

## Swainson's Hawk (*Buteo swainsoni*)

### Status

**State:** Threatened

**Federal:** None

### Population Trend

**Global:** Declining

**State:** Declining

**Within Inventory Area:** Unknown



### Data Characterization

The location database for the Swainson's hawk (*Buteo swainsoni*) within the inventory area includes 4 data records from the California Natural Diversity Database (CNDDDB) (2001), dated 1987 to 2000, and approximately 7 nest site locations within the last 4 years (Steve Glover pers. comm). Of these 11 records, 8 were documented within the last 10 years. All records are considered extant and mapped at high precision (nest may be accurately located within 80 meters).

A considerable amount of literature is available for the Swainson's hawk. Most of the literature pertains to habitat requirements, niche determination, competition with congeners, population trends, migration, and mortality from insecticide use on the wintering grounds.

### Range

This diurnal raptor is a complete migrant, highly mobile, and has a large home range. Swainson's hawks breed in desert, shrubsteppe, grassland, and agricultural habitats in areas throughout most of the western U.S. and Canada, and in northern Mexico (England et al. 1995). They are locally common to rare breeders in California. Historically, breeding populations probably occurred throughout the state of California, except in bioregions characterized by mountainous forested terrain (Bloom 1980). Breeding populations in California currently occur in 2 locations, the Great Basin and the Central Valley. The largest population of breeding Swainson's hawks in California is located in the middle of the Central Valley between Sacramento and Modesto, and in the northern San Joaquin Valley. Swainson's hawks arrive on the breeding grounds in late February and early March in the Central Valley and in mid-April in the Great Basin. In September, most Swainson's hawks migrate to the Pampas of southern South America. However, the Central Valley population winters in Central Mexico and to a lesser extent throughout Central and South America (Bradbury et al. in prep.).

## Occurrences within the ECCC HCP Inventory Area

Swainson's hawks have been documented nesting in the inventory area; however, they are not regular breeders there. The core breeding population occurs along the Central Valley floor, outside of the inventory area. In the inventory area, most pairs have been observed nesting in small clumps of eucalyptus trees (Glover, pers. comm. 2002). There are 4 CNDDDB (2001) records of Swainson's hawk nesting in the northeast section of the ECCC HCP/NCCP inventory area.

## Biology

### Habitat

In general, Swainson's hawks inhabit a wide variety of open habitats. In California's Central Valley, suitable habitat consists of 2 primary elements: suitable nest trees and proximity to high-quality foraging habitat. This species nests within riparian forest or in remnant riparian trees and forages in agricultural lands (such as fallow fields and alfalfa fields) (Estep 1989, Babcock 1995). Swainson's hawks also use clumps of eucalyptus trees, and a variety of large trees near old farm houses. Agricultural patterns and cover types influence suitability of foraging and home-range habitat. Overall, Swainson's hawk home range sizes are variable and apparently influenced by cropping patterns, including crop changes during the breeding season (Estep 1989). Habitat with the highest foraging value includes ruderal fields, fallow fields, grain crops, and safflower fields. In the Central Valley, extensive areas of unsuitable agricultural cover types may be the reason Swainson's hawks have large home-range sizes (mean 40.4 sq km) in this region (Babcock 1995).

### Breeding

In the Central Valley, nest trees commonly used by Swainson's hawk include Fremont cottonwood (*Populus fremontia*), willow (*Salix* spp.), sycamore (*Plantanus racemosa*), Valley Oak (*Quercus lobata*), and walnut (*Juglans* spp.). Occasionally planted trees, such as eucalyptus (*Eucalyptus* spp.), pine (*Pinus* spp.) and (*Sequoia sempervirens*), are also used for nesting. Most of the known nests occur in stringers of remnant riparian forest along drainages (England et al. 1997).

Density of Swainson's hawks within their breeding territories is influenced by land use and availability of nest trees (Estep 1989). Nest trees may be isolated or in a riparian forest (England et al. 1997). Breeding habitat suitability is also dependent on surrounding landscape and abundance of prey. Nest placement tends to be in the upper canopy and semi-exposed, which may provide birds with a panoramic view of the territory. Tree and nest heights are higher in the Central Valley compared to nest trees in the western United States (Estep 1989).

### Foraging

Historically, the Swainson's hawk probably foraged in upland and seasonally flooded perennial grasslands (Woodbridge 1998). Currently, Swainson's hawks forage in low-growing crops and are more abundant in areas of moderate cultivation than in either grassland areas or areas of extensive cultivation (Schmutz 1987). When ranking various habitats used by Swainson's hawks in the Central Valley, Estep (1989) found that perennial grassland and alfalfa fields ranked highest for foraging habitat suitability.

Central Valley Swainson's hawks prey on small mammals, birds, toads, crayfish, and insects. California voles (*Microtus* spp.), pocket gophers (*Thomomys bottae*), and deer mice (*Peromyscus maniculatus*) account for the majority of the mammalian prey species during the breeding season. Immediately after the breeding season and prior to migration, the majority of the diet consists of grasshoppers and crickets (Estep 1989). There is no data on diet for wintering Swainson's hawks (for the Central Valley population), but diet composition is probably made up of insects and to a lesser degree small mammals (Bradbury et al. in prep.).

### Reproductive Capacity

During the breeding season, Swainson's hawks form monogamous pairs and will defend territories against conspecifics (Estep 1989). A clutch size is typically 1 to 4 eggs (Fitzner 1980, England et al. 1997). In general, Central Valley Swainson's hawks will have a single clutch, which will be completed by mid-April (Estep 1989). Rarely does this species attempt to renest if first nest attempt fails. The female does the majority of incubating, and the incubation period lasts 34 to 35 days (Fitzner 1980). In addition, the female does most of the brooding and shading of nestlings, while the male feeds the young for their first 2 to 3 weeks (England et al. 1997). Young fledge at approximately 38 to 46 days (England et al. 1997). The Central Valley population exhibits low reproductive success compared to populations in other areas. This is probably due to the complete alteration of native foraging habitat into cultivated fields and urban development (Estep 1989).

Breeding density is influenced by availability of nest trees and land use. High densities of breeding birds are associated with alfalfa fields, while low densities are associated with irrigated pasture and weedy fields (Woodbridge 1991). A mean breeding density of 30.23 pair/100 sq km was recorded in the Central Valley (Estep 1989).

### Demography

There is little information on survival rates or longevity in this species (England et al. 1997). In Washington State, Swainson's hawks are thought to be long-lived (15–20 years) (Fitzner 1980). Mortality in

nestlings is primarily due to starvation and predation from nest predators (England et al. 1997). Adult mortality results from human-caused sources, such as collisions with vehicles, gunshot, and pesticide application used to control grasshopper outbreaks (especially in South America) (England et al. 1997).

## Dispersal

Juveniles remain with adults for 2 to 4 weeks after fledging, at which point they depart parental territories and form groups in areas where food is abundant. Adults also congregate at this time (in August) and forage on insects in fields (Fitzner 1980, Estep 1989). Juveniles and adults leave the breeding ground in September (Bradbury et al. in prep.).

## Behavior

Swainson's hawks build nests out of sticks, plant parts, and other weeds. Woodbridge (1998) found that some nests appeared flimsy and might not last the winter. Courtship displays occur near the nest site. They involve circling and steep dives (England et al. 1997).

During the breeding season, Swainson's hawks travel up to 29 km in search of prey (Estep 1989, Woodbridge 1991). This species spends large amounts of time foraging while soaring over open habitats. Foraging behavior in the Central Valley is associated with cultivation activities that expose prey (e.g. flood irrigation, burning, and disking). Large flocks of non-breeding individuals will forage and roost communally during the breeding season, eating a variety of prey that ranges from bats to flying insects (England et al. 1997, Woodbridge 1998).

Home-range size is dependent on proximity to foraging sites and the distribution of high-quality foraging habitat. The home-range size for pairs nesting in the Central Valley ranged from 336 to 8,718 hectares (Estep 1989) in one study, and from 724 to 7,659 hectares (Babcock 1995) in another study. The smallest home ranges were observed in areas where nest sites in riparian forest habitat were close to alfalfa or similar, recently harvested row crops (Estep 1989).

## Ecological Relationships

There is no information on predation of adults (England et al. 1997). Researchers have observed egg and nestling predation by American crows (*Corvus brachynchos*), great horned owls (*Bubo virginianus*), and golden eagles (*Aquila chrysaetos*).

## Threats

Loss of high-quality foraging habitat is probably the most significant threat to the species' population within the inventory area. Loss of nesting habitat (remnant riparian) may be a threat to this species statewide. In addition, nest sites on private lands are vulnerable to changes in development and agricultural practices.

Swainson's hawks show a strong association with riparian forests. Protection and restoration of these habitats may therefore be important to the recovery of the species. As mentioned above, presence of suitable nest trees combined with proximity to high-quality foraging habitat is necessary for the reproduction of this species.

Current DFG guidelines for mitigation of loss of foraging habitat are not sufficient because the guidelines allow for losses of foraging habitat throughout the remainder of the region (Estep pers. comm.). The guidelines do not consider cumulative effects of agricultural intensification and conversion of crops that provide high-quality foraging habitat to crops that provide low-quality foraging habitat (e.g. alfalfa to vineyards).

## Conservation and Management

The majority of the state's breeding sites are located in 2 disjunct populations: 1 in the Great Basin in the northeast corner of the state, and the other in the Central Valley. The largest population of this species is located within the inventory area between Sacramento and Modesto. Estep (pers comm.) estimates that this population includes approximately 900 breeding pairs.

## Modeled Species Distribution

### Model Description

#### Assumptions

1. Potential breeding habitat included all riparian woodland scrub and non-native woodland land cover types within the inventory area in or east of Marsh Creek and below 200 feet in elevation.
2. All cropland and pasture, within 10 miles of existing breeding sites or potential breeding habitat were considered potential Swainson's hawk foraging habitat.

3. Annual grassland, alkali grassland, and seasonal wetland land-cover types below 200 feet in elevation are also considered potential foraging habitat.

### Rationale

**Breeding Habitat:** In California, Swainson's hawks typically nest at the edge of narrow bands of riparian vegetation, in isolated oak woodland and in lone trees, roadside trees, or farmyard trees, as well as in adjacent urban residential areas (Estep 1989; England et al. 1995, 1997). There are no breeding records of Swainson's hawk west of Marsh Creek despite the occurrence of high-quality riparian habitat (e.g., Kirker Creek). The western extent of the breeding range of this species was considered to be Marsh Creek (Estep, pers. comm.; Sterling, pers. comm.).

**Foraging Habitat:** Historically, Swainson's hawks are believed to have foraged in upland and seasonally flooded perennial grasslands (Woodbridge 1998). In the Central Valley, Swainson's hawks now forage primarily in low-growing crop areas and perennial grasslands (Estep 1989, pers. comm. 2002). Preferred foraging habitats include alfalfa, fallow fields, beet, tomato, and other low-growing row or field crops, dry-land and irrigated pasture, rice land during the non-flooded period, and cereal grain crops (Estep 1989). Individual birds or nesting pairs may use over 15,000 acres of habitat or range up to 18 miles from the nest in search of prey (Estep 1989, Babcock 1993). The California Department of Fish and Game considers a 10-mile flight distance between active nest sites and suitable foraging habitats as a standard for direct impact analysis. This distance was used to identify all potential foraging Swainson's hawk foraging habitat within the ECCC HCP/NCCP inventory area. Swainson's hawks in the inventory do not forage above approximately 200 feet in elevation or west of Marsh Creek (Glover, pers. comm.; Sterling, pers. comm.; Estep, pers. comm.), so a filter was used in this model to exclude these areas.

## Results

Figure 2 shows the modeled potential habitat of the Swainson's hawk within the ECCC HCP/NCCP inventory area. Potential breeding habitat is restricted to riparian areas along lower Marsh Creek (above and below the Marsh Creek Reservoir) and isolated stands of non-native woodland. Potential foraging habitat includes extensive areas of row-crop and pasture land cover within the inventory area. All of these areas are within the 10-mile foraging range of the species from potential nesting habitat. Only one occurrence record was available for this species within the inventory area digitally. This record was located within potential breeding habitat identified by the model. Ten records identified in the Contra Costa Breeding Bird Atlas (Glover 2001) all fall within the modeled foraging habitat in the northeast corner of the inventory area.

Numerous other sites within agricultural and urban areas may also provide suitable breeding habitat for this species in the form of small woodlands and isolated trees. However, these areas could not be identified in this model because these small-scale features were not mapped.

## Literature Cited

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## **Personal Communications**

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