

State of California

Memorandum

Date: 10/22/2015

To: Kevin Thomas
Senior Environmental Scientist (Supervisor)
North Central Region

From: Sarah Mussulman
Environmental Scientist – High Mountain Lakes
North Central Region

Cc: Region 2 Fish Files

Subject: Sierra Nevada yellow-legged frog monitoring in the Phipps Creek Planning Watershed within Desolation Wilderness.

INTRODUCTION

Because of the presence of multiple SNYLF breeding locations and relatively low visitor use, the Aquatic Biodiversity Management Plan for the Desolation Wilderness Management Unit (CDFW 2012) identifies the entire Phipps Creek planning watershed (PWS) as a Native Species Reserve (NSR) for the Sierra Nevada yellow-legged frog, *Rana sierrae*, (SNYLF). SNYLF have been observed at Upper Leland Lake, Lower Leland Lake, McConnell Lake, and Lake Zitella by Eldorado National Forest (ENF) and California Department of Fish & Wildlife (CDFW) biologists (Figure 1). The NSR will include the lakes listed above as well as Horseshoe Lake and the 4-Q lakes.

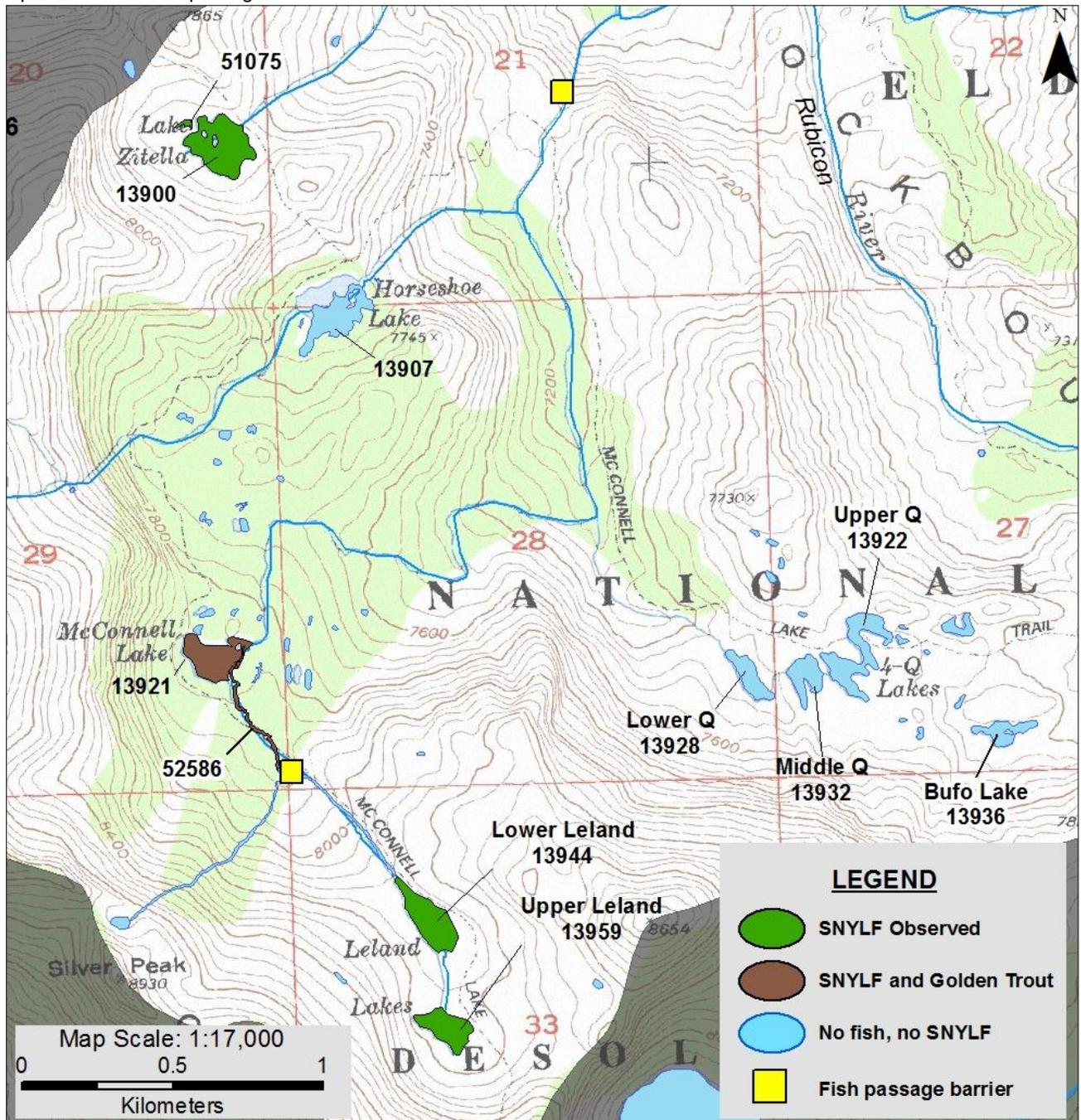
ENVIRONMENTAL SETTING

The most notable features of Phipps Creek PWS are the Rubicon River and Rubicon Reservoir. However, this memorandum primarily addresses the upper watershed and the headwater systems which drain into the Rubicon River. There are three main arms within the upper watershed: Lake Zitella; a dozen lakes and ponds collectively called the Q Lakes; and Leland-McConnell Lakes. Streams in these areas are generally ephemeral and most contain multiple fish passage barriers due to the steep granitic nature of the upper watershed. Lake elevations in the upper PWS range from approximately 7,200' to 8,200' above mean sea level.

The PWS is located in the remote north-central section of the Desolation Wilderness and is not easily accessed. The lower watershed can be accessed using the Rubicon Trail from Loon Lake or the Rubicon OHV Trail. The upper watershed is a long hike from any trailhead but can be accessed from Wrights Lake using the Rockbound Trail or from Emerald Bay along the Velma Lakes Trail. The most direct access to the upper watershed is a cross country route from Number 3 Lake between Red and Silver peaks. As a result of the difficult access, this area receives much less use than other portions of the Desolation Wilderness (CDFW 2012). ENF manages the land.

The combination of relatively low recreational use, presence of nearby SNYLF populations and partial lack of fish continue to make this an excellent watershed for native species management.

Figure 1: Upper Phipps Creek Planning Watershed (light portion of map). The whole upper watershed is designated as a Native Species Reserve (NSR) for SNYLF. Golden trout are present in the river system below McConnell Lake and the Rubicon River contains multiple fish species; these areas are not included in the NSR. Green lakes are fishless and contain SNYLF; brown lakes contain both SNYLF and golden trout; blue lakes contain neither SNYLF nor trout. Yellow squares indicate fish passage barriers.



THREATS

- Disease – All SNYLF populations in El Dorado County are positive for chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*). However, low numbers of observed frogs during 2008 and 2010 limited sampling to eight frogs – five from Lake Zitella and nearby pond 51075 and three from the Leland Lakes. SNYLF were sampled using epithelial swabs and screened for the presence of *Bd* dna using real-time qPCR analysis. Of the eight swabs collected, *Bd* was only detected on a single swab from Upper Leland. Regardless, CDFW considers this population *Bd* positive due to

the fact that even a single detection indicates Bd presence in the area and adult frogs in Bd positive areas are known to gain and lose Bd repeatedly throughout their lives (Knapp et al 2011).

- Marginal Habitats and Small Population Size – SNYLF are persisting in extremely low numbers at four lakes and their seasonally flowing tributaries. Any disturbance, natural or otherwise, that results in changes to the hydrology or limnology of the deep water habitat poses a potential extirpation risk to the population. Potential risks include severe winter conditions, extended drought, or anthropogenic habitat disturbances. Additionally, populations of this size are subject to extinction due to stochastic events.
- Introduced Fish – McConnell Lake (Figure 2) and its tributaries contain a small population of golden trout. No records exist of CDFW fish plants in McConnell Lake; the fish likely became established in McConnell after being planted in the Leland Lakes. Larval SNYLF are regularly seen in McConnell Lake. Golden trout predate upon tadpoles, juvenile and adult frogs and are a potential source of competition for food items for adult and juvenile frogs.

Figure 2: McConnell Lake looking south. Note the emergent vegetation in the foreground (CDFW 2003).



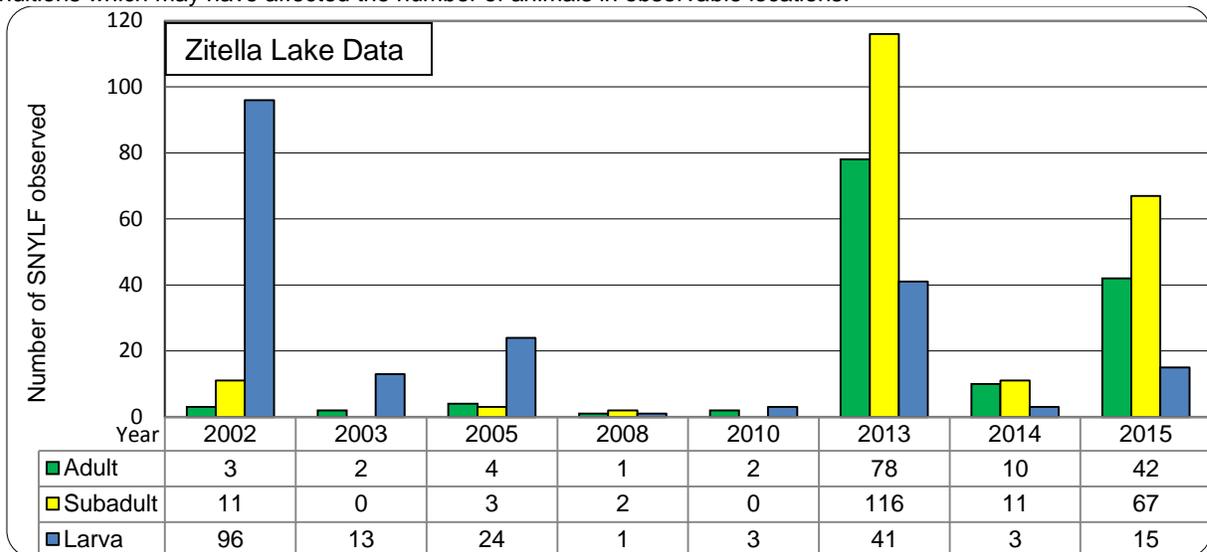
POPULATION STATUS

Lake Zitella and unnamed pond 51075

SNYLF were observed at Lake Zitella in 1993 by ENF and CDFW has been monitoring the population since 2002 (Figure 3). An unnamed pond next to Zitella was given a unique ID in 2010 to increase mapped site resolution in the area; previous years surveys may have included the pond. Lake Zitella was stocked with brook trout from 1935 through 1973 but due to its shallow depth it was likely fishless by 1986 (CDFW 2012). Between 2002 and 2010 numbers of observed adult SNYLF ranged from one to three and due to the relative simplicity of habitat at Lake Zitella, as well as its isolated location at the top of a small watershed, it is likely that the SNYLF population was extremely small. In 2013 surveyors observed large numbers of SNYLF at Lake Zitella for the first time. Although numbers in 2014 and 2015 are not quite as impressive, it appears that something noteworthy is occurring at Lake Zitella. An increase of this magnitude in a Bd-positive population is unexpected; possible factors include recent short winters, increased temperatures and increased food availability due to drought conditions. Nearby Highland Lake, which is in the process of fish removal to benefit SNYLF, has experienced a similar large increase in SNYLF observations. Regardless of the exact reasons, three consecutive years of increasing population

trend data in this area strongly suggest that the SNYLF population has significantly increased since 2010. CDFW will continue regular monitoring at Lake Zitella.

Figure 3: Survey data at Lake Zitella and nearby site 51075. Surveys in 2014 were conducted during moderately windy conditions which may have affected the number of animals in observable locations.



Upper and Lower Leland and McConnell Lake

The Leland Lakes drain into McConnell Lake via approximately 1.5 kilometers of seasonal stream and the small SNYLF population in the three lakes is likely related. Surveys in 2005 and 2013 included the whole stream reach between McConnell and Lower Leland and did not particularly increase the number of observed animals. More monitoring data is required to derive population trends and quantify the SNYLF population at the Leland Lakes and McConnell (Figure 4, Figure 5), although data from 2010 and 2013 suggest the population may be increasing slightly.

Fish plants were halted at Upper Leland when SNYLF were observed there in 1993 and fish plants were halted at Lower Leland in 1999 (CDFW 2012). CDFW and ENF removed the last few golden trout from Lower Leland between 2000 and 2003. McConnell Lake never received plants and fish likely became naturalized there by travelling downstream from the Leland Lakes. McConnell Lake is shallow and characterized by emergent vegetation and complex meadow tributaries where golden trout of all sizes are easily observed. Mechanical fish removal is not feasible at McConnell Lake (CDFW 2012), but a fish passage barrier approximately 500 meters above McConnell Lake prevents trout from ascending back into the Leland Lakes. In 2013 CDFW and ENF completed tributary surveys around the McConnell and Leland Lakes and unlike at other sites in the Northern Sierra, very few SNYLF were observed in the streams. Three adults and two juvenile SNYLF were observed in the inlet to McConnell Lake and no SNYLF were observed in any other nearby tributaries. This may simply be due to very low numbers of animals in the population. Larval SNYLF have been repeatedly observed in McConnell Lake by both CDFW and ENF personnel (CNDDDB, 2014) despite the presence of non-native golden trout. Currently the only feasible mechanical fish removal project in the watershed – at Leland Lakes – is complete; complex meadow and stream habitat around McConnell Lake precludes mechanical removal there. Because of this status, CDFW will continue to monitor this population until an additional restoration opportunity arises, the population disappears, or the SNYLF population in upper Phipps Creek PWS grows to a size where it is no longer in danger of local extinction.

Figure 4: Survey data by life stage at Leland Lakes from 2002 through 2013. *All larvae were observed at Upper Leland. The last golden trout was captured in Lower Leland in 2003.

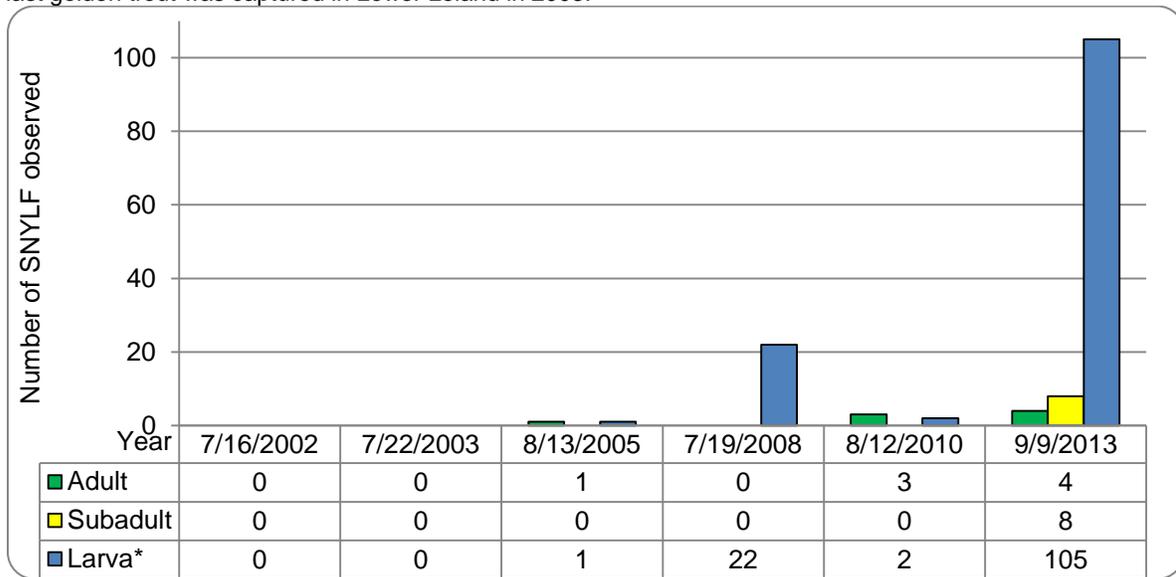


Figure 5: CDFW survey results at McConnell Lake from 2003 through 2013. Note: 2013 results include the inlet stream to McConnell Lake and three adults and two subadults were observed in the stream. Stream surveys were also conducted in 2005.

Year	Adult	Subadult	Larva
2003	0	0	0
2005	0	0	28
2008	0	0	4
2013	3	3	0

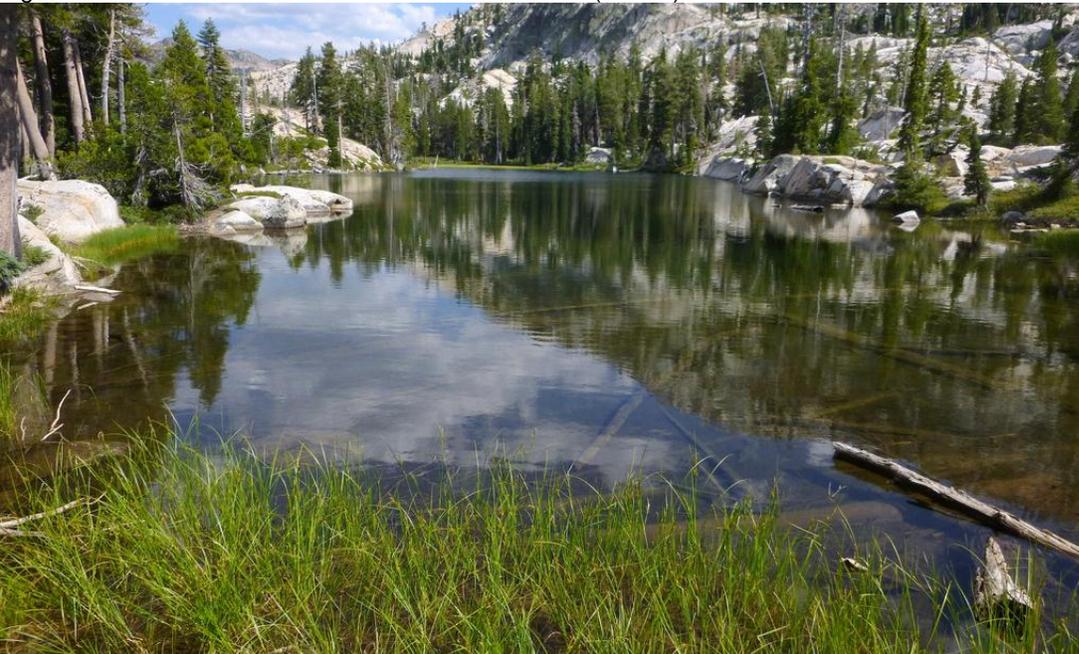
4 Q Lakes

The 4-Q Lakes became fishless in the absence of planting and the Aquatic Biodiversity Management Plan for the Desolation Wilderness Management Unit identifies them as a possible translocation location for SNYLF (CDFW 2012). Due to an apparent SNYLF population expansion at Lake Zitella and nearby Highland Lake CDFW survey crews surveyed all lakes in the vicinity of the 4-Q lakes for native amphibians in 2015. No amphibians were observed during the surveys. Although SNYLF have not been observed at the 4-Q Lakes, the area contains an interconnected combination of shallow marshes and ponds, seasonal tributaries and deep lakes and appears to be high quality SNYLF habitat (Figure 6, Figure 7).

Figure 6: A shallow marshy section of Upper Q Lake from the east on 8/7/2015 (ENF) Deep water habitat is just visible in the background.



Figure 7: Lower Q Lake from the northwest on 8/7/2015 (CDFW).



LITERATURE CITED

CDFW 2011. Report to the Fish and Game Commission: A status review of the mountain yellow-legged frog (*Rana sierrae* and *Rana muscosa*) . CA Fish and Game Commission. California Department of Fish and Game; 11/28/2011. Available from:
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=90162>

CDFW 2012. *Aquatic Biodiversity Management Plan for the Desolation Wilderness*. California Department of Fish and Wildlife; 12/19/2012. Available from:
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=59961>

CNDDDB. December 17, 2014. Accessed by S. Mussulman, CDFW.

Knapp, R.A., C.J. Briggs, T.C. Smith and J.R. Maurer. 2011. Nowhere to hide: impact of a temperature-sensitive amphibian pathogen along an elevation gradient in the temperate zone. *Ecosphere* 2:art.93.