Bald Eagle

(Haliaeetus leucocephalus)

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Legal Status
Federal: Delisted, Bald Eagle Protection Act.
State: Endangered, Fully Protected.

Global and State Conservation Status: G5S2: Global Rank, G5 = Secure: Common; widespread and abundant; State Rank, S2 = Imperiled: Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

Recovery Plan: The U.S. Fish and Wildlife Service prepared a Recovery Plan for the Pacific Bald Eagle (*Haliaeetus leucocephalus*) in 1986 (USFWS 1986).

Species Description and Life History

The bald eagle (*Haliaeetus leucocephalus*) is a large raptor with a total length of 71-96 cm (28-38 inches) and wingspan of 168-244 cm (66-96 inches) (Palmer *et al.* 1988) with distinctive white head and tail, dark brown body, and heavy yellow bill. Juveniles are completely dark brown, lacking white head and tail, and resemble the golden eagle (Buehler 2000). Females are approximately 25% larger than males but there are no distinguishing plumage characteristics for separating the sexes (Buehler 2000).

Seasonal Patterns

The bald eagle is a year round resident at some higher elevation areas of California, and a winter resident in numerous traditionally-used sites throughout much of the state. The breeding season extends from approximately February through July, peaking in March to June (Polite and Pratt 1999). Migration patterns in bald eagles are complex, with variations related to age (immature vs. adult), location of breeding site (north vs. south, interior vs. coastal), climate, and food availability (Buehler 2000). Bald eagles that breed in California may make only local winter movements in search of prey (Polite and Pratt 1999), spending the winter in the vicinity of their nesting areas. Bald eagles that nest in the northwestern United States migrate south to winter in California (Buehler 2000). Wintering areas are used traditionally as indicated by the data from the long-term California Mid-Winter Bald Eagle Survey. It also appears that there may be traditional movements between breeding areas and wintering areas. Eleven wintering bald eagles captured at Millerton Lake in Fresno County were all tracked during the late 1990s and early 2000s back to the same general area in Alberta, Canada (Linthicum *et al.* 2007).

Individuals migrating from the north arrive in fall or early winter and stay until February or March.

Reproduction

Bald eagles are capable of breeding in the fifth year of life when a definitive plumage is attained (Buehler 2000). Although breeding may occur at earlier ages, success is usually limited (Buehler 2000). Bald eagles are monogamous but pair formation is not well documented. Pairing is thought to occur on breeding grounds but may also occur on wintering grounds (Harmata 1984). Courtship may begin in September and consists of ritualized flights, including the pair locking talons and tumbling toward the ground (Cartwheel Display), pursuing one another (Chase Display), and diving from high altitudes toward the ground by folding wings (Roller Coaster Flight) (Stalmaster 1987). Nest building generally begins 1-3 months prior to egg-laying (Buehler 2000). Large nests are constructed by both males and females, although female may place the sticks (Buehler 2000). Sticks are collected from ground of the surrounding area or broken off of nearby trees (Buehler 2000). Anecdotal information suggests that fidelity to breeding sites in adults is high (Buehler 2000).

Bald eagles typically have one brood per season (Buehler 2000) with clutch size usually 2 but ranging from 1-3 (Polite and Pratt 1999). Incubation usually lasts 34-36 days (Polite and Pratt 1999) with semialtricial young hatching asynchronously (Ehrlich *et al.* 1988). Both sexes hunt and feed young (Buehler 2000) but males provide most of the food for the first 2 weeks while female tends to young in nest (Wallin 1982, Gerrard and Bortolotti 1988). For the first 2–3 weeks of the nestling period, females are present at the nest about 90% of time, and male is present about 50% of the time; at least 1 adult is at nest almost 100% of the time (Fraser 1981, Wallin 1982). Nest attendance declines sharply after 5–6 weeks and adults roost away from nest, usually in adjacent trees (Wallin 1982, Jenkins 1989). Young may fledge at 8-14 weeks (Buehler 2000).

Bald eagles are long-lived with the oldest wild eagle recorded at 28 years of age (Schempf 1997) and the oldest captive eagle reaching 36 years (Newton 1979). Studies of juvenile survival across the species' range are generally consistent with a California estimate of 77 percent (USFS 2008). Most estimates of adult survival are in the vicinity of 80 percent (Buehler 2000).

Home Range/Territory Size

Home range sizes vary greatly by location, according to breeding status of individual, season, food availability, and area (Buehler 2000). Home ranges in Oregon averaged 22 km^2 for both breeding and non-breeding pairs, with a range of 6 to 47 km^2 (2.3 to 18.1 mi^2) (Monte et al. 1993). Home ranges during the non-breeding season are typically much larger. Annual home ranges of non-breeding individuals covered 10,000 km^2 (3,861 mi^2) in the Chesapeake Bay region (Buehler *et al.* 1987). Immature home ranges during winter appear greater, >40,000 km^2 (15,444 mi^2) in Arizona (Grubb et al. 1994),

>21,000 km^2 (8108 mi^2) in Michigan, 310.7 km^2 (120 mi^2) in Colorado, and 401 km^2 (155 mi^2) in Arizona (Grubb *et al.* 1989). An adult in New Mexico was found to have a winter home range of 16 km^2 (6.2 mi^2) (Stahlecker and Smith 1993).

Bald eagles are territorial, especially during the breeding season, often perching in prominent areas, using threat vocalizations, and sometimes chasing intruders out of an area (Stalmaster 1987). Territories, like home ranges, vary widely based on nesting density, food supply, and method of measurement (Buehler 2000). Stalmaster (1987) suggested 1-2 km^2 (0.4-0.8 mi^2) as typical territory size. Breeding territories in Alaska (n = 14), varied from 11-45 ha (28-112 ac), and averaged 23 ha (57 ac) (Hensel and Troyer 1964). Average nest distance among 8 pairs in Oregon was 2 miles (3.2 km) (Johnsgard 1990). Minimum nest distance was 0.6 miles (1 km) in Alaska and 10 miles (17 km) in Washington (Polite and Pratt 1999).

Foraging Behavior and Diet

Bald Eagles hunt on the wing or from perches in tall trees or artificial perches. They are generalized and opportunistic scavengers and predators (Jurek 1988). The most common prey items on the west coast are fish, waterfowl, jackrabbits, and various types of carrion, such as fish, mammals, and waterbirds (USFWS 1986, Zeiner *et al.* 1990). Bald eagles feed individually as well as gregariously on abundant prey, such as spawning fish (Zeiner et al. 1990). They will hunt from perches (natural and man-made) and on the wing, wade in shallow water, and pounce on or chase injured or ice-bound water birds (Polite and Pratt 1999). They will occasionally pounce on displaced voles or other small mammals in flooded fields (Polite and Pratt 1999).

Predation

Eggs and nestlings are vulnerable to predation from a variety of birds and mammals, including magpie (*Pica pica*), crow and raven (*Corvus* spp.), raccoon (*Procyon lotor*), and black bear (*Ursus americanus*) (Chrest 1964, Hensel and Troyer 1964, Sprunt and Ligas 1964, McKelvey and Smith 1979, Nash et al. 1980). Few other non-human species have either the inclination or the capability to predate on immature or adult Bald Eagles unless they are compromised by starvation, disease, or other debilitating factors (Buehler 2000).

Habitat Requirements and Ecology

Breeding Season

Historically, bald eagles bred in a variety of habitats in California, including offshore islands; coastal cliffs and pinnacles; and along coastal rivers, interior valley streams and wetlands, and mountain lakes and rivers (Detrich 1985). Most eagle nesting territories are now found in mountainous habitat in ponderosa pine and mixed conifer forests (Lehman 1979, Detrich 1985, Jurek 1990). Bald Eagles require large bodies of water or free flowing rivers that support an abundance of fish, waterfowl, or other waterbird prey

(USFS 2008). In California, 87% of nest sites were within 1.6 km (1 mile) of water (Lehman 1979). Further, approximately 70% of breeding populations in California are associated with water bodies larger than 200 ha (494 acres) (Detrich 1985). Snags or other perches adjacent to water bodies are also required. Bald Eagles perch high in large, stoutly limbed trees, on snags or broken-topped trees, or on rocks near water (Polite and Pratt 1999).

Nests are constructed in a variety of large, old growth hardwoods and conifers, especially ponderosa pine (Polite and Pratt 1999). Trees that provide an unobstructed view of a water body and that are the dominant or co-dominant tree in the surrounding stand are typically favored (Lehman 1979). Bald eagles most frequently build nests in stands with less than 40% canopy cover, but usually some foliage shading the nest (Call 1978). Nests are constructed 16-61 m (50-200 feet) above the ground but usually below the tree crown (Polite and Pratt 1999). Anthony *et al.* (1982) and Lehman *et al.* (1980) reported that the mean diameter of nest trees was 104-117 cm (41-46 inches) at breast height in California and Oregon.

Bald eagles may compete for nest sites with other raptors such as corvids (crows and ravens) and osprey (*Pandion haliaetus*). Most interspecific interactions occur as a result of competition for food. Bald Eagles harass and are harassed by other raptors including golden eagles (Buehler 2000). They also steal food from osprey, and are chased and mobbed by blackbirds (*Icterid* spp.) (Buehler 2000). In a supplemental feeding study in Maine, mammalian scavengers (coyote, bobcat, and domestic dog) displaced bald eagles that were scavenging on carcasses (McCollugh *et al.* 1994).

Wintering Season

In California, bald eagle typically winter adjacent to nesting grounds (USFWS 1986). Eagles nesting in the northwest United States migrate south to winter in portions of California (Buehler 2000). Bald eagles winter along rivers, lakes, or reservoirs that support abundant fish or waterbird prey and that have large trees or snags for perch and roost sites (USFS 2008). This species roosts communally and roost sites typically possess different habitat components than daytime use areas, including day perch sites (USFS 2008). Night roosting often occurs within 0.8 kilometer (0.5 mile) of water on steep north- or northwest-facing slopes with green trees (USFS 2000). Night roosts are often in sites that are sheltered from the weather by landforms and in areas of coniferous stands that provide insulation from the weather (USFWS 1986). The species has been known to forage in rice fields and may occasionally use flooded pasturelands.

Species Distribution and Population Trends

Distribution

The bald eagle occurs throughout most of North America and breeds from the Aleutian Islands and Alaska in the north, east through Canada to Labrador, and south to Florida, Baja California, and other scattered locations in northern Mexico (USFWS 1999, Buehler

2000). In the contiguous United States, bald eagle breeding distribution is concentrated in the Cascade Range of Washington, Oregon, and northern California; the Rocky Mountains; the Great Lakes region; Maine; the Atlantic coast; Florida; the Gulf Coast in Louisiana and Texas; and central Arizona (Buehler 2000). The species' winter range includes the coastal portion of Alaska and Canada, southern Canada, and nearly the entire continental United States.

In California, bald eagles are permanent residents or winter migrants (Polite and Pratt 1999). The majority of breeding activity continues to occur in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties (Zeiner *et al.* 1990); however, since the 1980s, the breeding distribution has expanded to additional areas in northern and southern California. Breeding populations in California are resident year-long in most areas where the climate is relatively mild (Jurek 1988).

About half of the wintering population is in the Klamath Basin (Polite and Pratt 1999). Large numbers of wintering eagles also occur at Big Bear Lake, Cachuma Lake, Lake Mathews, Nacimiento Reservoir, San Antonio Reservoir, and along the Colorado River (Polite and Pratt 1999). More local wintering populations include Clear Lake, Lake Berryessa, and Folsom Lake. The California Mid-Winter Bald Eagle Survey documented 586 bald eagles in 2004 and 496 in 2005 at traditionally used wintering sites in California (www2.ucsc.edu/scpbrg/midwinter_survey.htm).

Population Trends

Since the bald eagle was listed throughout the lower 48 states, and particularly since the regional recovery plans were implemented in the 1980's, the species has dramatically increased in numbers and expanded its range (64 Federal Register 128), exceeding most recovery goals. Early declines were a result of the use of DDT and other organochlorine pesticides, habitat destruction, disturbances, shootings, and egg collection. By 1960, the southern California breeding population was extirpated, and by 1970, the species no longer bred in central California (Detrich 1985). Fewer than thirty nesting pairs of bald eagles occurred in California by late the 1960s and early 1970s, with all nest locations occurring in the northern third portion of the state (CDFG 2005).

With the reduction of threats, especially reduction in DDT, the population in the lower 48 states has increased from approximately 487 breeding pairs in 1963 to an estimated 9,789 breeding pairs in 2007 (72 Federal Register 130). In California, the number of breeding pairs increased from 29 in 1977 to 151 in 1999 (www.dfg.ca.gov/Bald-Eagle-Trends). Based on the best available scientific data, the USFWS determined that the species has recovered and the species was removed from the federal endangered species list in July 2007 (72 Federal Register 130).

Distribution and Population Trends in the Plan Area

Prior to 1990, there were no records of breeding bald eagles in Yolo County or elsewhere in the surrounding region. In 1990, an active nest was reported from the east side of Lake

Berryessa in Napa County approximately 3 miles west of the Yolo County line. Activity at this site, along with at least one other alternate nest site, has been intermittently documented since 1990 (CNDDB 2007). This pair eventually constructed a nest on Big Island, an island on Lake Berryessa, where it has been reported as active and successful as recently as 2003. In 2000, a second breeding pair constructed a nest in a foothill pine at the south end of Wilson Valley along Cache Creek approximately five miles northwest of the Yolo County line (Bureau of Land Management 2005, Mangan pers. comm.). In 2002, a third nesting pair constructed a nest in a ponderosa pine at Davis Creek Reservoir in the northwest corner of Yolo County. This nest remains extant and is the only known nest site in Yolo County (Mangan pers. comm.).

The most recently established bald eagle nest in the region is at Indian Valley Reservoir, approximately 10 miles northwest of the Yolo County line. Mangan (pers comm.) also reports that an additional 6 to 10 bald eagles are year round residents of the Cache Creek watershed each year. So, additional breeding sites either remain undetected or are expected to be established in the future.

The Cache Creek Watershed is also home to a relatively large wintering population of bald eagles. Numbering between 30 and 70 individuals, this wintering population has been monitored since the early 1980s. Most of these birds roost at Anderson Marsh on Clear Lake, but each day they fly down Cache Creek in search of food. Eagles are regularly found hunting and roosting along the downstream portion of Cache Creek (Capay Valley) in Yolo County during the winter months (Mangan pers comm.).

Bald eagles are also occasionally observed on the valley floor in the Plan Area during the winter, particularly in areas that support permanent and seasonal wetlands and open water habitat with abundant waterfowl prey such as the Yolo Bypass Wildlife Area (EDAW 2005).

Threats to the Species and Other Conservation Issues

The bald eagle was historically threatened by habitat loss, use of DDT and other organochlorine pesticides, and illegal shootings and egg collection. These threats have been reduced to a point where the species has recovered (72 Federal Register 130). However, the species are occasionally shot and DTT still causes egg failure for eagles occurring on Santa Catalina Island (Sharpe 2004). Currently, habitat loss continues to threaten bald eagles. Human development is the greatest cause of habitat loss affecting all life stages of the bald eagle: shoreline nesting, perching, roosting, foraging habitat, and dispersal (Buehler 2000). Human development may limit expansion of breeding populations in many areas and limit eagle carrying capacity at or below current population levels in some areas in the future (Fraser *et al.* 1996).

Bald eagles avoid human-developed areas for nesting (Fraser *et al.* 1985), roosting (Buehler et al. 1991a), and perching/foraging (Buehler et al. 1991b, Chandler *et al.* 1995). Additionally, human disturbance can cause abandonment of nest sites or relocation of nest sites (USFWS 1986). A recent study at Lake Almanor, northern

California, found that the eagle population increased despite increased human activity. Most new pairs of bald eagles there nested closer to sources of human disturbance (roads, developed area, isolated residences) than did pairs at older territories (i.e., <1 km), and yet were more successful and productive, indicating that the population is developing greater tolerance for human disturbance (Airola 2007). In Washington, the vast majority of wintering bald eagles tolerated human activities at a distance of 985 feet (300 meters), and only half tolerated activity at a distance of 492 feet (150 meters) (Stalmaster and Newman 1978, USFWS 1986). The most disturbing human activity appears to be boating; hiking and car traffic are also significant disturbances (USFWS 1986). Bald eagle responses to human disturbances vary from flushing to permanent displacement (Buehler *et al.* 1991b, McGarigal *et al.* 1991, Brown and Stevens 1997).

Because bald eagles in Yolo County are largely restricted to the higher elevation mountainous areas on the western side of the county, habitat-related threats are minimal. The most significant current threats to bald eagles in the Plan Area may be recreational activities. Although the bald eagle nesting population appears to be expanding in the region, increasing recreational use (e.g., hiking, kayaking, camping) in the Cache Creek watershed and surrounding area could increase levels of human disturbance and affect eagle nesting or nesting success.

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