

## Western Ecological Research Center

# Publication Brief for Resource Managers

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## Giant Gartersnake Thermal Ecology

Understanding the thermal ecology of reptile species can provide valuable information on the behavior and the thermal requirements or constraints of the species. These data can also promote habitat management appropriate for the conservation of reptiles. USGS scientists Glenn Wylie, Michael Casazza, Brian Halstead, and Christopher Gregory evaluated sexual, seasonal, and daily patterns of variation in body temperatures of the giant gartersnake (*Thamnophis gigas*). Their findings are published in a recent issue of the *Journal of Thermal Biology*.

The giant gartersnake is the largest and most aquatic of the gartersnakes. It is endemic to the Central Valley of California, and is listed as threatened at the state and federal levels because of extensive human-caused loss of its emergent wetland habitat. The current distribution of the giant gartersnake is limited primarily to remnant wetlands, rice agriculture, and canals associated with rice agriculture that provide emergent aquatic habitat during the active season (primarily April – September).

Temperature-sensitive radio telemetry from four sites in the Sacramento Valley demonstrated body temperature differences between the sexes and among months and times of day. At an annual timescale, sexual differences in body temperature varied among months. In particular, males demonstrated a greater body temperature than females in the late winter and early spring, and females had a greater body temperature than males during the summer. These differences in body temperature might be related to reproductive activities, with males elevating body temperature during the mating season, and females elevating body temperature while they are carrying embryos. Alternatively, elevated body temperatures may be a consequence of activity in warm

### Management Implications:

- Radio telemetry studies of the giant gartersnake revealed that males and females elevate their body temperatures during different seasons and at different times of day.
- Because giant gartersnakes elevate body temperatures using terrestrial habitats during the spring and mornings during the active season, terrestrial land management activities such as mowing should be conducted at other times (for example, cold days in winter when snakes are underground or hot summer afternoons when they can rapidly escape).
- Canal banks, wetland margins, and rice checks should be maintained with adequate vegetation to provide both thermoregulatory opportunity and cover from predators during the giant gartersnake active season (April – September).

habitats as males travel over land in search of females or while females are anorexic and reduce foraging activity in cool aquatic environments. When analysis was restricted to the active season, male and female body temperatures differed by month and time of day. Females generally had greater body temperatures than males early in the day, but it is currently unknown whether these differences were caused by active thermoregulation or the thermal inertia of larger, heavier females. Morning body temperatures of both sexes were higher relative to environmental temperatures in the spring than during the summer, suggesting active thermoregulation on cool mornings.

Body temperatures of the giant gartersnake reveal behavioral patterns important to consider when manag-

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ing habitat where the giant gartersnake is found. For example, because aboveground, land-based management activities such as mowing are prevalent in the spring and mornings during the active season, mowing at these times should be limited. The elevated body temperature of females while gravid requires that they have access to sites that combine a warm thermal environment with adequate cover to avoid detection by

predators. Favorable basking habitat for gravid females can be achieved by maintaining vegetation on canal banks, wetland margins, and rice checks.

*Wylie, G.D., M.L. Casazza, B.J. Halstead, and C.J. Gregory. 2009. Sex, season, and time of day interact to affect body temperatures of the giant gartersnake. Journal of Thermal Biology 34:183–189.*