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# **Loney Meadow Restoration Project Monitoring: Loney Meadow Amphibian Surveys 2019**

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## OVERVIEW

Loney Meadow and the surrounding meadow complex were surveyed for the presence of amphibian species of interest as part of amphibian monitoring in the Loney Meadow area prior/post to stream bank restoration activities. Surveys were conducted throughout Loney Meadow and at several adjacent lentic features to determine presence and life stages of sensitive amphibian species. Observations were compared across surveys from pre and post meadow restoration activities. Repeat visual encounter surveys were conducted prior to restoration in June of 2015 and July of 2016, and post restoration surveys were conducted in July and August of 2019.



**Figure 1:** Surveys in Main Meadow

## METHODS

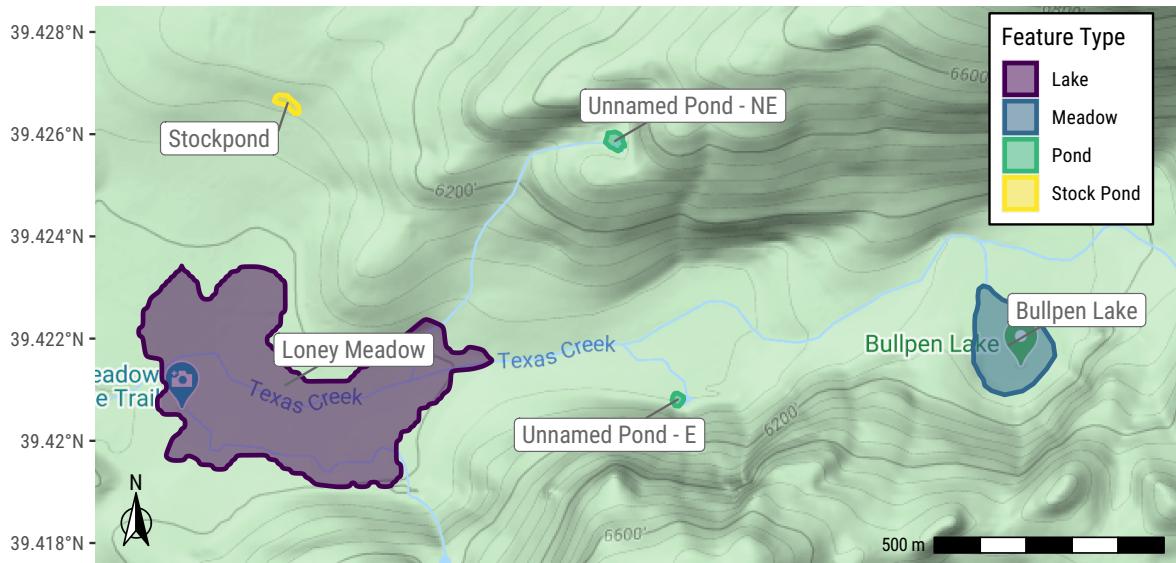
Meadow and stream channel surveys were conducted in Loney Meadow following survey protocols in Heyer et al. (1994). Both day and night surveys were conducted with four surveyors using combined methods such as visual observation, dip netting, and auditory surveys to maximize potential detection of herpetofauna. During each survey, surveyors walked across the meadow at equal intervals, zig-zagging along a transect corresponding to the longest meadow axis. All visible and accessible stream channels were also walked in pairs or in groups of three, with surveyors on each bank and one or two surveyors in the channel. In both the meadow and stream channels, surveyors used dipnets and D-nets to sweep vegetation and aquatic habitat for individuals. Upon observation of species, locations were marked and survey time was stopped during processing and identification. Survey effort was calculated for each survey by the total survey time multiplied by the number of surveyors. Prior to and following surveys, all equipment and field gear was decontaminated following accepted protocols (Daszak, Cunningham, and Hyatt 2001; Johnson et al. 2003; Phillott et al. 2010). All analysis and mapping was conducted in R using tidyverse, sf and ggmap packages (Kahle and Wickham 2013; Pebesma 2018; R Core Team 2019; Wickham et al. 2019).

**Table 1: 2019 Surveys**

Site	Start Time	End Time	Surveyors	Effort (min)	Conditions	Month
Loney Meadow	1101	1430	7	1883	Clear, Sunny	7
Unnamed Pond	1522	1430	7	686	Clear, Sunny	7
Loney Meadow	900	1107	4	468	Clear, Sunny	8
Unnamed Pond	1153	1300	4	588	Clear, sunny	8

## SITES

In 2019, Loney Meadow and several adjacent lentic ponds or lake habitats were surveyed during July and August (Figure 1, Figure 2). Each site was visited during clear and sunny conditions. The stockpond, Bullpen Lake, and unnamed pond (NE) and (E) did not appear to have changed in structure or condition between visits, and since previous visits in 2016.

**Loney Meadow Amphibian Monitoring Sites: 2016-2019****Figure 2: Map of Survey Sites**

The ponds surveyed surrounding Loney Meadow appear to remain largely permanent, though the water levels fluctuate depending on the month surveyed (see Figure 3 and Figure 4). These habitats may provide refugia and suitable sources for amphibian populations, and occur within distances feasible for amphibian movement. Centroid distance from **Loney Meadow** to **Bullpen Lake** is approximately 0.98 miles, while centroid distance between Loney Meadow and the **Unnamed Pond - East** is 0.55 miles.

## RESULTS

Surveys for amphibians were conducted in Loney Meadow on July 16 and August 21, 2019 (Table 1). Teams of two or three observers walked along wetted perimeters, stream corridors, and four or more observers were used in wet meadow areas with no clear channel.



**Figure 3:** Lentic unnamed pond east of Loney Meadow in August 2019, looking southeast

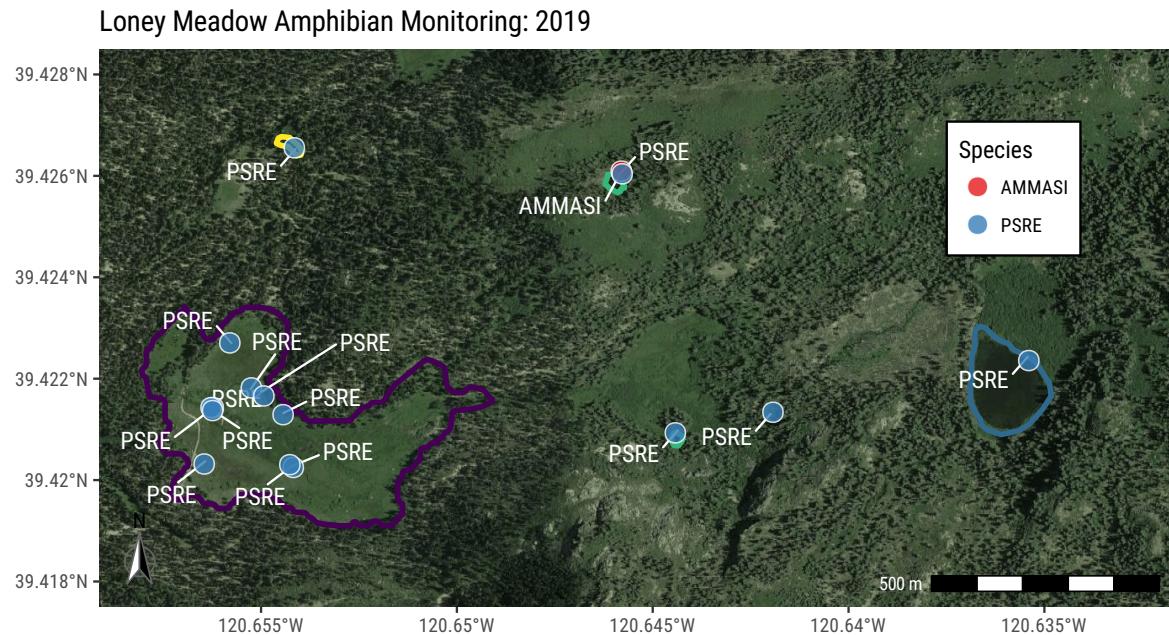


**Figure 4:** Lentic unnamed pond east of Loney Meadow in July 2016, looking southeast

## Amphibians

In 2019, surveys found primarily Pacific chorus frogs (*Pseudacris regilla*) [PSRE] in multiple life stages (eggs, tadpoles and adults were observed), however, Southern long-toed salamanders (*Ambystoma macrodactylum signatum*) [AMMASI] larvae were observed again in the small pond just northeast of the main Loney Meadow (Figure 3 and Figure 5). This is the same location they were observed in 2016 as well. The AMMASI larvae were observed at an elevation approximately 100 meters higher than Loney Meadow, and have consistently been observed at this site since 2016. No other site at or near Loney Meadow has detected AMMASI. There was no evidence of grazing or cattle at the unnamed pond. Additional herpetofauna observed in 2019 included Sierra and mountain

gartersnakes (*Thamnophis couchii* [THCO] and *Thamnophis elegans elegans* [THEL]). Both of these species were observed in multiple locations within the area, similar to 2015 and 2016. There were no new species observed in 2019 that were not observed in 2015 or 2016.



**Figure 5:** Map of amphibian species observations 2019.

**Table 2:** 2019 Observations

Species	Species Code	Stage	No. Obs	UTM E	UTM N	Month
<i>Thamnophis couchii</i>	THCO	Adult	1	701749	4366162	July
<i>Pseudacris regilla</i>	PSRE	Larvae	10	701749	4366162	July
<i>Ambystoma macrodactylum sigillatum</i>	AMMASI	Larvae	60	702633	4366699	July
<i>Pseudacris regilla</i>	PSRE	Larvae	>100	702633	4366699	July
<i>Pseudacris regilla</i>	PSRE	Larvae	3	701860	4366204	August
<i>Pseudacris regilla</i>	PSRE	Larvae	10	701929	4366042	August
<i>Pseudacris regilla</i>	PSRE	Adult	3	701929	4366042	August
<i>Pseudacris regilla</i>	PSRE	Larvae	>100	702633	4366699	August
<i>Ambystoma macrodactylum sigillatum</i>	AMMASI	Larvae	>100	702633	4366699	August
Fairy Shrimp	NA	Larvae	5	702633	4366699	August
<i>Thamnophis couchii</i>	THCO	Adult	4	702633	4366699	August



**Figure 6:** Pacific chorus frog in unnamed pond (northeast)



**Figure 7:** Sierra garter snake in Loney Meadow

### **Additional Observations**

In addition to herpetofauna observed in 2019, we observed spinytail fairy shrimp (*Streptocephalus sealli*) (see Dexter (1956)) in the unnamed pond (NE). Several of these shrimp were observed in the pond along the margins in the same areas the Southern long-toed salamanders were observed (Figure 9). These species are not listed and are the most widely distributed fairy shrimp in North America (Eriksen and Belk 1999). Fairy shrimps are well adapted to occurring in habitats that may dessicate via a reproductive strategy which uses cysts. Cysts are highly resistant and stable “eggs”



**Figure 8:** Southern long-toed salamander larvae in unnamed pond (northeast)

by which fairy shrimps reproduce or hatch into nauplii. Interestingly, fairy shrimps are a common prey item of salamanders (Eriksen and Belk 1999). In addition the cysts can be successfully passed through salamander and crayfish digestive systems and remain viable, thus predation does not end the life-cycle of the fairy shrimp (Eriksen and Belk 1999).



**Figure 9:** Spinytail fairy shrimp at unnamed pond (NE)



**Figure 10:** Spinytail fairy shrimp in unnamed pond (NE)

## References

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