



Giant Gartersnake Biology and Conservation

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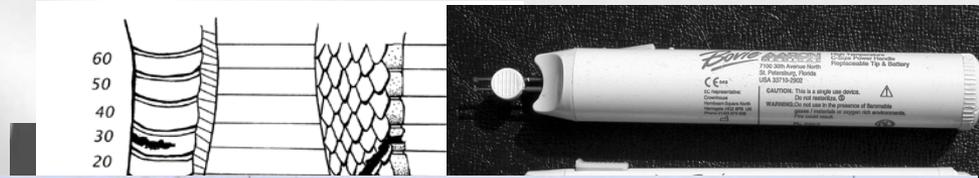
Giant Gartersnake Basics

- The largest gartersnake
- Restricted to Central Valley
- Marsh (or marsh-like) habitat
- Prey
 - Fish
 - Frogs
 - Tadpoles
- State and federally listed as threatened
 - Habitat loss



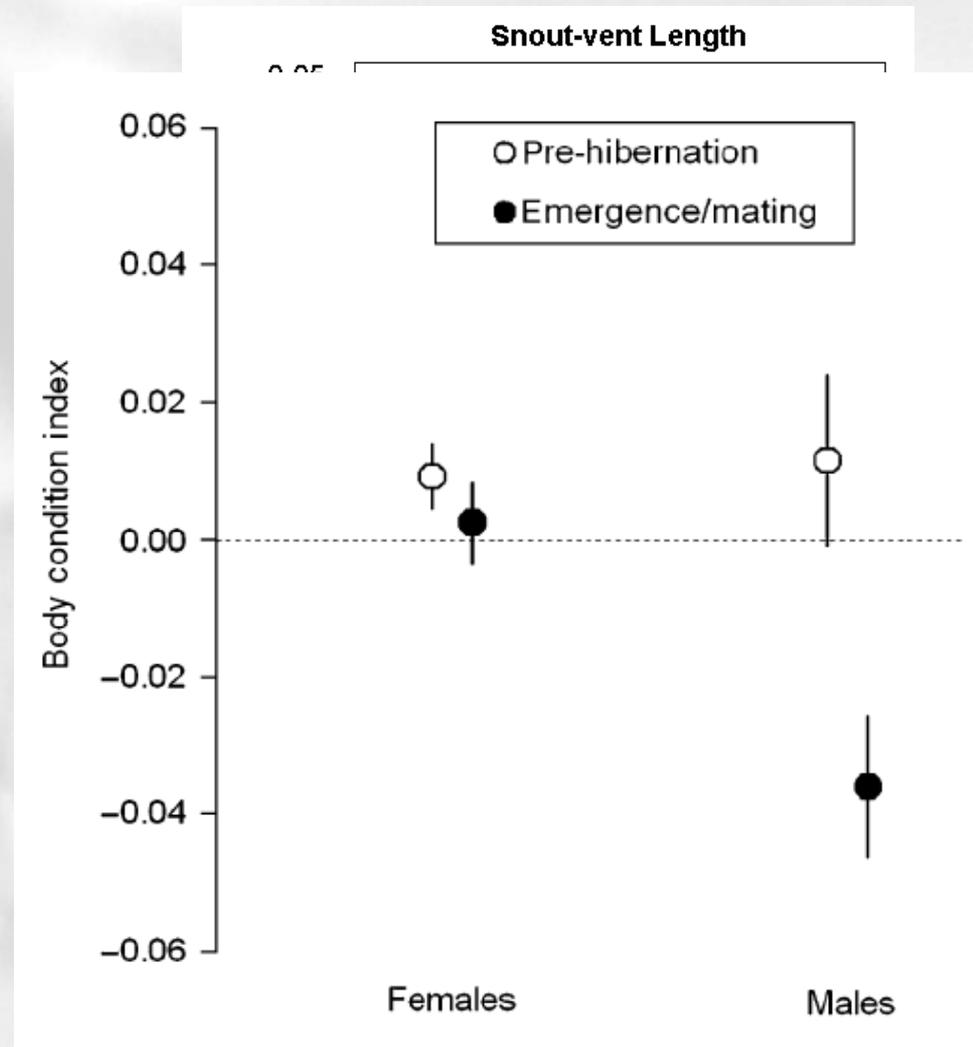
Research Methods

- Initiated studies in 1995
- Mark-recapture
- Radio telemetry
- Variety of habitats
 - Rice
 - Natural wetlands
 - Restored wetlands/managed marshes



Growth and Body Condition

- Growth slows with size
- Differing patterns of growth
 - Males exhibit retarded growth in early spring
- Sexual size dimorphism
 - Females larger sex
- Differing patterns of body condition
 - Greatest difference in spring; female condition greater than males



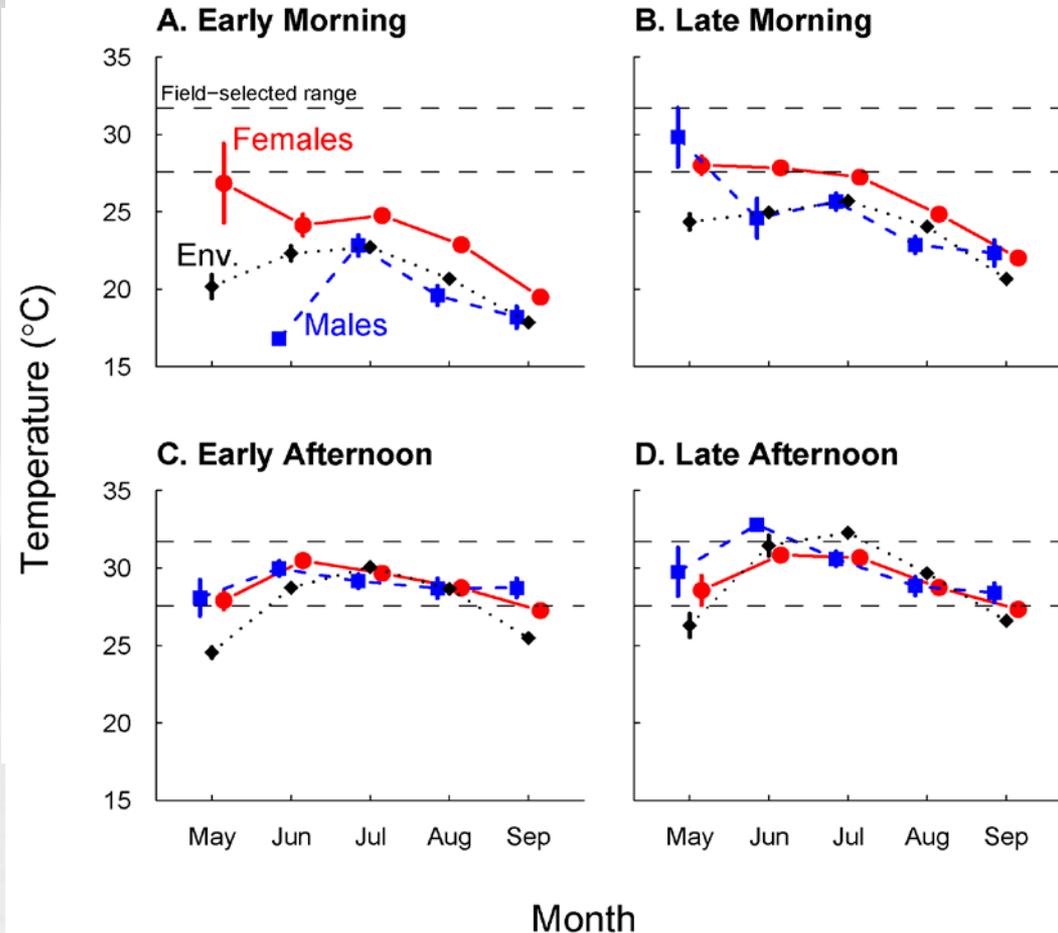
Coates, P. S., G. D. Wylie, B. J. Halstead, and M. L. Casazza. 2009. *Journal of Zoology* 279:285–293.

Wylie, G. D., M. L. Casazza, C. J. Gregory, and B. J. Halstead. 2010. *Journal of Herpetology* 44:94–103.

Thermal Ecology

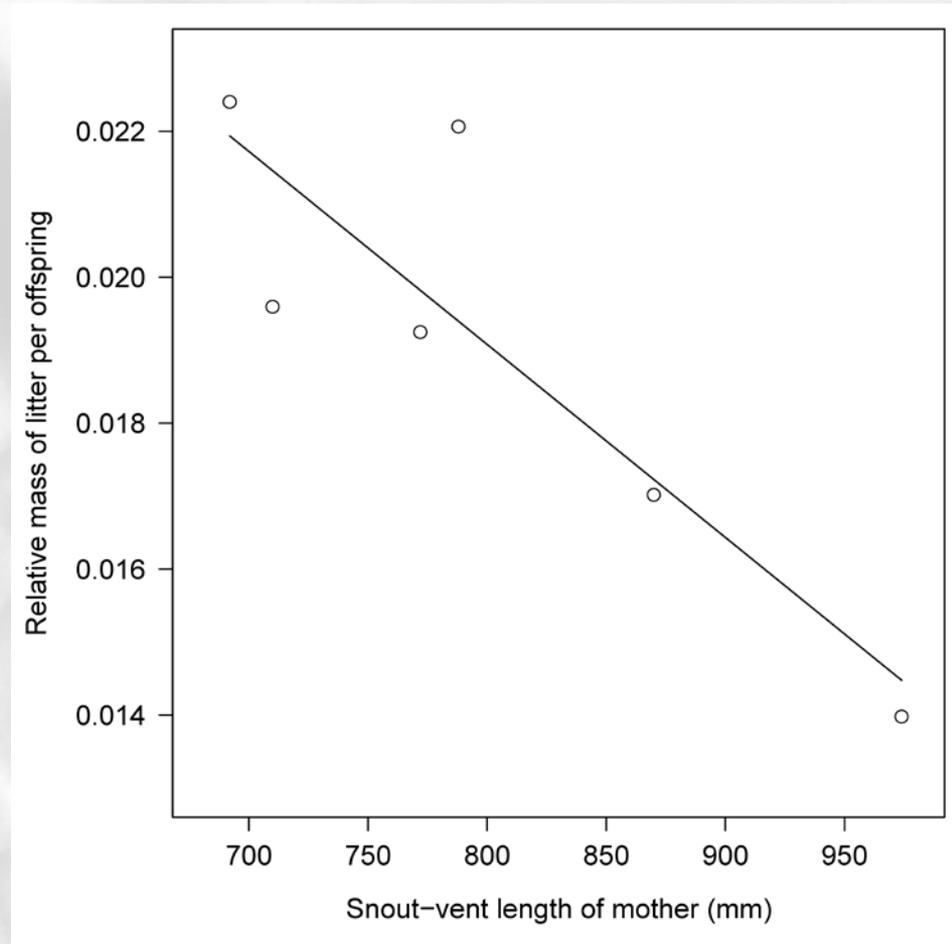
- Snakes don't use thermal environment at random
- Males and females use thermal environment differently
 - Males elevate body temperature in late winter/early spring
 - Females elevate body temperature in late spring/early summer

Monthly Temperatures by Time of Day



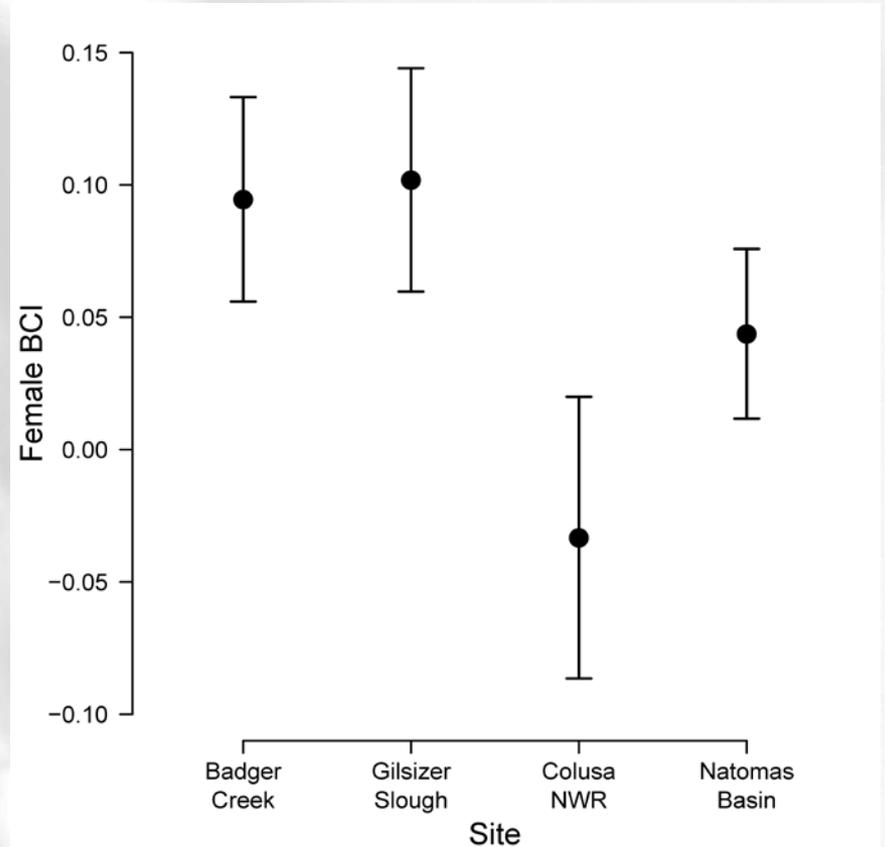
Reproductive Ecology

- Mean litter size = 17 (13 – 21)
- Litters usually born mid July – mid September
- Neonate size
 - SVL = 209 (197 – 221) mm
 - Mass = 4.9 (4.1 – 5.7) g
- Larger females invest in more, rather than larger, offspring
- Reproductive output varies temporally



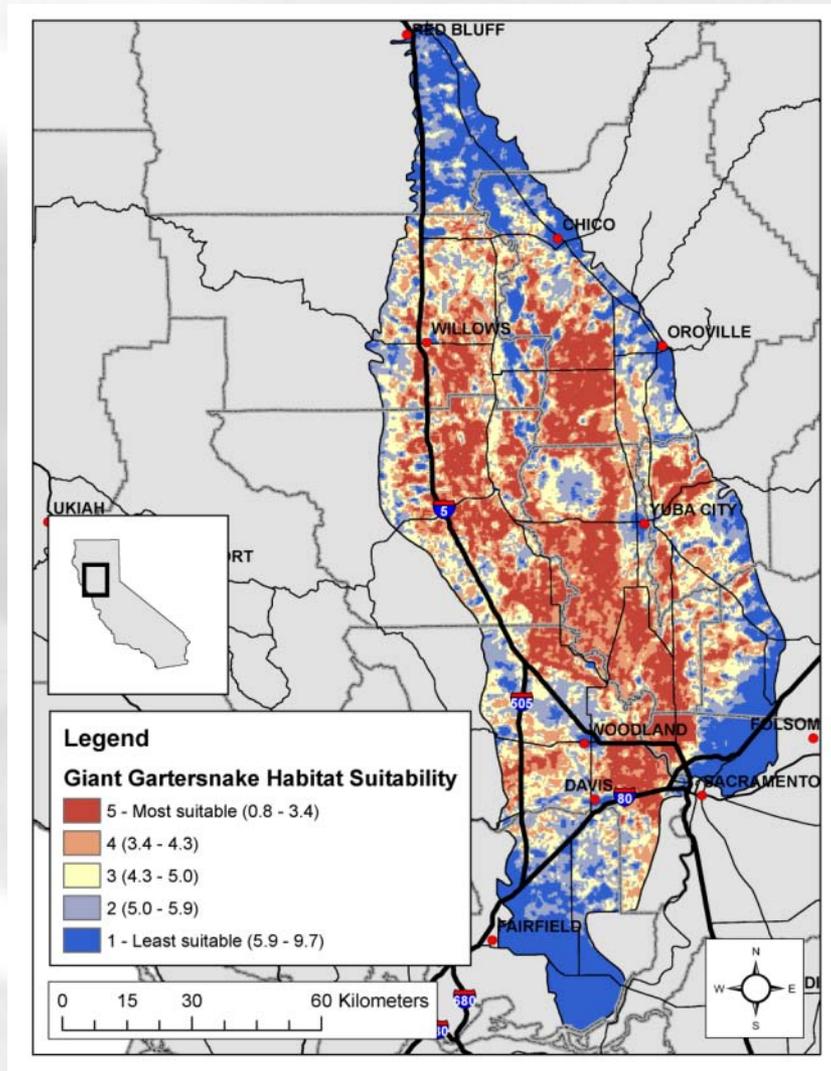
Abundance and Density

- Sex ratio = 0.93 (0.75 – 1.15)
- Abundance and density vary with context
 - Lowest in managed seasonal marshes (dry in summer, flooded in winter)
 - Greatest in natural marshes
 - Rice intermediate
- Body condition follows similar patterns



Habitat Suitability

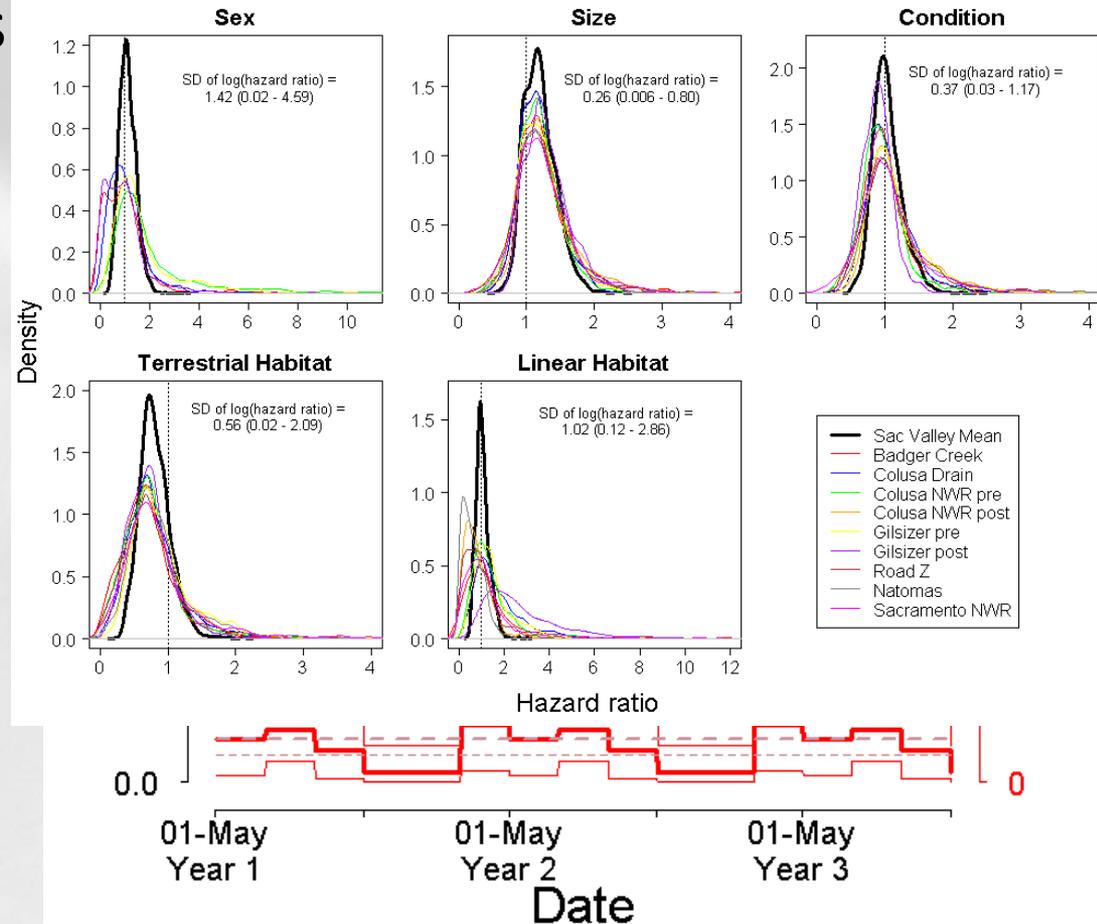
- More likely to occur
 - Near rice
 - Away from streams
 - Near open water
 - High density of canals
 - (Near wetlands)
- These conditions primarily occur on floor of Sacramento Valley



Survival

- Risk of mortality varies by season
- Annual probability of survival = 0.70 (0.56 – 0.82)
- No covariates have an overall effect
- Linear habitats more risky in some places

Survival Curves and Daily Hazards for Seasonal Step and Constant Models

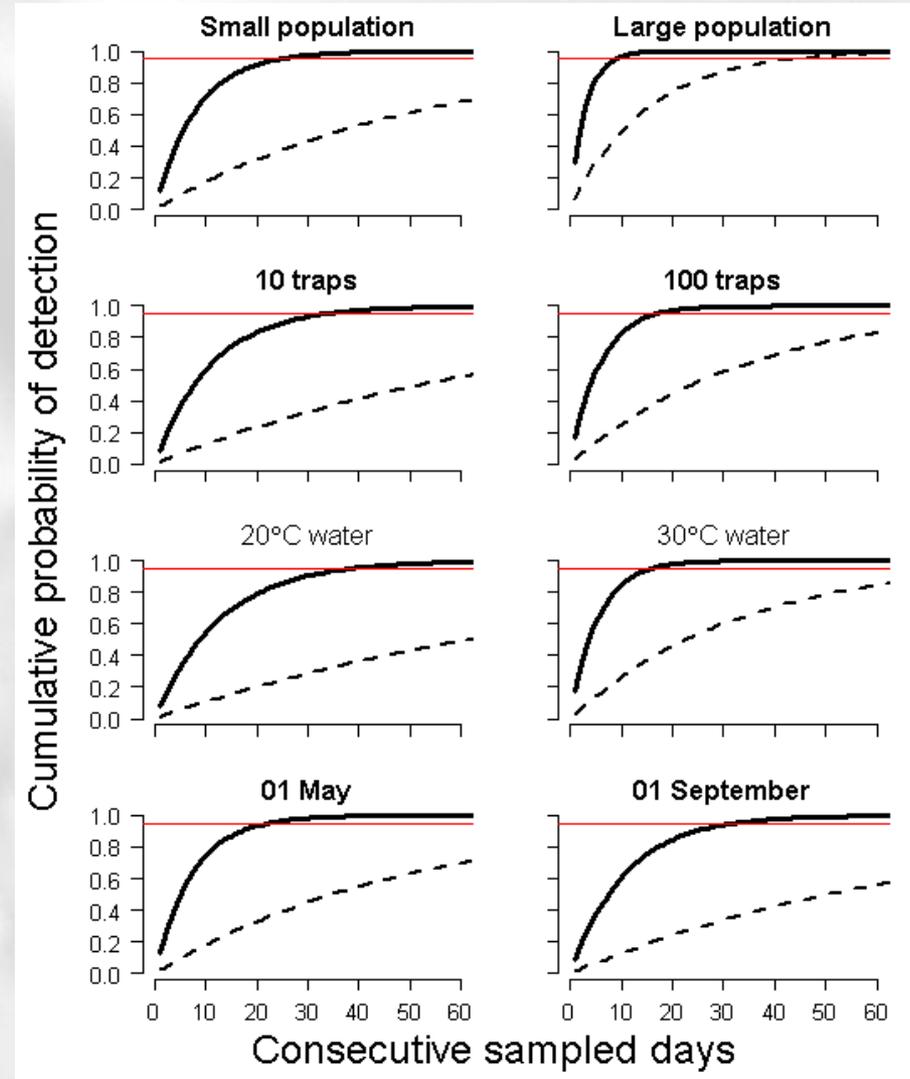


Sources of Mortality



Survey Protocol

- Survey conditions affect detection probability
 - Abundance
 - Number of traps
 - Water temperature
 - Date
- Must be accounted for when interpreting survey results





Moving Forward with Giant Gartersnake Conservation

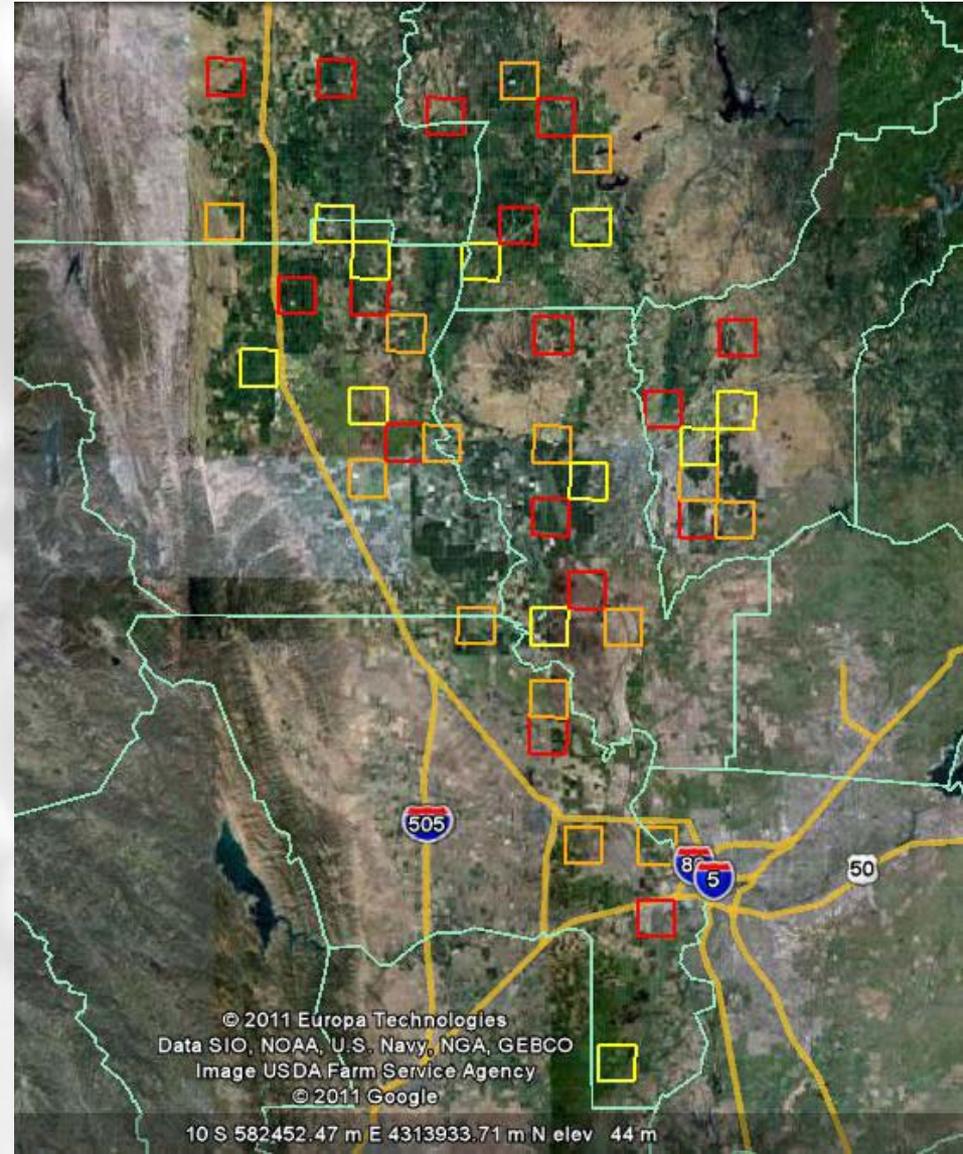
What we're currently doing

Current Field Research

- Evaluation of trap modifications to improve capture probabilities for the Giant Gartersnake
- Patterns in occurrence of the Giant Gartersnake in the Sacramento Valley

Sacramento Valley Occupancy

- Randomly selected 25 km² grid cells (sample units)
- Sample “best” habitat within sample unit
- Removal design
 - Deploy traps for 21 days or until first capture of giant gartersnake
 - Remove traps and deploy at next sample unit





Funding Sources/Partners

- California Department of Fish and Game
- California Department of Water Resources
- California Rice Commission
- California Rice Industry Association
- California Waterfowl Association
- Consulting Firms (Wildlands, Inc.; Essex International, others)
- The Natomas Basin Conservancy
- The Nature Conservancy
- Private Landowners (numerous)
- Reclamation/Irrigation Districts (numerous)
- Solano County Water Agency
- U.S. Army Corps of Engineers
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- U.S. Fish and Wildlife Service
- Yolo Resource Conservation District

Questions?

