

Surveys for Giant Garter Snakes in Solano County: 2005 Report

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BACKGROUND

Giant garter snakes (*Thamnophis gigas*) are endemic to wetlands of the Central Valley and are federally and state listed as threatened (U.S. Fish and Wildlife Service 1993) because of loss of over 95% of original wetlands in the Central Valley (Frayer et al. 1989) and fragmentation of remaining habitat. Little information exists on giant garter snakes in Solano County beyond historic observations conducted on a haphazard basis. Focused surveys are needed to assess the distribution and abundance of giant garter snakes in Solano County to provide scientific information for habitat conservation planning for Solano County. This report summarizes the results of the USGS surveys for giant garter snakes in Solano County for the 2005 field season, the second year of surveys.

OBJECTIVES

The objectives of this project are 1) to determine the presence or the (presumptive) absence of giant garter snakes in selected irrigation canals and natural drainage features in eastern Solano County, 2) estimate the abundance of giant garter snakes in areas where snakes are present, and 3) assess the quality of habitat types for supporting giant garter snakes in the study areas.

PROCEDURES

We sampled 17 locations along irrigation canals, drains and natural water features in the eastern part of Solano County we determined most likely to support populations of giant garter snakes (Figure 1, Table 1). Modified floating minnow traps (Casazza et al. 2000) were deployed along the edge of the water at each location approximately 10 meters apart. Traps were checked daily for giant garter snakes. Prey species (fish, frogs, and tadpoles) were counted in one out of five traps. Habitat was characterized within one meter of each trap and vegetative characteristics were averaged over each trapping location. Adjacent farm field conditions (crop type, fallow, etc.) were also recorded for each trapping location on the first day of trapping.

RESULTS

Lower Ulatis

We trapped three sections of lower Ulatis Creek in April and one section in September (Figure 1, Table 1). In 2004 we trapped three sections of Ulatis Creek from late June to early August (Figure 2, Table 2). We captured no giant garter snakes at any of these sites in either year. We did catch four common garter snakes in 2005 and two common garter snakes in 2004 each at Lower Ulatis 1 and Lower Ulatis 2 (Tables 1 and 2). We did catch some small fish and some tadpoles in the traps as giant garter snake food items compared to 2004 when we caught

only one tadpole (Tables 3 and 4). Abundant emergent aquatic vegetation was present at all but the most upstream Ulatis sites (Figure 3). At lower Ulatis the vegetation was terrestrial grasses and weedy dicots and habitat substrate reflected this in the large proportion of terrestrial substrate (Figure 3). Habitat substrate was mostly open water and emergent vegetation at the other Ulatis sites (Figure 3). At Lower Ulatis 2 the vegetation near the traps was mostly grasses and terrestrial weeds with water and terrestrial vegetation dominating the substrate type (Figure 3). Surrounding land use at each Ulatis site was mostly dry and irrigated pasture (Table 1).

McCune

We trapped two sections of McCune Creek in April during 2005 compared to June and early July in 2004 (Figures 1 and 2, Tables 1 and 2). We captured no giant garter snakes at either location in either year, but we did catch several common garter snakes, a king snake, and a gopher snake (Table 1). We caught a few fish and tadpoles at the McCune sites similar to our results in 2004 (Tables 3 and 4). The vegetation near the traps at both locations was dominated by terrestrial grasses and weeds with open water and terrestrial vegetation dominating as the substrate type (Figure 3). Surrounding land use was irrigated non-rice crops (Table 1).

Salem Road

We trapped a canal near Salem Road from late April into May 2005 compared to July of 2004 (Figures 1 and 2, Tables 1 and 2). We captured no giant garter snakes or any other snake at this location. We caught no fish and only one tadpole in the traps at this site compared to several fish we caught the previous year (Tables 3 and 4). The vegetation near the traps in 2004 was mostly grasses and sedges, with a mix of water, emergent and terrestrial vegetation as the substrate type (Figure 3). Surrounding land use was dry pasture in 2005 and 2004 (Table 1).

Sweeny Creek

We trapped two sections of Sweeny Creek during April in 2005 compared to early to mid-June in 2004 (Figures 1 and 2, Tables 1 and 2). We captured no giant garter snakes and only two common garter snakes at these locations (Table 1). We only caught only two tadpoles at this location compared to a few fish caught the previous year (Tables 3 and 4). The vegetation near the traps was mostly terrestrial grasses and weeds with water and terrestrial vegetation dominating the substrate type (Figures 3). Surrounding land use was dry upland fields (Table 1).

V Drain

One historical sighting of a giant garter snake in Solano County was in the V Drain. We trapped four locations in the V Drain during May in 2005 compared to mid-June to mid-August in 2004 (Figures 1 and 2, Tables 1 and 2). We also trapped one location in September 2005. We captured no giant garter snakes at these locations in either 2005 or 2004. We did capture three gopher snakes at these sites in 2005 (Table 1). We captured a few fish in the V Drain, but no tadpoles at these sites similar to results from the previous year (Tables 3 and 4). The vegetation near the traps was mostly terrestrial grasses and weeds with water and terrestrial vegetation dominating the substrate type (Figures 3). Surrounding land use was upland and irrigated non-rice crops (Table 1).

W Drain

One historic sighting of a giant garter snake was in the W Drain. We trapped five locations of the W Drain in May 2005 compared to mid-July to mid-August in 2004 (Figures 1 and 2, Tables 1 and 2). We also trapped one location from late August through September in 2005. We captured no giant garter snakes at any of these locations in either year. We did capture a king snake and a gopher snake in 2005 at one location (Table 1). We caught the most fish of any other location at the W Drain sites, similar to the results of the previous year (Tables 3 and 4). Terrestrial grasses and weedy dicots dominated the vegetation with water and terrestrial vegetation dominating the substrate type for all but the north site. At the north site rip rap was a substrate feature of the habitat (Figure 3). Surrounding land use was generally dry fields (Table 1).

DISCUSSION

We caught no giant garter snakes at any of the 15 locations we trapped in Solano County during 2004 and again in 2005. We caught only a few common garter snakes gopher snakes and king snakes and at these sites. Although vegetative and substrate characteristics of the areas we trapped are similar to other sites in which we find giant garter snakes, prey species for these snakes are very scarce in all but the W Drain sites. Land use adjacent to our study sites was generally dry pasture or irrigated row crops which provide no habitat for giant garter snakes.

We searched for giant garter snakes in Solano County in the late spring and summer of 2004. In 2005 our field work was conducted mostly in the spring to see if our trapping results may have been affected by season. We also returned to the most promising sites of Lower Ulatis, the V Drain and the W Drain to trap in late summer to also account for potential field affects. Because of extensive trapping effort over 2004 and 2005 encompassing most of the active season for giant garter snakes, our results indicate the absence of giant garter snakes along the water features in which we worked, including the ditches in the eastern part of Solano County where giant garter snakes had been sighted decades ago. The historic populations of giant garter snakes in Solano County may never have been abundant along this westerly edge of their range, and periods of unfavorable habitat conditions likely extirpated the snakes. Because agricultural crops in Solano County does not provide habitat for giant garter snakes, the snakes would have no refugia if habitat conditions in the ditches deteriorated. Certainly the current prey base is very sparse to support populations of giant garter snakes.

Searches of wetlands and adjacent ditch habitat of the Pope Ranch, immediately east of W Drain in Yolo County, have also not found giant garter snakes (USGS, Wildlands, Inc., unpublished data), which also supports the contention that giant garter snakes are not in this vicinity. The nearest known population of giant garter snakes is in the Yolo Bypass Wildlife Area immediately east of Davis in the interior of the Yolo Bypass. There does not appear to be good connectivity between this population and habitat in Solano County. Giant garter snakes may or may not be in the freshwater tidal reaches of the Delta in the southeast part of Solano County. Although we did not look for giant garter snakes along the fringes of the Delta, we did search drainage features with suitable habitat that directly connect to these tidal reaches and into which the snakes could readily move (Lower Ulatis, W Drain, V Drain). We have found no evidence that giant garter snakes are in Solano County.

LITERATURE CITED

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Frayser, W.E., D.D. Peters, and H.R. Pywell. 1989. Wetlands of the California Central Valley status and trends. U.S. Fish and Wildlife Service. Portland, Oregon. 28 pp.

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Table 1. Information on locations trapped for giant garter snakes in Solano County in 2005.

Study Site	Snake species caught or sighted	Adjacent Field conditions	Trap/Search Dates
Lower Ulatis	1- <i>T. sirtalis</i> (common garter snake)	Dry upland fields, and dry crop/non- rice.	50 traps 4/15-4/25
Lower Ulatis-1	None	Dry crop/non-rice, and dry wetlands	50 traps 4/12-4/26
Lower Ulatis-2	None	Dry crop/non-rice, and dry wetlands	50 traps 4/14-4/29
McCune Creek-N	1- <i>T. sirtalis</i> (common garter snake) 1- <i>P.c. catenifer</i> (gopher snake)	Irrigated crop/non- rice, dry upland field, and dry disked field,	50 traps 4/25-5/9
McCune Creek-S	2- <i>T. sirtalis</i> (common garter snake)	Dry crop/non-rice, and dry disked field	50 traps 4/26-5/10
Salem Rd.	None	Dry upland	30 traps 4/29-5/13
Sweeney Creek-N	None	Irrigated crop/non- rice, development	50 traps 4/18-5/2
Sweeney Creek-S	2- <i>T. sirtalis</i> (common garter snake)	Dry upland , dry disked, dry crop/non- rice and development	50 traps 4/21-5/5
Lower V Drain	1- <i>P.c. catenifer</i> (gopher snake)	Dry upland fields	50 traps 5/2-5/16
Upper V Drain	None	Irrigated crop/non- rice and dry upland	50 traps 5/5-5/19
V Drain -E	1- <i>P.c. catenifer</i> (gopher snake)		25 traps 5/4-5/18
V Drain-W	1- <i>P.c. catenifer</i> (gopher snake)		25 traps 5/4-5/18
W Drain-N	1- <i>P.c. catenifer</i> (gopher snake) 1- <i>L. g. californiae</i> (king snake)	Dry disked field, dry upland, and development	50 traps 5/6-5/20
W Drain-S	None	Dry crop/non-rice, dry pasture land, and development,	50 traps 5/13-5/25
W Drain-S/2	None	Dry grassy field, and development	50 traps 5/16-5/25
W Drain	None	Dry grassy meadow	50 traps 5/6-5/20

Table 1. Information on locations trapped for giant garter snakes in Solano County in 2005
(continued).

Study Site	Snake species caught or sighted	Adjacent Field conditions	Trap/Search Dates
Lower Ulatis -3	None	Dry, upland pasture	50 traps 9/2-9/19
Upper V Drain	None	Dry, upland pasture	50 traps 8/31-9/30
W Drain	None	Irrigated crop/non-rice and dry upland	50 traps 8/24-9/30

Table 2. Information on locations trapped for giant garter snakes in Solano County in 2004.

Study Site	Snake species caught or sighted	Adjacent Field conditions	Trap/Search Dates
Lower Ulatis	None	Dry grasses and crop/non-rice	50 traps 6/23-7/9
Lower Ulatis-1	2- <i>T. sirtalis</i> (common garter snake)	Dry and flooded grasses	50 traps 7/21-8/3
Lower Ulatis-2	2- <i>T. sirtalis</i> (common garter snake)	Dry and flooded grasses	50 traps 7/22-8/4
McCune Creek-N	1- <i>T. sirtalis</i> (common garter snake)	Irrigated crop/non-rice	50 traps 6/17-7/1
McCune Creek-S	1- <i>T. sirtalis</i> (common garter snake) 1- <i>L. g. californiae</i> (king snake)	Irrigated crop/non-rice	50 traps 6/18-7/2
Salem Rd.	None	Dry upland field	50 traps 7/15-7/29
Sweeney Creek-N	None	Dry crop/non-rice, disked field and upland field	50 traps 6/3-6/17
Sweeney Creek-S	None	Dry crop/non-rice and upland field	50 traps 6/4-6/18
Lower V Drain	None	Puddled crop/non-rice and dry upland field.	50 traps 7/1-7/15
Upper V Drain	None	Dry upland field and disked field.	50 traps 7/27-8/10
V Drain	None	Irrigated crop/non-rice	50 traps 6/22-7/8
V Drain-2	None	Irrigated crop/non-rice and upland field	50 traps 7/30-8/13
W Drain-N	None	Dry and irrigated upland field	50 traps 7/14-7/28
W Drain-S	2- <i>T. sirtalis</i> (common garter snake)	Dry, irrigated and flooded upland fields	100 traps 7/29-8/13
W Drain	1- <i>P. melanoleucus</i> (gopher snake)	Dry upland field	50 traps 7/2-7/16

Table 3. Trap contents for giant garter snake prey species in 2005.

Trap contents	Lower Ulatis	Lower Ulatis-1	Lower Ulatis-2	McCune Creek-N	McCune Creek-S	Salem Rd.	Sweeny Creek-N	Sweeny Creek-S
Number of Frogs caught	0	0	0	0	1	0	1	0
Frog Density (frogs/trap days)	0	0	0	0	.001	0	.001	0
Number of Tadpoles caught	0	9	33	0	8	1	1	0
Tadpole Density (tadpoles/trap days)	0	.013	.044	0	.011	.002	.001	0
Number of Fish caught	1	3	6	10	8	0	0	7
Fish Density (fish/trap days)	.002	.004	.008	.014	.011	0	0	.010
Total Prey Density (total prey/trap days)	.002	.017	.052	.014	.024	.002	.003	.010
Total number of GGS caught	0	0	0	0	0	0	0	0

Table 3. Trap contents for giant garter snake prey species in 2005 (continued).

Trap contents	Lower V Drain	Upper V Drain	V Drain-E	V Drain-W	W Drain-N	W Drain-S	W Drain-S/2	W Drain
Number of Frogs caught	0	0	0	0	0	1	1	0
Frog Density (frogs/trap days)	0	0	0	0	0	.002	.002	0
Number of Tadpoles caught	0	0	0	0	0	0	0	0
Tadpole Density (tadpoles/trap days)	0	0	0	0	0	0	0	0
Number of Fish caught	2	4	0	3	11	17	8	68
Fish Density (fish/trap days)	.003	.006	0	.009	.016	.028	.018	.097
Total Prey Density (total prey/trap days)	.003	.006	0	.009	.016	.030	.020	.097
Total number of GGS caught	0	0	0	0	0	0	0	0

Table 3. Trap contents for giant garter snake prey species in 2005 (late summer, continued).

Trap contents	Lower Ulatis -3	Upper V Drain	W Drain
Number of Frogs caught	4	0	8
Frog Density (frogs/trap days)	.005	0	.004
Number of Tadpoles caught	1	0	1
Tadpole Density (tadpoles/trap days)	.001	0	.001
Number of Fish caught	6	3	42
Fish Density (fish/trap days)	.007	.002	.023
Total Prey Density (total prey/trap days)	.013	.002	.028
Total number of GGS caught	0	0	0

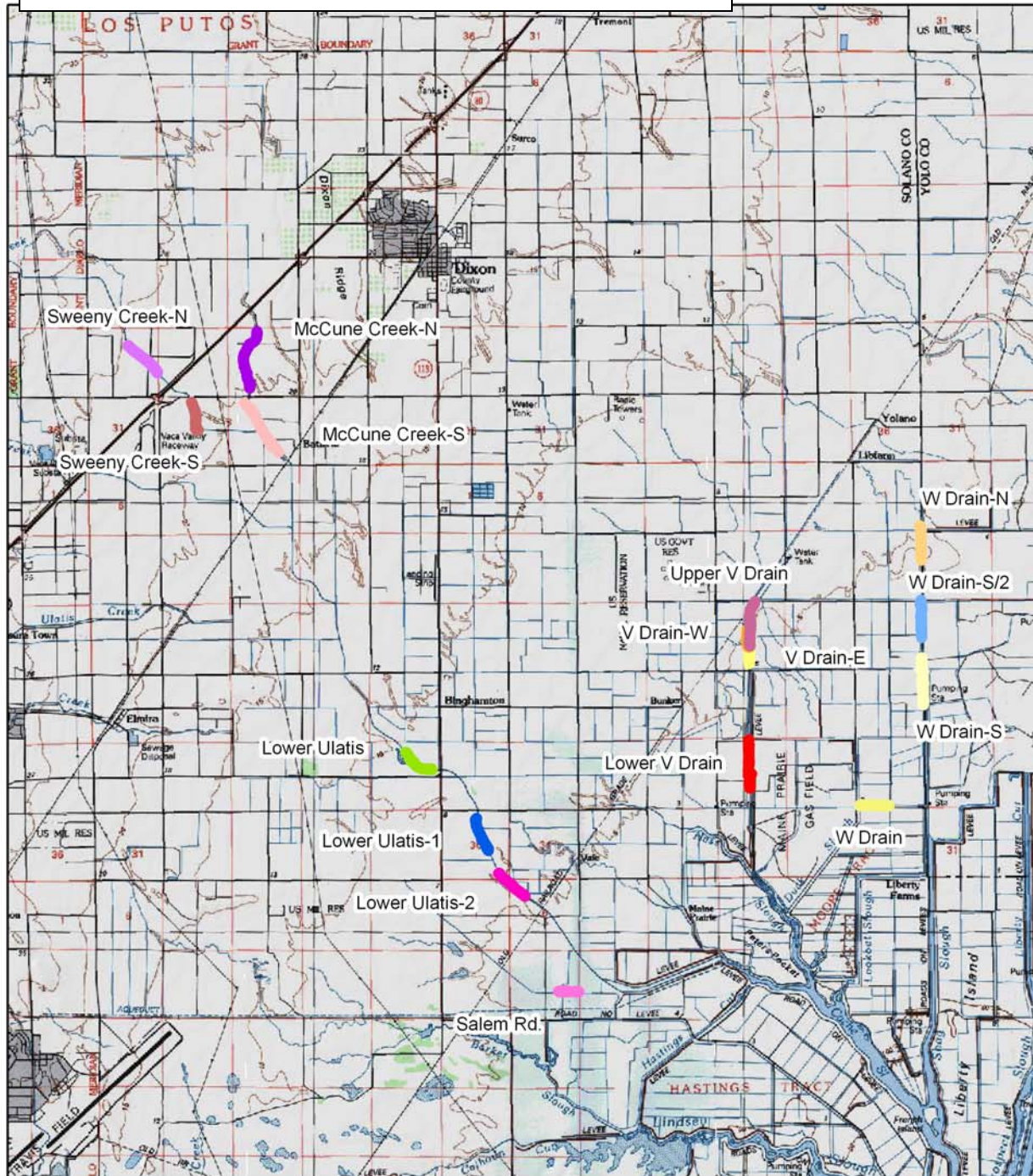
Table 4. Trap contents for giant garter snake prey species in 2004.

Trap contents	Lower Ulatis	Lower Ulatis-1	Lower Ulatis-2	McCune Creek-N	McCune Creek-S	Salem Rd.	Sweeny Creek-N	Sweeny Creek-S
Number of Frogs caught	2	0	0	0	0	0	0	0
Frog Density (frogs/trap days)	.003	*	*	*	*	*	*	*
Number of Tadpoles caught	0	1	0	0	1	0	0	0
Tadpole Density (tadpoles/trap days)	*	.002	*	*	.001	*	*	*
Number of Fish caught	15	10	1	8	0	14	2	2
Fish Density (fish/trap days)	.020	.015	.002	.011	*	.021	.003	.003
Total Prey Density (total prey/trap days)	.022	.017	.002	.011	.001	.021	.003	.003
Total number of GGS caught	0	0	0	0	0	0	0	0

Table 4. Trap contents for giant garter snake prey species in 2004 (continued).

Trap contents	Lower V Drain	Upper V Drain	V Drain	V Drain-2	W Drain-N	W Drain-S	W Drain
Number of Frogs caught	0	0	0	0	0	14	3
Frog Density (frogs/trap days)	*	*	*	*	*	.010	.004
Number of Tadpoles caught	0	0	0	0	0	0	0
Tadpole Density (tadpoles/trap days)	*	*	*	*	*	*	*
Number of Fish caught	7	8	10	1	26	26	31
Fish Density (fish/trap days)	.010	.011	.013	.001	.037	.019	.044
Total Prey Density (total prey/trap days)	.010	.011	.013	.001	.037	.030	.050
Total number of GGS caught	0	0	0	0	0	0	0

Figure 1. Locations trapped for giant garter snakes in 2005.



2005 SOLANO TRAPPING

Trap Information

Name, Number of traps, Dates of trapping

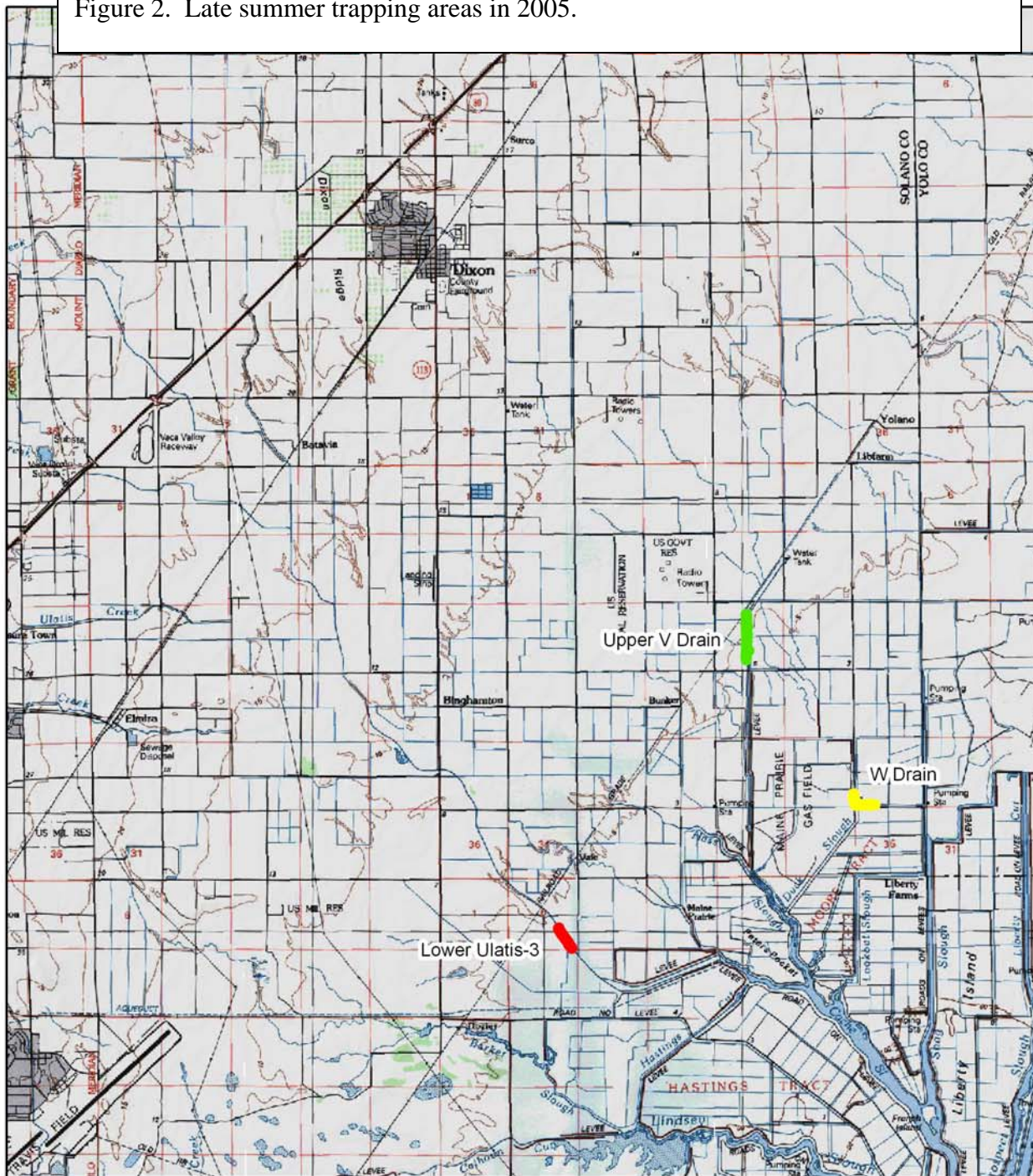
- Lower Ulatis: 50 traps (4/15-4/25)
- Lower Ulatis-1: 50 traps (4/12-4/26)
- Lower Ulatis-2: 50 traps (4/14-4/29)
- McCune Creek-N: 50 traps (4/25-5/9)
- McCune Creek-S: 50 traps (4/26-5/10)
- Salem Rd: 30 traps (4/29-5/13)
- Sweeny Creek-N: 50 traps (4/18-5/2)
- Sweeny Creek-S: 50 traps (4/21-5/5)
- Lower V Drain: 50 traps (5/2-5/16)
- Upper V Drain: 50 traps (5/5-5/19)
- V Drain-E: 25 traps (5/4-5/18)
- V Drain-W: 25 traps (5/4-5/18)
- W Drain-N: 50 traps (5/6-5/20)
- W Drain-S: 50 traps (5/13-5/25)
- W Drain-S/2: 50 traps (5/16-5/25)
- W Drain: 50 traps (5/6-5/20)



4,100 2,050 0 4,100 Meters



Figure 2. Late summer trapping areas in 2005.



2005 SOLANO TRAPPING

Trap Information

Name, Number of traps, Dates of trapping

- Lower Ulatis-3: 50 traps (9/2-9/19)
- Upper V Drain: 50 traps (8/31-9/30)
- W Drain: 50 traps (8/24-9/30)



4,100 2,050 0 4,100 Meters



Figure 2. Trap locations for giant garter snake surveys in Solano County in 2004.

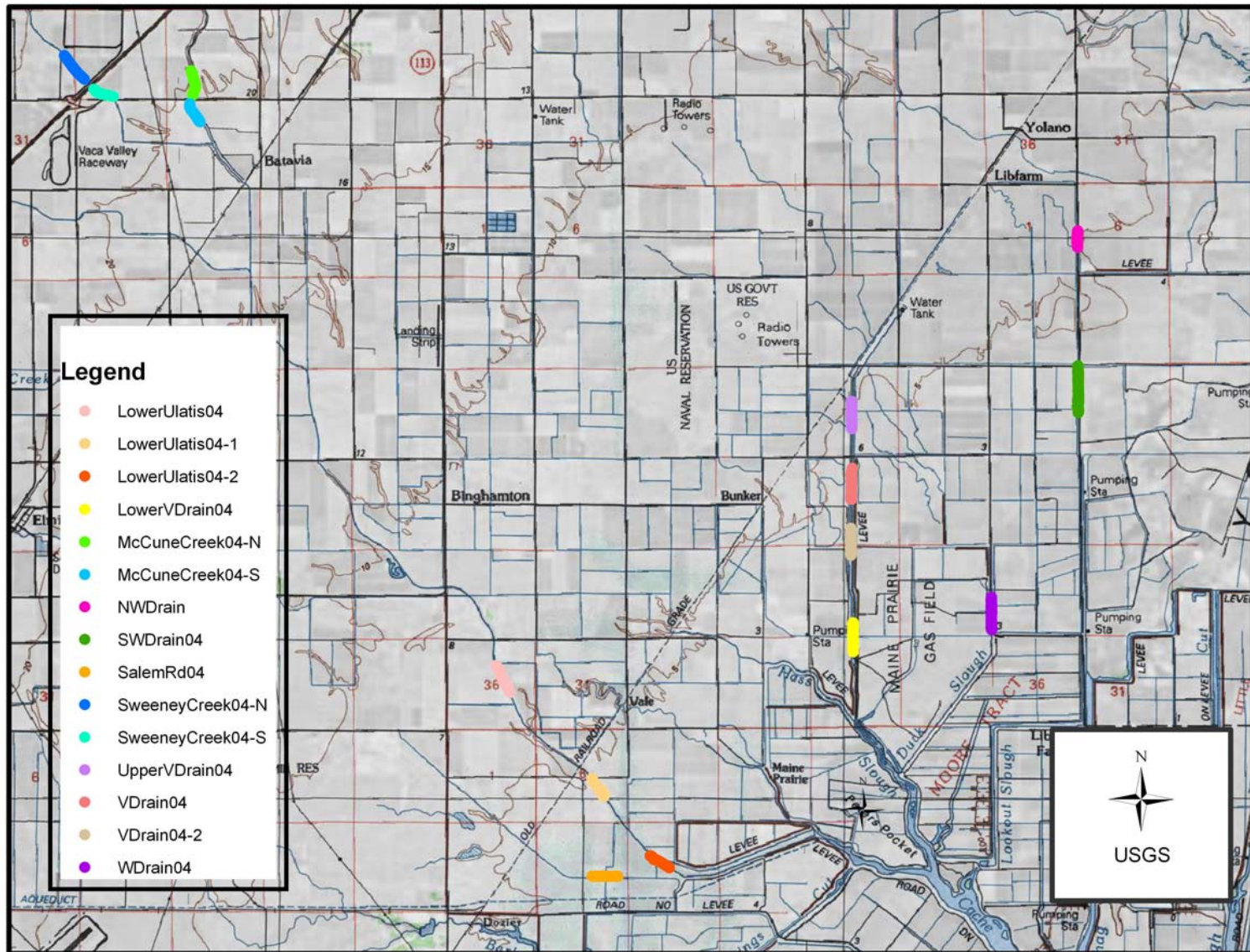
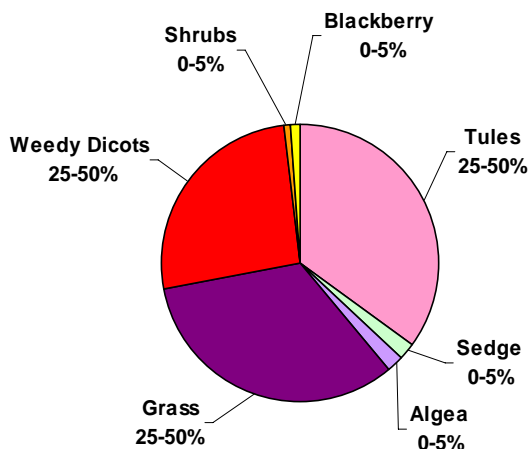


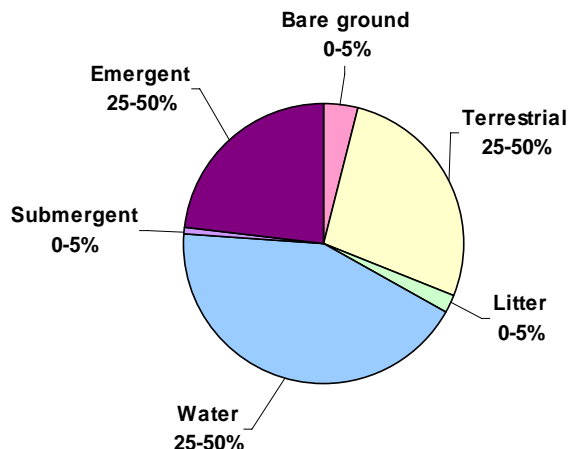
Figure 3. Substrate and habitat characteristics of trapped areas.

SUBSTRATE

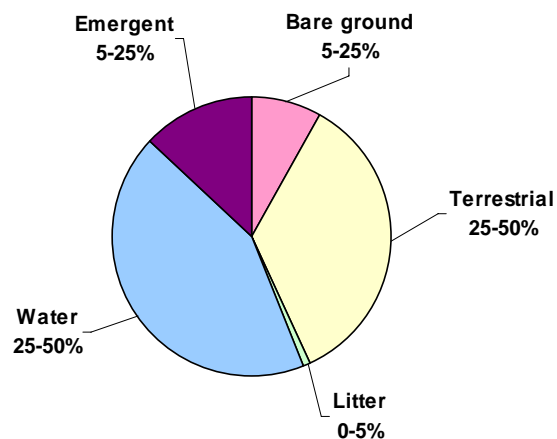
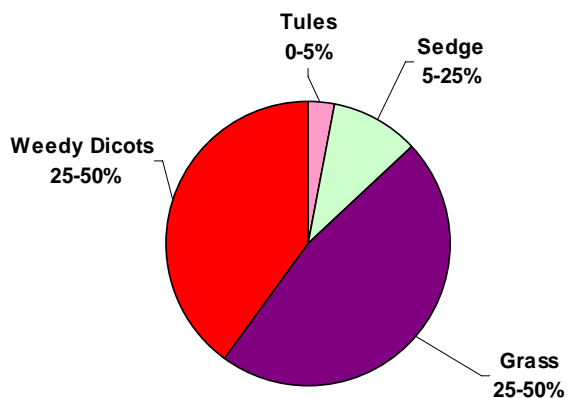


Lower V Drain

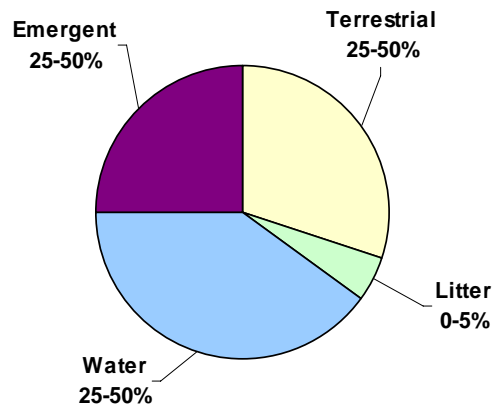
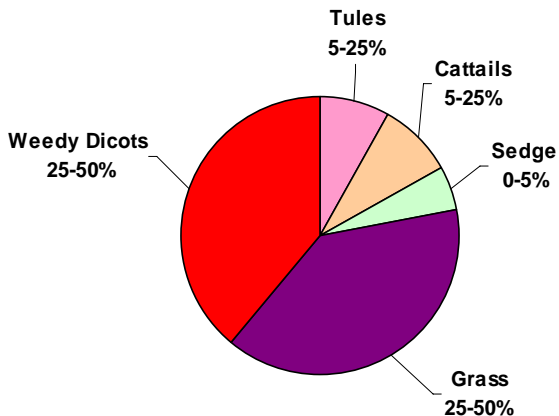
HABITAT



Upper V Drain



V Drain East



V Drain West

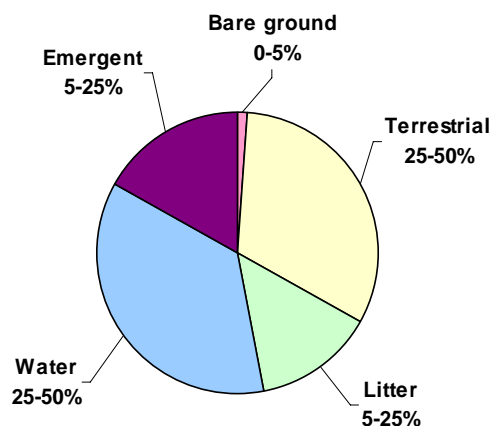
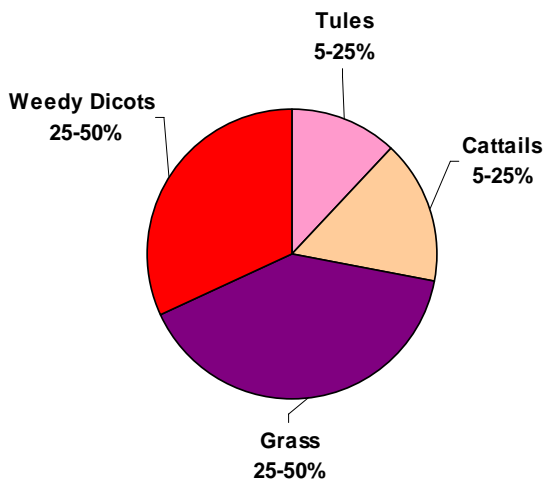
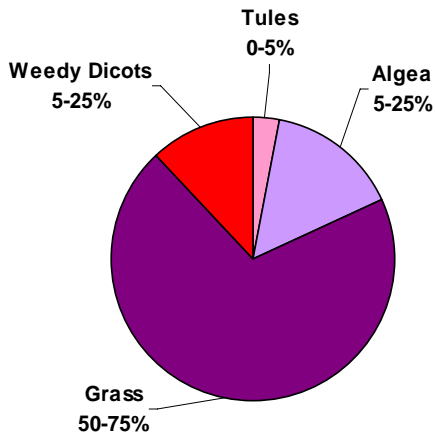


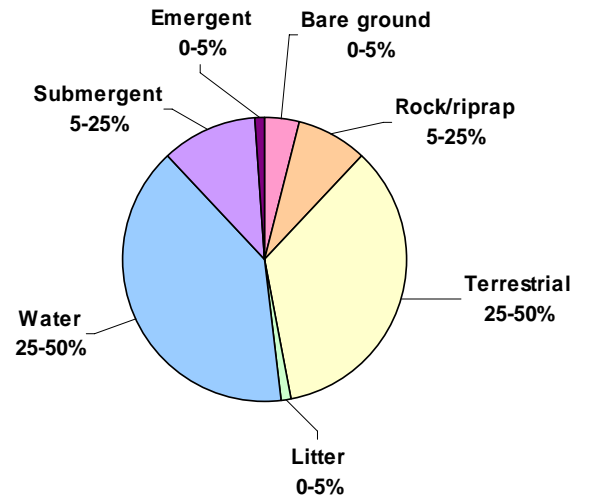
Figure 3. Substrate and habitat characteristics of trapped areas (continued).

SUBSTRATE

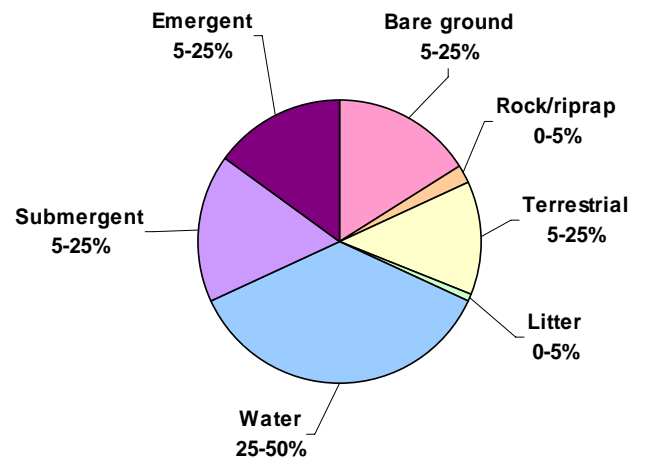
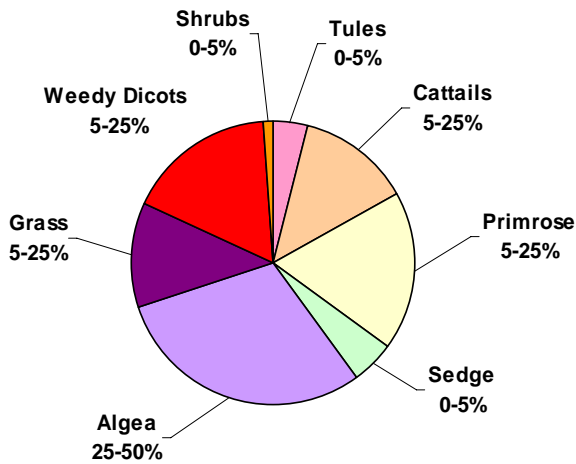


Lower Ulatis

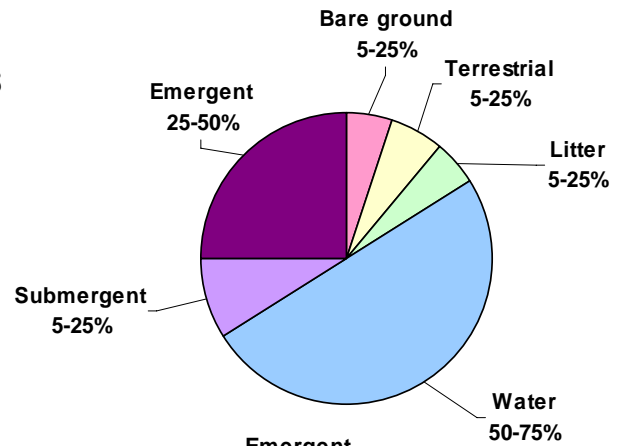
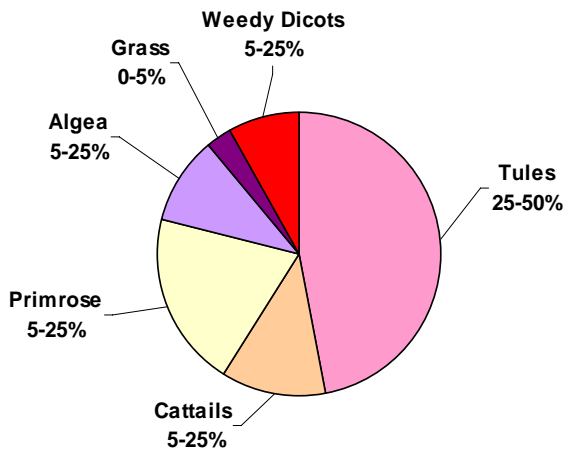
HABITAT



Lower Ulatis-2



Lower Ulatis-3



Salem Rd.

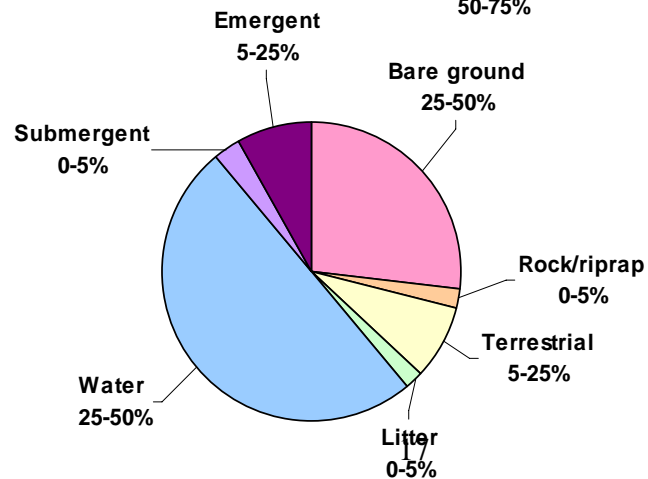
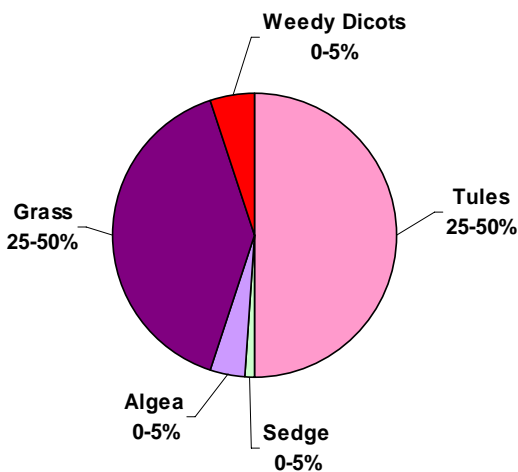
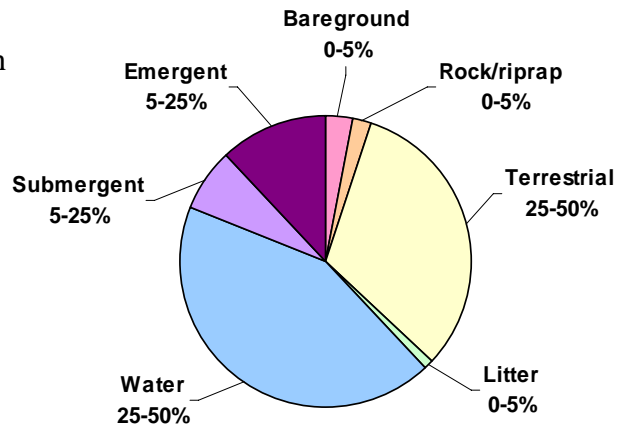
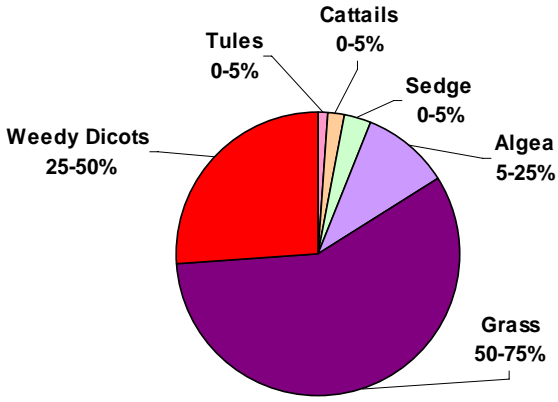


Figure 3. Substrate and habitat characteristics of trapped areas (continued).

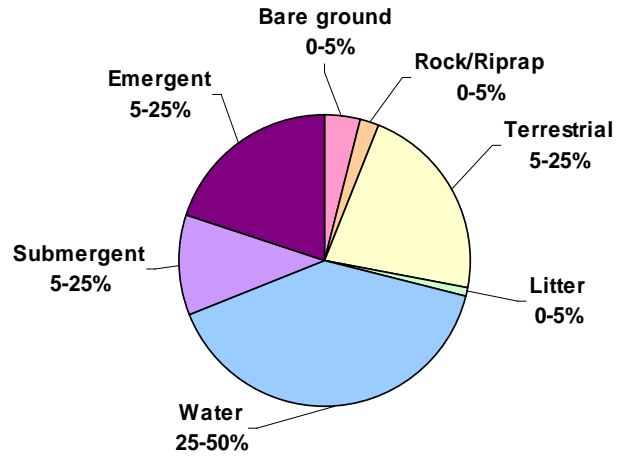
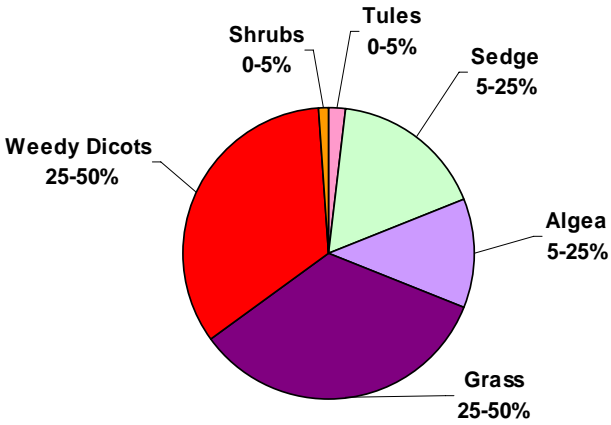
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HABITAT

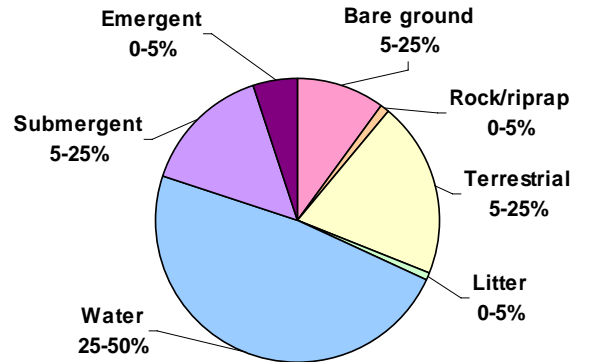
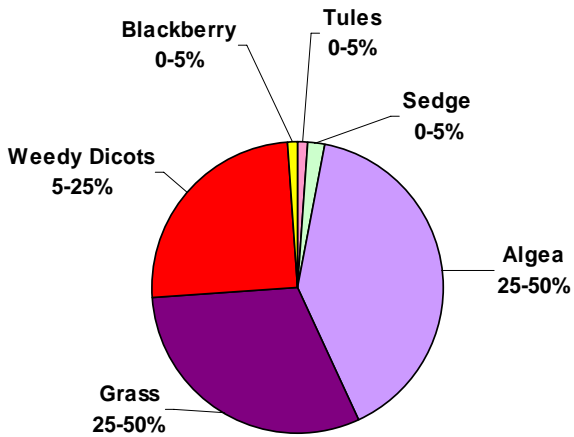
McCune North



McCune South



Sweeny Creek North



Sweeny Creek South

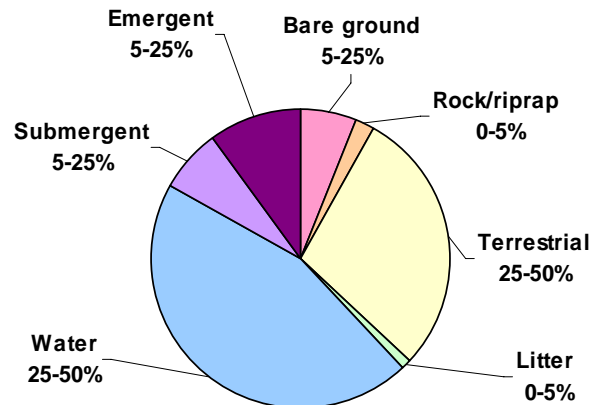
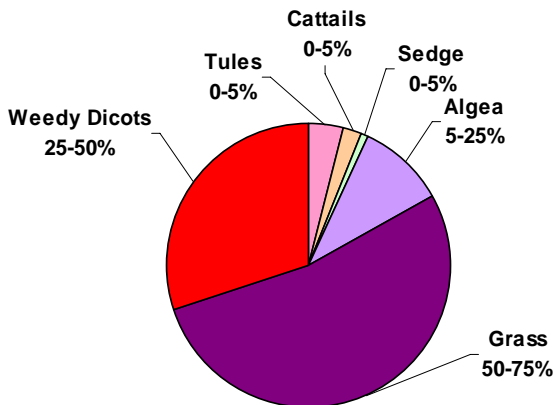
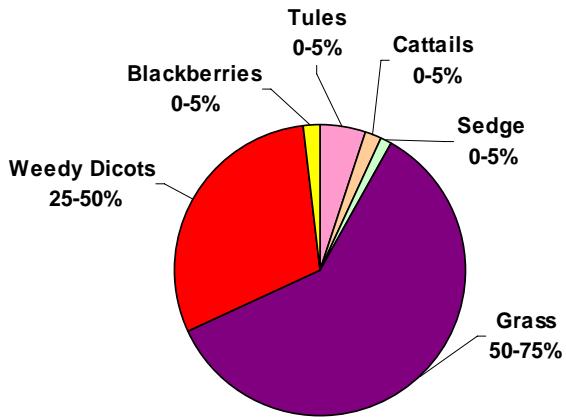


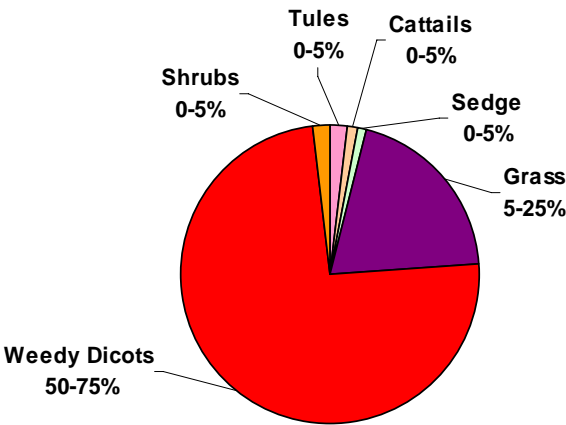
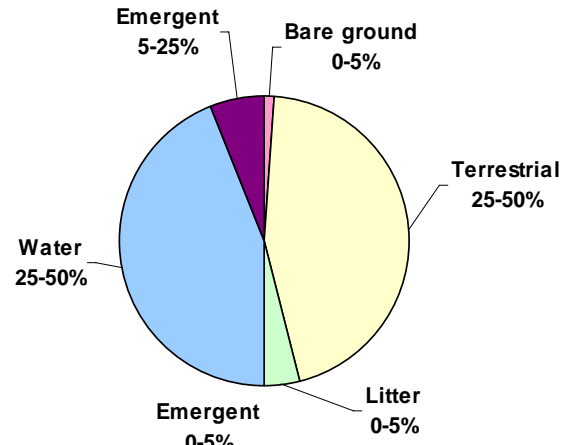
Figure 3. Substrate and habitat characteristics of trapped areas (continued).

SUBSTRATE

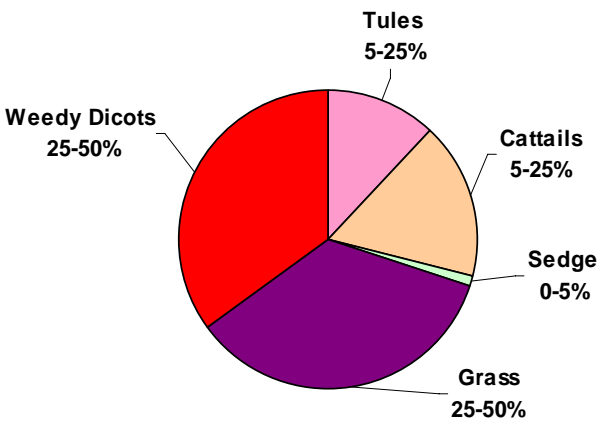
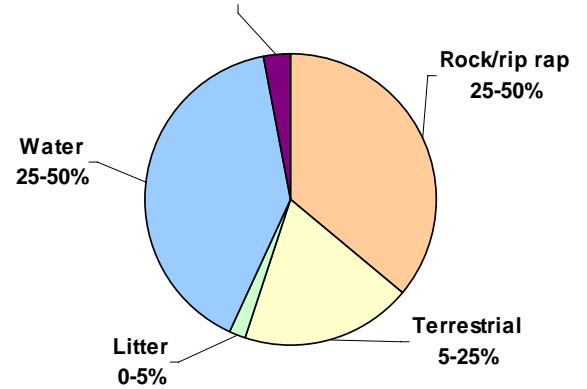
HABITAT



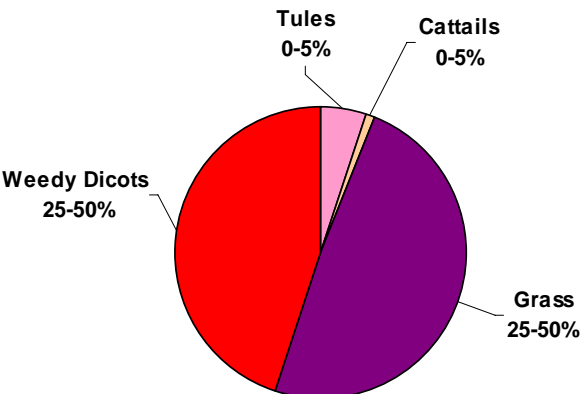
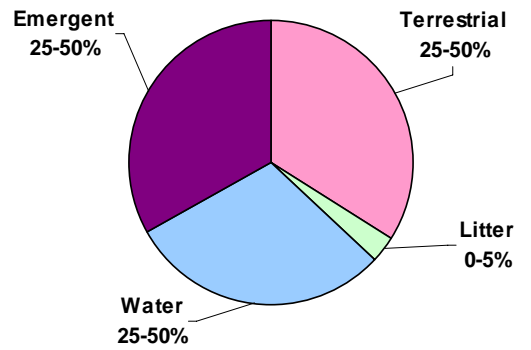
W Drain



W Drain-North



W Drain-South



W Drain-South 2

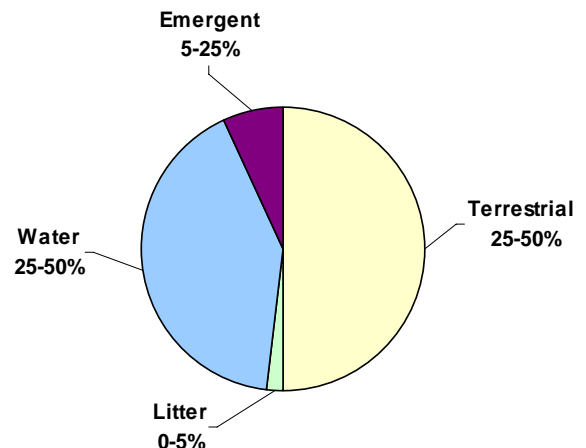
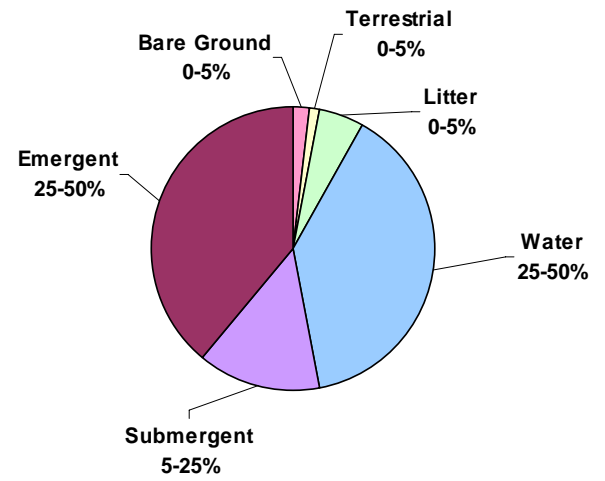
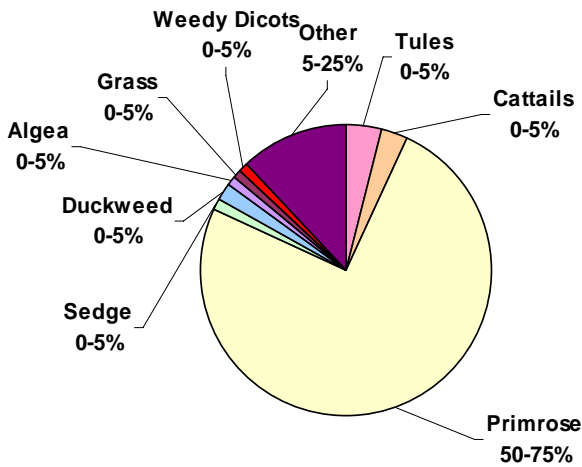


Figure 3. Substrate and habitat characteristics of trapped areas (continued).

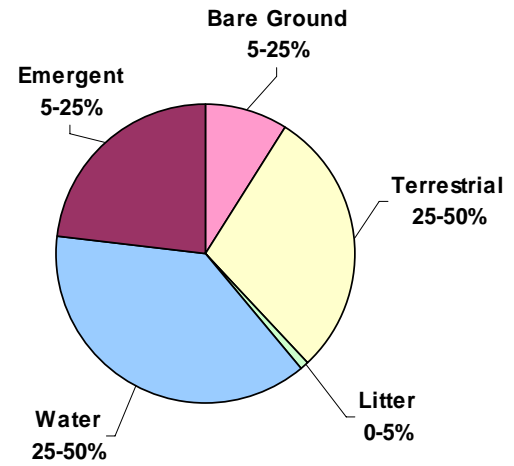
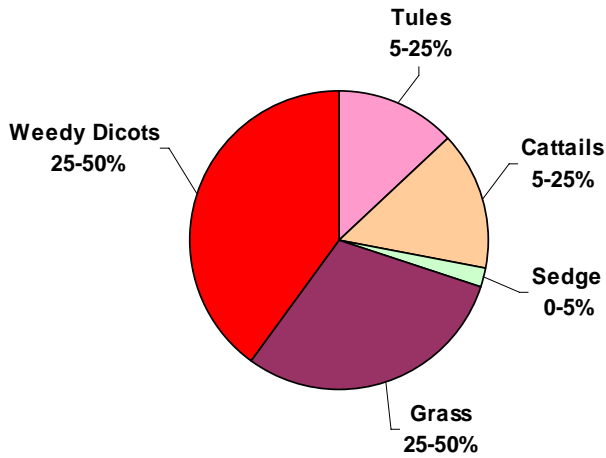
SUBSTRATE

HABITAT

Lower Ulatis-3



Upper V Drain



W Drain

