



## Investigations of Giant Garter Snakes in The Natomas Basin: 2002 Field Season



# **Investigations of Giant Garter Snakes in The Natomas Basin: 2002 Field Season**

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U.S. GEOLOGICAL SURVEY  
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## INTRODUCTION

The Dixon Field Station of the U.S. Geological Survey, Biological Resources Division, entered into an agreement with the Natomas Basin Conservancy to study giant garter snakes (*Thamnophis gigas*) in the Natomas Basin area of northern Sacramento County during the 2002 field season. Giant garter snakes are federally and state listed as threatened and, with Swainson's hawks, are the subject of a habitat conservation plan for the Natomas Basin. Our purpose is to develop information on distribution and abundance, habitat use, and demography of giant garter snakes in the Natomas Basin and to help develop strategies to properly manage and conserve giant garter snakes in this part of Sacramento County. We specifically surveyed property recently acquired by the Conservancy for giant garter snakes as well as continuing our assessment of giant garter snakes in other areas of the Natomas Basin. This agreement is a continuation of the giant garter snake project conducted at the Station since 1995. This document is a summary report of our findings for the 2002 field season.

## METHODS

### Study Sites

Because most lands in the Natomas Basin are privately owned, areas in which we could search for giant garter snakes were limited by specific permission to enter these properties. In addition to properties owned by the Conservancy, various landowners allowed us access to their lands.

### Capture

We began the field season in late April using as our primary source of capture floating modified minnow traps deployed along edges of ditches, canals, and wetland vegetation (Casazza et al., 2000). We also searched on foot for snakes along the trap locations. We moved traps to new locations if we caught no snakes in a three to four week period. We used global positioning system (GPS) units to determine the geo-coordinates of capture locations with an error of about 5 meters. We also recorded environmental characteristics of the sites of snake captures, such as vegetation and substrate types and ambient temperature.

### Measuring and Marking

Each snake was processed as soon as possible after capture to determine weight, total length, snout to vent length, and sex. Taxonomic features were also quantified such as labial scale counts on the head and dorsal scale counts at mid-body. Individuals were implanted with passively induced transponder (PIT) tags for permanent identification. All snakes were released at the point of capture as soon as possible after they were processed. Density estimates to giant garter snakes were made using the program CAPTURE for two week sampling intervals when recaptures warranted a density estimates for a sampling area.

## **Results**

From late April into September we captured 76 female giant garter snakes and 64 male snakes, for a total of 140 individual captures; we captured 58 snakes multiple times. The size frequency distributions for the snakes caught in 2002 are shown in Figure 1 and Figure 2, and are consistent with results from previous years. Size frequencies indicate recruitment of young giant garter snakes into the population.

Our mark and recapture information for each of the ten trapping sites is shown in Tables 1-10. The total number of technician hours for the 2002 field season was 2814, which includes trap assembly, data entry and analysis, trap checking, and searching on foot. The effort we spent on trapping and searching is broken out by site in Table 11. Total captures ranged from 35 to 0 for the sites.

Development of giant garter snake habitat on Conservancy lands should proceed as quickly as practical. In the Sacramento Valley, water is being purchased from rice growers and the water exported to the south, and rice fields fallowed by water sales may increase. If land fallowed by water sales increases in the basin, the habitat managed by the Conservancy becomes all the more important to protecting snake populations. Also, development projects in the southern end of the Basin will destroy local snake populations, particularly when there is no avenue of escape from construction activity. In these cases the U.S. Fish and Wildlife Service should consider if snakes in these areas of imminent development should be captured in a salvage effort and relocated to TNBC property with suitable habitat. We could do a radio telemetry study to examine how these transplanted snakes adapt to their new locations and determine if transplanting within the Basin is a viable conservation measure.

## **Literature Cited**

- Casazza, M. L., G. D. Wylie, and C. J. Gregory. 2000. A funnel trap modification for surface collection of aquatic amphibians and reptiles. *Herpetological Review* 31(2), 91-92.
- Wylie, G. D., M. L. Casazza, L. Martin, and E. Hansen. 2000. Investigations of giant garter snakes in the Natomas Basin: 2000 field season. Progress report to The Natomas Basin Conservancy. USGS-BRD, Dixon, CA.



Ditch on Sills Ranch property.

Table 1. Snake and trapping statistics associated with the Sills Ranch Property trapping effort.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b> |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|-------------------|
| Sills Ranch          | *                          | *                                   | 6                               | 0                                 | 55                           | 7/11/02-8/26/02   |



Ditch located on Airport property, adjoining Miester Road.

Table 2. Snake and trapping statistics associated with trapping effort at Miester Road ditch.

| Trapline Name | Population Estimate | Density Estimate (snakes/km) | Total number of captures | Total number of recaptures | Total number of traps | Trap Dates     |
|---------------|---------------------|------------------------------|--------------------------|----------------------------|-----------------------|----------------|
| Miester Road  | *                   | *                            | 1                        | 0                          | 28                    | 8/8/02-9/10/02 |



Ditch off of Elkhorn Road.

Table 3. Snake and trapping statistics associated with trapping effort at Elkhorn ditch.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b> |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|-------------------|
| Elkhorn              | *                          | *                                   | 0                               | 0                                 | 59                           | 7/18/02-8/23/02   |





Ditch on Bennett South property.

Table 4. Snake and trapping statistics associated with the trapping effort at Bennett South property ditch.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b>  |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|--------------------|
| Bennett S.           | 27                         | 45 ± 5.99<br>(95% C.I. 20-47)       | 20                              | 6                                 | 30                           | 6/11/02-<br>8/8/02 |



Ditch on Lucich North property

Table 5. Snake and trapping statistics associated with the trapping effort at the Lucich North property.

| Trapline Name | Population Estimate | Density Estimate (snakes/km)       | Total number of captures | Total number of recaptures | Total number of traps | Trap Dates     |
|---------------|---------------------|------------------------------------|--------------------------|----------------------------|-----------------------|----------------|
| Lucich N.     | 41                  | $31.8 \pm 7.5$<br>(95% C.I. 37-64) | 35                       | 13                         | 62                    | 4/23/02-6/7/02 |



Ditch on east side of Ayala property



Ditch at south end of property



Edge of rice located at west side of Ayala property

Table 6. Snake and trapping statistics associated with the trapping effort at the Ayala property.

| Trapline Name | Population Estimate | Density Estimate (snakes/km) | Total number of captures | Total number of recaptures | Total number of traps | Trap Dates     |
|---------------|---------------------|------------------------------|--------------------------|----------------------------|-----------------------|----------------|
| Ayala         | *                   | *                            | 0                        | 0                          | 73                    | 7/3/02-8/22/02 |



Ditch commonly referred to as Snake Alley.

Table 7. Snake and trapping statistics associated with the trapping effort at Snake Alley.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b> |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|-------------------|
| Snake Alley          | 38                         | 20 ± 8.3<br>(95% C.I. 28-64)        | 24                              | 10                                | 59                           | 5/17/02-7/18/02   |



Ditch on NTI property near I-99 and an airstrip.

Table 8. Snake and trapping statistics associated with trapping effort at canal known as Airstrip.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b> |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|-------------------|
| Airstrip             | *                          | *                                   | 23                              | 1                                 | 55                           | 5/13/02-7/11/02   |



Ditch on Lucich South property.

Table 9. Snake and trapping statistics associated with trapping effort at Lucich South property.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b>  |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|--------------------|
| Lucich S.            | 55                         | 55 ± 12.5<br>(95% C.I. 38-89)       | 23                              | 3                                 | 60                           | 5/10/02-<br>7/3/02 |



Pond at east side of BKS



BKS E-W canal adjacent to pond



Pond at west end of BKSE-W canal



Canal middle of BKS property near house



Marsh S-W side of BKS



Ditch at west edge of BKS property

Table 10. Snake and trapping statistics associated with trapping effort at the BKS property.

| <b>Trapline Name</b> | <b>Population Estimate</b> | <b>Density Estimate (snakes/km)</b> | <b>Total number of captures</b> | <b>Total number of recaptures</b> | <b>Total number of traps</b> | <b>Trap Dates</b> |
|----------------------|----------------------------|-------------------------------------|---------------------------------|-----------------------------------|------------------------------|-------------------|
| BKS                  | *                          | *                                   | 2                               | 1                                 | 63                           | 6/7/02-9/10/02    |



Table 11. Trapping effort and technician hours involved in giant garter snake surveys in the Natomas Basin for the 2002 field season.

| Trapline Name | Population Estimate | Density Estimate (snakes/km)   | Total number of captures | Total number of recaptures | Total number of traps | Trap Dates      | Tech Hours |
|---------------|---------------------|--------------------------------|--------------------------|----------------------------|-----------------------|-----------------|------------|
| Airstrip      | *                   | *                              | 23                       | 1                          | 55                    | 5/13/02-7/11/02 | 264        |
| Ayala         | *                   | *                              | 0                        | 0                          | 73                    | 7/3/02-8/22/02  | 227        |
| Bennett South | 27                  | 45 ± 5.99<br>(95% C.I. 20-47)  | 20                       | 6                          | 30                    | 6/11/02-8/8/02  | 264        |
| BKS           | *                   | *                              | 2                        | 1                          | 63                    | 6/7/02-9/10/02  | 417        |
| Elkhorn       | *                   | *                              | 0                        | 0                          | 59                    | 7/18/02-8/23/02 | 170        |
| Lucich North  | 41                  | 31.8 ± 7.5<br>(95% C.I. 37-64) | 35                       | 13                         | 62                    | 4/23/02-6/7/02  | 207        |
| Lucich South  | 55                  | 55 ± 12.5<br>(95% C.I. 38-89)  | 23                       | 3                          | 60                    | 5/10/02-7/3/02  | 240        |
| Miester Road  | *                   | *                              | 1                        | 0                          | 28                    | 8/8/02-9/10/02  | 146        |
| Sills Ranch   | *                   | *                              | 6                        | 0                          | 55                    | 7/11/02-8/26/02 | 209        |
| Snake Alley   | 38                  | 20 ± 8.3<br>(95% C.I. 28-64)   | 24                       | 10                         | 59                    | 5/17/02-7/18/02 | 272        |

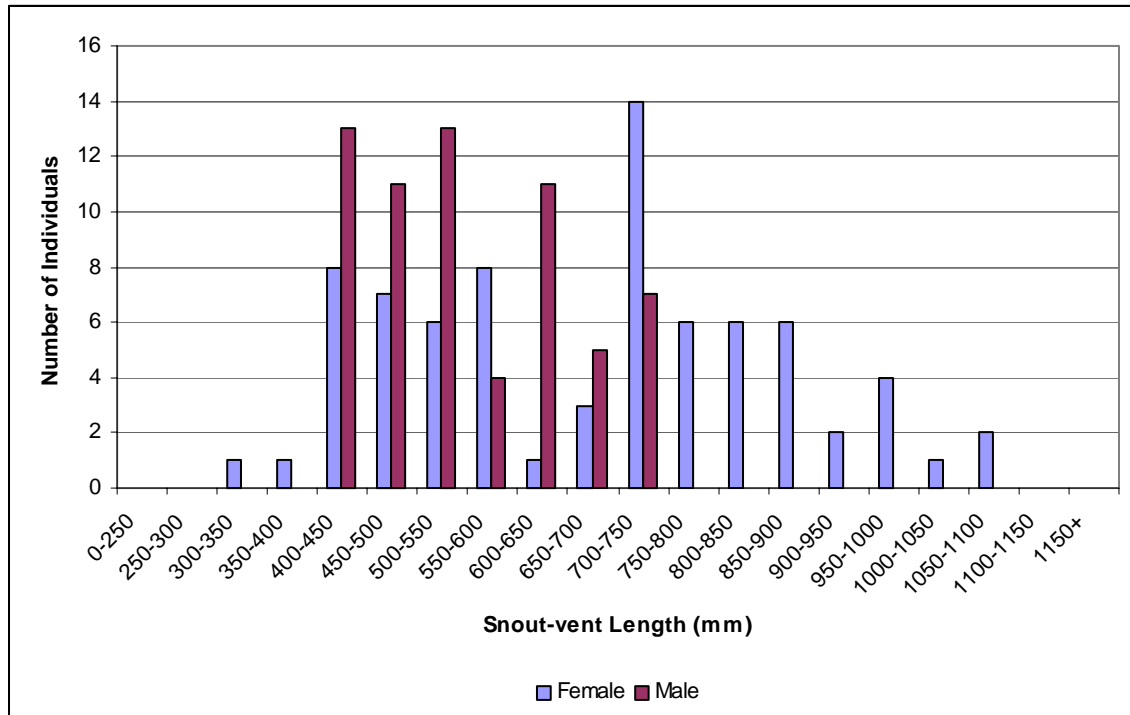


Figure 1. Length frequency distribution of giant garter snakes caught in 2002.

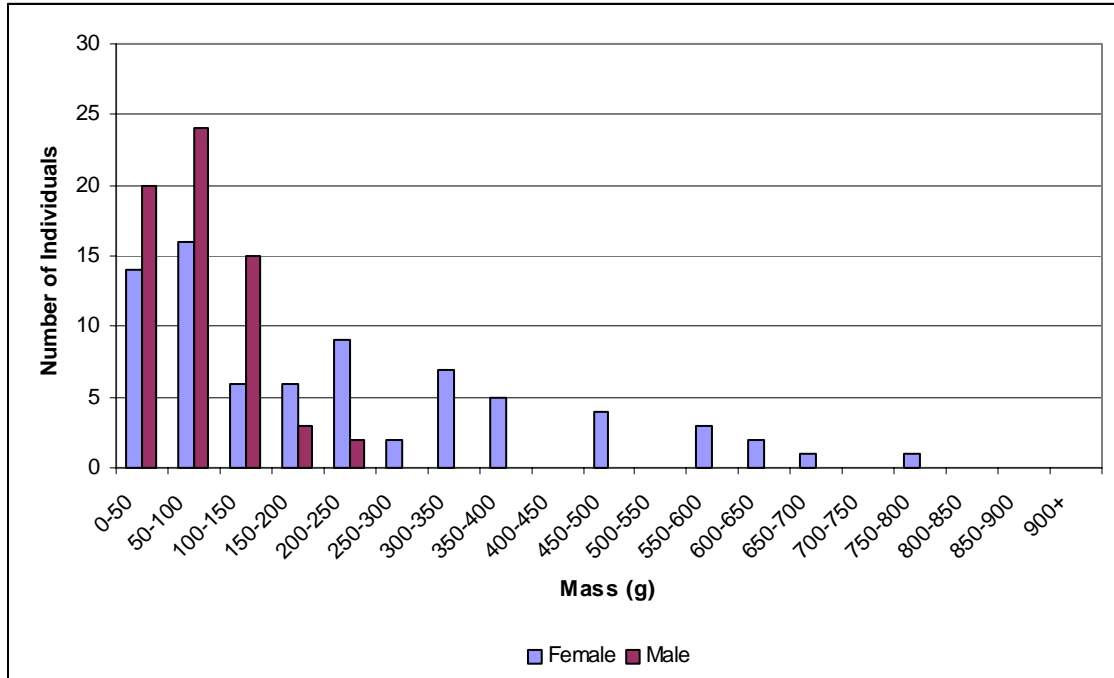


Figure2. Weight frequency distribution of giant garter snakes caught in 2002.