

State of California
Department of Fish and Wildlife

Memorandum

Date: 2 August 2023

To: Leslie Alber,
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Acting Sierra District Supervisor;
North Central Region Fisheries

From: Isaac Chellman, Environmental Scientist;
High Mountain Lakes;
North Central Region Fisheries

Cc: Region 2 Fish Files

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Subject: **Native amphibian monitoring in Desolation Wilderness;**
• ***Rana sierrae* surveys at the Pyramid Peak ponds**



SUMMARY

The Pyramid Peak ponds are a collection of small, high alpine waterbodies located less than one kilometer (km) northwest of Pyramid Peak in Desolation Wilderness, El Dorado County. The Pyramid Peak ponds contain a small population of Sierra Nevada Yellow-legged Frogs (*Rana sierrae*, SNYLF) that California Department of Fish and Wildlife (CDFW) staff have monitored occasionally since 2002. CDFW staff visited the site in 2021 and detected a small number of SNYLF in the two largest ponds. CDFW plans to continue periodic surveys of the area to monitor SNYLF population trends.

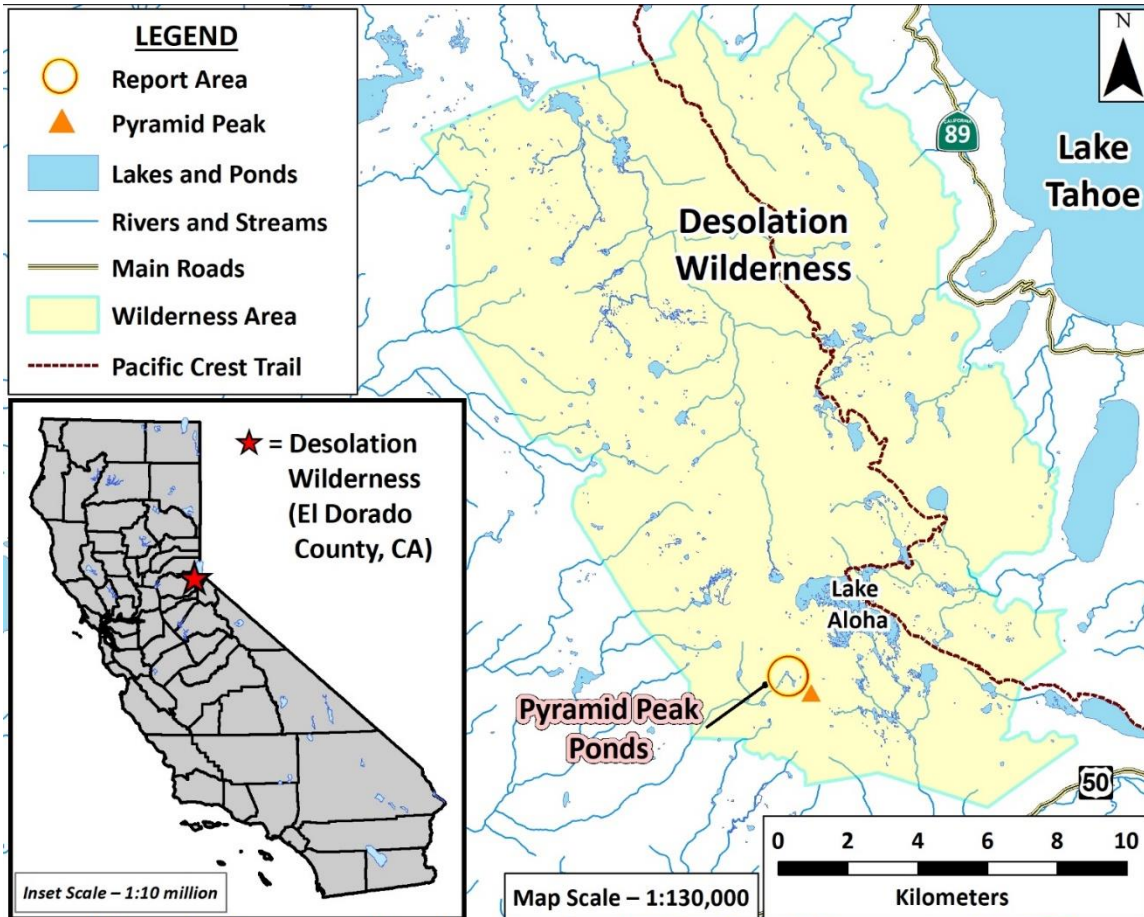


Figure 1. Desolation Wilderness, El Dorado County, CA. The area discussed in this memorandum is circled.

ENVIRONMENTAL SETTING

The Pyramid Peak Ponds are located in Desolation Wilderness, El Dorado County, at approximately 8,900 feet (ft; 2,713 meters [m]) in elevation. The ponds, along with Lyons Lake and Lake Sylvia, form the headwaters of Lyons Creek, which flows into South Fork Silver Creek, through Ice House Reservoir, and ultimately into the South Fork American River. Eldorado National Forest (ENF) manages this section of Desolation Wilderness and the surrounding land. The Pyramid Peak ponds are accessed via the Lyons Creek Trail, which is found approximately four miles up Wrights Lake Road from Highway 50 (**Figure 1**).

INTRODUCTION

The Aquatic Biodiversity Management Plan (ABMP; CDFG 2012) for the Desolation Wilderness Management Unit identifies the Pyramid Peak ponds as a Native Species Reserve (NSR) for SNYLF (**Figure 2**). The NSR consists of two main ponds, Site ID 14299 (**Figure 3**) and Site ID 14311 (**Figure 4**); plus, the stream channel connecting the two main ponds (Site ID 50145; **Figure 5**), Site ID 61605 (**Figure 6**), Site ID 61604 (**Figure 7**), and Site ID 52915 (**Figure 8**).



Figure 2. An adult Sierra Nevada Yellow-legged Frog (*Rana sierrae*) captured at Site ID 14311 on 28 July 2021. (CDFW)

CDFW stocked Site ID 14311 (identified as “Pyramid Peak Lake” in CDFW stocking records) with Golden Trout (*Oncorhynchus aguabonita*; GT) periodically from 1965 until 1988. Additionally, CDFW completed one additional stocking event of Brook Trout (*Salvelinus fontinalis*; BK) in 1974. In 2004, CDFW set overnight gill nets into Site ID 14311 and Site ID 14299 (one net in each pond), both of which resulted in zero fish captures. Site ID 14311 contains limited spawning habitat and GT likely died off after aerial stocking ceased in 1988.



Figure 3. Site ID 14299 in late July 2021, looking north. (CDFW)



Figure 4. Site ID 14311 in late July 2021, looking north. This site is referred to as “Pyramid Peak Lake” in CDFW stocking records. (CDFW)



Figure 5. Site ID 50145 in late July 2021, looking south. Much of this stream segment, which flows from Site IDs 14311 to Site ID 14299, flows beneath deeply piled talus. (CDFW)



Figure 6. Site ID 61605 in late October 2022, looking down from Pyramid Peak. (I. Chellman)



Figure 7. Site ID 61604 in late July 2021, looking southwest. (CDFW)



Figure 8. Site ID 52915 in late July 2021, looking southwest. (CDFW)

THREATS

Disease

The Pyramid Peak ponds SNYLF population is positive for chytrid fungus (*Batrachochytrium dendrobatidis*; *Bd*). CDFW sampled SNYLF in basin in 2008, 2010, and 2012 using epithelial swabs and had the swabs screened for the presence of *Bd* DNA using real-time quantitative polymerase chain reaction (qPCR) analysis. In total during the three sampling years, staff collected 11 swabs. Of the 11 total samples, no *Bd* was detected on four swabs, while results from the remaining seven swabs resulted in very light to moderate *Bd* infection intensity.

Loss of Genetic Diversity

Like many SNYLF populations in the northern Sierra Nevada, the Pyramid Peak ponds SNYLF population is small and isolated. Desolation Valley SNYLF populations, which are fairly robust and widespread, are located only about 2 km to the east of the Pyramid Peak ponds (CDFW 2022). However, the crest of the Crystal Range lies between these two areas. Therefore, gene flow between SNYLF populations in Desolation Valley and the Pyramid Peak ponds is likely extremely rare. In addition to the threats presented by stochastic environmental events (e.g., drought or especially harsh winter), genetic isolation can lead to factors such as inbreeding depression, genetic drift, fixation of deleterious alleles, and loss of genetic diversity, all of which are population genetic factors exacerbated in small populations (Frankham et al. 2009).

Marginal Habitats

The two main Pyramid Peak ponds (Site IDs 14299 and 14311; **Figures 3 and 4**) are fairly large (1.8 acres [0.72 hectares (ha)] and 2.5 acres [1 ha], respectively), but relatively shallow (staff using depth finders during CDFW baseline surveys recorded 3.1 and 3.3 m [10.8 and 10.2 ft] estimated maximum depths, respectively). Over time, even ponds of this size may be at risk of desiccation if the Sierra Nevada continues to experience consistently hotter and drier summers, more winter precipitation falling as rain, and loss of snowpack, as currently predicted by many climate models (Hatchett et al. 2017, Dettinger et al. 2018, Huang et al. 2018, Rhoades et al. 2018, Sun et al. 2019, Wahl et al. 2019, Coats et al. 2021). Any disturbance, natural or otherwise, that changes the hydrology or limnology of the two deep water habitats poses a potential extirpation risk to the population. Extended drought, severe winter conditions, or anthropogenic habitat disturbances are some of the potential risks.

POPULATION STATUS

Twenty years of visual encounter survey (VES) data indicate the SNYLF population in the Pyramid Peak ponds NSR is very small, but appears to be remaining stable (**Figures 10 and 11**). Since CDFW surveys began in 2002, staff have only detected SNYLF in the two main ponds (Site IDs 14299 and 14311), Site ID 50145, and Site ID 61605 (**Figure 9**). Staff have detected nearly all SNYLF in the two main ponds, of which the majority have been at Site ID 14311. Additionally, CDFW staff have detected SNYLF breeding, as evidenced by observations of larvae and subadults, in both of the larger ponds. The only additional SNYLF observations that have occurred elsewhere in the drainage include one adult staff observed at Site ID 50145 in August 2012, and one adult staff observed at Site ID 61605 in August 2015.

In 2021, CDFW staff surveyed most of the Pyramid Peak ponds NSR, with the exception of Site ID 61605 (**Figures 6 and 9**). During the survey day, staff observed one SNYLF adult (**Figure 12**) seeking refuge underneath a large boulder approximately 50 m down the outlet stream of Site ID 14299 (**Figure 13**). Overall, staff observed fewer SNYLF of all life stages on 28 July 2021 when compared with most other survey years (**Figures 10 and 11**). Observer bias, variation in survey conditions, and relatively low number of detections all make deriving trends difficult (Mazerolle et al. 2007). The particularly lower SNYLF counts in 2021 may be due any of these aforementioned factors or others. CDFW Region 2 Sierra Fisheries program staff will continue long term SNYLF monitoring under a current State Wildlife Grant (federal grant #F22AF01541-00). Monitoring under this current grant is occurring from 2022 to 2025. Therefore, CDFW plans to return to the Pyramid Peak ponds during the current grant period to undertake additional monitoring. Rather than traditional single observer VES, CDFW plans to use double-observer survey methods, which help account for detection probability (Fellers et al. 2015).

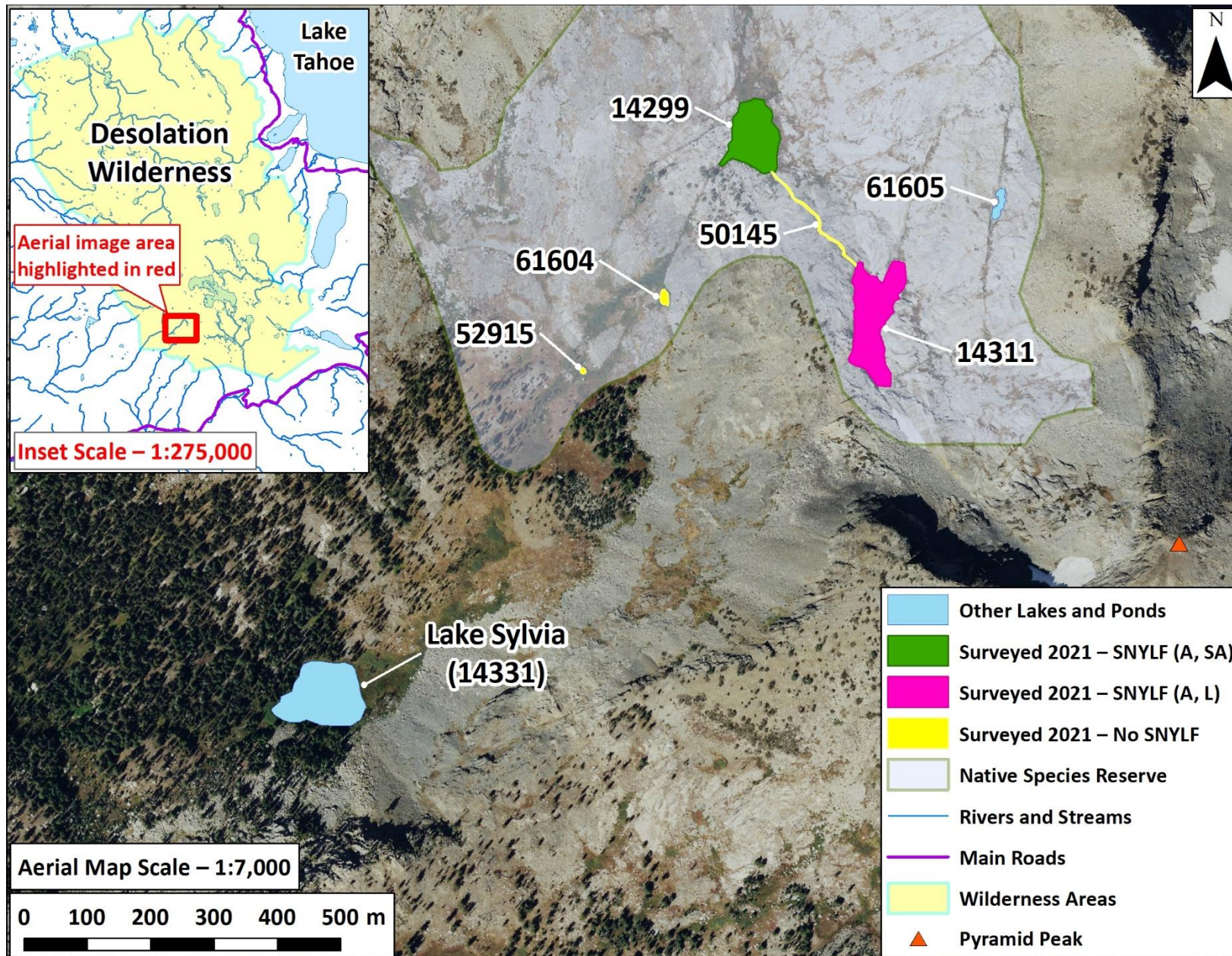


Figure 9. [See figure caption at the beginning of the next page.]

Figure 9 (continued). Pyramid Peak ponds Native Species Reserve (NSR), Desolation Wilderness, CA. California Department of Fish and Wildlife (CDFW) staff have consistently observed Sierra Nevada Yellow-legged Frogs (*Rana sierrae*; SNYLF) in the two largest ponds. SNYLF letter codes in the legend, which indicate the life stages observed during the most recent survey, are as follows: “A” = adults, “SA” = subadults, and “L” = larvae. Number labels shown are unique site identification codes that CDFW uses for data collection. The drainage forms the headwaters of Lyons Creek, which flows into South Fork Silver Creek (not shown).

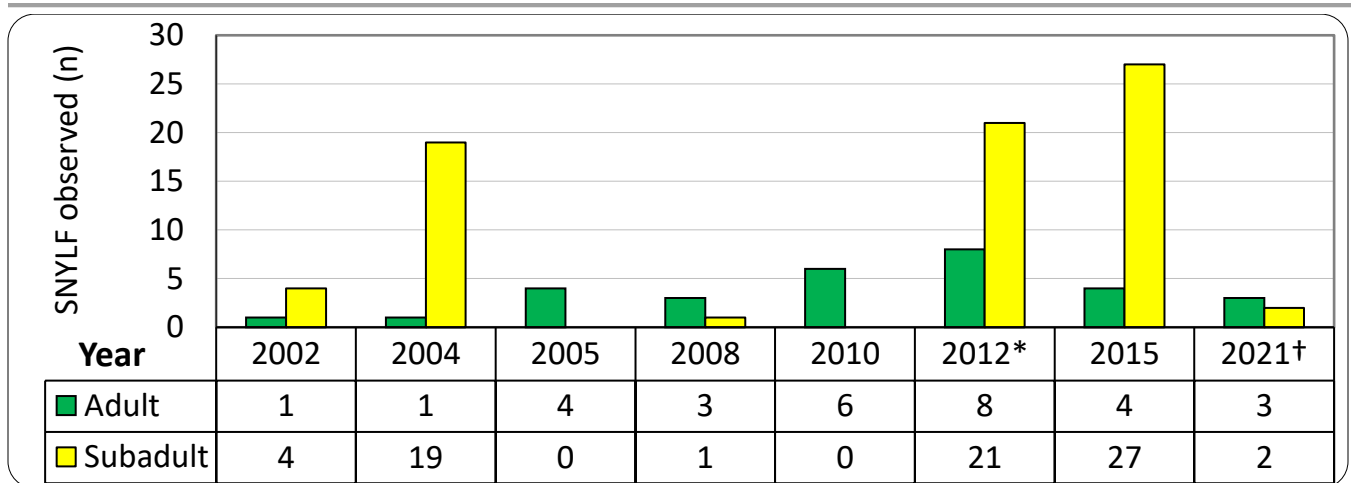


Figure 10. Visual encounter survey (VES) data for adult and subadult SNYLF in the Pyramid Peak ponds area from 2002 to 2021. CDFW surveyed the two main ponds (Site IDs 14299 and 14311), and the stream segment connecting the two sites (Site ID 50145), each survey year from 2002–2021.

*Beginning in 2012, CDFW added Site ID 61605 to surveys.

†In 2021, CDFW did not survey Site ID 61605. This was also the first time CDFW officially surveyed Site IDs 61604 and 52915. Staff did not detect Sierra Nevada Yellow-legged Frogs (*Rana sierrae*) in either of these newly included ponds.

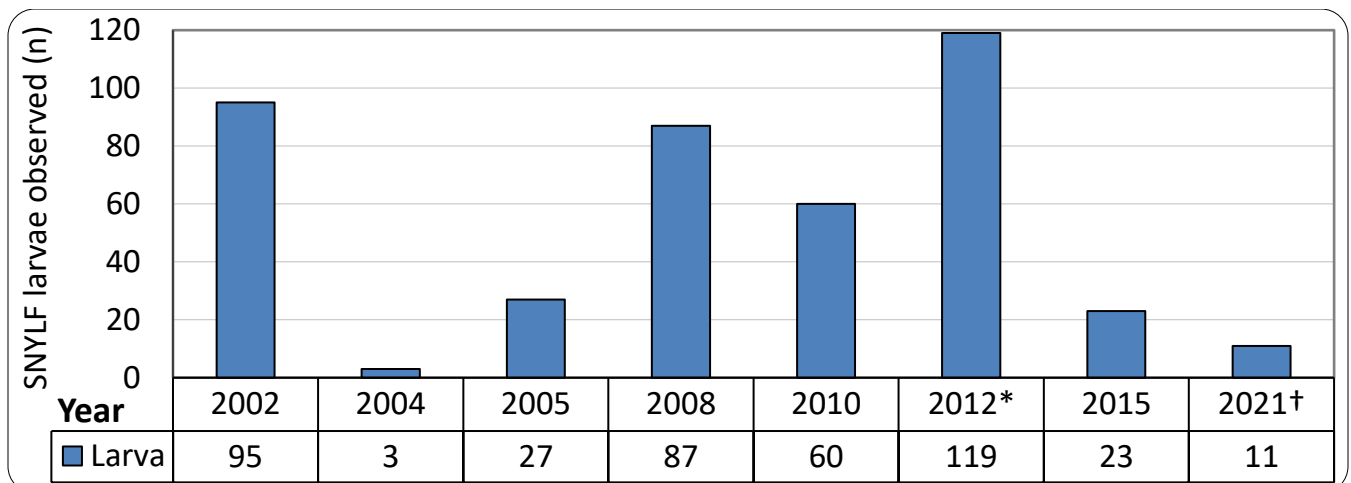


Figure 11. Visual encounter survey (VES) data for larval SNYLF in the Pyramid Peak ponds area from 2002 to 2021. See the notes below **Figure 10** for a summary of caveats related to each survey year.



Figure 12. An adult Sierra Nevada Yellow-legged Frog (*Rana sierrae*) that California Department of Fish and Wildlife staff detected beneath an overhanging boulder in the outlet stream of Site ID 14299 on 28 July 2021. (CDFW)



Figure 13. The outlet stream of Site ID 14299 on 28 July 2021, looking upstream toward the pond (northeast). (CDFW)

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