

State of California
Department of Fish and Wildlife

Memorandum

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To: Sarah Mussulman,
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North Central Region Fisheries

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

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Subject: Native fish and amphibian monitoring in Pacific Creek, Alpine County: 2020 survey results.

SUMMARY

Pacific Creek is a small headwater tributary to the North Fork Mokelumne River, located in Alpine County (**Figure 1**). The headwaters of Pacific Creek contain a population of federally threatened Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*; LCT), which is monitored occasionally by California Department of Fish and Wildlife (CDFW) fisheries staff. Before 2020, the most recent survey occurred in August 2017, during which two CDFW fisheries biologists observed a single adult Sierra Nevada Yellow-legged Frog (*Rana sierrae*, SNYLF; **Figure 2**) in a small tributary to a headwater meadow feeding Pacific Creek. This detection was the second known SNYLF observation in the Pacific Creek drainage, and the first observed by CDFW. The closest known SNYLF population to Pacific Creek is present in the headwaters of the North Fork Stanislaus River, which is located over a ridgeline approximately 2 kilometers (km) west of Pacific Creek. In August 2020, a CDFW biologist revisited Pacific Creek to conduct a visual encounter survey (VES) for aquatic species, including LCT and SNYLF. During the survey, CDFW did not observe any SNYLF, but detected 46 healthy LCT.

In future surveys, CDFW will continue monitoring the LCT population and remain vigilant for any additional SNYLF observations in the headwater meadows of the watershed. Additionally, during the next visit to Pacific Creek, CDFW staff plan to survey for SNYLF farther up the Pacific Creek drainage, in the small headwater streams and pools below Bull Run Peak. CDFW may also investigate areas in upper Marshall Canyon Creek, which could potentially contain remnant SNYLF above LCT-occupied habitat.

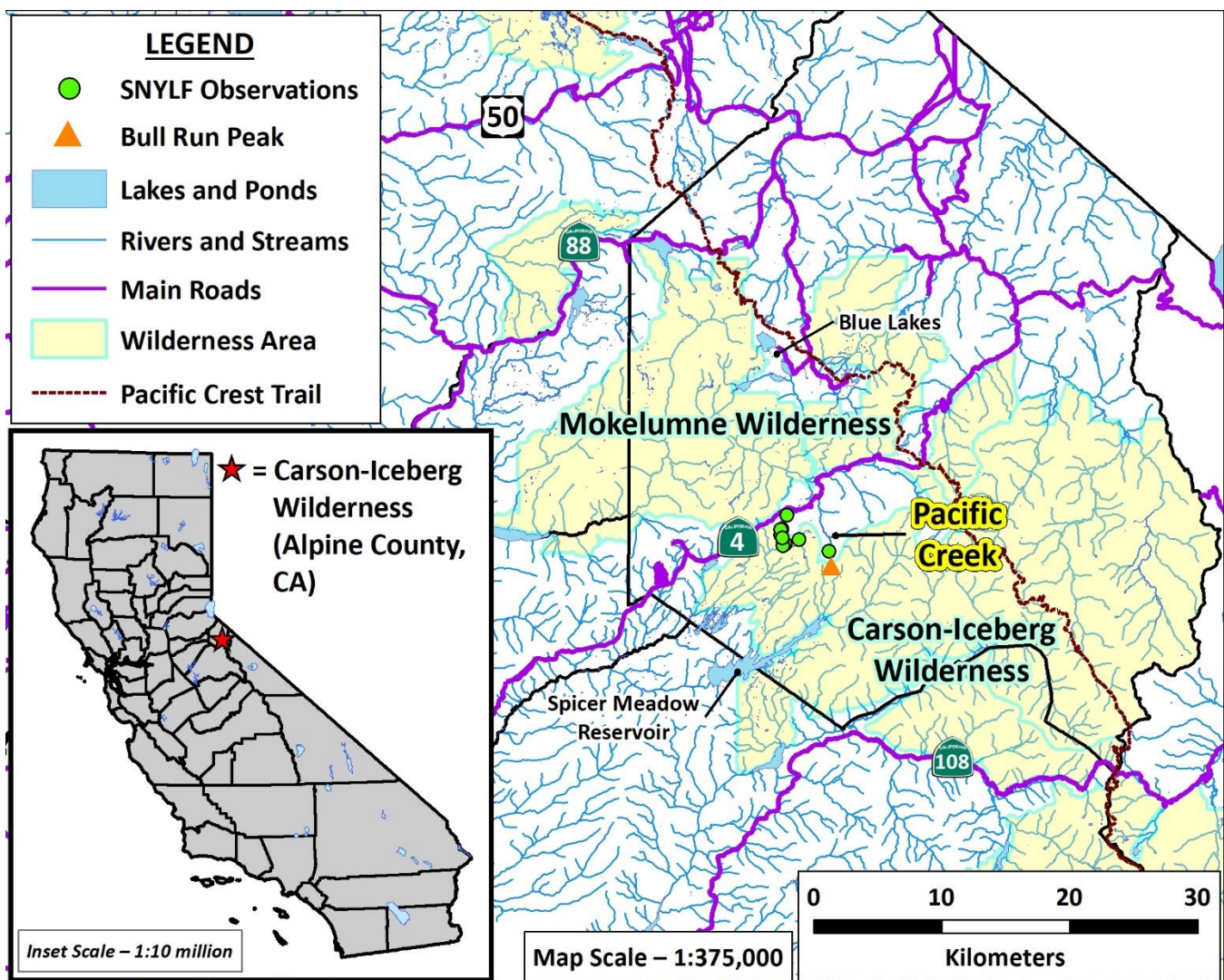


Figure 1. Alpine County, CA. Green dots show *Rana sierrae* (SNYLF) sites with positive detections by CDFW staff during recent visual encounter surveys in the area of Pacific Creek.

ENVIRONMENTAL SETTING

Pacific Creek (**Figure 3**) is located south of State Route (SR) 4 and north of Carson-Iceberg Wilderness in southwest Alpine County (**Figure 1**). Pacific Creek originates from a collection of high gradient meadows and snowmelt streams located below Bull Run Peak, which is approximately 9,500 feet in elevation. Pacific Creek flows north, past SR 4, before joining the North Fork Mokelumne River. Stanislaus National Forest (SNF) manages Pacific Creek and the surrounding land. A dirt road connects SR 4 with the Pacific Creek Trailhead. A rough four-wheel-drive (4x4) road begins at the trailhead, which turns into a hiking trail at the southern end of the first large meadow south of the trailhead. The hiking trail proceeds up the slope west of Pacific Creek before reaching a junction where the main trail branches off to the east, up Marshall Canyon. The secondary trail heading south from the junction is partially overgrown and unmaintained, but continues to the upper meadow before climbing up over the saddle east of Bull Run Peak.

INTRODUCTION

CDFW does not know the original date and location from which LCT were stocked into Pacific Creek. One of the older published accounts with information about fish planting in the area mentions that two men, “brought Tahoe trout from Hope Valley and planted them in the head waters of the Mokelumne River” (Jordan 1904). Given the large size of the Mokelumne watershed, a reference to headwaters of the Mokelumne River provides insufficient detail to know the specific tributaries to which the author was referring. However, the same account discusses LCT (referred to as “Tahoe trout”) being planted from Hope Valley into Union Water Company’s “reservoir at the head of the north fork of the Stanislaus” in 1859 and another planting of LCT from Wolf Creek (Carson Valley) to Highland Lakes in 1863 (Jordan 1904). Union Reservoir and Highland Lakes are both relatively close to Pacific Creek (10 km southwest and eight km east, respectively). Therefore, a reasonable guess is that the LCT in Pacific Creek were originally planted from Hope Valley sometime in the late 1850’s or 1860’s (**Figure 4**).

The lower section of Pacific Creek (Site ID 52790; **Figure 5**, in red) and the section of Site ID 52791 (**Figure 5**, in yellow) below the first barrier to upstream fish passage contains various trout species, including Brook Trout (*Salvelinus fontinalis*; BK), Brown Trout (*Salmo trutta*; BN), and Rainbow Trout (*Oncorhynchus mykiss*; RT) (J. Hanson, pers. comm.). Although LCT (**Figure 6**) may be present in the lower sections of Pacific Creek, the primary LCT habitat in the drainage is found in the headwaters (Site ID 52792; **Figure 5**, in green). Two definitive barriers to upstream fish movement (**Figure 5**; red asterisks) prevent BK, BN, and RT from ascending into the primary LCT habitat of the upper meadow (Site IDs 52792, 52794, and 52795; **Figure 7**).

Before 2017, CDFW had not observed SNYLF in the Pacific Valley drainage. During baseline surveys in the early 2000’s, CDFW field staff surveyed several small ponds in the uplands surrounding Pacific Valley and found no SNYLF (CDFW 2016). However, those were one-time surveys that focused on lentic habitat and occurred approximately 20 years ago. The only other reported SNYLF record in the drainage (of which CDFW is aware) was an individual observed during backpack electrofishing surveys by SNF in late July 2004 (record from the California Natural Diversity Database). The nearest confirmed SNYLF population is in the upper North Fork Stanislaus River drainage, which is found approximately 3 km from Pacific Creek, over a ridgeline to the west (**Figures 1 and 4**).



Figure 2. An adult Sierra Nevada Yellow-legged Frog (*Rana sierrae*) observed by California Department of Fish and Wildlife fisheries staff during a survey of Pacific Creek in August 2017. (CDFW)



Figure 3. The meadow containing Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*), located near the headwaters of Pacific Creek. This photo was taken from the northern end of the meadow, next to the main stream channel (Site ID 52792), on 6 August 2020. Bull Run Peak is visible in the background. (CDFW)

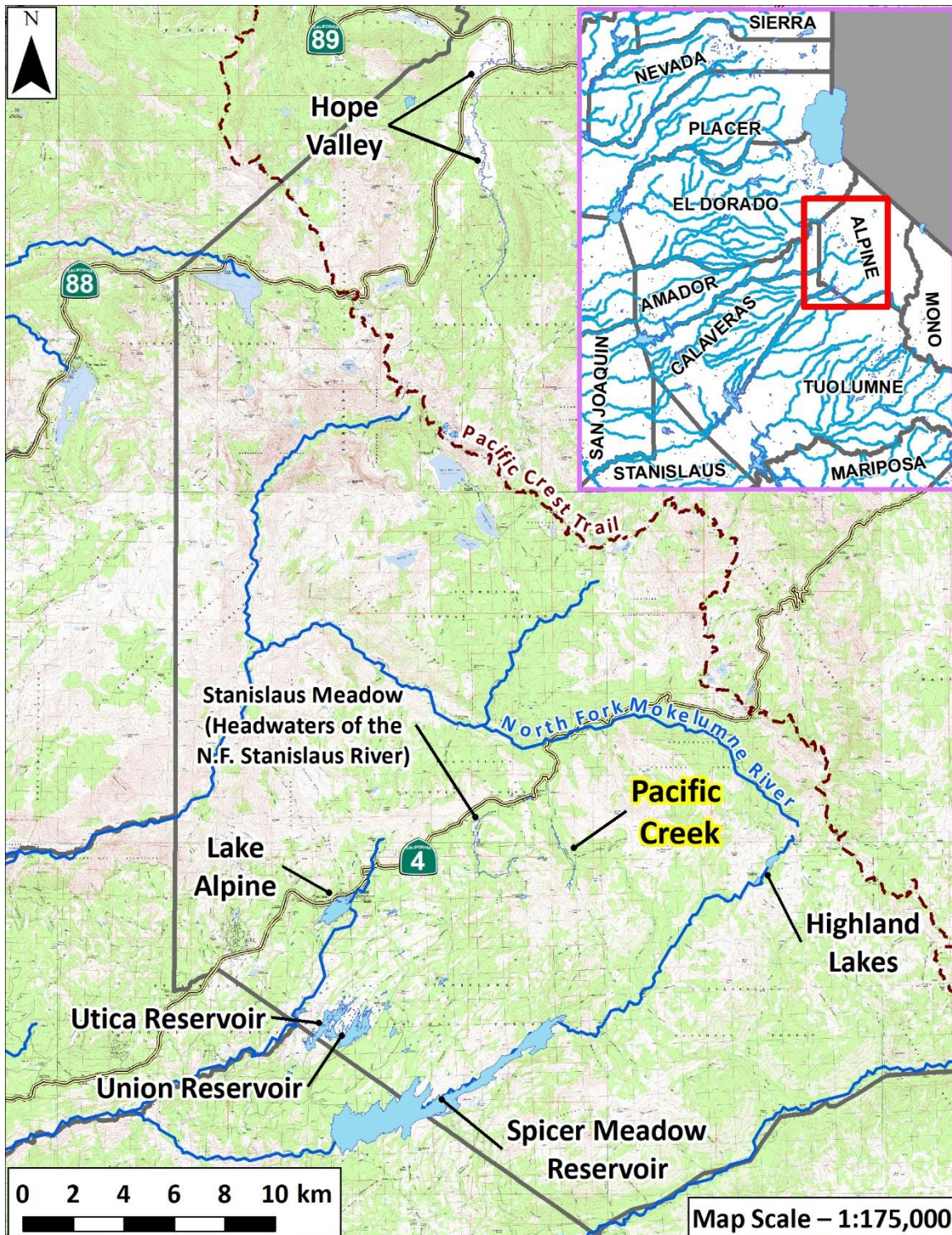


Figure 4. Western Alpine County, showing the location of Pacific Creek (yellow font) in relation to areas for which there are anecdotal historic planting records for Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*; LCT; Jordan 1904). The LCT in Pacific Creek may have originated from Hope Valley around the 1860's, but California Department of Fish and Wildlife does not know the exact source and date of the first planting event.

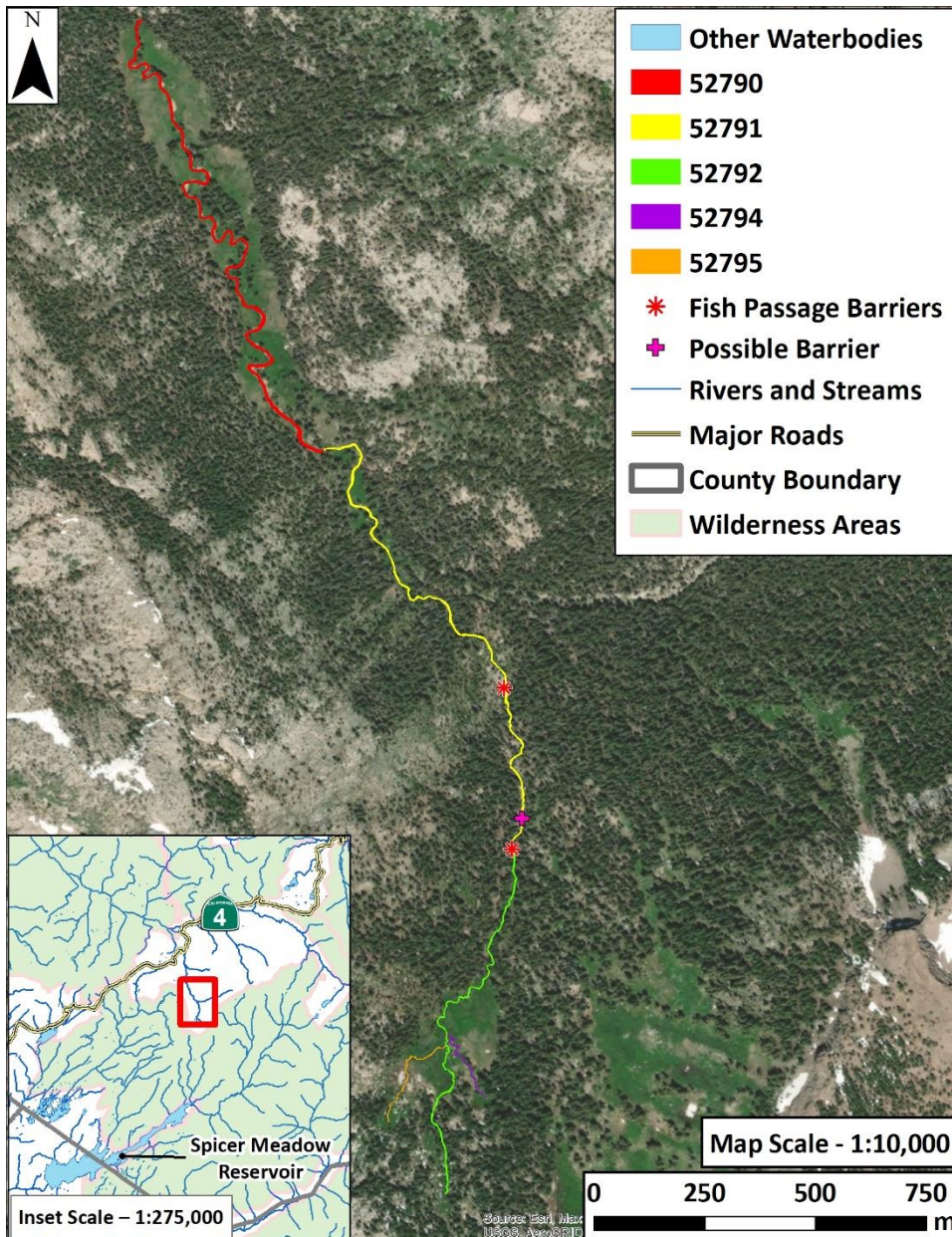


Figure 5. Pacific Creek, Alpine County, CA. Upper Pacific Creek (Site ID 52792) contains a population of Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) that is monitored regularly by California Department of Fish and Wildlife (CDFW) fisheries staff. Five-digit numbers in the legend are unique site identification codes that CDFW uses for data collection. The lower section of Pacific Creek (Site ID 52790 and the section of Site ID 52791 below the first barrier) contains various trout species, including Brook Trout (*Salvelinus fontinalis*), Brown Trout (*Salmo trutta*), and Rainbow Trout (*Oncorhynchus mykiss*). The figure shows two definitive barriers to upstream fish movement (red asterisks) and a smaller partial barrier (pink cross). On 6 August 2020, a CDFW staff member visually surveyed all Site IDs displayed in this figure.

METHODS and RESULTS

CDFW used standard VES (CDFW, unpubl. High Mountain Lakes survey protocol), modified from methods developed by Fellers and Freel (1995), to survey for aquatic species in Pacific Creek. Given the SNYLF observation in 2017 (**Figure 2**), CDFW focused on surveying for amphibians. However, CDFW also kept a tally of trout observed in each reach (**Table 1**; **Figure 5**). Due to ample cover (e.g., undercut banks, submerged logs, and overhanging vegetation), pool staining, shade, and speed of trout, CDFW staff were not able to accurately identify to species all trout seen in the lower stream reach (Site ID 52790; **Figure 5**). However, the upstream reaches (Site IDs 52792, 52794, and 52795; **Figure 7**) were smaller, which made fish identification easier. CDFW staff were also able to hand capture several LCT from Site ID 52792 in a small dip net, which allowed for confirmation of species identification (**Figure 6**).

CDFW did not observe any herpetofauna (amphibians or reptiles) during the survey of Pacific Creek. However, field staff heard a few Sierran Chorus Frogs (*Hyliola sierra*) calling in the area of Site ID 52790 the evening before the survey of Pacific Creek.

Table 1. Location, species, and number of trout observed by CDFW in Pacific Creek on 6 August 2020.

Site ID	Species Code*	Number Observed	Notes
52790	BN	1	Identified from a photograph (J. Hanson, pers. comm.).
52790	TRT	21	Many of these individuals appeared to be BN. However, BK* and RT* are known to be present in the lower reaches of Pacific Creek (J. Hanson, pers. comm.).
52791	TRT	4	Fry; observed in the lower section, close to Site ID 52790.
52792	LCT	46	Visually identified and confirmed by dip net capture (Figure 6). All LCT seen were ~8–10 inches total length.
52794	N/A	0	Dry. No fish observed.
52795	N/A	0†	†A few LCT were seen in the downstream section of 52795, but these fish were included in the total for 52792.

*Species codes: BK = Brook Trout (*Salvelinus fontinalis*), BN = Brown Trout (*Salmo trutta*), LCT = Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*), RT = Rainbow Trout (*Oncorhynchus mykiss*), and TRT = Unidentified trout species.



Figure 6. Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) captured by dip net from the main channel of the Pacific Creek headwaters (Site ID 52792) on 6 August 2020.

DISCUSSION

The observation of a single adult SNYLF in 2004 (by SNF) and 2017 (by CDFW) suggests there may be a small frog population present in Upper Pacific Creek. However, CDFW cannot rule out that the observed adult(s) may have moved into the Pacific Creek drainage from occupied habitat to the west. Although such a movement would be farther than any overland movements known for SNYLF, the areas currently occupied by SNYLF in the headwaters of the North Fork Stanislaus River are relatively close to the Pacific Creek drainage (the closest known SNYLF observation in the headwaters of the North Fork Stanislaus is <2 km from Pacific Creek). There is a forested saddle north of Heiser Lake, which could provide connectivity to Pacific Valley for SNYLF, under the right conditions. However, such a large movement is speculative and, if ever undertaken by SNYLF, likely a rare occurrence. Alternatively, the adult SNYLF may be relict individuals from a small population on the brink of extirpation. However, CDFW suspects there may be an extant, albeit likely very small, SNYLF population still present among the small streams and pothole pools in the headwaters of Pacific Creek.

The southern end of upper Pacific Creek meadow (i.e., the area shown in **Figure 7**) contains numerous small and relatively deep pools, and a complex network of stream channels flowing through dense vegetation. During VES in August 2020, CDFW also observed a similar complex of small streams and pools among the wetland vegetation between the upper meadow and Bull Run Peak. Aerial imagery also reveals other small pool and stream networks in alpine meadow habitats in the immediately surrounding area. These locations may harbor a small number of SNYLF, which have access to enough perennial water to remain in upper Pacific Creek, above habitat currently occupied by trout.

During historic surveys, CDFW had focused amphibian VES on lentic habitats, largely based on surveys and studies of SNYLF in high alpine habitats, in places such as Yosemite National Park, John Muir Wilderness, and Sequoia and Kings Canyon National Parks, in which SNYLF and the closely related *Rana muscosa* are often found in lentic habitats. When surveying streams, CDFW would mainly focus within 200 meters of a target lake or pond. In subsequent years, CDFW and partner scientists from the U.S. Forest Service, National Park Service, U.S. Geological Survey, and academic institutions have learned that SNYLF inhabit lotic habitats more commonly than previously known (Brown et al. 2019, Yarnell et al. 2019). Therefore, CDFW, other agencies, and research scientists continue to locate small SNYLF populations in lotic habitats that received less attention during widespread survey efforts throughout the Sierra Nevada in the early 2000's.

In future surveys of the Pacific Creek watershed, CDFW plans to look more closely at headwater areas that have not yet been searched for SNYLF, including above upper Pacific Creek meadow and in the upper section of Marshall Canyon Creek, both of which may contain remnant SNYLF above LCT-occupied habitat.

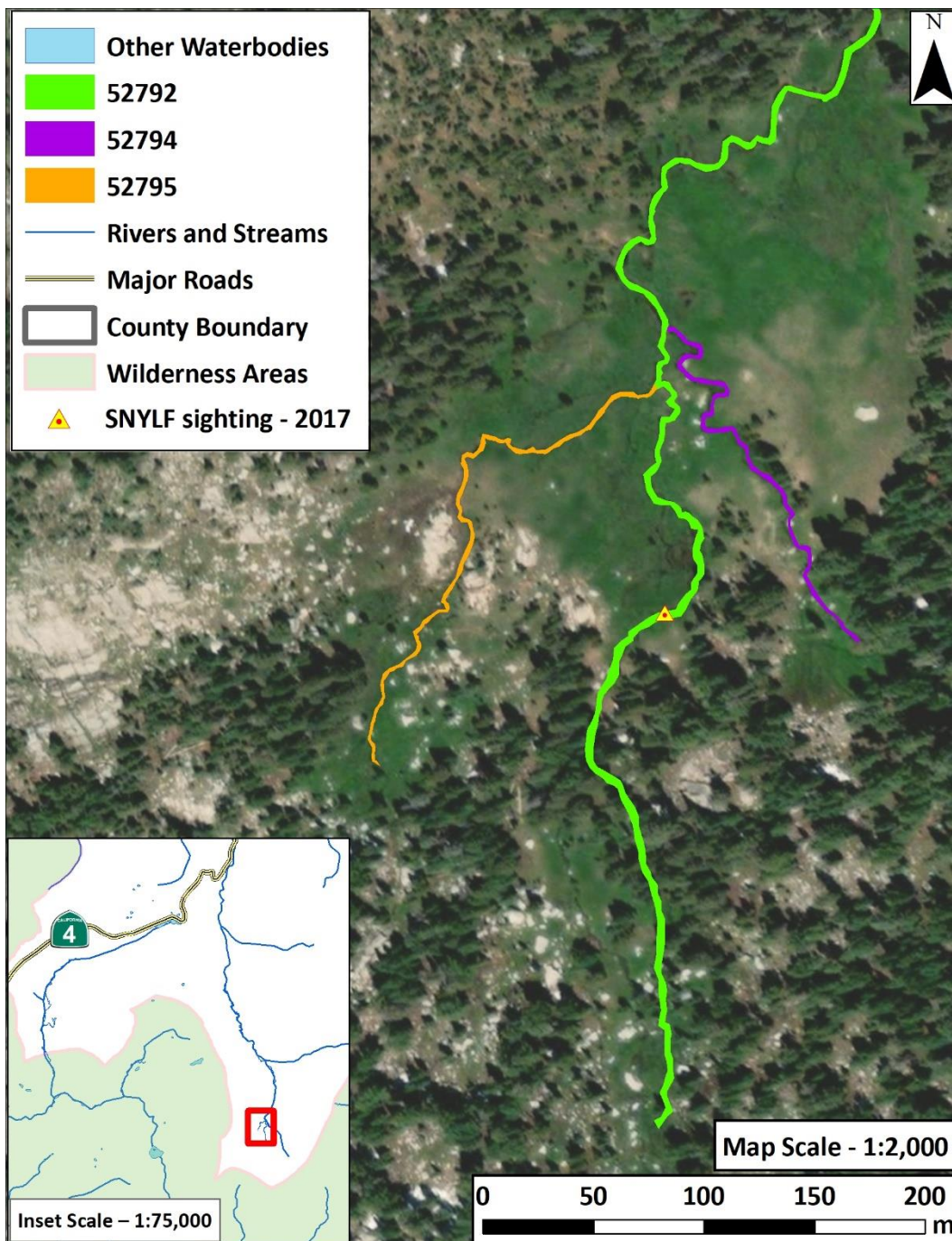


Figure 7. Large scale aerial map of the upper meadow of Pacific Creek, which contains the primary Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) habitat in the Pacific Valley drainage. The main stream channel is shown in green (Site ID 52792) and the two largest side channels are shown in purple (Site ID 52794) and orange (Site ID 52795). Five-digit numbers in the legend are unique site identification codes that California Department of Fish and Wildlife (CDFW) uses for data collection. The location along Site ID 52792 at which CDFW staff observed an adult Sierra Nevada Yellow-legged Frog (*Rana sierrae*) on 17 August 2017 is shown with the yellow and red triangle.

LITERATURE CITED

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