State of California

M e m o r a n d u m

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Subject: Native amphibian monitoring in Amador County – Updated 2015.

ENVIRONMENTAL SETTING

Sierra Nevada yellow-legged frog (*Rana sierrae*; SNYLF*)* are extant at ten locations in Amador County (Figure 1). All of these populations are small and present very limited opportunities for restoration projects. CDFW began monitoring the Amador County SNYLF populations in 2001. Eldorado National Forest manages the land.

THREATS

- Disease – All Amador County SNYLF populations are positive for chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*). Epithelial swabs were collected from Amador County SNYLF populations between 2008 and 2011 and screened for the presence of *Bd* dna using real-time qPCR analysis. Results from all years detected levels of Bd DNA ranging from very light to heavy; Bd spores were detected on 43 of 51 swabs collected. Recruitment from tadpole to juvenile is likely affected by the presence of Bd.

- Marginal Habitats – These frog populations are generally persisting in isolated habitats with very little water. Any disturbance, natural or otherwise, that results in changes to the hydrology or limnology of the aquatic habitat poses a potential extirpation risk to the population. Risks to the population include extended drought, severe winter conditions, and anthropogenic habitat disturbances.

- Small populations – Most Amador County SNYLF populations likely contain less than twenty adult SNYLF. Additionally, most populations are isolated by distance and topography from their nearest neighbors. Small isolated populations are prone to extirpation due to a combination of random environmental and genetic factors.

- Introduced Fish – Cole Creek supports a population of introduced trout and fish removal is not feasible due to the lack of a suitable downstream fish barrier. A fish removal project was attempted at Cole Creek in the mid-2000s and did not succeed. Although the rest of the SNYLF lakes in Amador County appear to be fishless, Granite Lake and the three SNYLF lakes northeast of Granite Lake drain into Silver Lake, a large managed-water level reservoir with self-sustaining trout.

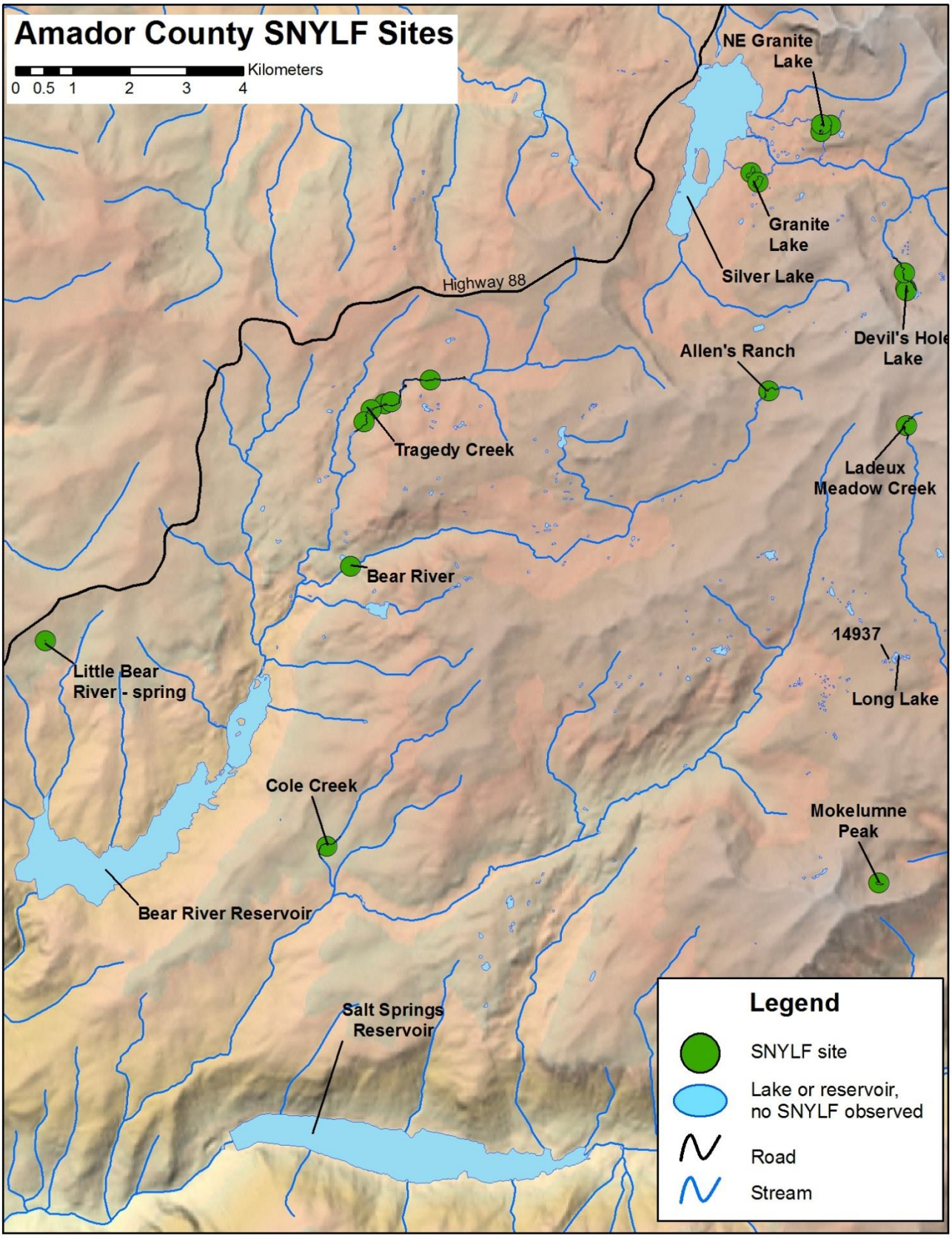


Figure 1: Locations of Amador County SNYLF sites. Green circles indicate sites where SNYLF were observed in 2011 or 2012.

POPULATION STATUS AND DISCUSSION

Mokelumne Peak

This population is persisting at two small connected ponds (Site IDs 51066 and 15084) at approximately 8000' elevation (Figure 2, Figure 3). It was first surveyed in September 2012 and 20 adults, 47 juveniles, and 113 larvae were observed. No swabs were collected and Bd status is unknown but likely positive. Both sites are shallow (3m and 1m) and consist of relatively simple silty habitat. This area is isolated from other water bodies in a small basin 800 meters west of Mokelumne Peak.

Figure 2: Site 51066 is a small tannin pond with breeding SNYLF (CDFW 2012).

Figure 3: Site 15084 is approximately 3 meters deep and has breeding SNYLF (CDFW 2012).

Long Lake

A single adult SNYLF was observed at a small unnamed site (site ID 14937) on the west end of Long Lake (14934) in 2001 and 2002. Long Lake is in Mokelumne Wilderness at 7900' elevation and a CDFW gill net survey in 2001 returned 19 rainbow trout, while a 2012 gill net survey captured zero trout and the lake is believed to have gone fishless. All sites in the area were resurveyed in 2012 and no SNYLF were found.

Cole Creek

A small section of Middle Cole Creek was surveyed by CDFW crews in 2005, 2008, 2009, 2010 and 2012. The section of Middle Cole Creek where SNYLF have been observed is in the Mokelumne Wilderness between 6600 and 6800'. In 2005 CDFW surveyors observed 7 larvae, while in 2008, 2010 and 2012 a single adult was observed and this population, which tested positive for Bd, is believed to be in decline. A self-sustaining rainbow trout population persists in Cole Creek and fish removal is not feasible due to the lack of a suitable barrier.

Allen's Ranch – Updated 2015

A small population of breeding SNYLF persists in a tributary of Bear River near Allen's Ranch at approximately 8100' elevation above mean seal level (Figure 4). Allen's Ranch is privately owned and surrounded by a fence and CDFW has conducted surveys along the stream both upstream and downstream of the fenced area, although SNYLF have never been observed downstream of the property. Eldorado National Forest began surveying this population in 2002 (CNDDB, 2014) and CDFW surveyed the area in 2010 and 2012. A single adult was observed at each survey, and 28 tadpoles were counted in 2010, 10 tadpoles were counted in 2012. Additional data is necessary in order to determine the status of this population; Bd status is also unknown.

2015 Update: CDFW personnel surveyed both reaches of the stream on September 22, 2015. No SNYLF were observed in the nearly dry downstream reach, however 5 adults, 16 juveniles and 45 larvae were observed in the upstream reach. These data suggest this SNYLF population is either increasing or stable despite drought conditions.

Figure 4: Site 51101, Allen's Ranch, is a tributary of Bear River with a breeding SNYLF population (CDFW 2012).

Bear River – Updated 2014

CDFW crews surveyed a medium-sized lake (site 14880) in 2002 and observed five SNYLF larvae at the confluence of Bear River and the outlet of 14880 (Figure 5). A single adult was incidentally observed at the confluence in 2003. In 2010 CDFW crews returned to the area and surveyed a 200 meter section of Bear River, beginning approximately 3 kilometers upstream of Upper Bear Reservoir, and between 6500 and 6700' elevation above mean sea level. This stream reach was re-surveyed in 2012. Two adult SNYLF and eight larvae were seen in 2010; three adults and a sub-adult were observed in 2012. This section of Bear River consists of isolated shallow pools interspersed with granite slab and boulders and surveyors found very little wetted habitat during the 2012 survey, which occurred on September 21st.

2014 Update: Both the small lake (site 14880) and the Bear River stream reach were surveyed in 2014 and no SNYLF were observed at either site. However, the surveys occurred on May 29th and high flows, shadows and cold water (8 degrees Celsius) made observations difficult (Figure 6). CDFW does not consider a population extirpated until 3 negative surveys have been conducted under good conditions and will continue monitoring this population until either 3 consecutive negative surveys occur or it reaches a size where it is no longer in eminent danger of local extinction.

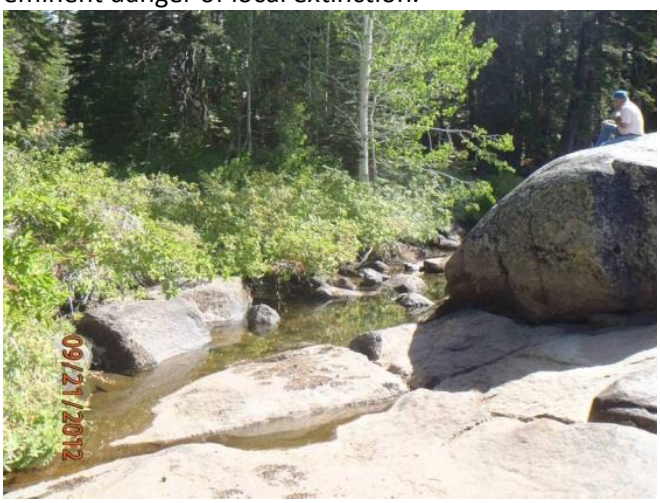


Figure 5: Site 50577, a section of Bear River where SNYLF are observed (CDFW 2012).

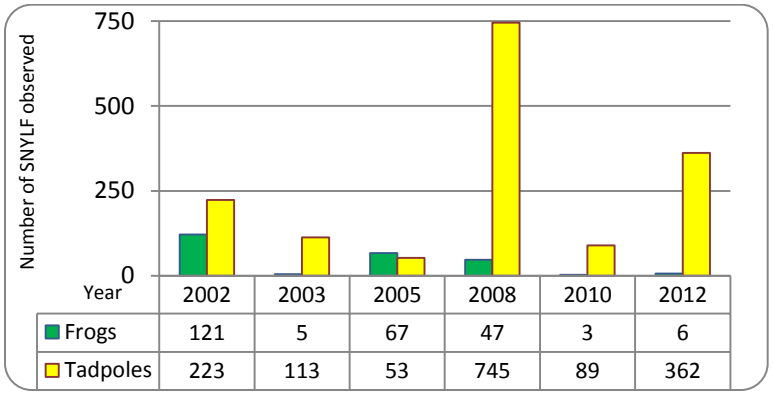
Figure 6: No SNLYF were observed in Bear River on May 29th, 2014. CDFW will continue to monitor this population.

Little Bear River Spring

Little Bear River spring consists of two sites (Site IDs 27979 and 27501) which were surveyed by CDFW in 2003, 2005, 2008, 2010 and 2012. 27979 is a "water hole" in USFS vernacular, for pumping water out for logging, and a single adult SNYLF was observed there in 2005. Site 27501 is the headwaters of Little Bear River at approximately 6700' elevation. Outlet streams from both sites connect at 6400' elevation and all lotic habitat above that was surveyed once by CDFW. No SNYLF were observed in the stream.
At site 27501 CDFW crews observed 1 juvenile and 101 larvae in 2003; 9 adults and 31 larvae in 2005; 2 adults, 7 juveniles, and 6 larvae in 2008; 1 juvenile and 18 larvae in 2010; and 1 adult and 9 larvae in 2012. The population appears to be declining and three swabs collected here were Bd positive.

Ladeux Meadow Creek

The headwaters of Ladeux Meadow Creek are located in the Mokelumne Wilderness at 8400 feet elevation. Ten years of CDFW monitoring data suggest that the population is stable (Figure 6). This population is considered positive for Bd infection. A cattle exclosure is present in the meadow.



Year	2002	2003	2005	2008	2010	2012
Frogs	121	5	67	47	3	6
Tadpoles	223	113	53	745	89	362

Figure 6: VES Data by life stage at Ladeux Meadow Creek 2002 to 2012.

Devil's Hole Lake – Updated 2015

A total of 30 surveys were conducted by CDFW at the 6 sites near Devil's Hole Lake where SNYLF have been observed between 2001 and 2012, with an average of 1.9 juvenile and adult frogs seen per survey. Four larvae were detected in 2001 at site 14682, and a single tadpole was seen in 2012 at site 50146. Although Devil's Hole Lake is now fishless (according to a CDFW gill net set in 2008) no SNLYF have been seen in the lake since 2001. Most SNYLF are observed at site 14682, a small off-channel pond west of Devil's Hole Lake (Figure 7). The outlet of Devil's Hole runs through a beaver-impacted meadow and appears to be fishless (Figure 8). Ten years of data suggest the population is stable but small (Figure 9). Additional fish-free habitat has been available since at least 2008 yet the frog population does not appear to be increasing.

2015 Update: All sites in the vicinity of Devil's Hole Lake were surveyed on September 23, 2015 and a total of 3 adult SNYLF, 18 juveniles and 10 larvae were observed at site 14682 and Devil's Hole Lake's outlet stream (50146). Despite drought conditions the population appears to be stable, although no SNYLF were observed at the majority of sites surveyed. Remaining water in site 50146 was black in color but many of the pools appeared deep enough to support overwintering SNYLF.

Figure 7: Site 14682, a small unnamed pond near Devil's Hole Lake where SNYLF are observed (CDFW 2008).

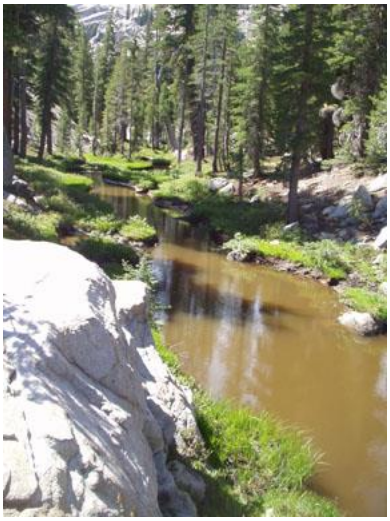
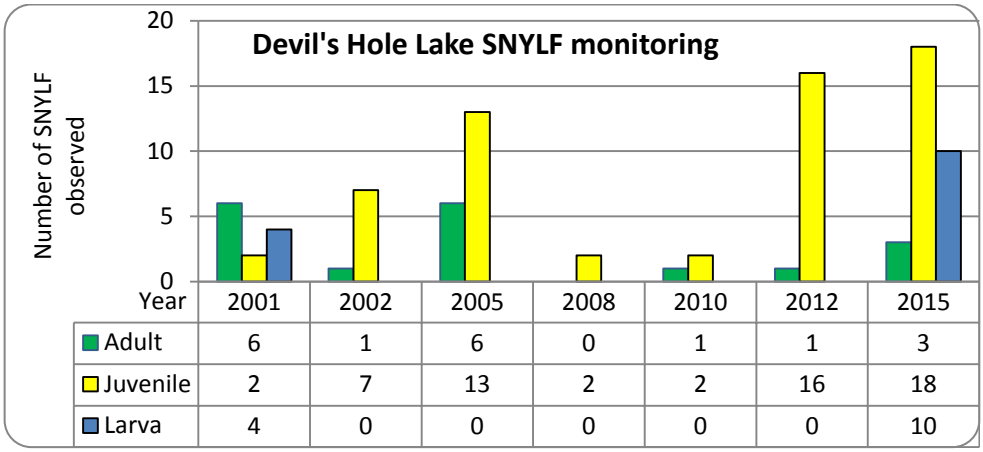


Figure 8: Site 50146 (Devil's Hole Lake outlet looking west (CDFW 2008).

Figure 9: Site 50146 on September 23, 2015. Remaining water in the streambed was stained nearly black ; some pools retained deep water.



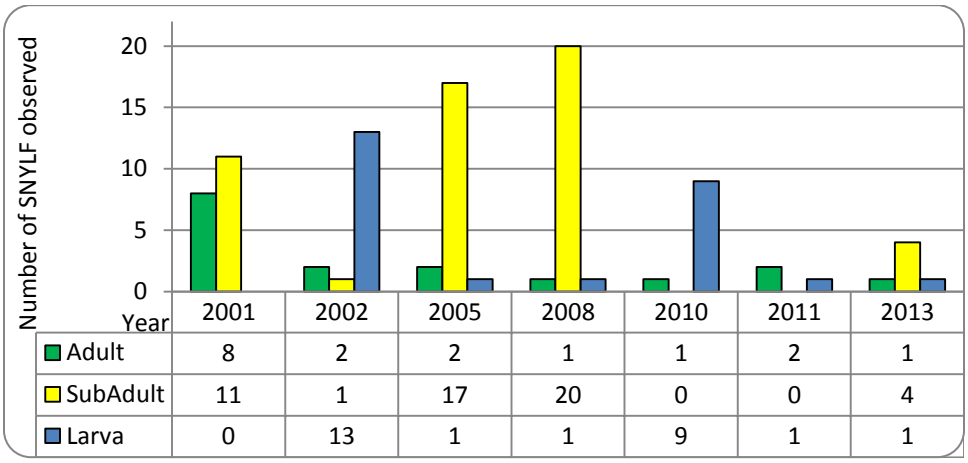
Year	2001	2002	2005	2008	2010	2012	2015
Adult	6	1	6	0	1	1	3
Juvenile	2	7	13	2	2	16	18
Larva	4	0	0	0	0	0	10

Figure 9: VES Data by life stage at Devil's Hole Lake and six unnamed sites from 2001 to 2015. Not all sites were surveyed each year.

Granite Lake and 26625

Granite Lake and site 26625 are above and east of Silver Lake at 7500' elevation (Figure 10). Both lakes have deep habitat (26625 is 10m deep, Granite Lake is 3.8m deep), but drain into Silver Lake. Granite Lake drains north toward the trail and eventually flows into the Devil's Hole outlet not far from Silver Lake. A waterfall on this outlet prevents fish from returning to Granite Lake. Ten years of monitoring data suggest the frog population is stable but is at risk of extirpation due to its small size (Figure 11). Granite Lake had fish in 2001 but an overwinter gill net in 2011-2012 caught no fish.

Figure 10: Granite Lake (14633) from the northeast during a 2013 VES (CDFW).

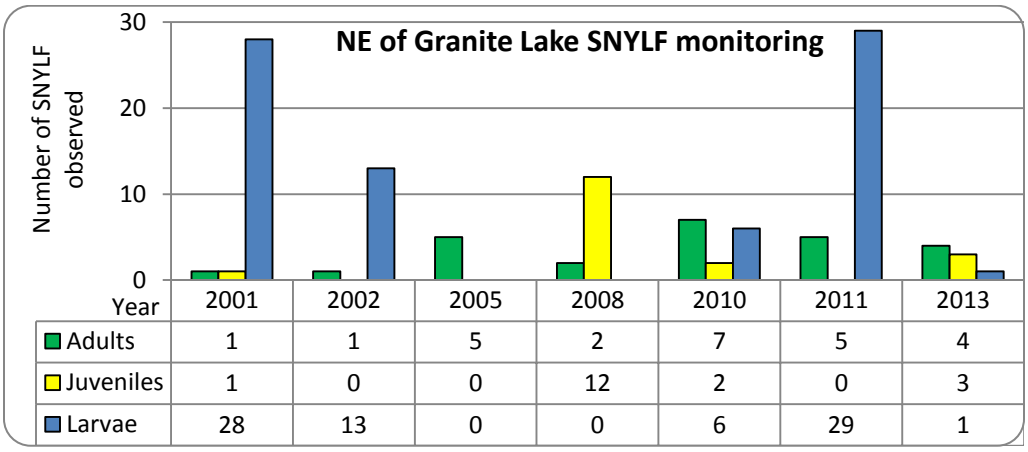


Year	2001	2002	2005	2008	2010	2011	2013
Adult	8	2	2	1	1	2	1
SubAdult	11	1	17	20	0	0	4
Larva	0	13	1	1	9	1	1

Figure 11: VES Data by life stage at Granite Lake and one unnamed site from 2001 to 2013. Each site was surveyed each year.

NE Granite Lake

SNYLF are persisting at four small sites west of Silver Lake at 7800' elevation. Two of the sites drain north and west into Silver Lake while the other two drain south into the Devil's Hole outlet stream, which flows into Silver Lake. Tadpoles are observed at a single site, Lake ID 14612, which is 4 meters deep. Ten years of monitoring data and the population appears stable but is at risk of extirpation due to its small size (Figure 12). Swabs collected here tested positive for Bd. Incidentally, USFS surveys in the 90's found adult SNYLF in the stream between Granite Lake and Devil's Hole Lake.



Year	2001	2002	2005	2008	2010	2011	2013
Adults	1	1	5	2	7	5	4
Juveniles	1	0	0	12	2	0	3
Larvae	28	13	0	0	6	29	1

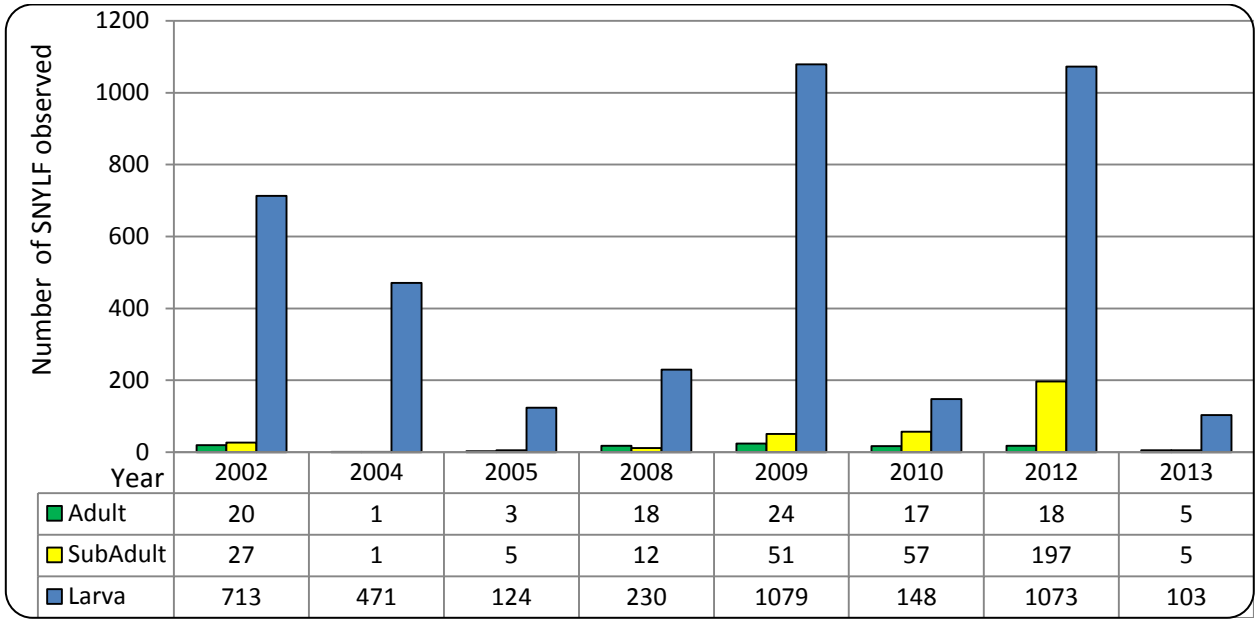
Figure 12: VES data by life stage at four unnamed sites northeast of Granite Lake from 2001 to 2013.

Tragedy Creek – Updated 2013

An extant SNYLF population is found on a section of Tragedy Creek between 7100 and 7300' elevation above mean sea level (Figure 13). Tragedy Creek drains into Bear River about two kilometers above Upper Bear Reservoir. SNYLF are observed along approximately 2700 meters of stream and CDFW has been monitoring this population since 2002. Ten years of monitoring data suggests that the population is stable or slowly increasing (Figure 14). Of the sixteen swabs collected, three were from juvenile frogs and all three returned very high levels of Bd DNA therefore the population is considered Bd positive.

2013 Update: Numbers of observed SNYLF were slightly lower in 2013, but surveys took place in June when large flows were present and CDFW still considers this population to be stable.

Figure 13: Standing pool in Tragedy Creek reach during a 2009 visual encounter survey (CDFW 2009).



Year	2002	2004	2005	2008	2009	2010	2012	2013
Adult	20	1	3	18	24	17	18	5
SubAdult	27	1	5	12	51	57	197	5
Larva	713	471	124	230	1079	148	1073	103

Figure 14: VES Data by life stage along a 2700 meter reach of Tragedy Creek from 2002 to 2013.