California during the past two centuries is shown on Figure 9-5. The relationship between large fires and buck harvest rate (potentially an indicator of herd population) is shown on Figure 9-6.

Important deer nutritional studies were completed in the mid-1900s in eastern Tehama County. Dasmann (1956) found that browse quality, with regards to palatability and nutritive value, varied by plant species, time of year, and whether plants were re-sprouting following a recent burn or were well-established. In the eastern Tehama study area, preferred browse species included wedge-leafed ceanothus (*Ceanothus cuneatus*), birch-leafed mahogany (*Cercocarpus betuloides*), and acorns. These findings probably hold true for the Tehama West herds also.

The deer season in northern California is an important social event for many people, although less so than several decades ago, and infuses considerable economic input to the county. Deer season in Tehama County begins with an archery hunt in late summer, followed by the regular firearm season extending into the autumn. Based upon the 2002 deer harvest (CDFG 2002), there were a total of 17,741 deer recorded as taken during the regular season statewide; 909 of which were from Tehama County (5.1 percent of the statewide total). Due to a variety of reasons, the actual harvest is estimated to be considerably larger, or approximately 33,000. Therefore, it is possible that the actual Tehama County hunting take is almost 1,800 animals. The 2002 archery season take was 1,340 animals statewide, with 57 coming from Tehama County. Likewise, the actual numbers are estimated to be almost twice as many.

The economic value of deer hunting to local counties may be considerable. California Department of Fish and Game (1997) completed an economic analysis for five counties north and east of Tehama County, showing that the average rifle hunter spent \$223 per season and higher amounts for archery and muzzle-loader hunters.

Wild Pig

Wild pigs have become an increasingly sought after game species. They occur within the Tehama West Watershed from the shrub-dominated community's downslope through the agricultural lands. First introduced from European domestic varieties, they appear to be increasing in population and distribution in California. They are now considered a big game species. The number of wild pigs harvested on public land increased from 5,800 in 1997 to 9,600 in 1999. There is no reliable estimate of how many are killed on private land; however, they may be approaching deer in the amount of their annual kill (Ahlborn 2004; CDFG 2004b).



Wild pigs are prolific, with the potential of having two litters per year and up to 15 piglets per litter. Landowners complain about the variety of damage they can incur, including damage to fences, rooting-caused damage to fields and rangelands, and eating of acorns important to wild species. They are also known to be susceptible to anthrax (Barrett 1997; CDFG 2004b).

Waterfowl

Waterfowl occur throughout the Sacramento Valley and provide much recreation for hunters. Approximately 30 species of waterfowl may, on occasion, exist in the watershed and be hunted. There are large numbers of waterfowl that breed in California each year, from 400,000 to 800,000 breeding pairs were noted during the period from 1992 to 2005 (CDFG 2005a). In addition, the Sacramento and San Joaquin Valleys are major wintering areas for many other birds that breed further north and inland.

Waterfowl hunting is an important recreational activity in the Sacramento Valley and many landowners with ponds or slough areas likely make money from allowing hunting to occur on their property.

Other Harvested Species

Pronghorn antelope (*Antilocapra americana*) and tule elk (*Cervus elaphus nannodes*) occurred historically in the Sacramento Valley but were eliminated by habitat disruption and excessive hunting. Although the re-introduction of pronghorn in eastern Tehama County has been discussed for years, apparently there are no current plans to do so. It is also possible that tule elk could be re-established in Tehama County. However, it is unlikely, due to the land ownership pattern, and the limited amount of habitat remaining, that either species can expand to numbers that can support hunting in the watershed.

There are many other hunted species that occur within the watershed and provide enjoyment and economic benefits to the county. Although difficult to quantify, it is very likely that many ranchers and farmers bring in some to considerable income from offering their lands to hunters or hunting clubs for the opportunity to hunt these species.

EXOTIC SPECIES

In the past, wildlife species have been introduced into America both accidentally and intentionally. Well-known introduced wildlife species in the watershed include the bullfrog, ring-necked pheasant, wild turkey, feral pig, European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), Virginia opossum (*Didelphis virginiana*), muskrat (*Ondatra zibethicus*), rock dove (*Columba livia*), and New Zealand mud snail (*Potamopyrgus antipodarum*). Descriptions follow for some of these species with regards to their potential impacts on local habitats and wildlife resources:

Bullfrog

The results of bullfrog importations have been varied. On the negative side, the bullfrog has directly impacted aquatic species by preying upon and out-competing native amphibians and reptiles, including the California red-legged (*Rana aurora draytonii*) and foothill yellow-legged frogs (*Rana boylei*) and northwestern pond turtle (*Clemmys marmorata marmorata*) (Moyle 1973; Hayes and Jennings 1986). In addition, they have a voracious nature and can capture ducklings, fish, and many other species (Basey and Sinclair 1980; Zeiner et al 1988).



The bullfrog is native to eastern portions of North America, and was introduced into western states for mosquito control, mainly in the 1920s and 1930s. Records indicate bullfrog invasions were appearing in California as early as 1895. Bullfrogs likely exist through the lower elevations of the watershed, wherever warm, weedy, permanent ponds and lakes, ditches and slow-moving streams and ponds, or perennial streams exist (Zeiner et al 1988).

The reduction or elimination of bullfrogs from specific areas should aid the native frog population. Following population control, it may be possible to re-introduce native frog species that historically inhabited specific locations.

Wild Pig

Domestic pigs were brought to California by the Spanish in 1769. Throughout the following century European settlers, including the Russians at Fort Ross, continued to transport domestic swine into the state. Most of these pigs were variously colored mongrels exhibiting short-legged, chuffy, lard pig traits (Wood and Barrett 1979; Barrett 1997). In 1925 Eurasian wild boar stock from North Carolina was introduced near Carmel, Monterey County. Since that time, the species has continually expanded its range (Barrett 1997).

Wild pigs are common in foothill and valley habitats. The minimum requirements for good wild pig habitat are dense vegetation and the presence of a water source nearby. The existence of mast crops is also an important factor influencing pig distribution and population density. Adjacent agricultural lands also enhance the value of the pig's habitat because the fields and orchards provide many forage opportunities. Wild pigs are omnivorous and their diet changes with the seasons. During the dry summer months, pigs eat green plants. During the autumn, they consume acorns, walnuts, and fruit when they are available. During the winter, when rains soften the soil, wild pigs eat roots, bulbs, insects, and worms that they locate by plowing or "rooting" the ground with their tough snouts. In the spring, as the soil dries, they gradually shift back to green plant parts. In some agricultural areas, barley and alfalfa are preferred foods. Small animals and carrion form a minor part of the pig's diet year-round (Barrett 1997). Feral pigs were noted at both the proposed Upper Red Bank and Thomes-Newville dam sites (CALFED 2000).

Rooting by pigs in moist or irrigated soil is normally quite visible. Sometimes only a few small sites are rooted or the disturbed area may cover several hundred square feet or more. Rooting can harm pastures, crops, and native plants and may cause soil erosion. Pig rooting can alter the relative abundance of different plant species at the site and can change the functioning of natural ecosystems. In years of acorn shortage, wild pigs may compete with wild turkey, mule deer, squirrels, and black bears. Destruction by pigs of native vegetation and nests of ground-nesting birds may also be a serious problem (Barrett 1997).

Wild Turkey

Wild turkey can be found throughout much of the Tehama West Watershed; however, no data regarding local turkey populations were found. Consequently, this section is based on statewide data and generally understood biology.



The California Fish and Game Commission first introduced Merriam's wild turkeys to California in June of 1908, with many more releases since that time. The historical range of this species is suspected to be Arizona, New Mexico, and Colorado. They have established populations in approximately 37 counties in California, and are generally found in deciduous riparian, oak, and conifer-oak woodlands. They prefer large trees with some canopy, ideally with numerous grass/forb openings near water in hilly terrain. Densities range from 60 to 120 acres per bird in portions of their range, with a total estimated population of at least 154,000 birds in the state. Nest size averages 10.5 eggs per clutch and hatching success is around 87 percent. An average of 17,176 birds per year are taken in the annual harvest.

The California Department of Fish and Game has an active program to expand and enhance wild turkey populations through translocation programs. The turkey is not native to California and this program has been receiving opposition from environmental groups. A suit has been filed by the California Native Plant Society against CDFG, stating the potential impacts of these releases to sensitive flora and fauna. CDFG is currently researching the wild turkey habitat relationship and food habits in California to better address the possible impacts of continued translocations.

Pheasant

Ring-necked pheasants are medium-sized game birds characteristic of the Sacramento Valley. They are generally found on agricultural lands where grain crops exist near herbaceous and woody cover. This habitat exists in the Tehama West Watershed, however no pheasant surveys have been found. Pheasant hunting does occur within the watershed. Current statewide hunting regulations permit the harvest of males only, and because pheasants are polygamous, hunting should not effect the reproduction of the species.



The ring-necked pheasant is not native to this continent and was first introduced from China to the Willamette Valley of Oregon in 1881, and then brought to California sometime in the 1880s. By 1925, the pheasant population established itself in California in sufficient numbers for a hunting season. There are an estimated 732,214 birds throughout the state, and a density of 0.66 to 12 acres per bird. The nesting success of the pheasant is around 53 percent, with a clutch size averaging 12 and an 83 percent hatching rate (CDFG 2005b).

New Zealand Mud Snail

The New Zealand mud snail's (*Potamopyrgus antipodarum*) discovery in Putah Creek in 2003, only a short distance south of the Tehama West drainage, is a real concern for fishery biologists. They are very small aquatic snails native to New Zealand, accidentally introduced into the Rocky Mountains of North America in the 1980s. Their first California appearance was in 2000, in the Owens River. These snails were certainly spread by fishermen from the original introduction sites (CDFG 2003). They are not yet known to occur in the Tehama West Watershed.



To date, there has been little research on the potential impacts of New Zealand mud snails on other aquatic resources. It is thought that when the snails become very dense they can compromise the macro-invertebrate populations. They also have the potential to reduce a stream's algal production, which affects the forage values for small invertebrates, and which in turn would affect fish (CDFG 2003).

DATA GAPS

Many data gaps exist with regard to the wildlife species that actually exist in this watershed, their range and distribution, and their population and trend. These data gaps are not unique to this area—the same can be said for most rural portions of the state. The studies initiated by the state for proposed dams at the Thomes-Newville and Upper Red Bank Creek during the past several decades have resulted in a great amount of valuable information, including findings of potential isolated populations of both the California red-legged frog and the Western spadefoot toad, as well as significant populations of other uncommon species. It is possible that important information pertaining to individual species or habitats exist, in individual's or agency's files; however, they were not accessed for this assessment.

To complete a comprehensive inventory of wildlife for all habitats existing throughout the Tehama West drainages is probably beyond the range of what realistically can be expected. However, proper management of certain species, including determination of whether individual taxa are doing well or at risk, requires some data and knowledge of historical trends. More information is also needed regarding the distribution of each special-status and introduced wildlife species to assess potential impacts to wildlife habitats and native species.

It is suggested that a program be initiated to collect baseline data regarding wildlife usage of Tehama West habitats and, over time, determine population trends for various controversial species or ones considered to be indicators of ecosystem health. This inventory can be based upon the model used by the CALFED (2000) studies of dam sites. Specifically, systematic data collected regarding uncommon or declining habitats and animal groups tending to be sensitive to habitat changes (e.g., raptors, bats, amphibians, and mammalian predator species) would greatly assist in the management of wildlife populations and their habitats.

An additional data gap that limits the ability to enhance native populations and habitats pertains to introduced species. Many of these species are known or suspected to have major impacts on native species. A better understanding of the distribution and population dynamics of these alien species would certainly help managers. The CALFED (2000) dam studies have begun this work, documenting bullfrog distribution and densities in two areas of the Tehama West drainage (both areas having sensitive, native amphibian species).

Finally, a data void pertains to adaptive management strategies for vernal pool habitats and their associated species, both plants and animals. This could be accomplished in concert with the *Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2004) and involve the Tehama Resource Conservation District, private landowners, and the University of Davis Cooperative Extension, among others.

CONCLUSIONS AND RECOMMENDATIONS

Wildlife in the Tehama West watershed provides opportunities for observation, hunting and other recreational activities, and greatly contributes to the quality of life. Drainage-specific data pertaining to the wildlife species resources are limited and are artificially focused on areas near the Sacramento River, Interstate 5, and proposed dam sites at the base of the Coast Range. In most cases, we can only surmise, by using models, which species exist; their population trends can only be assumed by considering statewide trends, if known.

Restoration of degraded wildlife habitats is important, as well as protection of existing high quality and/or unique habitats. Considering the information available at this time, a statement regarding which habitats have been degraded and their degree of degradation cannot be made, other than to say that water-related habitats certainly have been severely affected by development. In addition, given the available information pertaining to existing habitats, the location and status of high quality or value habitats can only be identified in a general manner. Identification of unique or uncommon habitats in the Tehama West area can be done reasonably well, because of the ability to classify all vegetation using satellite imagery. This inventory has shown that habitats known to harbor a large diversity of wildlife species, including wetlands and riparian habitats, are very uncommon within the drainage and those that still exist likely harbor many rare or at-risk species.

Important wildlife issues identified in this assessment, or suggested by reviewers, include:

- Loss or decline of special status species and habitats, including vernal pool invertebrates and raptors
- Impacts of introduced species on native taxa and habitats
- Loss of riparian forest and wetland habitats, including riparian impacts of channelization and destabilization of streams from gravel mining
- Loss and degradation of oak woodlands
- Agricultural management, vector abatement, and urban development impacts to sensitive species and their habitats
- Impacts of historical fire and forest management on wildlife species

Specific recommendations are located in the following sections.

Inventory of Habitats and Wildlife Species

Tehama West Watershed would benefit from an inventory of the most valuable habitats and habitat features in the county. These include habitats that support a high diversity of species, are uncommon or widely scattered, or at risk of degradation. Until more is known about the wildlife in the watershed, these likely include: oak woodlands and riparian areas, vernal pool landscapes, caves, and cliffs. Those vegetation communities and localized habitats that are rare or uncommon and contribute disproportionately to the watershed's habitat values should be identified wherever possible so that if opportunities arise, they can be acquired by the state or federal government or protected by conservation easements. Collecting data regarding the current conditions will allow a future determination regarding changes that occur over time and habitat quality trends.

Geographic Information Systems (GIS) can be used to analyze habitat characteristics in a manner and at a speed that no other technology can do. Habitat edge, while considered by biologists to be very valuable for many wildlife species, is rarely quantified or evaluated over time. For some species, it is suspected that habitat fragmentation, a process that increases edge, may be detrimental. It is possible to use habitat inventories and existing habitat mapping data to determine edge or habitat continuity metrics and to periodically re-assess to determine trends. This could be incorporated with wildlife surveys geared toward answering the question of how habitat fragmentation affects various wildlife species.

While a comprehensive inventory of wildlife species throughout the watershed is probably not possible, it can be done for a variety of high-value habitats. Special effort can be placed on the status of the lesser-known special species listed on Table 9-3, because of their lower environmental profile and the possibility that they might become rare in the future. As in the case of a habitat inventory, these data should help planners understand future trends and help prioritize habitat protection and restoration efforts.

Inventory and Control of Invasive Species

It is also recommended that the control and exclusion of invasive species be a priority. Because of their occurrence and potential impact to riparian habitats, these invasive species control efforts should be focused on arundo, tamarisk, non-native aquatic plants, and the New Zealand mud snail. It is also recommended that inventories be completed for the wildlife species most thought to be causing habitat degradation or impacts to native species, including feral pig and bullfrog. Following inventories, control efforts can be planned.

Institution of an Integrated Wildlife Data Management Program

The California Department of Fish and Game, through the California Natural Diversity Database (CNDDDB), provides a repository of information regarding special status species and uncommon habitats. Unfortunately, federal agencies frequently fail to use this database, and even in the case of dam studies sponsored by the State of California, the data collected was not all entered into the state database. It is certain that a large amount and variety of information exists in different agencies' files that are almost impossible to find and use.

Data collection only makes sense if the data goes into a management system that allows easy access. For this reason, it is recommended that time and effort be spent finding existing data and placing it into existing databases, such as the CNDDDB. In addition, data collection activities by a variety of agencies should be strongly encouraged to be done cooperatively and maintained in a cooperative database.

Cooperative Management Programs

Cooperative relationships between private landowners and local governments with wildlife management agencies for the monitoring of species and habitats would provide many benefits. Wildlife management agencies will have additional information for making management decisions and will also gain a greater understanding of the priorities and challenges facing private landowners in conducting resource management. Cooperative programs that are currently available to private landowners in the watershed, such as the Wetland Reserve Program and the cost-sharing available through the Natural Resources Conservation Service, should be expanded and utilized to their fullest capacity in the watershed.

Land Use

Retention of large tracts of land for species that require certain stand sizes of habitat should be encouraged. This includes incorporation into city, county, state, and federal planning documents. An assessment of the effects of various forms of recreation on the fish and wildlife populations and habitat should also be conducted to develop a plan to provide for recreation in a way that minimizes impacts on fish and wildlife.

Prior to future development, an assessment of barriers, impacts of roads (including new roads), and development on species guilds should be developed.

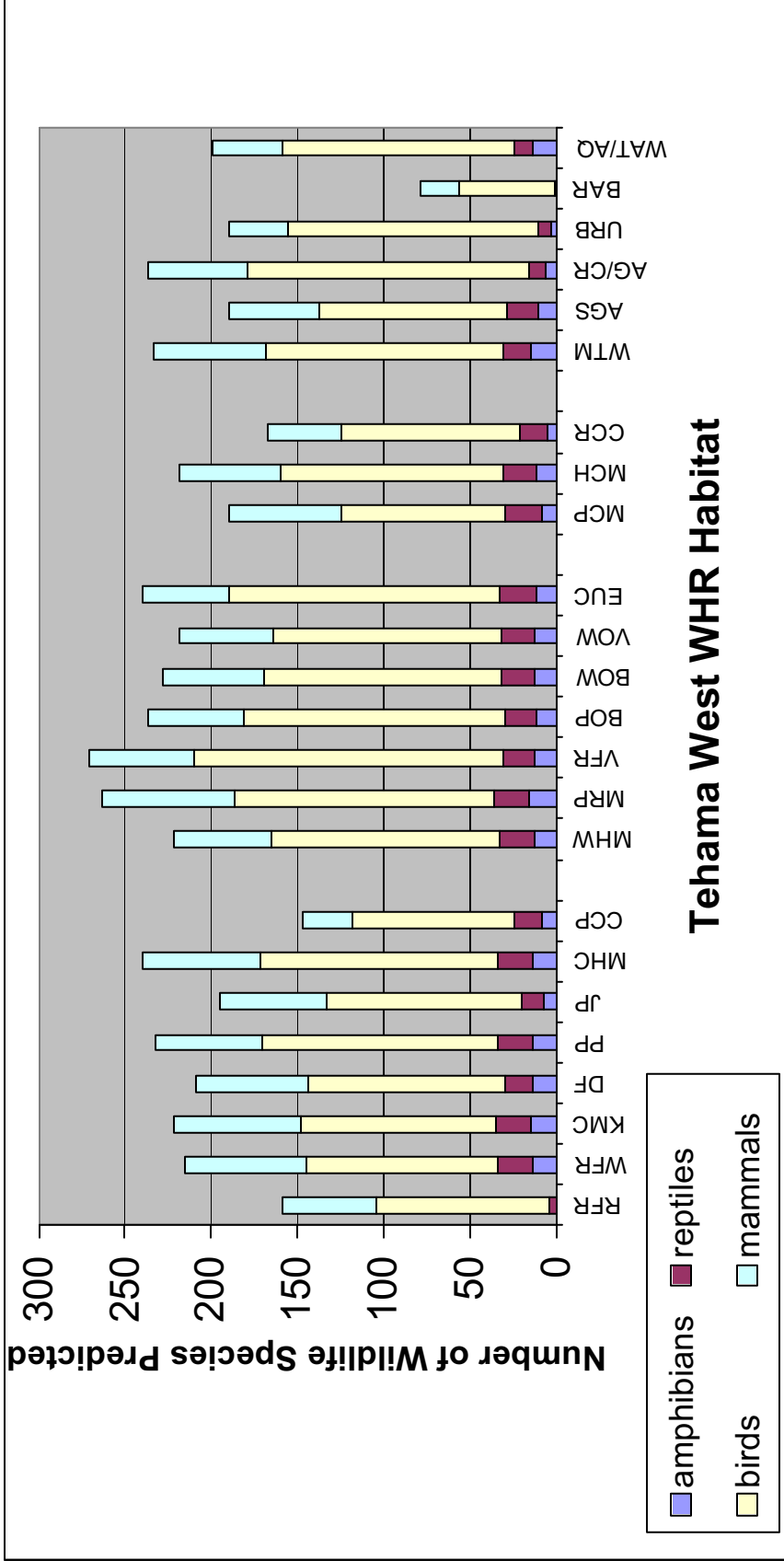
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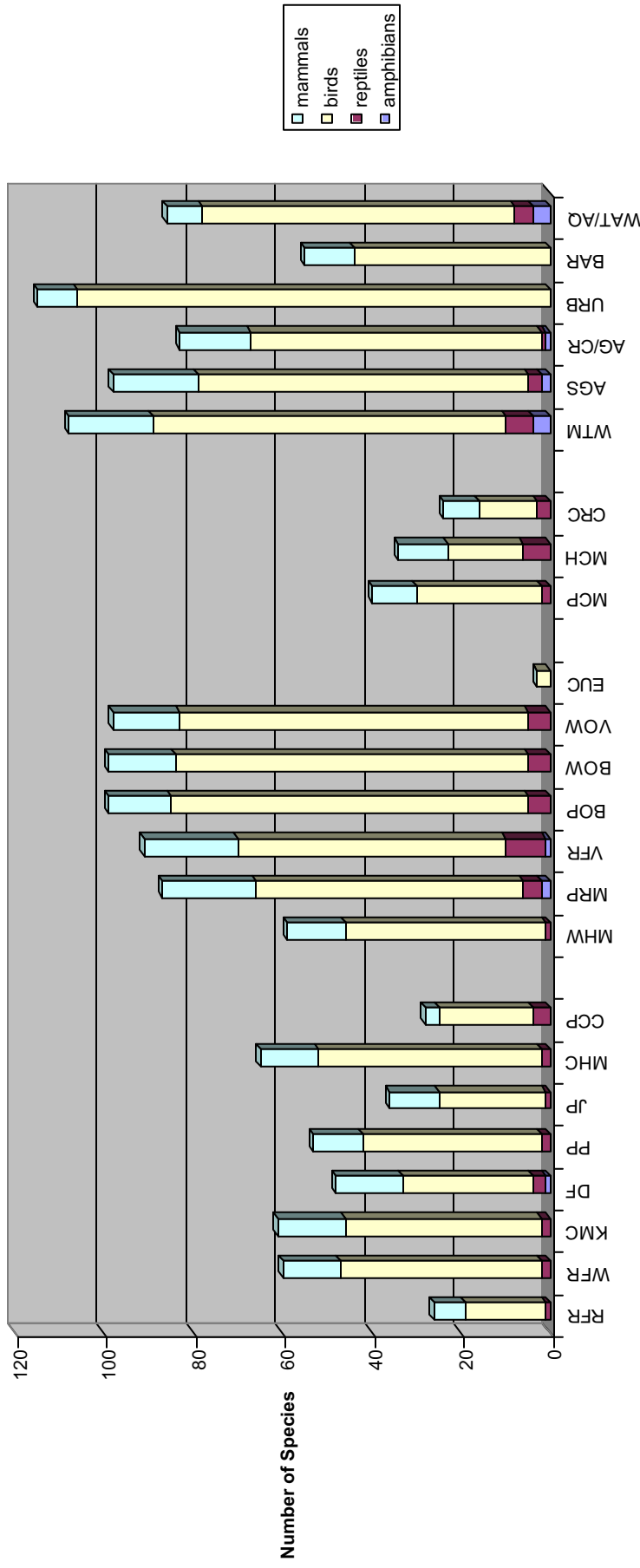
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- RFR - Red Fir
- WFR - White Fir
- KMC - Klamath Mixed Conifer
- DF - Douglas Fir
- PP - Ponderosa Pine
- JP - Jeffrey Pine
- MHC - Montane Hardwood Conifer
- CCP - Closed Cone Pine-Cypress
- MHW - Montane Hardwood
- MRP - Montane Riparian
- VFR - Valley Foothill Riparian
- BOP - Blue Oak Foothill Pine
- BOW - Blue Oak Woodland
- VOW - Valley Oak Woodland
- EUC - Eucalyptus
- MCP - Montane Chaparral
- MCH - Mixed Chaparral
- CCR - Chamise-Redshank Chaparral
- WTM - Wet Meadow
- AGS - Annual Grassland
- AG/CR - Agriculture/Crops
- URB - Urban
- BAR - Barren
- WAT/AQ - Water and Aquatic Habitats

FIGURE 9-1
VERTEBRATE WILDLIFE SPECIES PREDICTED TO USE TEHAMA WEST HABITATS DURING SOME PART OF THE YEAR
TEHAMA WEST WATERSHED ASSESSMENT



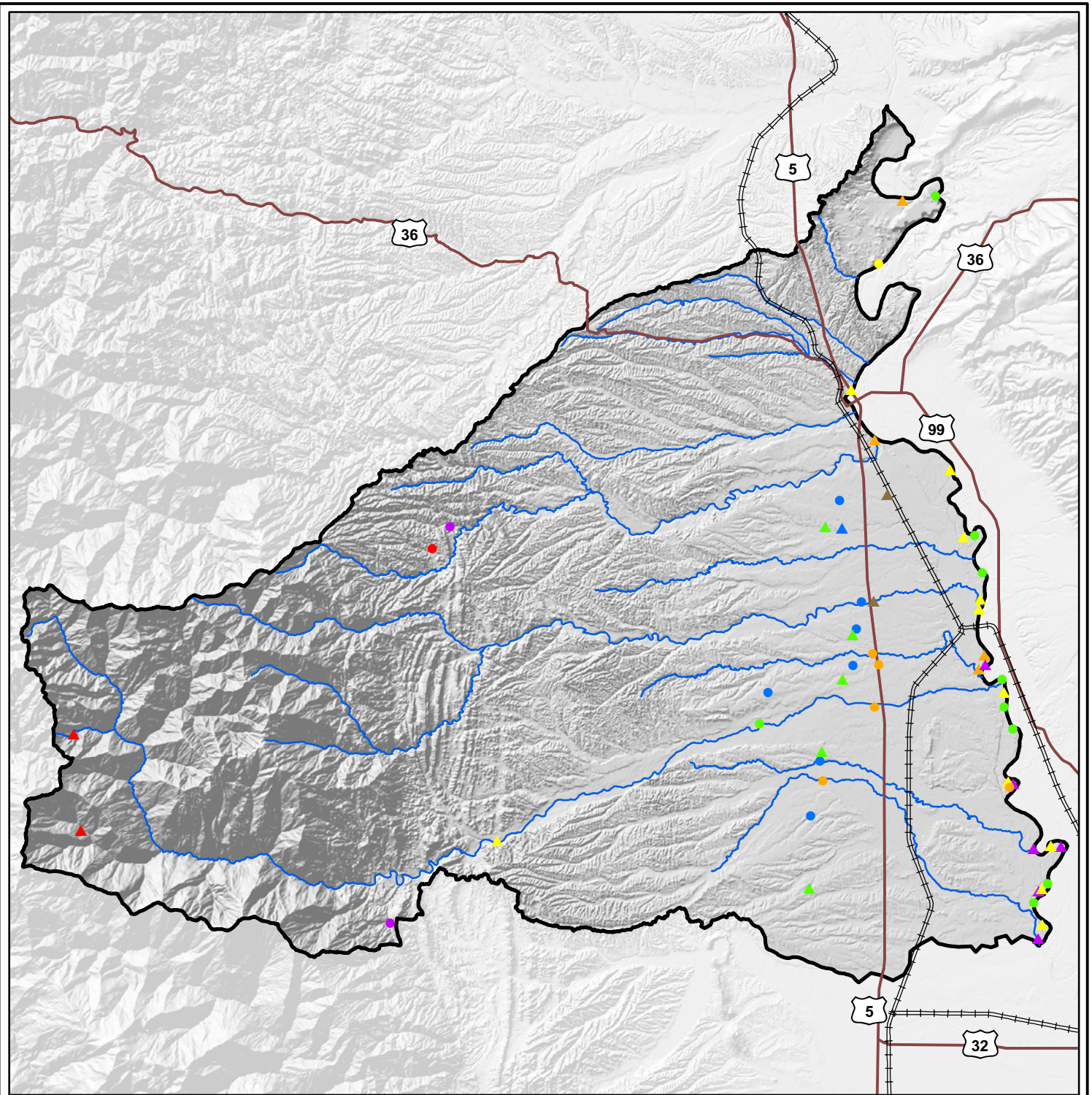


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- WTM - Wet Meadow
- AGS - Annual Grassland
- AG/CR - Agriculture/Crops
- URB - Urban
- BAR - Barren
- WAT/AQ - Water and Aquatic Habitats

FIGURE 9-2
 VERTEBRATE WILDLIFE SPECIES PREDICTED TO USE AND GAIN
 HIGH FORAGE, HIDING, AND REPRODUCTIVE VALUES FROM
 TEHAMA WEST HABITAT
 TEHAMA WEST WATERSHED ASSESSMENT

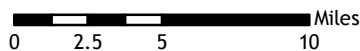


SOURCE: US FOREST SERVICE CALVEG DATA



Legend

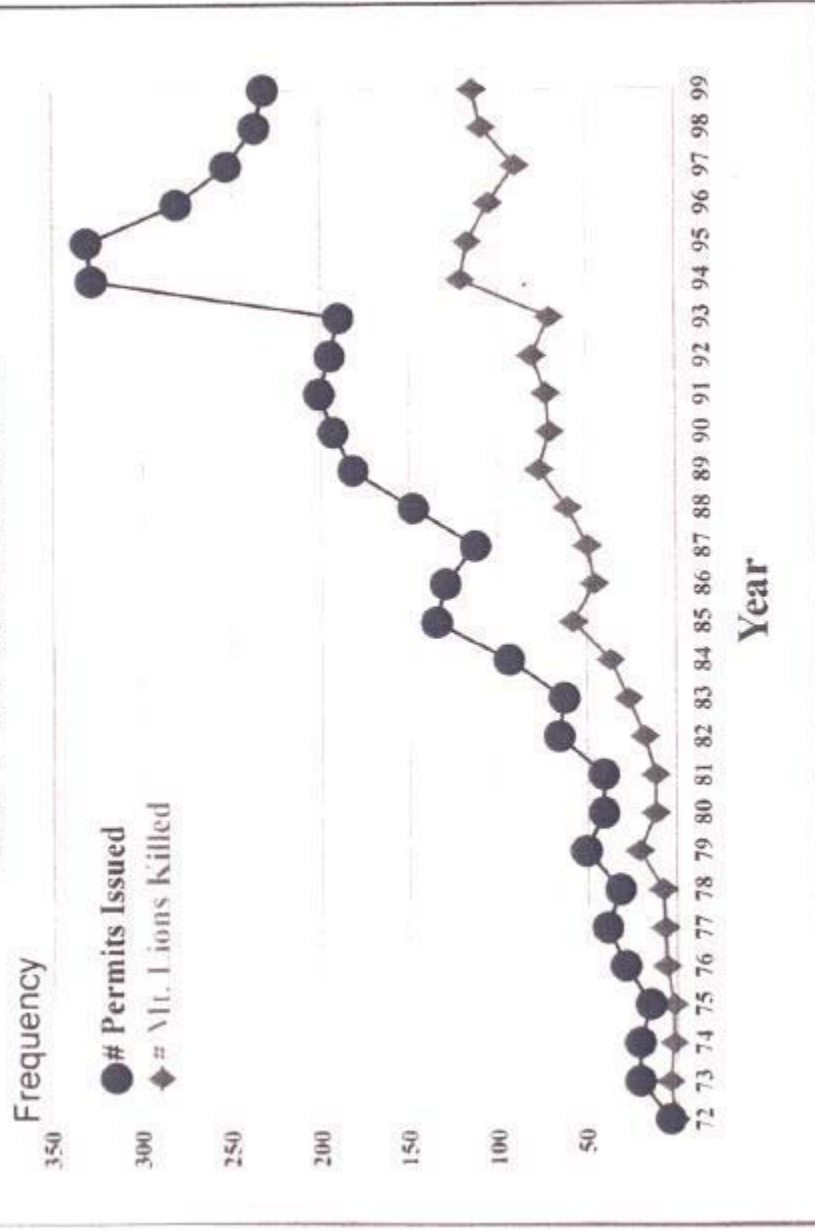
- | | | |
|------------------------------|-------------------------------------|--------------------------------|
| ⚓ Railroad | ● Bald eagle | ▲ Vernal pool tadpole shrimp |
| — Major Highway | ● Bank swallow | ▲ Western yellow-billed cuckoo |
| — Major Tributary | ● Burrowing owl | ▲ White-tailed kite |
| ▭ Tehama West Watershed | ● Foothill yellow-legged frog | |
| ● California red-legged frog | ▲ Northern goshawk | |
| ● Swainson's hawk | ▲ Osprey | |
| | ▲ Valley elderberry longhorn beetle | |
| | ▲ Vernal pool fairy shrimp | |



**FIGURE 9-3
CNDDDB OCCURENCES
TEHAMA WEST WATERSHED ASSESSMENT**



Summary of mountain lion depredation incidents 1972-1999, California

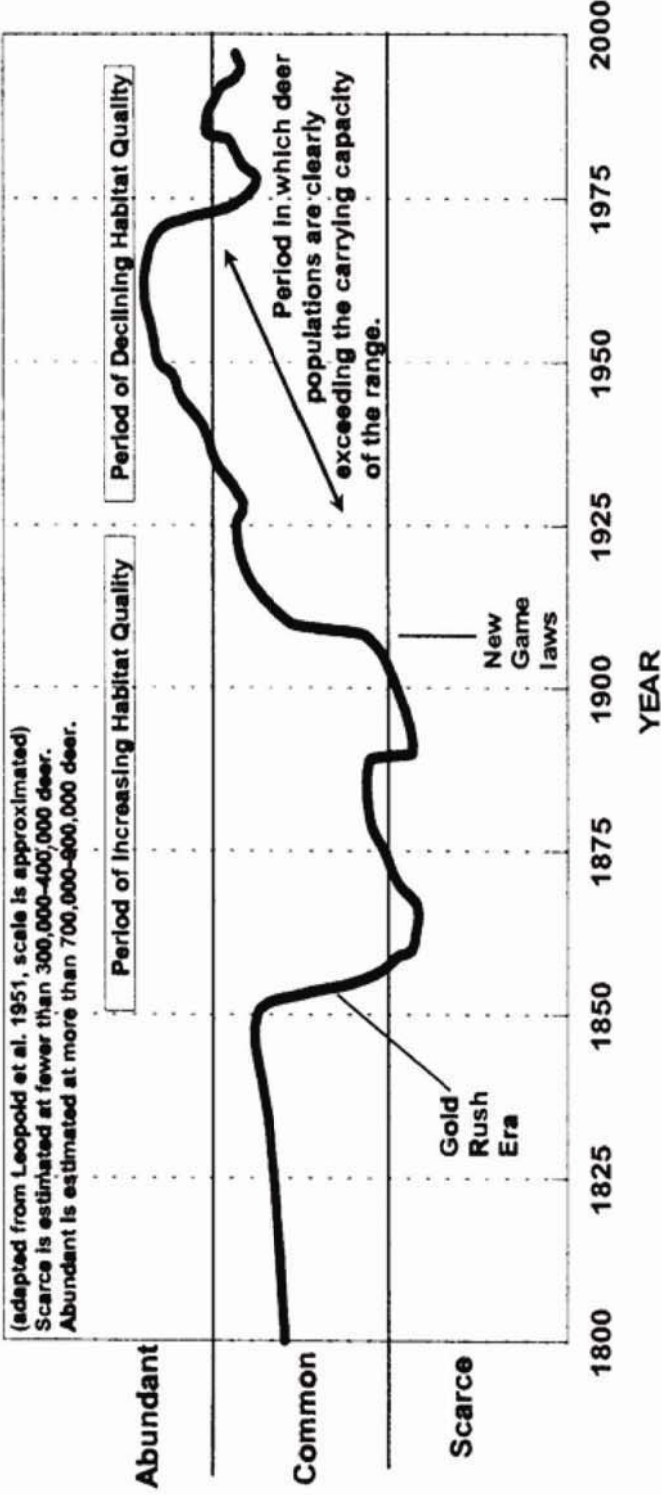


Graphic © Steve Torres

California observed a dramatic increase in conflicts between mountain lions and humans over the last 30 years of the 20th century.

FIGURE 9-4
SUMMARY OF MOUNTAIN LION DEPREDAATION
INCIDENTS: 1972 - 1999, CALIFORNIA
TEHAMA WEST WATERSHED ASSESSMENT

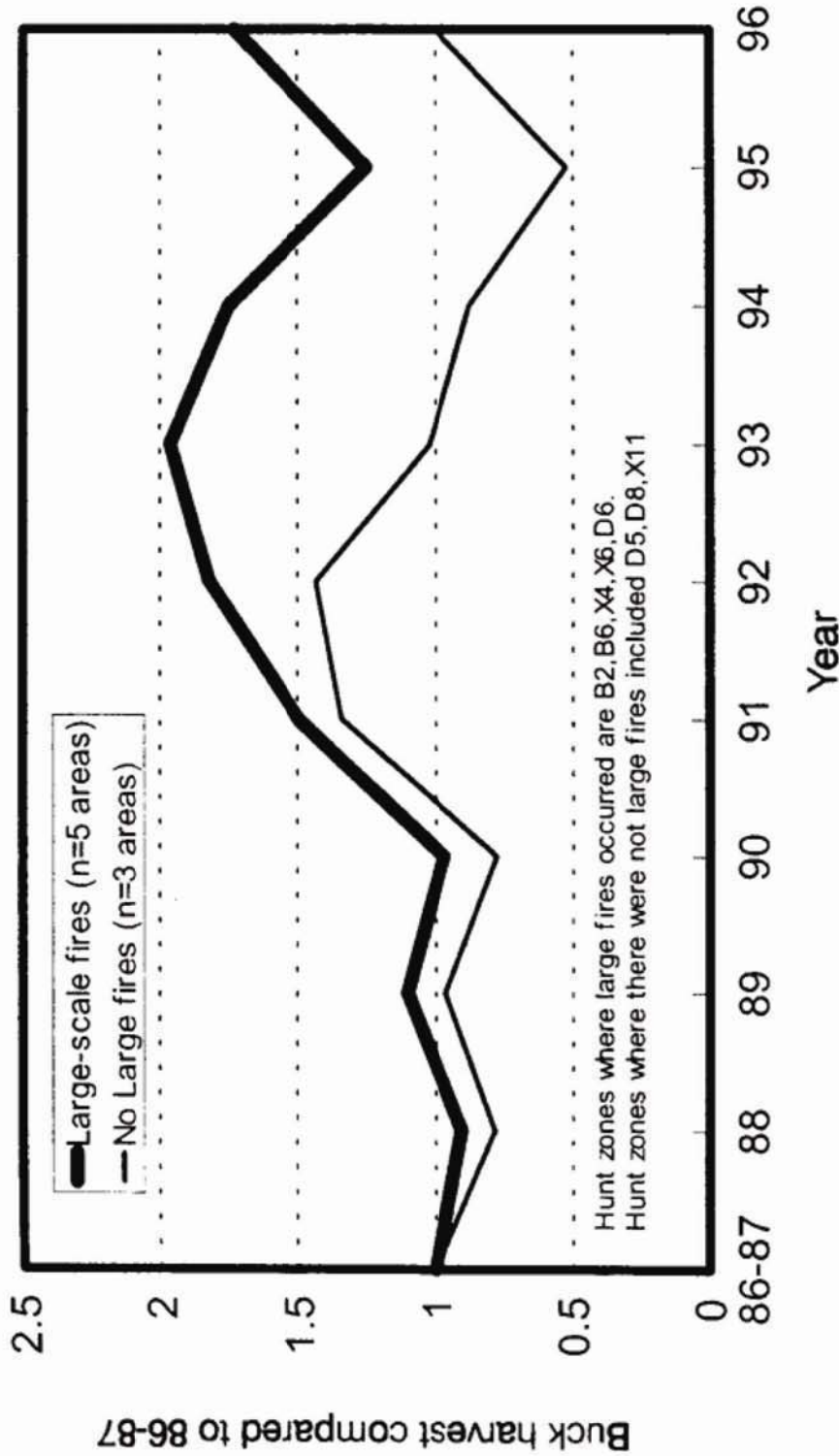
Generalized Representation of California Deer Numbers in Relation to Habitat Quality



Generalized deer population trends as they relate to key periods of increasing habitat quality due to disturbances (e.g., fire and logging) and decreasing habitat quality due to declining disturbance (fewer fires and more regulated logging). Opening of forests as a result of post World War II logging activities likely contributed to the final peak in deer numbers in the 1960s, but also signaled the start of the decline as those forests began to “close” again.

FIGURE 9-5
 GENERALIZED REPRESENTATION OF CALIFORNIA DEER
 NUMBERS IN RELATION TO HABITAT QUALITY
 TEHAMA WEST WATERSHED ASSESSMENT





Buck deer harvest in years following 1987 fire year on forested deer ranges. Numbers reflect proportional change in deer harvest compared to 1987 values in five areas with, and three areas without, large fires. These zones comprise portions of the DAUs. Fires were each greater than 30,000 acres in size.

FIGURE 9-6
DEER HARVEST YEARS
TEHAMA WEST WATERSHED ASSESSMENT

