Jollyville Plateau Salamander Interim Report, 2009, for the Balcones Canyonland Preserve

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This document is a summary of the survey results conducted under the permits Bendik 2009 (direct counts and mark-recapture). We conducted salamander surveys on the following Balcones Canyonland Preserve (BCP) tracts: Hanks, Franklin, Lanier, Ivanhoe; and Stillhouse Hollow and Barrow Preserve tracts, jointly managed with Austin Parks and Recreation Department (Figure 1). Tables 1 and 2 provide a list of all quarterly and annual monitoring sites, along with their corresponding sample site numbers. The scope of all surveys conducted is outlined in the original permit proposal/QAPPs, which includes the survey and analysis procedures. Detailed statistical analyses for this project have not been completed yet, and must wait for both the completion of data collection and in some cases, development of new analytical methods. These analyses will be presented in a more comprehensive report, detailing results of all of the past surveys conducted, including surveys not conducted within the BCP. I anticipate preliminary results from the analysis to be completed by the end of 2009 or early 2010. For additional details about the project and including background and methods, please consult the original permit proposals, QAPPs and referenced reports therein.

Benthic macroinvertebrates

We collected benthic macroinvertebrates during QII, QIII, and QIV survey periods (Quarterly survey periods for 2009 are as follows: Q**I** Jan-Feb; Q**II** April-May; Q**III** July-Aug; Q**IV** Oct-Nov). Due to drought conditions during QII and QIII, not all sites were able to be sampled. Ironically, heavy rains prevented us from collecting at some sites in QIV. Identification of all invertebrate samples has not yet been completed as of November 2009, and therefore I must postpone reporting those results.

Water quality

Water quality parameters measured during each survey were not particularly noteworthy. Parameter values were averaged over each site-year and are shown in Figures 2-4. Dissolved oxygen (Figure 3) varied the most between years; however this is more likely an artifact of daily conditions than a reflection of any inherent change in water quality. Specific conductivity (Figure 4) continues to show a positive correlation with respect to urban vs. rural settings (Bendik 2008). Avery Deer Spring (site 1355) had a lower than expected specific conductivity given the high impervious cover in the surrounding area, although this is based on a single data point.

Table 1. Quarterly monitoring sites.

Site Name	Sample Site Number	Land Use	Sections Surveyed
Bull Creek Tributary 6 (BCP Hanks Tract)	151	Urban – recent development	1,2/3,6
Bull Creek Franklin on Trib 7 at (BCP Franklin Tract)	349	Rural (preserve)	2,3,4,7
Balcones District Park (Walnut Creek) Spring	445	Urban- old development	1
Stillhouse Hollow	927	Urban- old development	1-5,7-8
Tanglewood Spring	928	Urban- recent development	1-13
Barrow Preserve Tributary	929	Urban- old development	1-3
Spicewood Springs Tributary	930	Urban- old development	1-4
Bull Creek Tributary 5 (BCP Hanks Tract)	1164	Urban – recent development	1,2,4,5,6
Baker Spring (Audubon Preserve)	3959	Rural (preserve)	1-7
Lower Ribelin	4035	Rural- newly developing	1
Upper Ribelin	4184	Rural- newly developing	1-3

Table 2. Annual monitoring sites.

Troll Spring		Urban	1-2
Avery Deer Spring	1355	Urban – recent development	1-2
Ivanhoe Spring 2	1957	Rural/Urban	1
Bull Creek Tributary 3 (Great Hills CC)	926	Urban – recent development	1-4

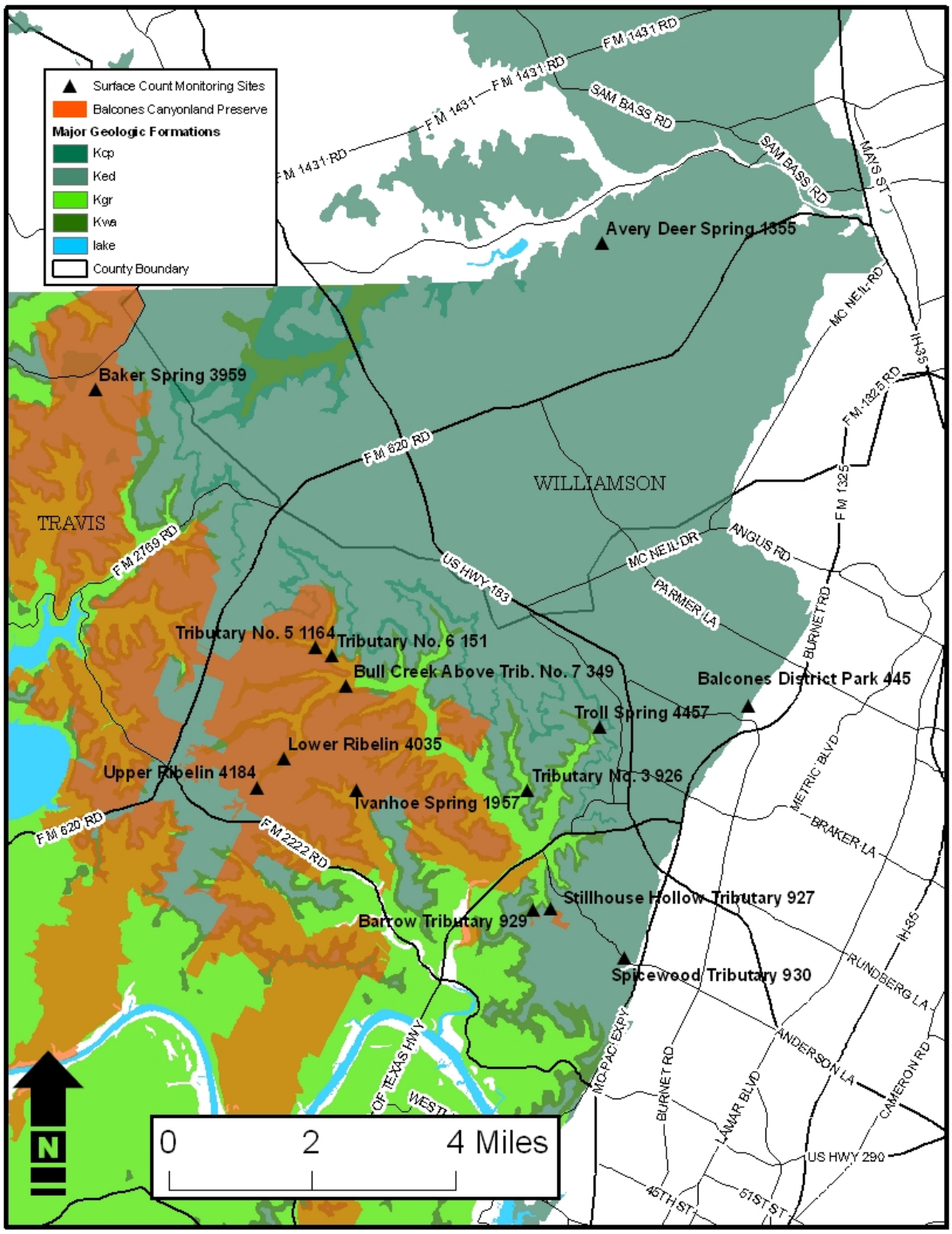


Figure 1. Map of all surface count monitoring sites for 2009.

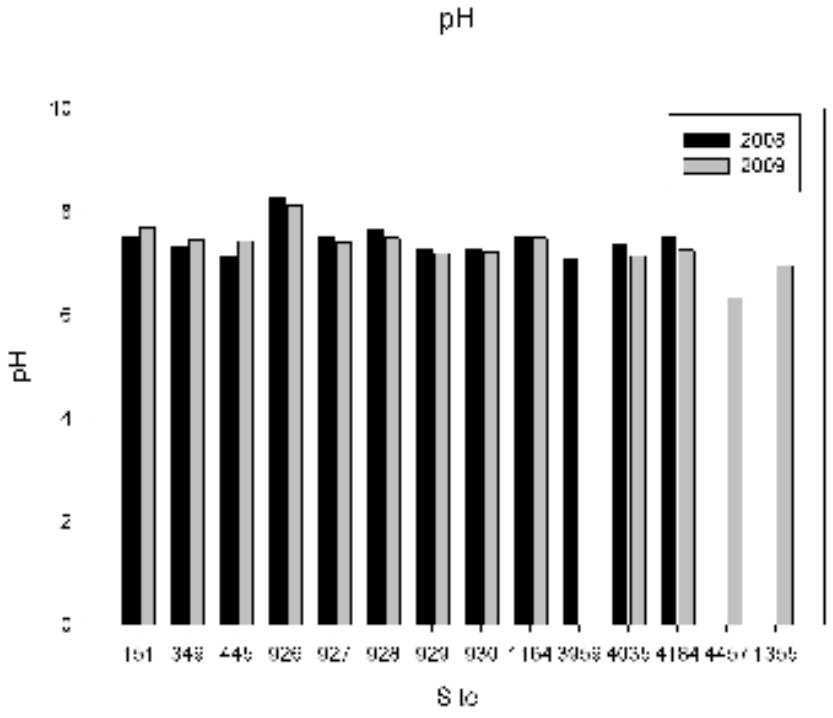


Figure 2. Average pH (standard units) across all sites for 2008 and 2009.

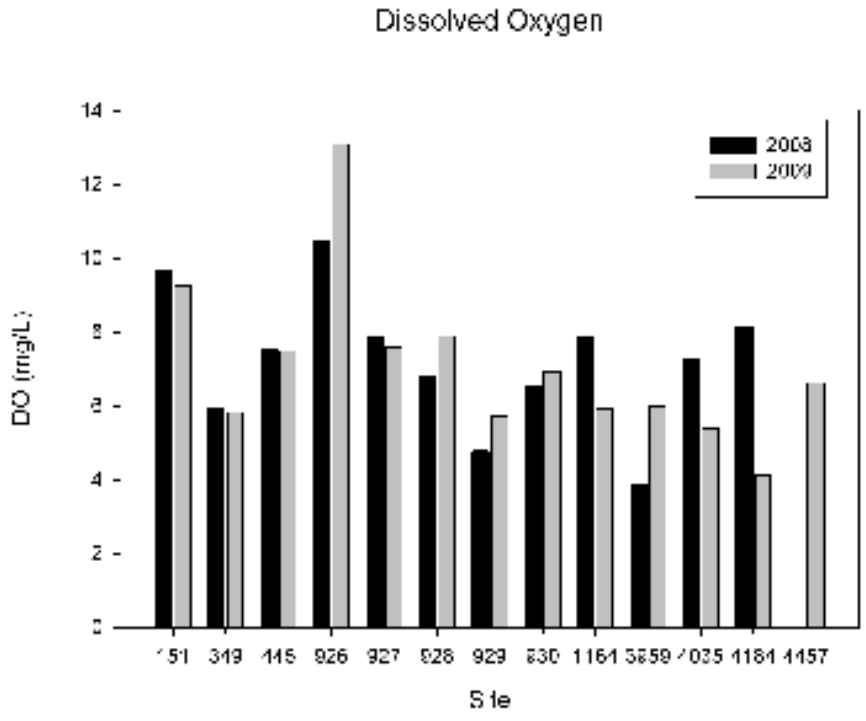


Figure 3. Average dissolved oxygen (mg/L) across all sites for 2008 and 2009.

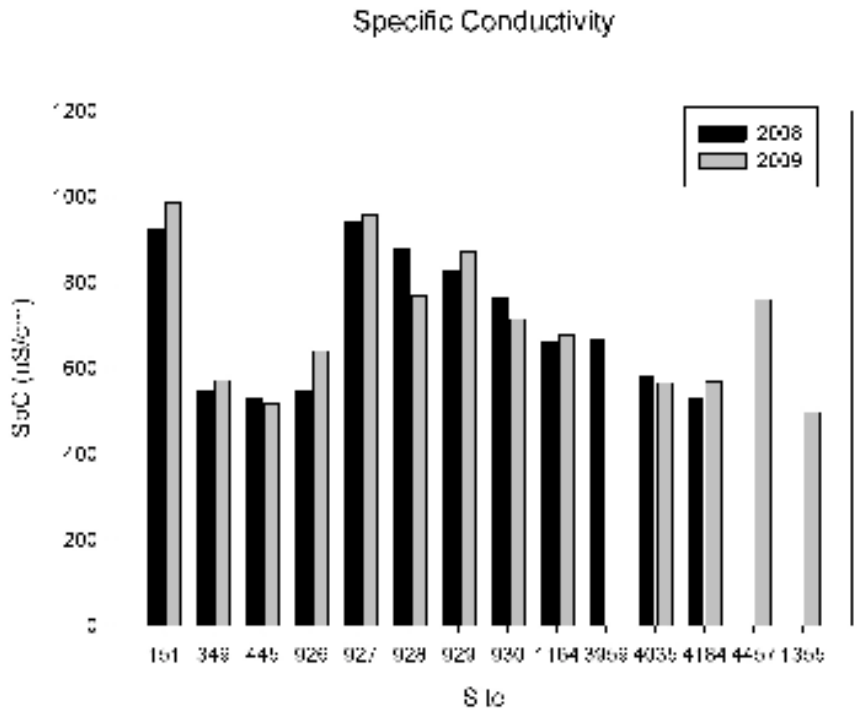


Figure 4. Average specific conductivity (µS/cm) across all sites for 2008 and 2009.

Annual Survey Results Summary

The total count summary for 2009 at all survey sites are reported in Figure 5, and all raw data in Table 3. Balcones Canyonland Preserve sites on Bull Creek main stem (Upper Ribelin, Lower Ribelin, and Franklin) continue to exhibit higher population sizes than urban populations. Populations in closer proximity to urban development do not appear to harbor large salamander populations, and data are consistent with previous conclusions regarding population declines in these areas (O'Donnell et al. 2006). No salamanders have been observed at Balcones District Spring (site 445) since 2005, and this trend continues (no plot shown). Among sites where samples were able to be conducted at least twice, survey period II continues to yield the highest salamander counts. This is consistent with previous survey data where late spring tends towards higher salamander numbers, as stated above.

Two new monitoring sites were established for a single annual survey during QII, Troll Spring (4457) and Avery Deer Spring (1355). Both occur in areas with high impervious cover but these preliminary results suggest that population sizes are larger at these sites than many of our other sites in urban watersheds.

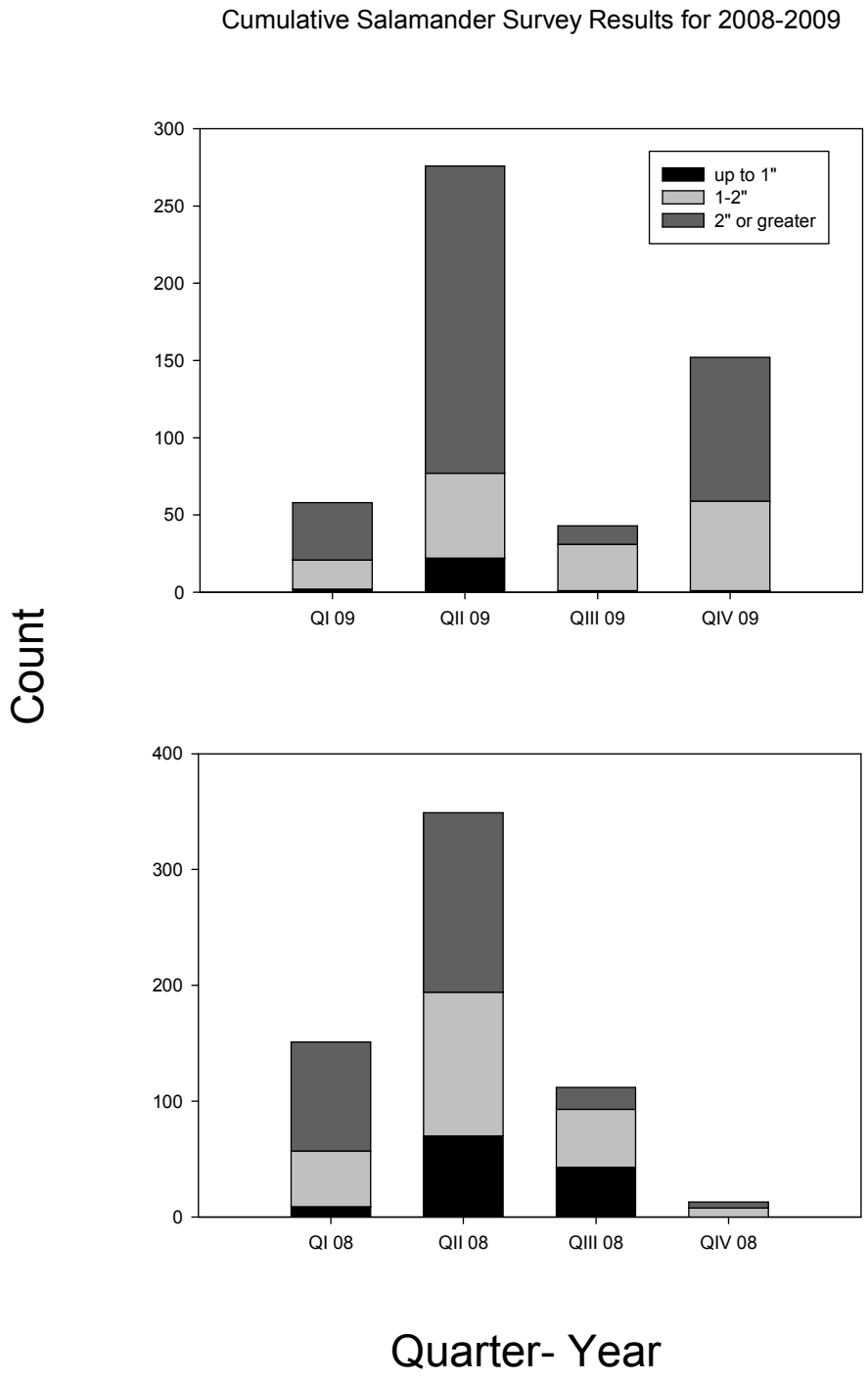


Figure 5. Cumulative salamander survey results for 2008-2009 across 11 sites, excluding once per annum sites. QII surveys overall had the largest numbers of salamanders observed. Additionally, juveniles were predominantly found during QII.

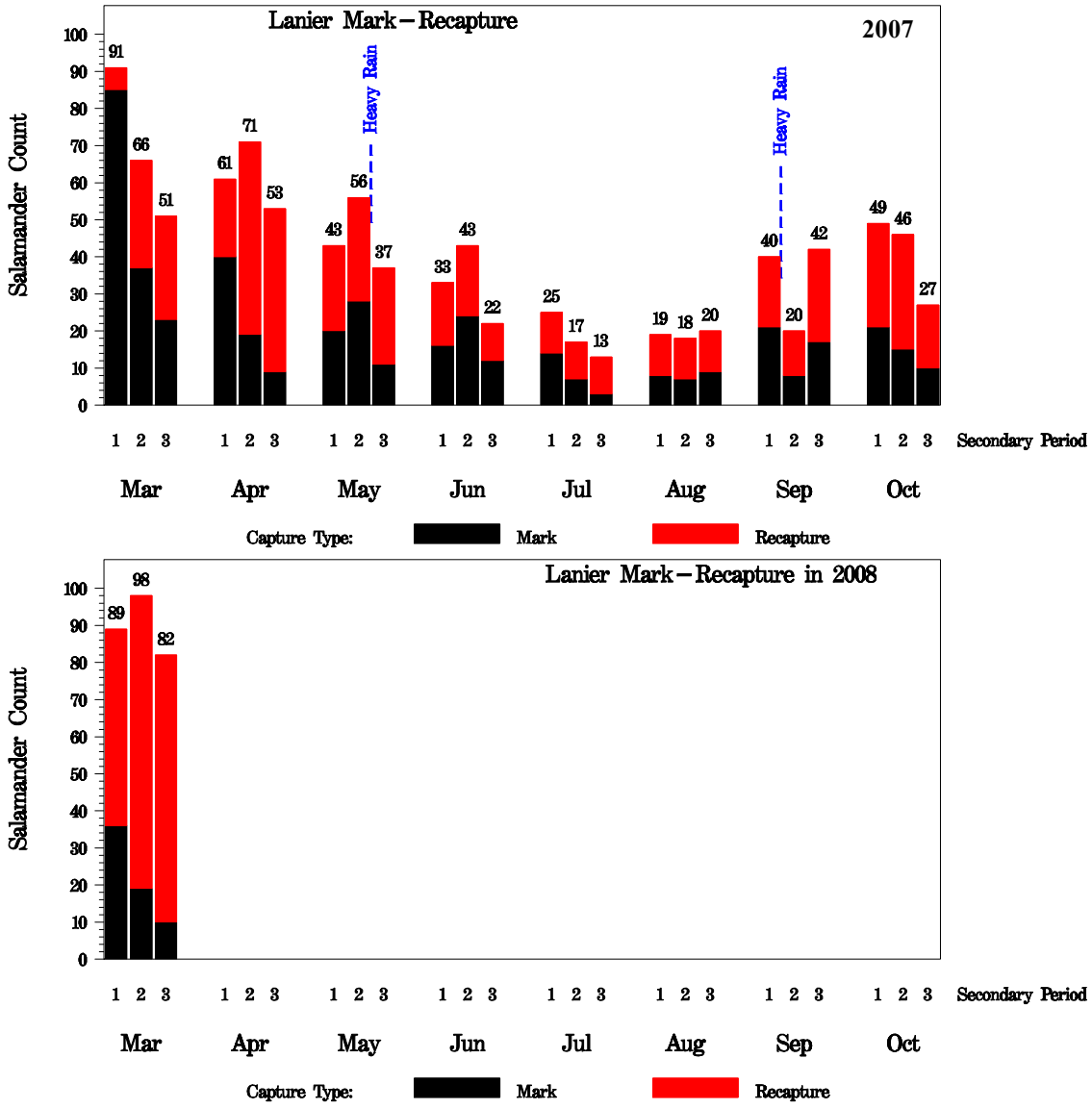
		Site Number														
		151	**349**	**445**	**927**	**928**	**929**	**930**	**1164**	**3959**	**4035**	**4184**	**926***	**1355***	**1957***	**4457***
QI	<1	0	0	0	0	0	0	0	0	.	2	.	.	.	.	.
	1-2	0	2	0	0	0	0	0	0	.	17	.	.	.	.	.
	>2	1	5	0	2	0	1	0	0	.	28	.	.	.	.	.
QII	<1	5	2	0	5	0	0	0	0	.	10	0	0	10	.	1
	1-2	2	5	0	0	1	0	1	0	.	14	32	1	7	.	4
	>2	14	9	0	1	4	0	1	0	.	74	96	1	20	.	8
QIII	<1	0	0	0	1	0	.	0	0	.	.	.	.	.	.	.
	1-2	1	25	0	0	0	.	4	0	.	.	.	.	.	.	.
	>2	0	11	0	0	0	.	1	0	.	.	.	.	.	.	.
QIV	<1	0	0	0	0	0	0	0	0	.	1	0	.	.	.	.
	1-2	0	10	0	9	0	4	6	0	.	20	9	.	.	.	.
	>2	1	8	0	2	0	1	4	0	.	32	45	.	.	.	.

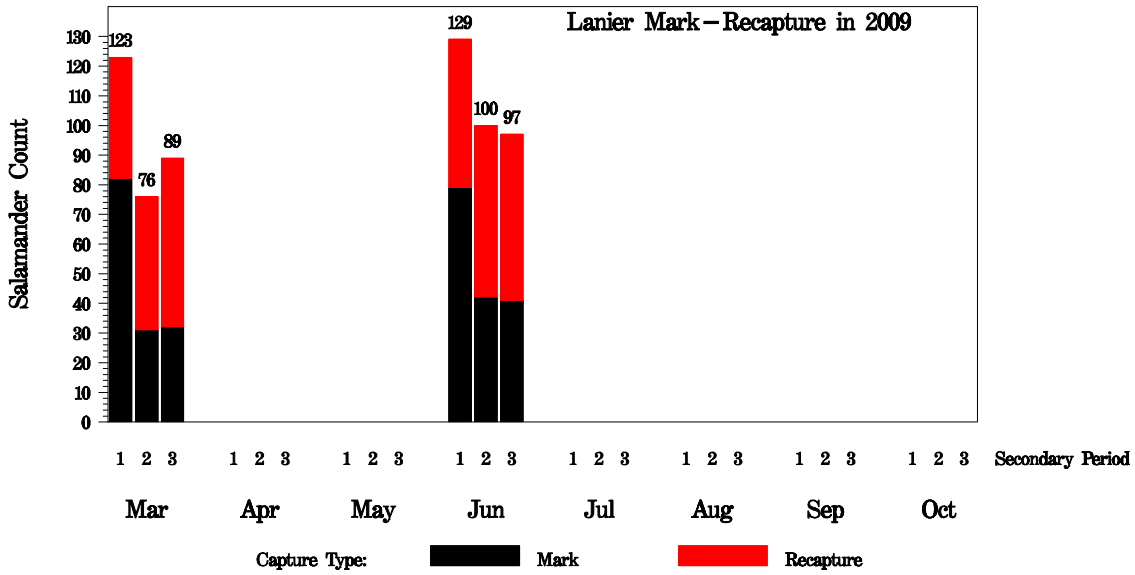
*These sites are scheduled to be surveyed only once per year in QII.

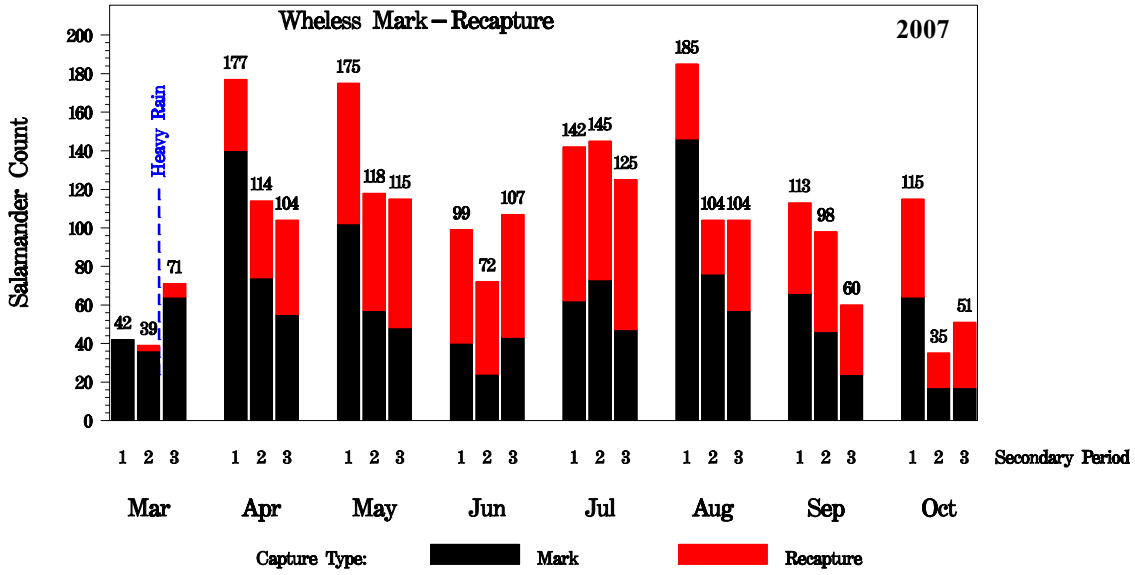
Table 3. Direct count results for all sites in 2009. Surveys for sites 445 and 1164 did not detect any salamanders even though both were surveyed four times.

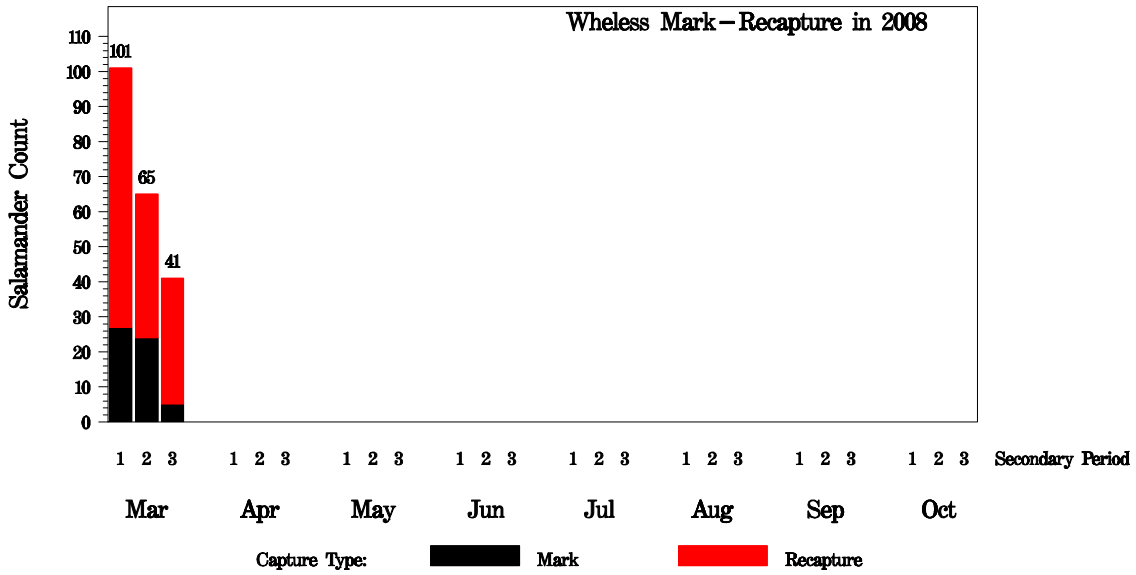
Results from the mark-recapture surveys are reported in Figure 6. Due to the intense drought, numerous surveys were missed due to low or zero spring flow, resulting in only one survey at Wheless for 2008 and 2009 and three surveys for Lanier Spring during that same time period. For comparison, 2007 results are also shown. Despite less frequent surveys than in 2007, recapture rates continue to be high (over 30% between March 2008 and March 2009 at Lanier; Figure 6), and thus *E. tonkawae* may exhibit high site fidelity. I anticipate continuing the mark-recapture project, although given our success with recaptures, a sampling plan of two visits per year (spring and early fall) should be adequate for tracking population dynamics over time. With this schedule, we would also be able to re-incorporate the Ribelin mark-recapture site in our plan.

Figure 6. New captures (mark) and recaptures compared across years at Lanier and Wheless.




Lanier Mark–Recapture in 2009
Salamander Count
123
76
89
129
100
97
Secondary Period
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Capture Type:
Mark
Recapture


Wheless Mark–Recapture
2007
Heavy Rain
Salamander Count
42
39
71
177
114
104
175
118
115
99
72
107
142
145
125
185
104
104
113
98
60
115
35
51
Secondary Period
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Capture Type:
Mark
Recapture


Wheless Mark−Recapture in 2008
Salamander Count
110
100
90
80
70
60
50
40
30
20
10
0
101
65
41
1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3
Secondary Period
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Capture Type:
Mark
Recapture