

Giant Garter Snake (*Thamnopsis gigas*)

Status

State: Threatened

Federal: Threatened

Population Trend

Global: Declining

State: Declining

Within Inventory Area: Unknown



Data Characterization

The location database for the giant garter snake (*Thamnopsis gigas*) within its known range in California includes 142 data records from 1908 to 2000. Of these, 30 were documented within the past 10 years, 12 of which are of high precision and may be accurately located. Two of these records are located outside but near the ECCC HCP/NCCP inventory area. This database includes records of individual sightings and locations of occupied, vacant, and natal dens.

A moderate amount of literature is available for the giant garter snake because of its threatened status. Most of the literature pertains to habitat requirements, distribution, population demographics, threats, and management activities. A recovery plan for the giant garter snake has been published (U.S. Fish and Wildlife Service 1999).

Range

The giant garter snake is endemic to the valley floor of the Sacramento and San Joaquin Valleys of California. Records coincide with the historical distribution of large flood basins, freshwater marshes, and tributary streams of the Central Valley of California (Hansen and Brode 1980). The historic distribution of the giant garter snake extended from Sacramento and Contra Costa Counties southward to Buena Vista Lake near Bakersfield in Kern County. Some experts consider Contra Costa County outside the current range of giant garter snake; however the lack of records from the County may be due to a lack of survey effort (Hansen pers. comm.) (see below).

Occurrences within the ECCC HCP/NCCP Inventory Area

One historic record of giant garter snake was documented within the ECCC HCP/NCCP inventory area near Antioch (Hansen pers. comm.). Although this species may have occurred in the inventory area historically, it may have been extirpated there due to predation by sport fish (e.g., striped bass, black bass).

Areas in the inventory area west of Marsh Creek are not considered within the range of giant garter snake (Hansen pers. comm.).

Suitable habitat occurs in the slough areas and drainage network associated with agricultural fields in the northeast section of the County (U.S. Fish and Wildlife Service 1999). The lack of records from this area may be due to a lack of survey effort. For example, recent studies of giant garter snake distribution and genetics have not focused on Contra Costa County (Hansen pers. comm.).

Biology

Habitat

The giant garter snake inhabits agricultural wetlands and associated waterways, including irrigation and drainage canals, rice fields, marshes, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands (U.S. Fish and Wildlife Service 1999). Important features of these habitats include: 1) sufficient water during the snake's active season (early spring through mid-fall) to maintain an adequate prey base; 2) emergent vegetation, such as cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.), for escape cover and foraging habitat; 3) upland habitat with grassy banks and openings to waterside vegetation for basking; and 4) higher elevation upland areas for cover and refuge from flood waters during the snake's inactive season (Hansen 1980, 1988, Brode and Hansen 1992, Hansen and Brode 1993). Giant garter snakes are absent from the larger rivers; wetlands with sand, gravel, or rock substrates; and riparian areas lacking suitable basking sites or suitable prey populations (Hansen 1980, Rossman and Stewart 1987, Brode 1988, Hansen 1988, U.S. Fish and Wildlife Service 1999).

Foraging Requirements

Giant garter snakes feed primarily on fish and amphibians and take advantage of pools that trap and concentrate prey (Brode 1988, R. Hansen 1980, G. Hansen 1988, Hansen and Brode 1993). Prey species include bullfrogs (*Rana catesteiana*), Pacific chorus frogs (*Pseudacris regilla*), carp (*Cyprinus carpio*), mosquito fish (*Gambusia affinis*), and blackfish (*Othodox microlepidotus*) (Fitch 1941, Fox 1952, Cunningham 1959, R. Hansen 1980, Brode 1988, Hansen and Brode 1993, Rossman et al. 1996).

Reproduction

The breeding season for the giant garter snake extends from March through May and resumes briefly during September (G. Hansen pers. comm. in U.S. Fish and Wildlife Service 1999). Males begin searching for females immediately after emergence from overwintering sites. Females brood young internally and typically give birth to 10 to 46 young (mean = 23) from late July through early September (Hansen and Hansen 1990). The young immediately disperse to

dense cover where they absorb their yolk sac, then start feeding independently. The young will typically have doubled in size by 1 year of age (G. Hansen pers. comm. in U.S. Fish and Wildlife Service 1999), and sexual maturity usually takes 3 years in males and 5 years in females.

Demography

No studies of the longevity of giant garter snakes have been conducted.

Behavior

Giant garter snakes are most active from early spring through mid-fall; activity being dependent on local weather conditions (Brode 1990, Hansen and Brode 1993). During the winter, giant garter snakes are generally inactive, although some individuals may bask or move short distances on warmer days (U.S. Fish and Wildlife Service 1999). During the active season, giant garter snakes generally remain in close proximity to wetland habitats but can move over 800 feet from the water (G. Hansen 1988, Wylie et al. 1997) during the day. Some individuals may move up to 5 miles over a period of several days, if the conditions of their habitat become unsuitable (Wylie et al. 1997).

Ecological Relationships

Giant garter snakes prey on a variety of fish and amphibians available within their habitat and are in turn prey for raccoons (*Procyon lotor*), striped skinks (*Mephitis mephitis*), opossum (*Didelphis virginiana*), red foxes (*Vulpes vulpes*), gray foxes (*Urocyon cinereoargenteus*), hawks (*Buteo* spp.), northern harriers (*Circus cyaneus*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), American bittern (*Botaurus lentiginosus*), and great blue herons (*Ardea herodias*). Giant garter snakes may coexist with 2 other species of garter snake: the valley garter snake (*T. sirtalis fitichi*) and the western terrestrial garter snake (*T. elegans*) (R. Hansen 1980, G. Hansen 1986). This coexistence may be possible because of differences in foraging behavior (U.S. Fish and Wildlife Service 1999).

Threats

Habitat loss, degradation, and fragmentation are the primary threats to giant garter snake population viability (U.S. Fish and Wildlife Service 1999). Conversion of wetlands for agricultural, urban, and industrial development has resulted in the loss of over 90% of suitable habitat for this species in the Central Valley. Degradation of habitat—including maintenance of flood control and agricultural waterways, weed abatement, rodent control, discharge of contaminants into wetlands and waterways, and overgrazing in wetland or streamside habitats—may also cumulatively threaten the survival of some giant

garter snake populations (Brode and Hansen 1992, California Department of Fish and Game 1992, G. Hansen 1988, Hansen and Brode 1993).

Introduction of non-native predators, including the bullfrog, largemouth bass (*Micropterus salmoides*) and catfish (*Ictalurus* spp.), has been responsible for eliminating many species of native fishes and aquatic vertebrates in the western United States (Minkley 1973, Moyle 1976, Holland 1992). Exotic species probably had detrimental effects on the giant garter snake through direct predation (sensu Bury and Whelan 1984, Treanor 1993) and competition for smaller forage fish (California Department of Fish and Game 1992, G. Hansen 1986, Schwalbe and Rosen 1989).

Toxic contamination, particularly from selenium, and impaired water quality have also been identified as threats to some populations of the giant garter snake (Ohlendorf et al. 1988, Saiki and Lowe 1987, U.S. Fish and Wildlife Service 1993). Preliminary studies have documented potential bioaccumulative effects of agriculturally derived contaminants on giant garter snakes or their prey species (see Saiki et al. 1992, 1993). Disease and parasitism, (potentially related to reduced immune response ability from contaminants), may also pose a threat to this species (U.S. Fish and Wildlife Service 1999).

Conservation and Management

The giant garter snake was listed as threatened in California in 1971 and federally in 1993. Subsequent conservation actions have included the establishment of guidelines and mechanisms to minimize and mitigate take (U.S. Fish and Wildlife Service 1999), habitat and population surveys (G. Hansen 1982, 1986, 1996, Hansen and Brode 1980), and development of management plans for public lands and land acquisitions (U.S. Fish and Wildlife Service 1999). A draft recovery plan for the giant garter snake was completed in 1999 (U.S. Fish and Wildlife Service 1999).

Modeled Species Distribution

Model Description

Assumptions

1. The slough/channel, pond, and stream land-cover type east of Marsh Creek and within or adjacent to pasture and cropland were considered core habitat for the giant garter snake.
2. Pasture, cropland, and ruderal land-cover types within 900 feet of core habitat were considered potential movement and foraging habitat for the giant garter snake.
3. Core or movement habitat that was not linked to the San Joaquin River through other core or movement habitat was omitted from the model.

Rationale

Core Habitat: The giant garter snake inhabits agricultural wetlands and associated waterways, including sloughs, irrigation and drainage canals, ponds, low-gradient streams, and adjacent uplands (U.S. Fish and Wildlife Service 1999). Areas in the inventory area west of Marsh Creek are not considered within the range of giant garter snake (Hansen pers. comm.). Suitable habitat (both core and movement) was defined only as areas accessible from the San Joaquin River, which provides the only link with known populations outside the inventory area.

Movement Habitat: During the active season, giant garter snakes generally remain in close proximity to wetland habitats but can move over 800 feet from the water during the day (G. Hansen 1988, Wylie et al. 1997). Because the actual movement patterns of garter snakes are not known, we used a conservative estimate of 900 feet to define the potential movement habitat requirements for this species.

Model Results

Figure 2 shows the modeled potential habitat of the giant garter snake within the inventory area. No occurrence records for this species were found within the inventory area. The only known records in the vicinity of the inventory area are to the north in the Sacramento/San Joaquin Delta. However, few surveys have been conducted for this species within the inventory area, but suitable habitat is known to occur there. Suitable core and movement habitat is largely restricted to the sloughs and surrounding agricultural areas in the eastern edge of the inventory area.

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