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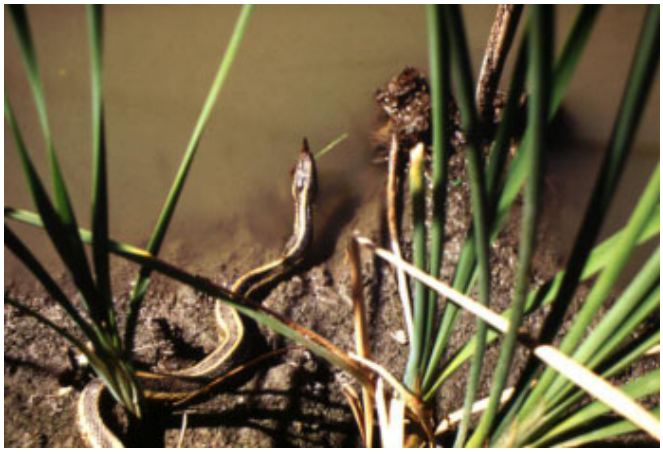
Science Support for Recovery of Giant Garter Snakes

Found only in the Central Valley of California, giant garter snakes once inhabited the flood basins, freshwater marshes, and tributary streams from Butte County in the north to Buena Vista Lake in Kern County in the south. Now a threatened species, the snakes are extirpated south of Fresno.

Land development and the reclaiming of wetlands for agriculture have eliminated much of the giant garter snake's original habitat. Continued decline in populations has been attributed to changes in water management, continuing habitat destruction, selenium contamination, and predation of juvenile snakes by nonnative species such as bullfrogs and largemouth bass.

Conservation strategies are being developed to recover populations of giant garter snakes. WERC research biologists provide science support to the U.S. Fish and Wildlife Service (FWS), U.S. Army Corps of Engineers, and the Natomas Basin Conservancy. In addition, they provide professional advice and information to the California Department of Fish and Game and Department of Water Resources and private organizations such as Ducks Unlimited and the California Waterfowl Association.

At Colusa National Wildlife Refuge, WERC scientists are using radio telemetry to evaluate habitat use by giant garter snakes in a restored wetland to improve management of these snakes and provide a model for future wetland restoration projects. In the Natomas Basin of Sacramento and Sutter counties, the scientists continue to monitor giant garter snakes in habitats acquired under the Habitat Conservation Plan for the basin, and are guiding habitat management for this species by the Natomas Basin Conservancy.



Studies by WERC scientists show giant garter snakes remain motionless to avoid detection more often than readily fleeing from disturbance. Photo: G. Wylie, USGS

Research is still needed to:

- Determine the effect of selenium and other agricultural contaminants on giant garter snakes.
- Evaluate improvement of giant garter snake survival by controlling nonnative species.
- Evaluate habitat use in existing wetlands and in wetlands restored for giant garter snakes to identify features that will yield the greatest benefit for recovery.
- Define current distribution and abundance of giant garter snakes in their existing habitat and monitor the success of recovery efforts, particularly in the Sacramento/San Joaquin Delta and in the San Joaquin Valley.

The longest of garter snakes, the giant garter snake can grow to more than 5 feet. The snake feeds on small fish, tadpoles, and frogs in remnant wetlands, rice fields, and irrigation and drainage canals.

Radio telemetry is showing aspects of habitat use and movements that were previously poorly understood for this species. WERC scientists have identified the use of burrows and riprap as wintering sites and the common features of vegetative cover, permanent water, and an abundant food supply for habitats used from spring to fall. They developed a trapping method to capture snakes and have successfully used passively induced transponders (PIT) tagging to estimate snake densities from mark-and-recapture methods.

Although influenced by weather, giant garter snakes generally begin emerging from winter retreats in April. By mid-April, most snakes are active and beginning to



Giant garter snakes are captured in traps, weighed and measured, and marked with PIT tags before they are released. Selected snakes are surgically implanted with radio transmitters and returned to the point of capture, where scientists begin to document their movements using radio telemetry. Photos: G. Wylie, USGS

search for food and mates. By May, all snakes have usually emerged and are actively foraging. During periods of very high temperatures, snakes retreat underground to maintain appropriate body temperatures. Once thought strictly diurnal, giant garter snakes have been observed foraging after dusk on hot days. During October, snakes begin seeking winter retreats, and their activity is dependent on weather conditions. By November, most snakes are underground in burrows or riprap and will remain there until spring. Giant garter snakes are generally inactive in winter months, although some individuals may bask or move short distances on warm days.

WERC giant garter snake telemetry studies are the most innovative and extensive application of this technique for any snake in California, with over 100 snakes radio-marked and tracked during the past seven years. Radio telemetry has been a successful way to accurately evaluate habitat use and movement of these cryptic and secretive snakes. The telemetry information is incorporated into a state-of-the-art geographical information system, yielding statistically valid spatial analysis for estimating home range size and habitat preferences.

One of more than 100 giant garter snakes that USGS scientists have monitored during the past seven years. Photo: G. Wylie, USGS

Using radio telemetry to detect movements of snakes, WERC scientists documented the use of riprap by giant garter snakes as winter refuge. Photo: G. Wylie, USGS

In addition to continuing projects at Colusa National Wildlife Refuge and the Natomas Basin, in 2003, WERC scientists will begin surveying for giant garter snakes in private lands habitat projects for the FWS Partners for Fish and Wildlife program. They will also provide science support to the Corps of Engineers by assessing the effects of bank stabilization methods on giant garter snakes in the Colusa Drain.

For more information, contact:
Dr. Glenn Wylie
USGS Dixon Field Station
6924 Tremont Road
Dixon, CA 95620-9648
Phone: 707.678.0682 x616
Email: glenn_wylie@usgs.gov