Alameda Whipsnake (*Masticophis lateralis euryxanthus*)


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Status

State: None
Federal: Threatened
Critical Habitat: Designated in 2000 (USFWS 2000), but rescinded in 2003

Population Trend

Global: Unknown
State: Unknown
Within Inventory Area: Unknown

Data Characterization

There are 19 California Natural Diversity Database (CNDDB) records within the inventory area. The precision of these records ranges from an 80-meter circle to a 1-mile-radius circle (Darlene McGriff pers comm.). Of these 19 records, only 5 were recorded within the last 10 years, and the remaining 14 were documented as early as 1980. All of these CNDDB records are considered extant.

The USFWS published a draft recovery plan for the Alameda whipsnake in November 2002. The USFWS designated critical habitat for this species in March 2000 (65 FR 12155). The critical habitat designation was challenged in court and withdrawn as a result in May 2003.

Range

The Alameda whipsnake is a subspecies of the California whipsnake (*Masticophis lateralis*). The North American distribution for the California whipsnake includes Northern California west of the Sierran Crest and desert to central Baja California. This species is absent from the floor of the Central Valley, and its California distribution parallels that of chaparral habitat (Stebbins 1985). The Alameda whipsnake's range is restricted to the inner Coast Range in western and central Contra Costa and Alameda Counties (U.S. Fish and Wildlife Service 2000). The historical range of the Alameda whipsnake has been fragmented into 5 disjunct populations (U.S. Fish and Wildlife Service 1997): Tilden–Briones, Oakland–Las Trampas, Hayward–Pleasanton Ridge, Sunol–Cedar Mountain, and the Mount Diablo–Black Hills (U.S. Fish and Wildlife Service 1997).

Occurrences within the ECCC HCP/NCCP Inventory Area

Of the 48 CNDDB (2001) records for the Alameda whipsnake in the state, 19 records occur within the ECCC HCP/NCCP inventory area. A large portion of the Mount Diablo–Black Hills population of the Alameda whipsnake occurs within the ECCC HCP/NCCP inventory area.

Biology

Habitat

The Alameda whipsnake occurs primarily in coastal scrub and chaparral communities, but also forages in a variety of other communities in the inner Coast Range, including grasslands and open woodlands (Swaim 1994). Rock outcrops with deep crevices or abundant rodent burrows are important habitat components for overnight dens, refuges from predators and excessive heat, and foraging (Swaim 1994). According to USFWS (2000), suitable habitat for this species includes communities that support mixed chaparral, coastal scrub, and annual grassland and oak woodlands that are adjacent to scrub habitats. Grassland areas that are linked to scrub by rock outcrops or river corridors are also considered primary constituent elements (U.S. Fish and Wildlife Service 2000).

The Alameda whipsnake requires open and partially open, low-growing shrub communities for many of its biological needs. This habitat provides cover for snakes during dispersal, cover from predators, and a variety of microhabitats where whipsnakes can move to regulate their body temperature (Swaim 1994). Whipsnakes exhibit a high degree of stability and a high mean activity in body temperature (33.4 degrees centigrade). Whipsnake habitat must consist of a mix of sunny and shadey sites in order to provide a range of temperatures for the snake's activities (Swaim 1994, U.S. Fish and Wildlife Service 2000). A sparse shrub canopy is ideal because it also provides a visual barrier from avian predators (Swaim 1994).

Other important habitat features include small mammal burrows, rock outcrops, talus, and other forms of shelter that provide snakes with alternative habitats for temperature regulation, protection from predators, egg-laying sites, and winter hibernaculum (winter residence where the snakes hibernate). Alameda whipsnakes spend November through March in a winter hibernaculum (U.S. Fish and Wildlife Service 2000).

Home-range size for male snakes in Alameda and Contra Costa counties (Tilden Park and Moller Ranch) varies in size from 1.9 to 8.7 hectares (ha) (mean = 5.5 ha). Home-range size for female snakes was 3.9 and 2.9 hectares (Swaim 1994). When movements of individual snakes were monitored (2 males and 1 female) in these areas, results indicated that most of the home range was not used. Both male and female snakes repeatedly returned to core retreat areas within their home range after intervals of non-use. These snakes did exhibit overlap in use of

these relatively large home ranges, and there was no evidence of territorial behavior in this species (Swaim 1994).

Breeding Habitat Requirements

Mating occurs from late March through mid-June (U.S. Fish and Wildlife Service 2000). Whipsnakes lay a clutch of 6 to 11 eggs (Stebbins 1985), probably in loose soil or under logs or rocks (Zeiner et al. 1988). According to Swaim (1994), female Alameda whipsnakes will use grassland habitat for egg laying. Little else is known about habitat requirements for breeding and egg laying (Zeiner et al. 1988). Swaim (1994) documented that courtship and mating occur near the female's hibernaculum. During the breeding season, male snakes exhibit more movement throughout their home range, while female snakes remain sedentary from March until egg laying (Swaim 1994).

Foraging Requirements

In general, whipsnakes prey on a variety of vertebrate species, including frogs, lizards, nestling birds, and rodents (Zeiner et al. 1988). Studies indicate that the Alameda whipsnake prefers lizard prey and may be an example of a feeding specialist. Occupied areas usually support a prey base of at least 2 lizard species, especially the western fence lizard (*Sceloporus occidentalis*) (Stebbins 1985), and whipsnake populations thrive when lizards are abundant (McGinnis 1992 in USFWS 2002).

Rock outcrops are particularly important foraging habitat for the Alameda whipsnake because they support many of the species' prey (U.S. Fish and Wildlife Service 2000). Additionally, the Alameda whipsnake has been observed foraging in grassland habitats adjacent to native Diablan sage scrub habitats (Swaim 1994).

Demography

There have been no studies of the demography or longevity of Alameda whipsnakes.

Dispersal

The Alameda whipsnake is non-migratory. There is little information on site fidelity and patterns of dispersal in this species; however, Swaim (1994) observed evidence of individual snakes using the same home range in successive years.

Behavior

The Alameda whipsnake is a fast moving, diurnal predator that forages actively on the surface (Zeiner et al. 1988). Alameda whipsnakes have 2 seasonal peaks in activity, 1 during the spring mating season and the other during late summer/early fall. During the first peak in activity males will move throughout

their home range, while females remain close to their hibernaculum. Male movement appears to be associated with foraging and searching for mates. Females exhibit a peak in activity only for a few days during the spring when they move to an area outside their normal range, presumably to find egg-laying sites (Swaim 1994). After reproductive activities are completed, male and female movements resume similar patterns. In mid-June, both males and females exhibit decreased activity levels, though evidently this species does not estivate during the summer months (Swaim 1994). The second peak in seasonal activity occurs in late summer/fall. During this time, Swaim (1994) recorded activity in both hatchling and adult snakes, possibly in response to an increase in the availability of prey (hatchling lizards).

Ecological Relationships

Diurnal predators, especially raptors, prey on adult Alameda whipsnakes. Nocturnal mammals likely prey on Alameda whipsnake eggs (Zeiner et al. 1988). Basking in open terrain may expose snakes to predators such as red-tailed hawks (Fitch 1949 in Swaim 1994).

Threats

Alameda whipsnake populations have declined from loss of habitat resulting from urban expansion (U.S. Fish and Wildlife Service 2000). Urban development, particularly road and highway construction, has also fragmented Alameda whipsnake populations and made them more vulnerable to extinction (U.S. Fish and Wildlife Service 1997). Urban development adjacent to whipsnake habitat increases the likelihood of predation from feral cats and injury or death from public recreational use. Other significant threats to this species' recovery include inappropriate grazing practices and alteration of habitat through fire suppression (U.S. Fish and Wildlife Service 1997).

Fire suppression alters suitable Alameda whipsnake habitat in 2 important ways. First, fire suppression increases the chances of large catastrophic fires occurring in areas where vegetation has become overgrown. A buildup of flammable fuel loads in Alameda whipsnake habitat can lead to high intensity fire events that may be detrimental to this species. Second, fire suppression leads to a closed scrub canopy which tends to reduce the diversity of microhabitats that whipsnakes require(Swaim 1994).

Conservation and Management

The USFWS lists the Mount Diablo–Black Hills population of the Alameda whipsnake as having a high potential for recovery if threats from urban development, catastrophic wildfire, and grazing practices can be managed well (U.S. Fish and Wildlife Service 2000). As of August 2003, there had been no approved HCPs that cover the Alameda whipsnake or its habitat . At least three HCPs that cover the species are in development:

- Alameda Watershed HCP (San Francisco Public Utilities Commission);
- Mount Diablo State Park HCP (California Department of Parks and Recreation); and
- East Bay Watershed Lands HCP (East Bay Municipal Utilities District).

According to the recovery plan, recovery of Alameda whipsnake populations will require a combination of long-term research/management and immediate management actions. Incompatible land uses include fire suppression, off-road vehicle use, grazing practices, unauthorized collecting and mining.

Federal Critical Habitat

A final rule on critical habitat for Alameda whipsnake was issued in October 2000 by USFWS (USFWS 2000). This critical habitat designation included a significant portion of the HCP/NCCP inventory area. However, in May 2003, during preparation of the HCP/NCCP, Judge Anthony Ishii of the U.S. District Court for the Eastern District of California invalidated the critical habitat designation in response to a lawsuit filed by the Homebuilders Association of Northern California. The Alameda whipsnake critical habitat designation was remanded to USFWS for further consideration, including more detailed scientific and economic analyses. It is unknown if and when critical habitat for Alameda whipsnake will be reissued by USFWS.

Modeled Species Distribution in HCP Study Area

Model Description

Model Assumptions

All chaparral and scrub land cover within the inventory area was considered core habitat for Alameda whipsnake. In addition, a perimeter zone of all adjacent grassland, oak savanna and oak woodland within 500 feet of the scrub areas was also considered core habitat for this species. Core habitat for Alameda whipsnake is defined as home range areas in which individuals find shelter, breed, hibernate, and spend the majority of their time foraging.

All areas of annual grassland, oak woodland, oak savannah, riparian woodland/scrub and stream channels within a 1-mile radius of core Alameda whipsnake habitat were considered suitable movement habitat for this species.

Rationale

Core Habitat: Direct observations of Alameda whipsnakes and radio telemetry data on their movement patterns have shown that individuals tend to establish home ranges primarily within coastal scrub habitat, but also frequently move into adjacent grassland, oak savanna and occasionally oak woodland (Jennings 1983, Stebbins 1985, Swaim 1994). Most telemetry locations are within 170 feet of scrub habitat, but individuals have been tracked out to 500 feet (Swaim 1994). Whipsnakes can remain in grasslands for periods ranging from a few hours to

several weeks. Male whipsnakes use grasslands primarily during the mating season in spring; females use these areas mostly after mating, possibly in their search for suitable egg-laying sites (Swaim 1994). Rock outcrops are also important habitat to whipsnakes in providing sites for efficient thermoregulation, shelter retreats, and foraging. Within the core areas, Alameda whipsnakes most commonly occur on east, south, southeast and southwest facing slopes (Swaim 1994), but may also use north facing slopes in more open stands of scrub habitat (McGinnis 1990, Swaim, pers. comm. in USFWS 2000).

Movement habitat and corridors: Adult male whipsnakes commonly move long distances away from their core areas during the breeding season (Swaim 2000). Also juveniles and hatchlings disperse annually away from their natal core areas in search of new habitats. A recent review of Alameda whipsnake locality data revealed that numerous Alameda whipsnakes have been observed at distances significantly greater than 500 feet from scrub habitat (Swaim 2000). These distances range from 0.1 mile to 4 miles. The 4 mile records appears to be anomalous; the next longest distance being 1.5 miles and all other records (9) were less than 1mile (mean for the 10 values = 0.46 miles).

Because the data on these whipsnake movements is limited (Swaim 2000), for the purposes of this model we used a conservative estimate of 1.0 mile to define the potential dispersal/movement distance of whipsnakes away from core coastal scrub habitat. Within this radius, however, it is unknown what pathways the snakes may take. Rock outcrops probably facilitate these long distance movements in these areas, but are apparently not essential (Swaim 1994, 2000). Individual whipsnakes have been located over 3,000 feet from scrub in areas where no significant rock outcrops were present between the closet patch of scrub and the location where the snake was found. Stream channels also are probably used as movement corridors between core areas (Swaim 2000). For these reasons we included all grassland and oak savanna areas within a 1-mile radius of all coastal scrub area in the inventory area as suitable Alameda whipsnake movement habitat. Furthermore, we considered all stream channels in and networked with channels within this 1-mile radius as potential dispersal/movement corridors for this species.

Model Results

Figure 2 shows the modeled potential habitat of the Alameda whipsnake within the HCP/NCCP inventory area. The habitat includes the eastern slopes of Mt. Diablo and much of the surrounding foothills in the western and southwestern portions of the inventory area. The documented occurrences of Alameda whipsnakes in this area correspond well to locations within core areas or in adjacent movement habitat and corridors. Two recently documented occurrences are located in grassland habitat north and northeast of Los Vaqueros Reservoir approximately 4 miles from the nearest potential chaparral/scrub habitat. We closely examined the aerial photos at these locations and found no visible features (e.g., small patch of scrub, small rock outcrop, etc.) that might explain the occurrences. The California Department of Fish and Game (CDFG) has funded a trapping study of whipsnakes at those locations to verify them and to

develop a better understanding of whipsnake habitat away from chaparral and coastal sage scrub stands. CDFG staff agreed that the model could not be refined any more based on our current understanding of suitable habitat for this species and the data available (C. Wilcox, pers. comm.).

A small area southeast of Mt. Diablo is not shown as suitable habitat for the Alameda whipsnake. This area is likely suitable movement habitat because of the proximity (less than 1 mile) of chaparral and scrub habitat outside the inventory that was not mapped.

The minimum home range size of adult male Alameda whipsnakes in coastal scrub habitat is approximately 5 acres. Habitat patches of this size within the inventory area could not be mapped due to the 10-acre minimum resolution of the model. Rock outcrop areas, which are important to the Alameda whipsnake within core areas and movement corridors, were not mapped if they were less than one acre in size. If small patches of these habitat occurred to the east of mapped suitable habitat, the dispersal range of this species would extend farther into the urban limit line. A close examination of the aerial photos found no such small patches within the grassland in or near the urban limit line that would extend the model to the north or east. The model provides reasonable and conservative estimates for both core habitat and movement corridors/dispersal habitat.

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