

SURVEY OF SLAC LANDS FOR SAN FRANCISCO GARTER SNAKE*

Robert L. Seib and Theodore J. Papenfuss†
Stanford Linear Accelerator Center
Stanford University, Stanford, California 94305

The San Francisco garter snake (Thamnophis sirtalis tetrataenia) is protected under the endangered species act by the U.S. Fish and Wildlife Service and the California Department of Fish and Game. The snake is restricted to the San Francisco peninsula and all known populations are in San Mateo County (Barry, 1978). In southeastern San Mateo County and northwestern Santa Clara County T. s. tetrataenia intergrades with T. s. infernalis. Intergrade specimens are deposited in the collection of the California Academy of Sciences (Table 1). The Stanford Linear Accelerator Center (SLAC) lands are located in this area of intergradation. Two studies have recently been conducted on SLAC lands attempting to determine whether the endangered form is present. Barry (1976) surveyed SLAC lands during late July and although he found no San Francisco garter snakes, he stated that suitable habitat was available. He suggested that additional exploration be conducted in the spring. Balgooyen (1981) also surveyed the areas, but he did so during the winter when snakes hibernate and he found no snakes. He also suggested the need for a field study at a more favorable time of year. SLAC contracted Robert Seib and Ted Papenfuss to survey SLAC lands during September and early November, 1981, to determine the probability of occurrence of the San Francisco garter snake on their lands. Results of this investigation and management recommendations are presented here.

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† Present address: University of California, Museum of Vertebrate Zoology, Berkeley, California 94720.

METHODS

Twelve field days were spent on the SLAC lands and surrounding areas of habitat. Three field methods were employed: 1) Pitfall traps. Five gallon plastic buckets were buried in areas of suitable habitat on SLAC lands and near San Francisquito Creek at the Stanford golf course. Cover objects were placed over the traps. Reptiles seeking shelter crawl under the cover objects and fall into the buckets, becoming trapped. 2) Placement of artificial cover objects. Artificial cover was placed along stream courses on SLAC lands and along San Francisquito Creek at the Stanford golf course. Cover consisted of flattened cardboard boxes, boards and metal roofing material. 3) Stream habitat searches. We walked stream courses on SLAC lands, San Francisquito Creek and the marshes of Searsville Lake on each visit to look for active snakes.

Museum specimens from the general vicinity of SLAC were examined at the California Academy of Sciences in order to determine their subspecific status (Table 1).

RESULTS

Actual survey work on SLAC lands was concentrated on three water courses (Fig. 1). Additional survey work was conducted along San Francisquito Creek and at Searsville Lake.

We found a sub-adult intergrade specimen of T. sirtalis at drainage area 1 (Fig. 1). Intergrades between T. s. tetrataenia and T. s. infernalis have a lateral body pattern consisting of areas of unbroken red stripes occasionally interspaced with black bars (Figs. 2 and 3). No other specimens of T. sirtalis were located during the study.

DISCUSSION

Status of Intergrade Populations in the Stanford Area

Based on examination of specimens in the California Academy of Sciences herpetology collection (Table 1), it is evident that populations of T. sirtalis infernalis, T. sirtalis tetrataenia and intergrades occur in the Stanford area. T. s. tetrataenia is rare (one of 35 specimens examined). Most snakes are either T. s. infernalis (18/35), or T. s. tetrataenia X infernalis (16/35).

Thamnophis Sirtalis Habitat On and Adjacent to SLAC Lands

The best habitat is found adjacent to SLAC along San Francisquito Creek and at Searsville Lake (Fig. 4). Of the three major drainage areas on SLAC, drainage area 1 (Fig. 5) is the most suitable for T. sirtalis and is the only place where a specimen was found. This area has year-round water flow, abundant riparian vegetation and also provides a food source, Hyla regilla, which were observed in large numbers. In addition, the drainage flows directly into San Francisquito Creek which has the source population from which the drainage is colonized.

Drainage area 2 (Fig. 6) appears unsuitable for T. sirtalis. Little water is present and no frogs were seen.

Drainage area 3 (Fig. 7) is unsuitable for the above reasons and, in addition, the southern 90% of the drainage flows through an artificial ditch in a nursery.

Management Recommendations

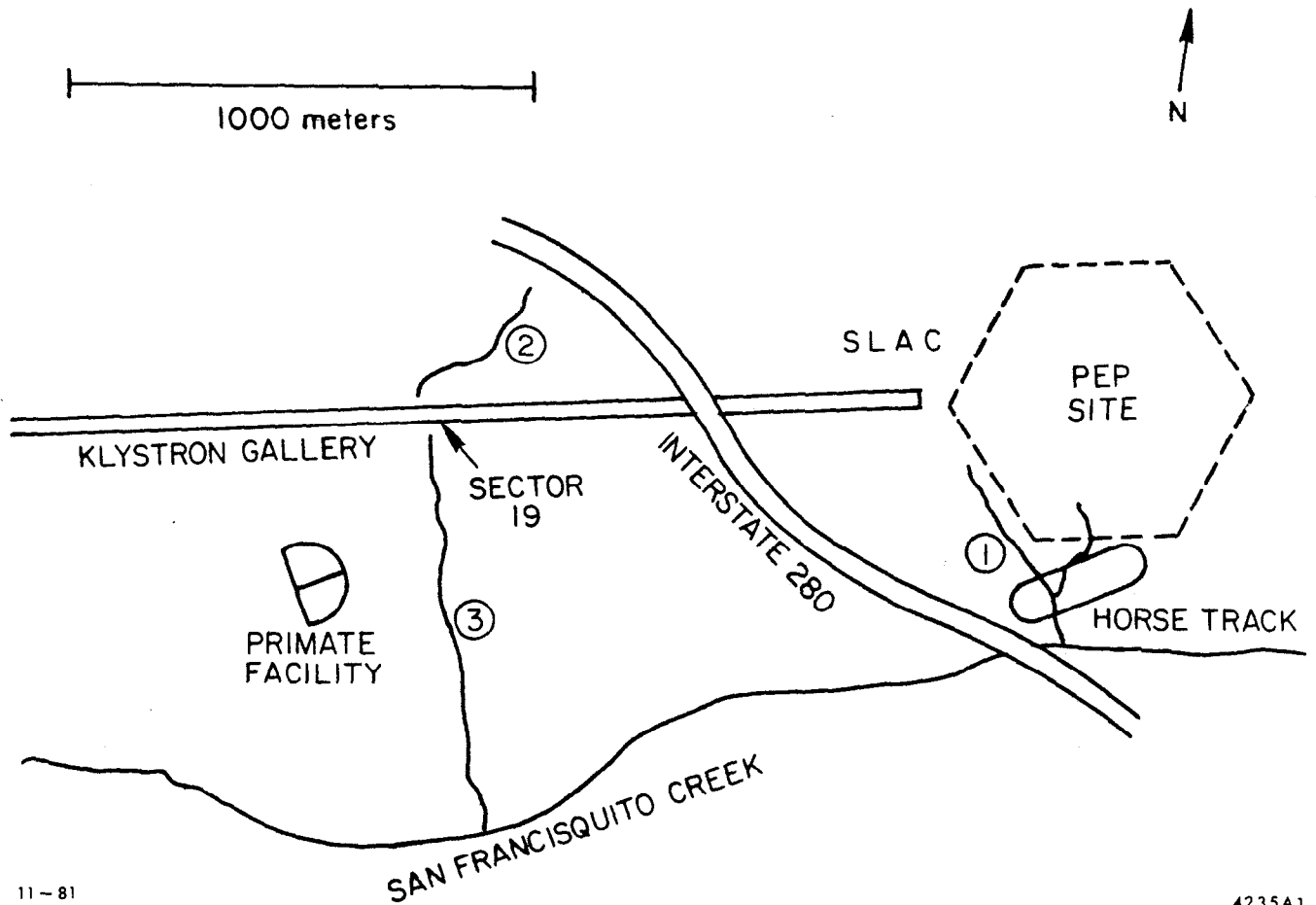
Any habitat alteration on SLAC lands except in the vicinity of drainage area 1 will have no effect on T. sirtalis. We recommend that disturbance to the vegetation and water flow at drainage area 1 be minimum. Construction of the linear collider should eventually improve the habitat for T. sirtalis because it will produce additional water flow.

LITERATURE CITED

- Balگوoyen, T. G. 1981. The Occurrence of the San Francisco Garter Snake and Subspecific Intergrade Populations at SLAC, Phase II. Draft Environmental Assessment. SLAC Linear Collider, Stanford, California, pp. 118-121.
- Barry, S. J. 1976. Investigations on the Occurrence of the San Francisco Garter Snake at the Stanford Linear Accelerator Center. Draft Environmental Assessment. SLAC Linear Collider, Stanford, California, pp. 108-117.

Table 1. Garter snakes (*Thamnophis sirtalis*) in the collection of the California Academy of Sciences from the Stanford area.

<u>Identification</u>	<u>Museum No.</u>	<u>Locality</u>	<u>Date</u>
<i>Thamnophis sirtalis tetrataenia</i>	CAS 54224	Stanford	1922
<i>Thamnophis s. tetrataenia x infernalis</i>	SU 1147	Stanford	1893
" "	SU 1188	Stanford	?
" "	SU 1190	Stanford	?
" "	SU 1192	Stanford	?
" "	SU 1194	Stanford	?
" "	SU 1195	Stanford	?
" "	SU 1210	Palo Alto	?
" "	SU 1653	Stanford	1894
" "	SU 1792	Palo Alto	1894
" "	SU 1807	Palo Alto	1893
" "	SU 4137	Palo Alto	1897
" "	SU 5262	Palo Alto	?
" "	SU 5310	Palo Alto	1908
" "	SU 7783	Stanford	1936
" "	SU 10818	L. Lagunita	?
" "	SU 10819	L. Lagunita	?
<i>Thamnophis sirtalis infernalis</i>	SU 1148	Palo Alto	1893
" "	SU 1189	Stanford	?
" "	SU 1193	Stanford	?
" "	SU 1196	Stanford	?
" "	SU 1791	Palo Alto	1894
" "	SU 4021	Palo Alto	1892
" "	SU 4136	Palo Alto	1897
" "	SU 4224	Palo Alto	1897
" "	SU 5263	Palo Alto	?
" "	SU 5272	Stanford	?
" "	SU 6381	Stanford	?
" "	SU 6382	Stanford	?
" "	SU 7834	L. Lagunita	1937
" "	SU 10230	Stanford	1943
" "	SU 11916	Stanford	1933
" "	SU 13798	Stanford	1909
" "	SU 13800	Stanford	1933
" "	CAS 54223	Stanford	1922



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Fig. 1. Major drainages on SLAC lands. No. 1 consists of two drainages at the east end of the site. They join at the horse track and a single channel flows into San Francisquito Creek. No. 2 is a small drainage located between Interstate 280 and the linear accelerator. No. 3 is a continuation of No. 2. It flows from the accelerator past the primate facility and eventually into San Francisquito Creek. This figure is modified from Barry (1976).

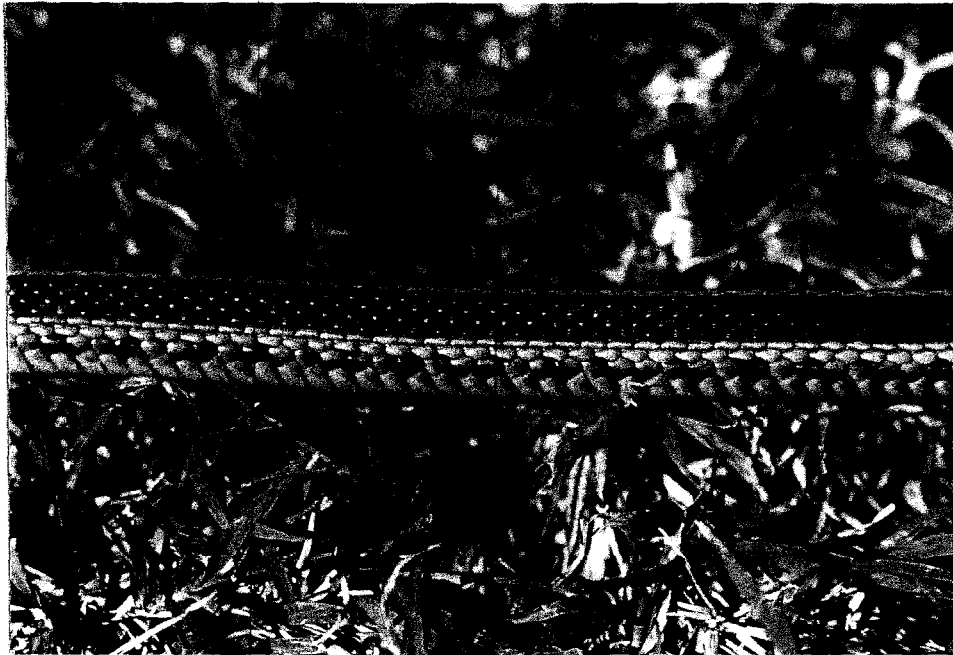


Fig. 2. Lateral view of the specimen of Thamnophis sirtalis infernalis x tetrataenia that was found at drainage 1 on SLAC lands just above the horse track. Note area of continuous red stripe (characteristic of tetrataenia) and area of black bars dividing the red (characteristic of infernalis).

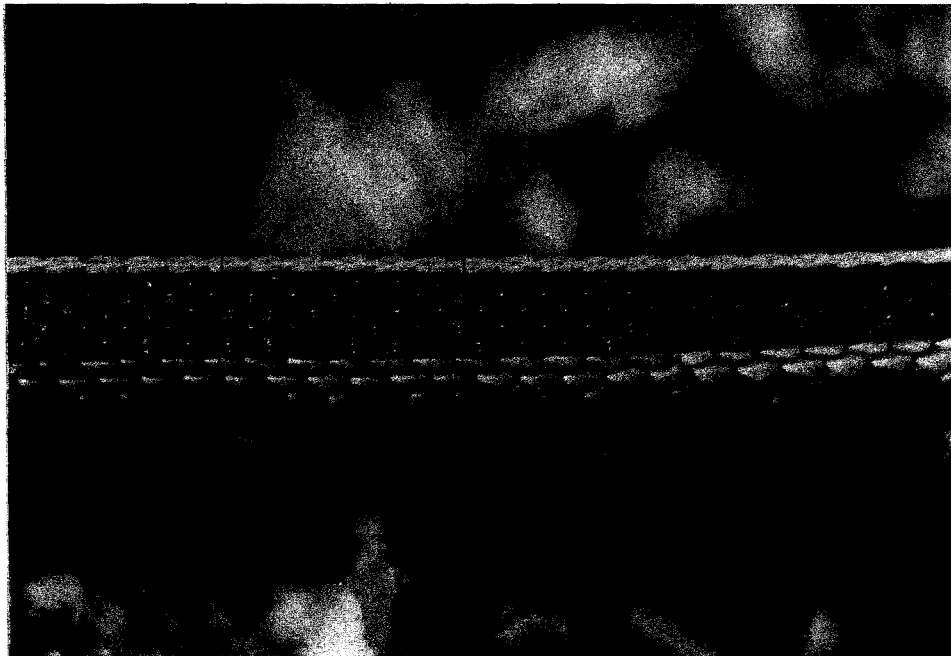


Fig. 3. Close-up lateral view of intergrade specimen.



Fig. 4. Searsville Lake adjacent to SLAC lands. Extensive marsh areas provide excellent habitat for Thamnophis sirtalis.



Fig. 5. Drainage 1 above the horse track. An intergrade garter snake (Thamnophis sirtalis infernalis x tetrataenia) was found here. A year round water flow and abundant riparian vegetation provide habitat for garter snakes.



Fig. 6. Drainage 2 below Interstate 280. This drainage was nearly dry in October, 1981. No frogs were seen here. This area is poor habitat for garter snakes.



Fig. 7. Drainage 3 looking past the primate facility towards San Francisquito Creek. Past the primate facility there was no water in the drainage in October, 1981. This drainage is poor garter snake habitat.