

# Salamander activity: The impact of abiotic factors on salamander movements in Northern California

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## Objectives

- To study the relationship between abiotic factors and salamander activity
  - Is soil moisture the largest abiotic variable influencing salamander activity?
  - What role do other variables (soil temperature, air temperature, daily precipitation, accumulative precipitation) play in the activity of terrestrial salamanders?

## Background

- Climate change is resulting in the alteration of habitats across the globe, causing warmer temperatures, altered precipitation patterns, etc..
- Salamanders are a sensitive species often used as ecosystem indicators.
- Salamanders need damp habitats to keep their permeable skin moistened for cutaneous respiration.
- Studies often focus only on a linear correlation between moisture and salamander activity.

## Methods

- 30 sites within the Arcata Community Forest, sampled three times during project.
- 50m<sup>2</sup> plots on trails, extending to one meter off of the trails.
- Conducted nocturnal spotlight surveys (at least 30 minutes after sunset), recording all salamanders within the plots that were active (Keen 1984).
- Soil moisture, soil temperature, air temperature, daily precipitation, and accumulative precipitation recorded at each site.
- *t*-test for soil moisture,
- Poisson Regression Model for all other variables

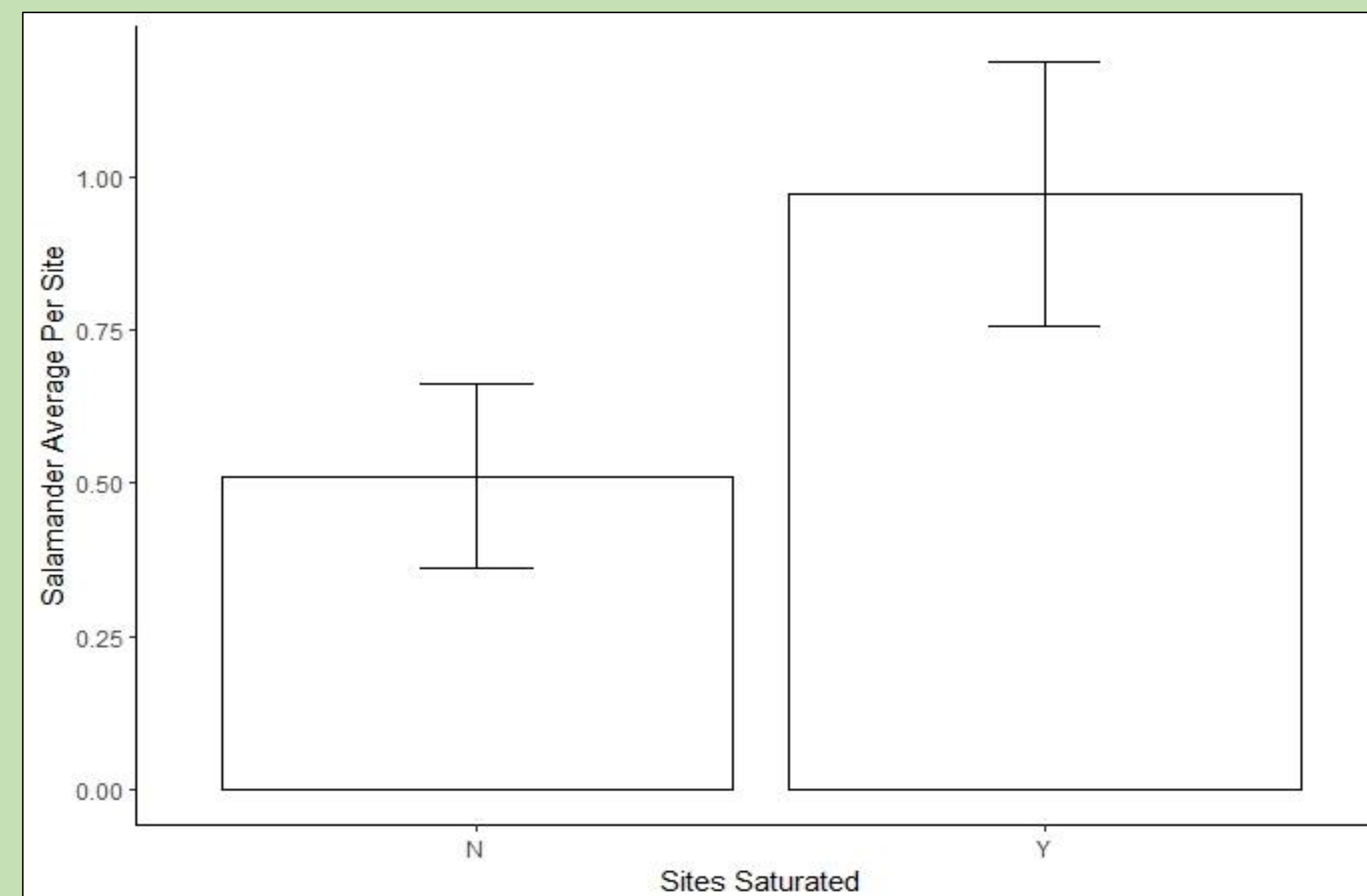


Figure 1. The average number of salamanders in unsaturated (N) and saturated (Y) sites.

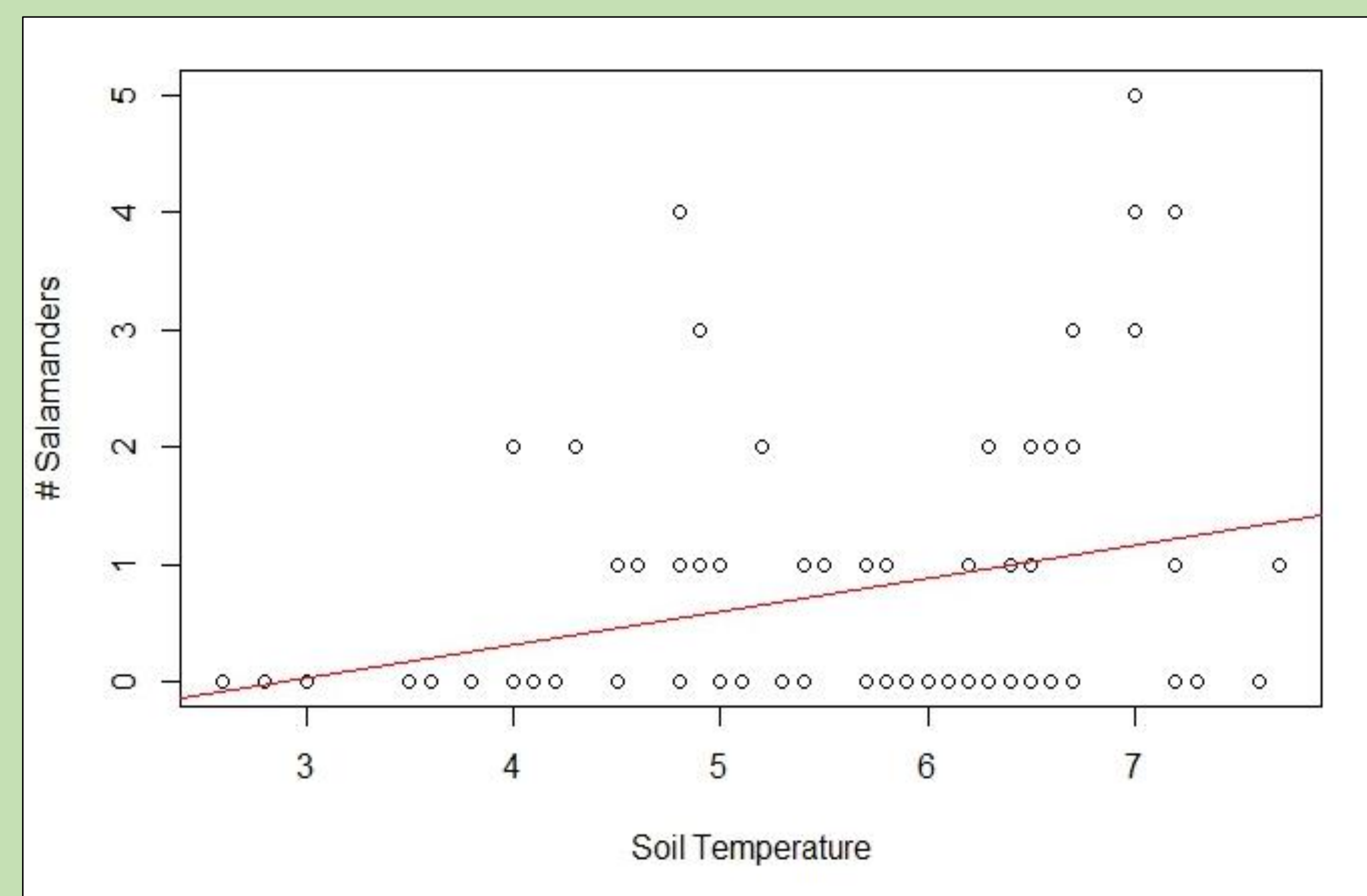


Figure 2. The positive correlation between soil temperature and salamanders observed (p-value 0.0337).

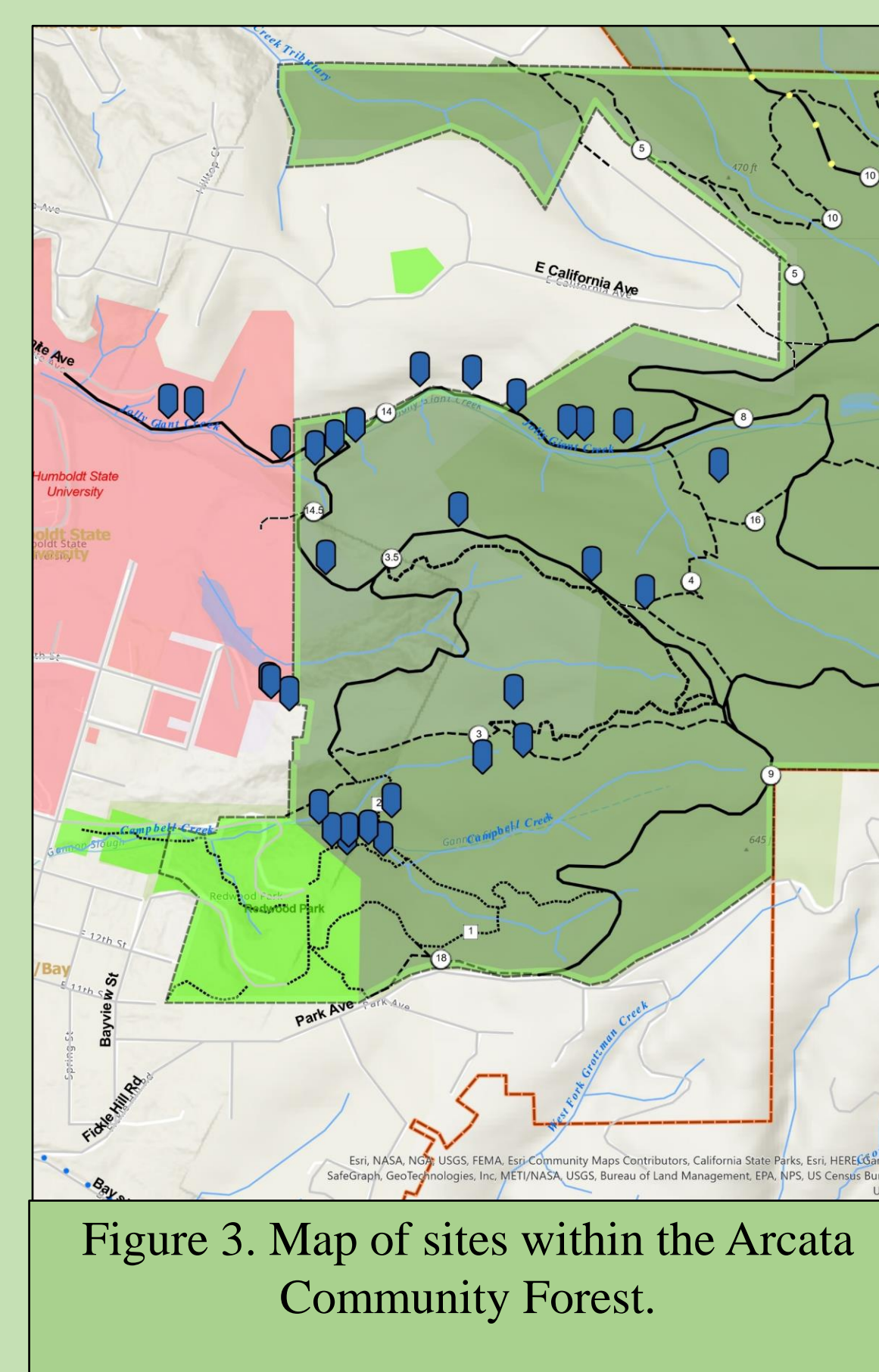


Figure 3. Map of sites within the Arcata Community Forest.



Figure 4. Ensatina (top left), California Slender Salamander (top right), and Northwestern Salamander (Bottom)

## Results

- 0.51 observations per site in unsaturated plots, 0.97 in saturated plots
- No significant difference between soil moisture in sites and salamander activity ( $t = -1.7518$ ,  $df = 63.878$ ,  $p\text{-value} = 0.0846$ ) (Figure 1.)
- Soil temperature the biggest factor in salamander activity (Figure 2.)

## Discussion

- Results show there is no correlation between soil moisture and salamander activity, so we accept the null hypothesis for our study.
- Results did indicate that there is a significant positive correlation between increasing soil temperature and salamander activity
- Most species observed in study have developed tactics to mitigate water loss
  - This could explain the results we calculated for soil moisture
- Complications with equipment, time, and funding constraints prohibited full examination of soil moisture in each site, improvements in our data collection for this variable could improve results
- Salamanders in Northern California may be more resistant to climate change than other species in different regions
- Only the two species resistant to drier conditions may be capable of adapting to climate change at a faster rate

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