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STATUS OF THE GIANT GATER SNAKE
(Thamnophis gigas)
IN THE SAN JOAQUIN VALLEY - 1995 1/

by

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INTRODUCTION

During 1976-1977 surveys, giant garter snakes (Thamnophis gigas) were observed at numerous locations in the San Joaquin Valley from Gustine south to Burrell (Hansen and Brode 1980). During 1985-1986 surveys, no GGS were observed in this area, even though apparently suitable habitat persisted in the region (Hansen 1988). The 1995 survey concentrated on locating and analyzing habitats where GGS were observed during 1976-1977 surveys. Additional areas that appeared suitable were surveyed as time permitted.

METHODOLOGY

The locations of prior GGS sightings were rechecked to: 1) determine whether potentially suitable GGS habitat remained at these locations, and 2) determine, if possible, whether GGS still occur at these locations.

GGS were sought at each location shown to support this species during 1976-1977 (Table 1, Figure 1a, 1b, and 1c) using the methods employed by Hansen and Brode (1980) and Hansen (1988). Since the emphasis of these surveys was to establish presence of GGS, no attempt was made to rule out their presence except where previously surveyed habitats have been eliminated. Once GGS presence was established within a habitat through direct observation, survey efforts were curtailed at that site. This allowed more effort to be spent elsewhere in order to maximize coverage of the area.

Potential supporting habitats of the GGS were located by searching the Project area from roadways, by boat, and on foot. USGS 7.5-minute topographic maps were used to locate and mark areas of suitable habitat and plot GGS sightings. Sites were also identified with a Global Positioning Unit (GPS) and cross checked against topographic maps.

Field surveys were to be conducted during April, May, and June, and July 1995, during favorable weather conditions. Surveys were conducted by walking, wading, boating and driving along canals, sloughs and marshes. Binoculars were used to search potential basking spots and to identify snakes from a distance. GGS were also sought beneath surface objects, especially boards and other debris deposited by floodwaters. During all phases of field work, roadways were being searched for living and dead GGS.

RESULTS

Giant Garter Snake

During this survey, 38 sites (Tables 1-3) were visited and searched for GGS. No GGS were captured south of San Joaquin County during this survey. However, one badly mangled dead specimen was found on the Mendota Wildlife Area (MWA), run over repeatedly on one of the roads marked "closed to vehicles" (Figure 1a; A).

Additionally, three snakes that appeared to be GGS were observed in the field briefly but eluded capture. One of these was seen on the MWA and escaped from the canal bank into the water (Figure 1a, A). The other two suspected GGS were found in the South Grasslands in the vicinity of Santa Fe Road at Britto Road (Figure 1b; B,C). One of these escaped into dense tules after crossing Britto Road, the other escaped from the bank into the water of the Agatha Canal west of Santa Fe Road.

Several GGS were observed in the Coldani Marsh area of San Joaquin County (Figure 1c; D,E). This habitat occurs along the Upland Canal and adjoining Department of Fish and Game (DFG) Wildlife Area marshes and canals. GGS have been observed here annually since the 1976-1977 surveys by myself and others.

Habitat Status

Following is a list with descriptions of sites visited during this survey. Table 2 presents 1995 survey data from habitats known to have supported GGS during prior surveys (see Table 1). Table 3 presents survey data from apparently suitable habitats encountered during 1995, but where GGS were not observed during earlier surveys.

TABLE 1. Known San Joaquin Valley Localities of the Giant Garter Snake in 1976, Based on Records of the California Department of Fish and Game. (from Hansen, Brode 1980)

	Locality	County
1-76	Fresno Slough, 1 mile W Burrel	Fresno
2-76	Hwy. 180, 0.7 miles E San Mateo Ave., 4 miles ESE Mendota	Fresno
3-76	Mendota Waterfowl Management Area, 2.5 miles SE Mendota	Fresno
4-76	Fresno Slough, N Hwy. 180, 2 miles SE Mendota	Fresno
5-76	Mendota Pool Area, E end Bass Ave., 1.5 miles N Mendota	Fresno
6-76	Hwy. 33 at Douglass ave., 2 miles NW Firebaugh	Fresno
7-76	Helm Canal rd. at Coaches Gun Club, 3.5 miles SW Dos Palos	Merced
8-76	Santa Fe Rd., vic. Britto Rd., 4 miles W Dos Palos	Merced
9-76	Santa Fe Rd., 3 miles NW Britto Rd., 6 miles SE Los Banos	Merced
10-76	Santa Fe Rd., at Arroyo Canal, 3 miles E Los Banos	Merced
11-76	Santa Fe Rd., at San Luis Spillway, 6 miles N Los Banos	Merced
12-76	Salt Slough at Wolfesen Rd., 7 miles N Los Banos	Merced
13-76	Los Banos Waterfowl Management Area, 4 miles N Los Banos	Merced
14-76	San Luis National Wildlife Refuge, 10 miles NW Los Banos	Merced
15-76	Canal W side Hwy. 165, 8 miles N Los Banos	Merced
16-76	Los Banos Creek at Santa Fe Rd., 2.5 miles S Gun Club Rd., 6 miles SE Gustine	Merced

TABLE 1.. Continued

	Locality	County
17-76	Los Banos Creek at Gun Club Rd., 4 miles SE Gustine	Merced
18-76	Los Banos Creek, 0.5 miles N Hwy. 140, 3 miles NE (SE?) Gustine	Merced
19-76	Stockton Diverting Canal, 0.5 miles E Hwy. 88 at Hwy. 99	SanJoaquin
20-76	Eight Mile Rd. at W. P. Railroad tracks, 3.5 miles W Hwy. 99	SanJoaquin
21-76	White Slough, 1 mile W Thornton Rd., 1.5 miles S Hwy. 12	SanJoaquin
22-76	Coldani Marsh, 0.8 miles W Thornton Rd. at Hwy 12	SanJoaquin

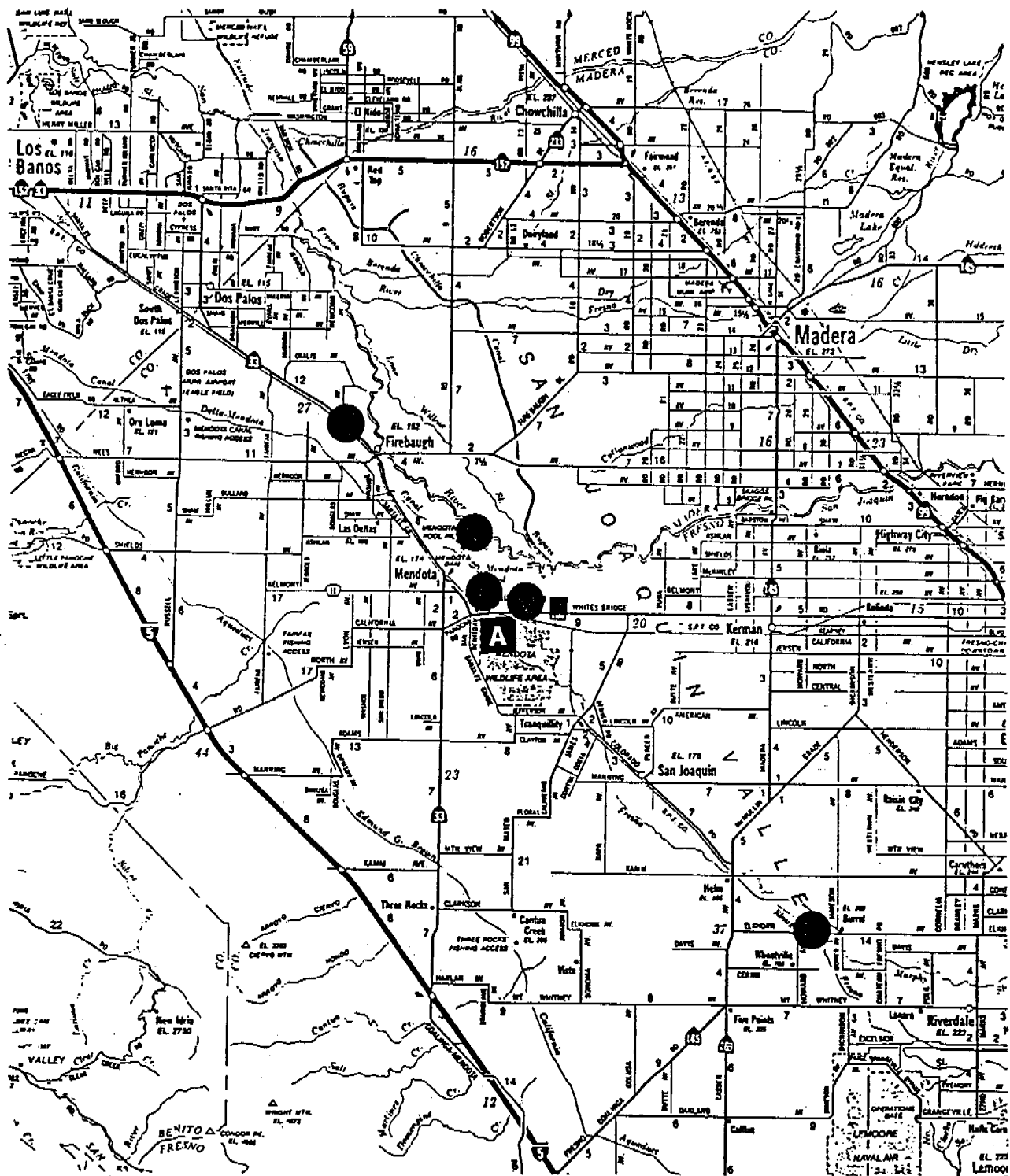


Figure 1a. Locations Surveyed During 1995 Giant Garter Snake (GGS) Surveys. Dark circles indicate locations where GGS were seen in 1976-1977 but not in 1995 (Tables 1 and 2); lettered squares indicate where GGS were sighted during 1976-1977 and again in 1995 (Tables 1 and 2); dark squares indicate sites surveyed during 1995 where GGS were not observed (Table 3).

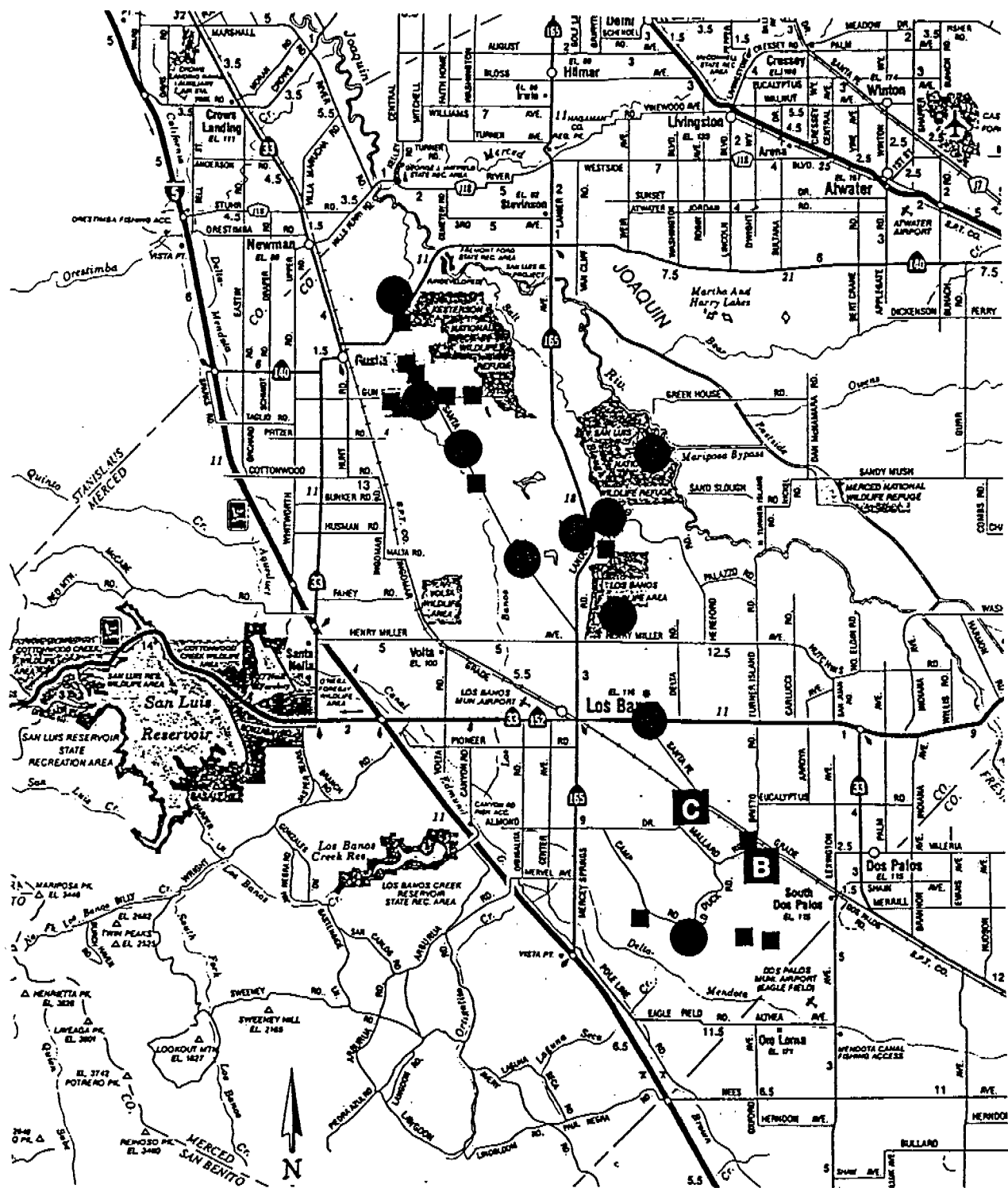


Figure 1b. Locations Surveyed During 1995 Giant Garter Snake (GGS) Surveys. Dark circles indicate locations where GGS were seen in 1976-1977 but not in 1995 (Tables 1 and 2); lettered squares indicate where GGS were sighted during 1976-1977 and again in 1995 (Tables 1 and 2); dark squares indicate sites surveyed during 1995 where GGS were not observed (Table 3).

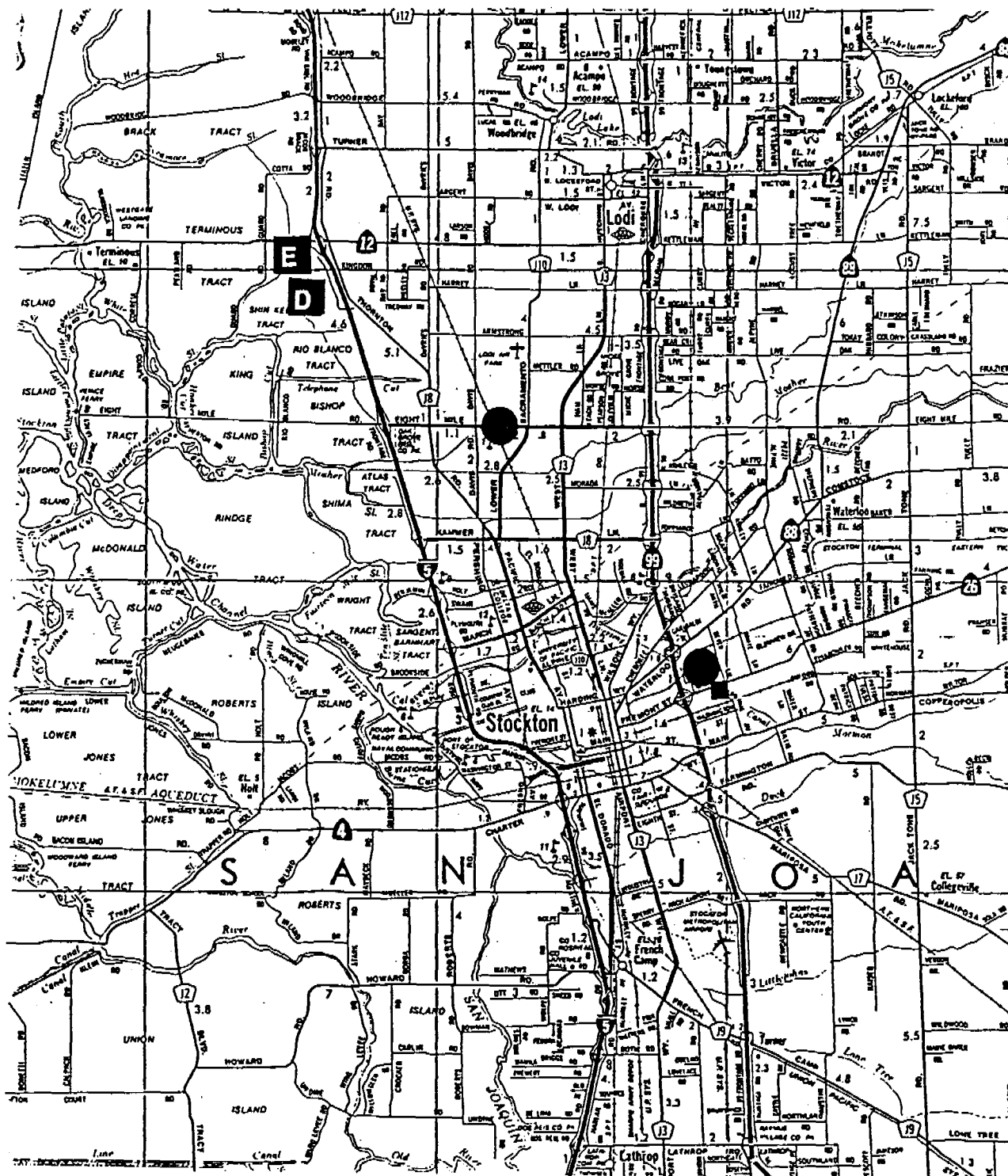


Figure 1c. Locations Surveyed During 1995 Giant Garter Snake (GGS) Surveys. Dark circles indicate locations where GGS were seen in 1976-1977 but not in 1995 (Tables 1 and 2); lettered squares indicate where GGS were sighted during 1976-1977 and again in 1995 (Tables 1 and 2); dark squares indicate sites surveyed during 1995 where GGS were not observed (Table 3).

TABLE 2. 1995 survey and GPS data from San Joaquin Valley localities known to have supported the giant garter snake in 1976, based on records of the California Department of Fish and Game (Hansen and Brode 1980). Map estimates are from records of the California Natural Diversity Data Base. In descriptions of canals, drains, and sloughs; small = 1-10 feet wide, medium = 11-20 feet wide, and large = over 21 feet wide.

NDDB	Locality	County	Reference	Loc#
8	Fresno Slough, 1 mile W. Burrell.	Fresno	CDFG	1-76
MAP	FIVE POINTS, CALIF. 1956 - REV 1978			
	T 17S R 18E : 1/4 OF NW 1/4 OF SECTION 03			
MAP EST.	N 36 o 29 '13 " W 120 o 00' 23 "			
GPS READ.	N 31 o 29 '08.01" W 120 o 00 '20.45" Q 1			
Habitat quality	poor, subject to extensive flooding			
Habitat type	mud-bottomed slough and flood plain between manicured levees; flood plain with ruderal vegetation, little bank vegetation, few willows and cottonwoods			
Prey observed	small fish			
GGS observed	0			
Photos	Slides N and S from bridges			
Dates visited	8/3, 11			
6	Hwy 180, 0.7 miles E San Mateo Ave., 4 miles ESE Mendota.	Fresno	CDFG	2-76
MAP	TRANQUILITY, CALIF. 1956 REV 1984			
	T 14S R 15E : SW 1/4 OF SE 1/4 OF SECTION 02			
MAP EST.	N 36 o 44 '07 " W 120 o 18 '03 "			
GPS READ.	N 36 o 44 '07.31" W 120 o 18 '07.55" Q 1			
Habitat quality	poor			
Habitat type	drainage canal with peppergrass, rushes, thistles on banks, dry S Hwy 180			
Prey observed	none			
GGS observed	0			
Photos				
Dates visited	5/29; 6/8, 26, 29; 8/9			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
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- 2a Mendota Wildlife Management Area Fresno MVZ, CDFG 3-76a
(MWA) at trestle, 0.8 miles E
Hwy 180 entrance).

MAP TRANQUILITY, CALIF. 1956 REV 1984

T 14S R 15E : 1/4 OF NE 1/4 OF SECTION 10
 MAP EST. N 36 o 43 '43 " W 120 o 19' 59 "
 GPS READ. N 36 o 43 '49.07" W 120 o 19 '19.06: Q 1
 Habitat quality poor
 Habitat type low lying areas now managed for waterfowl,
 dry during early summer survey (this area
 supported summer wetland habitat and GGS
 during 1970's.
 Prey observed none
 GGS observed 0
 Photos Slides of site
 Dates visited 5/29; 6/3,8,26,29; 7/5,8,14; 8/9

- 2b MWA, at intersecting canals near Fresno MVZ, CDFG; 3-76b
pump 1.5 mi ESE Hwy 180 entrance.

MAP TRANQUILITY, CALIF. 1956 REV 1984

T 14S R 15E : W 1/4 OF SW 1/4 OF SECTION 11
 MAP EST. N o ' " W o ' "
 GPS READ. N 36 o 43 '26.72" W 120 o 18 '32.61" Q 2
 Habitat quality fair
 Habitat type small roadside drainage ditch, between road
 and low areas (waterfowl habitat) dry until
 mid summer. Adjacent marsh/slough with
 emergent and bank vegetation including
 yellow waterweed, tules, cattails, nettles
 peppergrass, saltgrass, and mustard
 (similar to 1970's conditions).
 Prey observed small fish, bullfrogs
 GGS observed one GGS - snake escaped into water
 Photos Slides of site
 Dates visited 5/29; 6/3,8,26,29; 7/5,8,14; 8/9

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
2c	MWA, 0.5 miles S SP RR, 2.25 miles E Hwy 180 Entrance, at canal crossing N/S road at SE corner of Section 11.	Fresno	MVZ, CDFG; 3-76c	
MAP	TRANQUILITY, CALIF. 1956 REV 1984			
	T 14S R 15E : SE 1/4 OF SE 1/4 OF SECTION 11			
MAP EST.	N 0 ' " W 0 ' "			
GPS READ.	N 36 0 43 '37.49" W 120 0 18 '13.45" Q 1			
Habitat quality	dry			
Habitat type	medium canal that supported water and GGS during the 1970's, now blocked and dry			
Prey observed	none			
GGS observed	0			
Photos	Slides of site			
Dates visited	5/29; 6/3,8,26,29; 7/5,8,14; 8/9			
2d	MWA, S of SP RR at road crossing slough, 2 miles ESE Hwy 180 Entrance.	Fresno	MVZ, CDFG; 3-76d	
MAP	TRANQUILITY, CALIF. 1956 REV 1984			
	T 14S R 15E : SW 1/4 OF NE 1/4 OF SECTION 11			
MAP EST.	N 0 ' " W 0 ' "			
GPS READ.	N 36 0 43 '36.73" W 120 0 18 '09.67" Q 1			
Habitat quality	good, similar to 1970's conditions			
Habitat type	large open water slough with bank vegetation dominated by spike rush and peppergrass.			
Prey observed	small fish, bullfrogs			
GGS observed	0			
Photos	Slides of site			
Dates visited	5/29; 6/3,8,26,29; 7/5,8,14; 8/9			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
2e	MWA, 0.75 mi S of SP RR at intersecting canals, 1.5 miles SE Hwy 180 entrance.	Fresno	MVZ, CDFG; 3-76e	
MAP	TRANQUILITY, CALIF. 1956 REV 1984			
	T 14S R 15E : SW 1/4 OF SW 1/4 OF SECTION 11			
MAP EST.	N 36 o 43 '36.73"	W 120 o 18 '09.67"		
GPS READ.	N 36 o 43 '09.45"	W 120 o 18 '53.19"	Q 1	
Habitat quality	good, similar to 1970's conditions			
Habitat type	medium drainage canal with yellow waterweed in channel; tules and cattails at margins; and peppergrass, mustard, and saltgrass on banks.			
Prey observed	small fish and bullfrogs			
GGS observed	one GGS - dead on road.			
Photos	slides of site			
Dates visited	5/29; 6/3,8,26,29; 7/5,8,14; 8/9			
1,16	Area W of Fresno Slough and N of RR, N of Whitesbridge.	Fresno	CDFG	4-76
MAP	TRANQUILITY, CALIF. 1956 REV 1984			
	T 14S R 15E : 1/4 OF SW 1/4 OF SECTION 04			
MAP EST.	N 36 o 44 '21 "	W 120 o 20 '48 "		
GPS READ.	N 36 o 44 '08.17"	W 120 o 20 '54.25"	Q 2	
Habitat quality	good			
Habitat type	marshy/drain along N & S side RR W of Fresno Slough. Small channels connect railroad toe drains with Fresno Slough. Channels with yellow waterweed; margins and shallow areas with tules and cattails; banks with peppergrass, spike rush, mustard and thistles.			
Prey observed	small fish			
GGS observed	0			
Photos				
Dates visited	6/8, 26			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
3	Mendota Pool area, E end Bass Ave., E end of Helm Canal near Joaquin River, 1.5 miles N Mendota.	Fresno	MVZ	5-76
MAP	MENDOTA DAM, CALIF. 1956 REV 1984			
	T <u>13S</u> R <u>15E</u> : <u>1/4</u> OF <u>E</u> <u>1/4</u> OF SECTION <u>19</u>			
MAP EST.	N <u>36</u> o <u>47</u> '04 " W <u>120</u> o <u>22</u> '19 "			
GPS READ.	N <u>36</u> o <u>47</u> '11.41" W <u>120</u> o <u>22</u> '23.70" Q <u>1</u>			
Habitat quality	fair			
Habitat type	large canal with riprap and vegetation (mustard, peppergrass, thistles) on banks. Through cultivated lands.			
Prey observed	fish			
GGs observed	0			
Photos	Slides of site			
Dates visited	6/29; 7/8			
7	Hwy 33 at Douglass Ave., 2 miles NW Firebaugh.	Fresno	CDFG	6-76
MAP	POSO FARM *			
	T <u>12S</u> R <u>14E</u> : <u>1/4</u> OF <u>SW</u> <u>1/4</u> OF SECTION <u>18</u>			
MAP EST.	N <u>36</u> o <u>53</u> '02 " W <u>120</u> o <u>29</u> '21"			
GPS READ.	N <u>36</u> o <u>52</u> '57.52" W <u>120</u> o <u>29</u> '25.44" Q <u>2</u>			
Habitat quality	fair			
Habitat type	mid sized canal through agricultural land and fallow railroad right-of-way. Banks support peppergrass, thistles, nettles, and saltgrass. Habitat suitable S of Hwy only			
Prey observed	small fish			
GGs observed	0			
Photos				
Dates visited	6/29; 7/8			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
54	Helm Canal Road, 3.5 miles SW Dos Palos (at Coaches Gun Club).	Merced	CDFG	7-76
MAP	CHARLESTON SCHOOL, CALIF., 1956 - REV 1971			
	T <u>11E</u> R <u>11S</u> : <u>SE 1/4 OF SW 1/4 OF SECTION 27</u>			
MAP EST.	N <u>o</u> ' <u>"</u> W <u>o</u> ' <u>"</u>			
GPS READ.	N <u>36 o 56 '22.40"</u> W <u>120 o 45 '26.24"</u> Q <u>2</u>			
Habitat quality	good			
Habitat type	vegetated Camp 13 Slough/drain N of Main Canal; peppergrass, mustard, thistles and saltgrass on banks; yellow waterweed in channel; tules and cattails in stands along margins. Through South Grasslands Duck Clubs			
Prey observed	small fish			
GGs observed	0			
Photos	Slides of site			
Dates visited	5/6,23,25; 6/8,17; 7/5,8,14,31			
28	4 miles W Dos Palos (vic. Santa Fe X Britto Rds).	Merced	CDFG	8-76
MAP	DOS PALOS, CALIF. 1956 REV 1984			
	T <u>11S</u> R <u>12E</u> : <u>1/4 OF NW 1/4 OF SECTION 07</u>			
MAP EST.	N <u>36 o 59 '36 "</u> W <u>120 o 42 '21 "</u>			
GPS READ.	N <u>36 o 08 '22.50"</u> W <u>120 o 42 '19.16"</u> Q <u>1</u>			
Habitat quality	good			
Habitat type	medium canal/slough with vegetated banks adjacent to managed marsh (duck clubs). Channel with yellow waterweed; banks with spike rush, peppergrass, thistles and mustard.			
Prey observed	small fish, bullfrogs			
GGs observed	one snake (apparently GGS) escaped into roadside vegetation.			
Photos				
Dates visited	5/6,23,25; 6/3,8,17; 7/5,8,14,31			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
21	Santa Fe Road, 3 miles NW Britto Road, 6 miles SE Los Banos.	Merced	CDFG	9-76
MAP	DELTA RANCH, CALIF. 1961 REV 1977			
	T 10S R 11E : 1/4 OF SE 1/4 OF SECTION 34			
MAP EST.	N 37 o 00 '59 " W 120 o 44 '52 "			
GPS READ.	N 37 o 00 '39.17" W 120 o 44 '33.09 Q 3			
Habitat quality	good			
Habitat type	small-medium canal/slough with tules and neglected, vegetated banks (peppergrass, nettle, thistle, saltgrass, few willows). Located along old railroad right-of-way amid wetlands managed for waterfowl (duck clubs)			
Prey observed	small fish, bullfrogs			
GGS observed	0			
Photos				
Dates visited	5/6,23,25; 6/3,8,17; 7/5,8,14,31			
25	Salt Slough at Wolfsen Road, 7 miles N Los Banos.	Merced	CDFG	12-76
MAP	SAN LUIS RANCH, CALIF. 1961 REV 1987			
	T 09S R 11E : 1/4 OF SW 1/4 OF SECTION 07			
MAP EST.	N 37 o 09 '32 " W 120 o 48 '42 "			
GPS READ.	N 37 o 08 '31.31" W 120 o 48 '44.92" Q 1			
Habitat quality	fair - similar to 1970's conditions			
Habitat type	muddy, fairly fast flowing medium slough between agricultural land and managed marsh (duck clubs and San Luis National Wildlife Refuge). Stands of tule, cattail, peppergrass in shallows and at margins; thistles, spike rush, mustard and saltgrass on banks.			
Prey observed	fish			
GGS observed	0			
Photos				
Dates visited	5/6,23,25; 6/8,17,24; 7/5,8,14,25,27,30			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
23	4 miles N Los Banos (LBWMA).	Merced	MVZ	13-76
MAP	LOS BANOS, CALIF. 1960 REV 1987			
	T 09S R 11E : 1/4 OF E 1/4 OF SECTION 30			
MAP EST.	N 37 o 07 '17 " W 120 o 47 '49 "			
GPS READ.	N o ' " W o ' " Q			
Habitat quality	fair			
Habitat type	intersection of small swale/slough and small drainage canal through managed wetland (waterfowl habitat). Cattail, tule willow and peppergrass stand on banks and in water.			
Prey observed	small fish and bullfrogs			
GGS observed	0			
Photos				
Dates visited	5/6,23,25; 6/8,17,24; 7/5,8,14,25,27,30			
41	San Luis NWR, 10 miles NE Los Banos (N Mercy Hot Springs Rd., 7.8 mi N Los Banos).	Merced	CDFG	14-76
MAP	SAN LUIS RANCH, CALIF. 1961 REV 1987			
	T 08S R 11E : 1/4 OF SE 1/4 OF SECTION 30			
MAP EST.	N 37 o 12 '09 " W 120 o 47 '47 "			
GPS READ.	N 37 o 09 '11.44" W 120 o 49 '37.56" Q 1			
Habitat quality	fair - similar to 1976 conditions			
Habitat type	medium roadside drainage canal, banks with tule, cattail, peppergrass and few willows. W of Highway, runs beside grazing land and managed wetland (duck clubs and Kesterson National Wildlife Refuge).			
Prey observed	small fish and bullfrogs			
GGS observed	0			
Photos				
Dates visited	5/6,23,25; 6/8,17,24; 7/5,8,14,25,27,30			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
42	Lander Ave. (Hwy 165), 8 miles N Los Banos (N Zimmerman Gun Club).	Merced	CDFG	15-76
MAP	SAN LUIS RANCH, CALIF. 1961 REV 1987			
	T 09S R 10E : 1/4 OF SW 1/4 OF SECTION 12			
MAP EST.	N 37 o 09 '38 " W 120 o 49 '43 "			
GPS READ.	N 37 o 09 '11.44" W 120 o 49 '37.56" Q 1			
Habitat quality	fair - similar to 1976 conditions			
Habitat type	medium roadside drainage canal, banks with tule, cattail, peppergrass and few willows. W of Highway, runs beside grazing land and managed wetland (duck clubs and Kesterson National Wildlife Refuge.			
Prey observed	small fish and bullfrogs			
GGs observed	0			
Photos				
Dates visited	5/6,23,25; 6/8,17,24; 7/5,8,14,25,27,30			
33	Los Banos Creek at Santa Fe Road, 6 miles SE Gustine, 2.5 miles S Gun Club Rd.	Merced	CDFG	16-76
MAP	INGOMAR, CALIF. 1960 REV 1971			
	T 09S R 10E : NW 1/4 OF NW 1/4 OF SECTION 5			
MAP EST.	N 37 o 11 '45 " W 120 o 54 '43 "			
GPS READ.	N 37 o 12 '11.11" W 120 o 54 '54.14" Q 1			
Habitat quality	good during early summer, dried by mid July			
Habitat type	small-medium marshy roadside drain/slough through managed marsh (duck clubs). Dense stands of tule, cattail, peppergrass on banks and interior channel banks			
Prey observed	small fish			
GGs observed	0			
Photos				
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
31	4 mi SE Gustine nr Los Banos Ck at Gun Club Rd.	Merced	MVZ	17-76
MAP	INGOMAR, CALIF. 1960 REV 1971			
	T 08S R 09E : 1/4 OF SE 1/4 OF SECTION 14			
MAP EST.	N 37 ° 14 '03 " W 120 ° 56 '26 "			
GPS READ.	N 37 ° 13 '56.39" W 120 ° 56 '30.82" Q 1			
Habitat quality	good			
Habitat type	shallow marsh/ponded slough through managed marsh N and S of road. Dense stands of tule cattail at water edge, peppergrass and thistles on drier uplands			
Prey observed	small fish			
GGs observed	0			
Photos				
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30			
27	Hwy 140, 3 miles NE Gustine (0.5 miles N on Los Banos Ck).	Merced	CDFG	18-76
MAP	GUSTINE, CALIF. 1960 REV 1973			
	T 07S R 09E : 1/4 OF E 1/4 OF SECTION 34			
MAP EST.	N 37 ° 16 '52 " W 120 ° 57 '31 "			
GPS READ.	N ° ' " W ° ' " Q			
Habitat quality	fair - similar to 1976 conditions			
Habitat type	small vegetated slough through agricultural land, tule and cattail on interior banks, yellow waterweed in channel, peppergrass and thistles on upper bank			
Prey observed	small fish, bullfrogs			
GGs observed	0			
Photos				
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
55	Stockton Diverting Canal, 0.5 mi E Hwy 88 at Hwy 99.	San Joaquin	MVZ	19-76
MAP	STOCKTON EAST (unavailable)			
	T 02N R 08E : 1/4 OF NW 1/4 OF SECTION			
MAP EST.	N 37 o 58 '54 "	W 121 o 14 '55 "		
GPS READ.	N 37 o 58 '47.01"	W 121 o 14 '40.34"	Q	
Habitat quality	fair - conditions similar to 1970's			
Habitat type	drainage slough/canal through industrial area, pond upstream from check dam, enclosed between manicured levees. Banks support tule, cattail, peppergrass, and thistles. Yellow waterweed in channel.			
Prey observed	small fish			
GGS observed	0			
Photos				
Dates visited	6/13,22; 7/16			
53	Eight Mile Road at WPRR, 3.5 miles W Hwy. 99.	San Joaquin	CDFG	20-76
MAP	LODI SOUTH			
	T 02N R 06E : 1/4 OF NW 1/4 OF SECTION 04			
MAP EST.	N 38 o 03 '28 "	W 121 o 19 '27 "		
GPS READ.	N 38 o 03 '27.14"	W 121 o 19 '26.43"	Q	
Habitat quality	fair			
Habitat type	roadside drain; vegetated with peppergrass, thistles, tules and cattails. Through cultivated land and golf course			
Prey observed	small fish			
GGS observed	0			
Photos				
Dates visited	6/13,22; 7/16			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
51	White Slough (area) at Upland Canal, 1 mi W Thornton Rd, 1.5 mi S Hwy 12.	San Joaquin	CDFG	21-76
MAP	TERMINOUS, CALIF. 1978			
	T 02N R 06E : 1/4 OF 1/4 OF SECTION			N/A
MAP EST.	N 38 ° 03 '28 "	W 121 ° 19 '27 "		
GPS READ.	N ° ' "	W ° ' "		0
Habitat quality	fair			
Habitat type	Intersection of medium canal and large slough. Open water with yellow waterweed and hyacinth; banks with willow, nettle, mustard, thistle and saltgrass. Through cultivated land (W) and state wildlife area (E).			
Prey observed	small fish and bullfrogs			
GGS observed	0			
Photos				
Dates visited	3/25; 4/14,15,22; 5/4,16; 6/11			
49a	Coldani Marsh, 0.8 mi W Thornton Rd at Hwy 12 (State wildlife area canals and Upland Canal).	San Joaquin	CDFG	22-76
MAP	TERMINOUS, CALIF. 1978			
	T 03N R 05E : 1/4 OF 1/4 OF SECTION			N/A
MAP EST.	N 38 ° 06 '54 "	W 121 ° 24 '30 "		
GPS READ.	N 38 ° 06 '55.69"	W 121 ° 24 '47.82"		0 1
Habitat quality	good			
Habitat type	large canal/slough with levee on one side, marsh on the other. Marsh with tule, cattail, nettle and few willows; levee bank with nettle, blackberry, wild rose, mustard thistle and saltgrass. Channel with yellow waterweed, many snags and branches in water			
Prey observed	small fish and bullfrogs			
GGS observed	0			
Photos				
Dates visited	3/25; 4/14,15,22; 5/4,16; 6/11			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
49b	Coldani Marsh, 1.2 mi W Thornton Rd, 0.25 mi S Hwy 12 (Upland Canal at old bridge).	San Joaquin	CDFG	22-76
MAP	TERMINOUS, CALIF. 1978			
	T 03N R 05E : 1/4 OF 1/4 OF SECTION N/A			
MAP EST.	N 38 o 06 '54 " W 121 o 24 '30 "			
GPS READ.	N 38 o 06 '46.83" W 121 o 24 '47.75" Q 1			
Habitat quality	good			
Habitat type	large canal/slough with levee on one side, marsh on the other. Marsh with tule, cattail, nettle and few willows; levee bank with nettle, blackberry, wild rose, mustard thistle and saltgrass. Channel with yellow waterweed, many snags and branches in water			
Prey observed	small fish and bullfrogs			
GGs observed	0			
Photos				
Dates visited	3/25; 4/14,15,22; 5/4,16; 6/11			
49c	Coldani Marsh, 1.25 mi W Thornton Rd, 0.4 mi S Hwy 12 (Upland Canal (across from bay)).	San Joaquin	CDFG	22-76
MAP	TERMINOUS, CALIF. 1978			
	T 03N R 05E : 1/4 OF 1/4 OF SECTION N/A			
MAP EST.	N 38 o 06 '54 " W 121 o 24 '30 "			
GPS READ.	N 38 o 06 '41.16" W 121 o 24 '49.55" Q 2			
Habitat quality	good			
Habitat type	large canal/slough with levee on one side, marsh on the other. Marsh with tule, cattail, nettle and few willows; levee bank with nettle, blackberry, wild rose, mustard thistle and saltgrass. Channel with yellow waterweed, many snags and branches in water			
Prey observed	small fish and bullfrogs			
GGs observed	two - adults - escaped from bank to water			
Photos				
Dates visited	3/25; 4/14,15,22; 5/4,16; 6/11			

TABLE 2. Continued

NDDB	Locality	County	Reference	Loc#
49d	Coldani Marsh, 1.3 mi W Thornton Rd, 0.75 mi S Hwy 12 (Upland Canal at gated culvert).	San Joaquin	CDFG	22-76
MAP	TERMINOUS, CALIF. 1978			
	T 03N R 05E : 1/4 OF 1/4 OF SECTION N/A			
MAP EST.	N 38 o 06 '54 "	W 121 o 24 '30 "		
GPS READ.	N 38 o 06 '27.92"	W 121 o 24 '55.47"	Q 2	
Habitat quality	good			
Habitat type	large canal/slough with levee on one side, marsh on the other. Marsh with tule, cattail, nettle and few willows; levee bank with nettle, blackberry, wild rose, mustard thistle and saltgrass. Channel with yellow waterweed, many snags and branches in water			
Prey observed	small fish and bullfrogs			
GGs observed	0			
Photos				
Dates visited	3/25; 4/14,15,22; 5/4,16; 6/11			
49e	Coldani Marsh, 1.3 mi W Thornton Rd, 0.8 mi S Hwy 12 (canal E of Upland Canal).	San Joaquin	CDFG	22-76
MAP	TERMINOUS, CALIF. 1978			
	T 03N R 05E : 1/4 OF 1/4 OF SECTION N/A			
MAP EST.	N 38 o 06 '54 "	W 121 o 24 '30 "		
GPS READ.	N 38 o 06 '25.24"	W 121 o 24 '58.00"	Q 2	
Habitat quality	good			
Habitat type	medium canal/slough with levee on one side, marsh on the other. Marsh with tule, cattail, nettle and few willows; levee bank with nettle, blackberry, wild rose, mustard thistle and saltgrass. Channel with yellow waterweed, many snags and branches in water			
Prey observed	small fish and bullfrogs			
GGs observed	two - one medium and one large adult, both escaped to water			
Photos				
Dates visited	3/25; 4/14,15,22; 5/4,16; 6/11			

TABLE 3. Additional San Joaquin Valley Locations Surveyed for the Presence of the Giant Garter Snake in 1995, (for re-checks of 1976 GGS locations see TABLE 2). In descriptions of canals, drains, and sloughs small = 1-10 feet wide, medium = 11-20 feet wide, and large = over 21 feet wide.

LOC #	Locality	County
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1-95 Gun Club Rd. @ #2 bend W of Santa Fe Rd. @ parallel canals. Merced

MAP INGOMAR, CALIF., 1960 - REV 1971
T 8S R 9E : SW 1/4 OF SW 1/4 OF SECTION 14
GPS READ. N 37 ° 13 '52.66" W 120 ° 57 '28.09" Q 2
Habitat quality good - well vegetated/neglected banks
Habitat type parallel canal/drain system, medium channels with yellow waterweed, tule and cattail stands; rushes, thistles, mustard and peppergrass, and saltgrass on banks. Through cultivated land and managed marsh (duck clubs).
Prey observed small fish and bullfrogs
GGS observed 0
Photos
Dates visited 5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30

2-95 Gun Club Rd. @ old bridge/creek crossing, 1st bend W of Santa Fe Rd. Merced

MAP INGOMAR, CALIF., 1960 - REV 1971
T 8S R 9E : SW 1/4 OF 1/4 OF SECTION 14
GPS READ. N 37 ° 13 '59.36" W 120 ° 57 '09.89" Q 1
Habitat quality fair - well vegetated marshy swale/slough,
Habitat type open pond/marsh S of road with tule/cattail margins and emergent stands, peppergrass and thistles on banks. Small swale/drain N of road dries in summer. Through managed marsh (duck clubs).
Prey observed small fish
GGS observed 0
Photos
Dates visited 5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30

TABLE 3. Continued

LOC #	Locality	County
3-95	Gun Club Rd. @ Santa Fe Rd.	Merced
MAP	INGOMAR, CALIF., 1960 - REV 1971	
	T 8S R 9E : SW 1/4 OF 1/4 OF SECTION 13	
GPS READ.	N 37 o 13 '52.41" W 120 o 56 '03.96" Q 1	
Habitat quality	good - medium canal with vegetated banks S of Gun Club Road, medium vegetated slough N of road.	
Habitat type	medium channel with saltgrass, peppergrass and rushes on banks, yellow waterweed, tules, and cattails at water margins. Crosses to NE and becomes meandering slough	
Prey observed	small fish and bullfrogs	
GGs observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	
4-95	Mud Slough @ Gun Club Rd.	Merced
MAP	INGOMAR, CALIF., 1960 - REV 1971	
	T R : 1/4 OF 1/4 OF SECTION	
GPS READ.	N 37 o 12 '51.61" W 120 o 53 '51.66" Q 1	
Habitat quality	good - open water channel with vegetated banks	
Habitat type	intersection of medium canal (N of road) and small swale/marsh (S of road). Saltgrass on banks, yellow waterweed in channels, tules and cattails along margins and in stands. Through managed marsh (duck clubs).	
Prey observed	small fish and bullfrogs	
GGs observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	

TABLE 3. Continued

LOC #	Locality	County
5-95	Los Banos Creek @ Santa Fe Rd., ~1.2 miles N Gun Club Rd.	Merced
MAP	INGOMAR, CALIF., 1960 - REV 1971	
	T 8S R 9E : NE 1/4 OF 1/4 OF SECTION 14	
GPS READ.	N 37 ° 14 '44.99" W 120 ° 56 '37.40" Q 2	
Habitat quality	good - vegetated slough/canal	
Habitat type	medium drain/slough with yellow waterweed in channel, tules and cattails at margins, and peppergrass, mustard and thistles on banks. Through managed marsh (duck clubs).	
Prey observed	small fish	
GGs observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	
6-95	Canal intersecting Los Banos Creek at Santa Fe Rd., 1.7 miles N of Gun Club Rd.	Merced
MAP	GUSTINE, CALIF. 1960 - REV 1973	
	T 8S R 9E : NW 1/4 OF 1/4 OF SECTION 11	
GPS READ.	N 37 ° 15 '09.31" W 120 ° 56 '54.66" Q 2	
Habitat quality	good - drains and canals with vegetated banks intersect	
Habitat type	canal/slough intersection - small and medium channels and margins with yellow waterweed, tules, cattails; banks with peppergrass, thistles, nettles, saltgrass. Through managed marsh (duck clubs).	
Prey observed	small fish and bullfrogs	
GGs observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	

TABLE 3. Continued

LOC #	Locality	Merced
7-95	Los Banos Creek @ Hwy. 140.	Merced
MAP	GUSTINE, CALIF. 1960 - REV 1973	
	T 7S R 9E : SW 1/4 OF 1/4 OF SECTION 35	
GPS READ.	N 37 o 16 '33.46" W 120 o 57 '18.70" Q 1	
Habitat quality	fair - small slough with vegetated banks.	
Habitat type	small slough with yellow waterweed in channel; tules and cattails at margins; peppergrass, thistles and saltgrass on banks. Through grassland/managed marsh S and W, cultivated fields NE.	
Prey observed	small fish	
GGS observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	
8-95	Wolfesen Rd. E Hwy 165 @ parallel canals.	Merced
MAP	SAN LUIS RANCH, CALIF., 1961 - REV 1987	
	T 9S R 10E : SE 1/4 OF 1/4 OF SECTION 13	
GPS READ.	N 37 o 08 '50.35" W 120 o 49 '24.16" Q 1	
Habitat quality	good - vegetated canal/drain system	
Habitat type	parallel medium canal and drain with yellow waterweed in channel; tules and cattails on banks; and peppergrass, thistle, saltgrass and mustard on banks. Through grazing land and managed marsh (San Luis National Wildlife Refuge).	
Prey observed	small fish and bullfrogs	
GGS observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	

TABLE 3. Continued

LOC #	Locality	County
9-95	Agatha Canal W Santa Fe Rd., vic of Britto Rd.	Merced
MAP	DOS PALOS, CALIF., 1956 - REV 1984	
	T <u>11S</u> R <u>11E</u> : <u>NE 1/4</u> OF <u>1/4</u> OF SECTION <u>12</u>	
GPS READ.	N <u>36</u> o <u>59</u> '29.87" W <u>120</u> o <u>54</u> '12.23" Q <u>1</u>	
Habitat quality	good - vegetated canal/drain intersection	
Habitat type	canals/drains intersect to form complex of channels and vegetated swales along old railroad right of way. Tules and cattails in low areas and at channel margins; yellow waterweed in some channels; mustard, saltgrass, nettles, and peppergrass on banks	
Prey observed	small fish and bullfrogs	
GGS observed	one - escaped into water	
Photos		
Dates visited	5/6,23,25; 6/3,8,17; 7/5,8,14,31	
10-95	Santa Fe Rd. @ small ditch from SW ~3.5 mi S Gun Club Rd.	Merced
MAP	INGOMAR, CALIF., 1960 - REV 1971	
	T <u>9S</u> R <u>10E</u> : <u>NW 1/4</u> OF <u>NW 1/4</u> OF SECTION <u>5</u>	
GPS READ.	N <u>37</u> o <u>11</u> '08.26" W <u>120</u> o <u>54</u> '11.87" Q <u>1</u>	
Habitat quality	good - small canal with reedy banks,	
Habitat type	small canal/ditch with yellow waterweed in channel; spike rushes, saltgrass, nettles, and peppergrass on banks; through managed marsh (duck clubs).	
Prey observed	small fish	
GGS observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17,24; 7/5,8,14,25,27,30	

TABLE 3. Continued

LOC #	Locality	County
11-95	Hwy 180, 2.8 mi E San Mateo Ave.	Fresno
MAP	TRANQUILITY, CALIF., 1956 - REV 1984	
	T 14S R 16E : NW 1/4 OF NE 1/4 OF SECTION 7	
GPS READ.	N 36 o 44 '04.09" W 120 o 15 '49.30" Q 1	
Habitat quality	fair N of Hwy, poor S of Hwy	
Habitat type	open water slough through agricultural land; spike rushes, peppergrass, saltgrass and nettles on low banks, little buffer between channel and adjacent cultivated fields, channel dry S of Hwy.	
Prey observed	none	
GGS observed	0	
Photos		
Dates visited	5/29; 6/8,26,29; 7/5,8,14; 8/9	
12-95	Hwy 24 @ Stockton Diverting Canal.	San Joaquin
MAP	STOCKTON EAST, CALIF. (unavailable)	
	T R : 1/4 OF 1/4 OF SECTION	
GPS READ.	N 37 o 58 '26.20" W 121 o 14 '51.12" Q 1	
Habitat quality	fair - conditions similar to 1970's	
Habitat type	large bypass/slough/drainage canal through industrial area, pond upstream from check dam, enclosed between manicured levees. Banks support tule, cattail, peppergrass, and thistles. Yellow waterweed in channel.	
Prey observed	small fish and bullfrogs	
GGS observed	0	
Photos		
Dates visited	6/13,22; 7/16	

TABLE 3. Continued

LOC #	Locality	County
13-95	Ditch N Main Canal ~ 2 mi WNW Camp 13 Rd.	Merced Co.
MAP	CHARLESTON SCHOOL, CALIF. 1956 REV 1971	
	T 11S R 11E : SE 1/4 OF NE 1/4 OF SECTION 29	
GPS READ.	N 36 o 57 '22.40" W 120 o 45 '26.24" Q 2	
Habitat quality	fair - drying by mid-July	
Habitat type	small shallow marshy swale and vegetated ditch N of Main Canal. Through grazing land and managed marsh (duck clubs).	
Prey observed	small fish	
GGs observed	0	
Photos	slides	
Dates visited	5/6,23,25; 6/3,8,17; 7/5,8,14,31	
14-95	Frazier Gun Club @ Main Canal, ~2 mi E Camp 13 Rd.	Merced
MAP	DOS PALOS, CALIF., 1956 - REV 1984	
	T 11E R 11S : SW 1/4 OF SE 1/4 OF SECTION 25	
GPS READ.	N 36 o 56 '20.10" W 120 o 48 '01.80" Q 2	
Habitat quality	good - vegetated drains and canals	
Habitat type	intersection of small, medium, and large canals and sloughs. Channels N of Main Canal vegetated with yellow waterweed, tules and cattails. Banks support dense cattail and tule margins, thistles, nettles mustard peppergrass and saltgrass. Through grazing land and managed marsh (duck clubs)	
Prey observed	small fish	
GGs observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17; 7/5,8,14,31	

TABLE 3. Continued

LOC #	Locality	County
15-95	Main Canal @ Agatha Canal Rd. ~4 mi S Santa Fe Rd.	Merced
MAP	DOS PALOS, CALIF., 1956 - REV 1984	
	T 12E R 11S : SE 1/4 OF NW 1/4 OF SECTION 31	
GPS READ.	N 36 o 56 '08.92" W 120 o 42 '11.95" Q 1	
Habitat quality	good - vegetated drains and canals	
Habitat type	intersection of small, medium, and large canals and sloughs. Channels N of Main Canal vegetated with yellow waterweed, tules and cattails. Banks support dense cattail and tule margins, thistles, nettles, mustard peppergrass and saltgrass. Between grazing land/managed marsh (duck clubs) and cultivated fields.	
Prey observed	small fish	
GGS observed	0	
Photos		
Dates visited	5/6,23,25; 6/3,8,17; 7/5,8,14,31	

DISCUSSION

Potentially suitable environments for GGS were found at or near each of the locations known to have supported GGS during 1976-1977 surveys. These environments consist of mud-bottomed sloughs, canals, drains and other ditches that contain water during the summer activity season. Examples of bank vegetation include tule and cattail stands, peppergrass, reeds, grasses, nettles, mustard and thistles. Aquatic life (potential prey of GGS) at these locations varied from site to site, but nearly always included mosquitofish (Gambusia affinis) and at least a few bullfrogs (Rana catesbeiana).

Generally, however, GGS habitats have deteriorated within the North and South Grasslands areas around Los Banos and near Mendota since our 1976-1977 and 1987 DFG surveys. Many canals and drains now are maintained without vegetation (using herbicides and dredging), others that held water during earlier surveys are now dry. The concrete lined canal running from southeast to northwest through the Grasslands area (Mud Slough Bypass Canal, Santa Fe Canal, Arroyo Canal) is located within a short distance of many of the Grasslands GGS localities, and may be having a detrimental effect on local GGS.

Many apparently suitable GGS habitats have been lost throughout the Central Valley since our earlier DFG surveys (Hansen and Brode 1980, Hansen 1988). However, GGS remain observable at many locations within the Sacramento Valley, while sightings of GGS within the San Joaquin Valley have become very rare. Central San Joaquin Valley GGS appear to have declined even more dramatically over the last two decades than has apparently suitable habitat. This suggests that these declines in San Joaquin Valley GGS numbers may be attributable to factors in addition to loss of habitat, factors that affect GGS within what appear to be suitable wetland habitats. Thus, a combination of habitat loss (through urban and agricultural development) and habitat degradation (by poor water quality, toxins, or past interruptions in water supplies) probably share responsibility for recent declines in San Joaquin Valley GGS.

RECOMMENDATIONS

Since GGS do persist within the San Joaquin Valley, efforts to protect these snakes and their habitat should continue. Additional surveys of GGS distribution (especially within the San Joaquin Valley) and studies of GGS life history are needed to better understand this snake and its habitat requirements. Until GGS and its habitat are better understood, caution should be exercised to avoid ruling out GGS presence (as in pre-construction wildlife surveys) in known or suspected habitats simply because they are not observed during wildlife surveys or have not been recorded there recently.

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