



The effect of forest thinning on pond-breeding amphibians

Amphibians are locally important forest vertebrates because they link aquatic and terrestrial ecosystems. Pond breeding amphibians such as the southern long-toed salamander (*Ambystoma macrodactylum sigillatum*), western toad (*Anaxyrus boreas*), and Pacific chorus frog (*Pseudacris regilla*) are extremely abundant in unique forested pond habitats on the Lassen National Forest, CA. We conducted an experiment to determine how forest management practices, such as nearshore conifer thinning, contribute to the maintenance and/or restoration of habitat for pond breeding amphibians. We have completed two years of pre-treatment surveys and one year of post-treatment and will complete the second year in 2020.

Key Findings to Date



Southern Long-toed Salamander

- Captures of long-toed salamanders in the late summer and fall of 2019 did not indicate a preference for either treated or untreated plots; captures across all years were associated with higher leaf litter cover and lower tree density.
- Habitat surveys indicated that thinning treatments reduced tree density by 68% without altering key amphibian habitat variables such as leaf litter depth, canopy cover and woody debris cover.
- No amphibians were observed in or under burn piles the fall after treatment.
- Most adult salamanders (72%) were captured in pitfall traps located 3 m from the lake during fall months. This may indicate that adult salamanders overwinter in underground burrows close to the lake.
- Annual amphibian breeding success is highly variable and seems to be dependent on snow-pack. The above-average winter of 2018-2019 resulted in high water levels and high amphibian breeding success.



Upland forest habitat surrounding Big Lake before (left) and after (right) thinning treatments that were implemented in July of 2019.

Southern long-toed salamanders rely on both aquatic and terrestrial habitats, and are vulnerable to changes in either habitat.

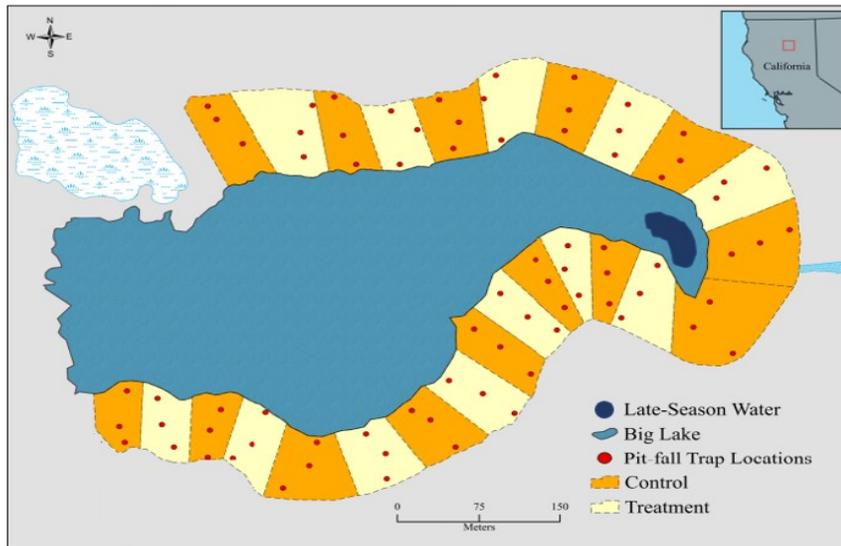


Monitoring Overview

Big Lake, a 10-hectare seasonally dry wetland located near Lassen Volcanic National Park, is home to a large long-toed salamander population. Understory hand-thinning treatments occurred within the riparian management zone surrounding the lake in July and August of 2019 using replicate control and treatment plots (see figure below). Upland habitat usage of pond-breeding amphibians was assessed before treatment (2017 and 2018) and following treatment (2019) using pitfall traps. Aquatic surveys were used to assess the abundance of aquatic life stages (eggs, larvae). Vegetation surveys were conducted to assess changes in habitat conditions following treatments. To date, 5,174 long-toed salamanders have been captured, measured, and released along with thousands of juvenile western toads and Pacific chorus frogs. To date, this monitoring has provided insight into the short-term impacts of nearshore hand-thinning treatments to pond-breeding amphibians. Continued monitoring will provide insight into longer-term effects.



Drift fence and pitfall trap array after a fall freeze.



Forest thinning treatment design. White polygons represent plots that were hand-thinned in the summer 2019. Orange polygons represent control plots that will be thinned in 2021.

Our goal is to determine how forest management practices, such as nearshore conifer thinning, contribute to the maintenance and/or restoration of habitat for species that utilize both aquatic and upland habitats, such as the southern long-toed salamanders.

This project addressed the following monitoring question from the Burney Hat Creek CFLRP Ecological Monitoring Strategy:

AQ.I.I. Does upslope thinning and post-thin burning affect the distribution of post-metamorphic long-toed salamanders and western toads that use these habitats during non-breeding seasons?

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