USGS science for a changing world

USGS Western Ecological Research Center

Publication Brief

Giant Gartersnakes' Use of Terrestrial Habitat: Implications for Management

The Giant Gartersnake (*Thamnophis gigas*) is a state and federally listed threatened species endemic to the Central Valley of California. Current legislation on the Giant Gartersnake aims to maintain or improve the water quality in its remaining environment. However, importance of adjacent terrestrial upland habitat is often overlooked and many agricultural and related activities, like levee and canal maintenance, continue to disturb ground near wetlands where the snake lives. An analysis of the Giant Gartersnake's use of terrestrial habitats can help resource managers protect this rare semi-aquatic snake.

USGS researchers set out to estimate the probability that Giant Gartersnakes would shelter in terrestrial environments, be underground, and take refuge in proximity to water. The scientists also studied how variables like season, temperature, and time of day influenced these probabilities. This study is the first quantitative assessment of Giant Gartersnake reliance on terrestrial uplands and is published in *Herpetological Conservation and Biology*.

The team captured, radio tagged, and released more than 250 Giant Gartersnakes within six sites in the Sacramento Valley and one site at the eastern edge of the Sacramento-San Joaquin Delta. Using telemetry data from surgically-implanted radio transmitters, they found that Giant Gartersnakes are more likely to appear in terrestrial refuges during their inactive winter season than during the summer. Snakes also used underground refugia during periods of relatively cooler or hotter temperatures.

Overall, the researchers found Giant Gartersnakes in terrestrial habitats more than half of the time during summer, with the snakes hibernating almost exclusively on land during winter. Females hibernated more than 10m from water in 25% of cases. In contrast, male snakes generally remained within 10m of water in all seasons.

This study indicates that Giant Garternsnakes would benefit from limiting activities that may disrupt terrestrial refugia such as those associated with habitat management, maintenance of flood control infrastructure, and construction. It also suggests that the timing of activities that disturb the terrestrial habitat is important, and that snakes may benefit if activities occur when they are less likely to be on land or taking refuge underground.

This Brief Refers To:

Halstead, BJ, SM Skalos, GD Wylie, ML Casazza. 2015. **Terrestrial ecology of semi-aquatic giant gartersnakes (*Thamnophis gigas*)**. *Herpetological Conservation and Biology* 10(2):633-644.
http://www.werc.usgs.gov/ProductDetails.aspx?ID=5383

The Giant Gartersnake was listed as a state and federally threatened species after losing up to 93% of its wetland habitat to anthropogenic and natural factors. Matt Meshriy/USGS.

MANAGEMENT IMPLICATIONS

- Eliminating or minimizing ground-disturbing activities like back-filling rodent burrows and dredging canals when Giant Gartersnakes are more likely to be underground (mornings, evenings) can reduce the risk of entombment. When these activities cannot be avoided, planning them for periods when snakes are more likely to remain in the water (late spring, summer) could minimize negative effects to these populations.
- Conducting ground-moving activities over a small area within a single season would also likely minimize negative impacts on populations.
- Removing vegetation by mowing or burning when snakes are either likely to be in the water (during afternoons in late spring and summer) or underground (cold mornings and evenings in winter) will likely help to minimize mortality directly caused by fire or mowers.

RESEARCH CONTACT

Brian Halstead
Dixon Field Station
bhalstead@usgs.gov
http://www.werc.usgs.gov/halstead