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The Influence of Hiking Trails on Salamanders

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The Influence of Hiking Trails on Salamanders

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Made by : Emily MacDonald

Study Area

The trees in the forest are primarily coniferous trees such as Coast Redwoods (*Sequoia sempervirens*). There are also a lot of low plants such as Redwood Sorrel (*Viola sempervirens*), Redwood Violets (*Oxalis oregana*), Pacific Trillium (*Trillium ovatum*), and Western Sword Ferns (*Polystichum munitum*) that live on the forest floor. There are 10 species of salamanders that have been reported as occurring in and near the Arcata Community Forest. Three of them were found during the study, these species were the Northwestern Salamander (*Ambystoma gracile*), Common Ensatina (*Ensatina eschscholtzii*), and the California Slender Salamander (*Batrachoseps attenuates*).

Hypothesis

If the human activity on the hiking trails is negatively impacting the salamanders, there will be an increase in the levels of species diversity and the overall number of salamanders as the plots get further away from the hiking trails.

Methods

A series of 1x1 meter area constrained searches were conducted at distances from 0 to 10 meters away from the trail in a randomized order. The plots were then searched using new nitrile gloves for every salamander. The salamanders were identified, weighed, and measured. The cover object they were found under was returned to their original position and the salamander was placed next to it so it could find its way back under without being squished.



Left to Right : Common Ensatina (*Ensatina eschscholtzii*), California Slender Salamander (*Batrachoseps attenuates*), Northwestern Salamander (*Ambystoma gracile*)

Results

The Spearman's Rank Correlation between the number of species and the distance away from the trail has a negative correlation of -0.615, and when using a one tailed t-test it came back with a p-value of 0.029.

The Spearman's Rank Correlation between the number of individual salamanders and the distance away from the trail has a negative correlation of -0.6, and when using a one tailed t-test it came back with a p-value of 0.033.

The results for whether there was a significant correlation between the distance from the trail and the weight and snout to vent lengths for the salamanders was not tested for the Northwestern Salamander because only one individual was found, and they came back as not significant for the Common Ensatinas. However, both data sets came back as nearly significant for the California Slender Salamanders with positive correlations of 0.512 and 0.133 respectively with both having p-values of 0.05 when two tailed t-tests are used.

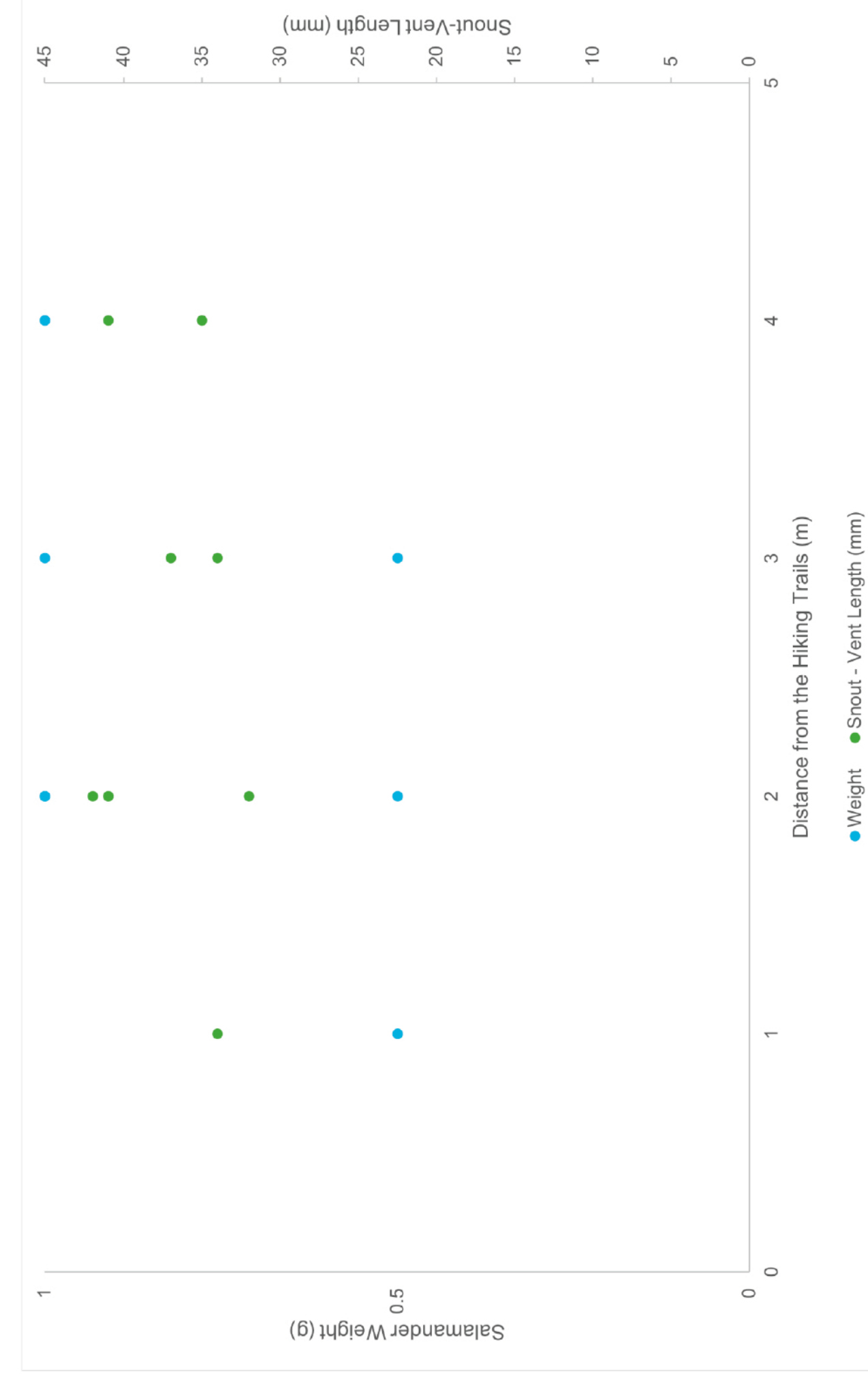


Figure 1. The weight and snout-vent length to the distance from the hiking trails for the California Slender Salamanders in Arcata Community Forest, Arcata California, March-April 2022.

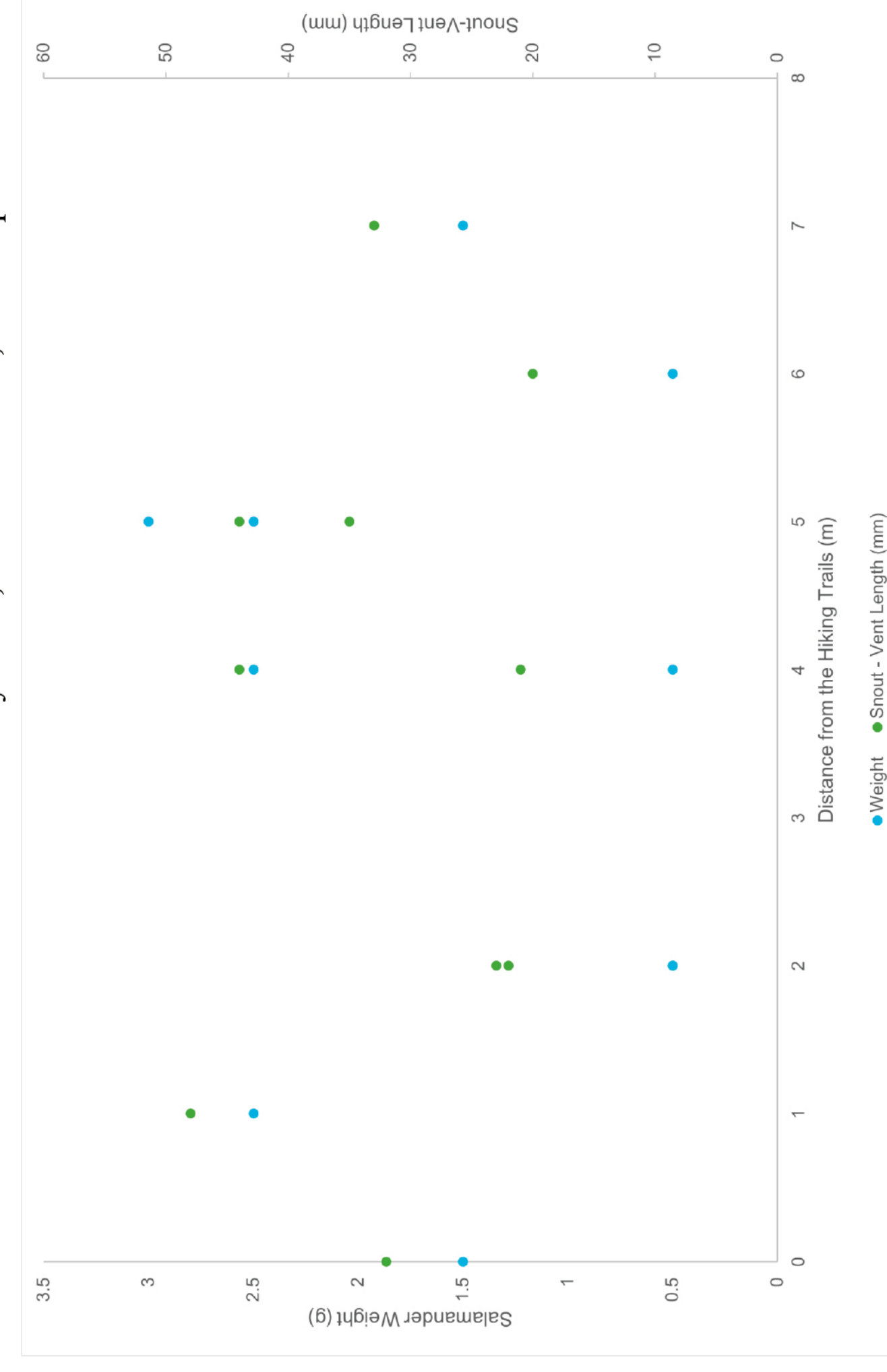


Figure 2. The weight and snout-vent length to the distance from the hiking trails for the Common Ensatinas in Arcata Community Forest, Arcata California, March-April 2022.

Discussion

There is a higher number of species and a higher number of total individual salamanders closer to the hiking trails. This goes against the second part of my hypothesis; however, this does not mean that they aren't causing harm to the salamanders. The salamanders may be stepped on by people using the hiking trails. California Slender Salamanders become longer and heavier the further away from the trails they are. This could indicate that the younger individuals are using the habitat that is closer to the trail, perhaps this is the result of intraspecific resource competition. If I were to do this study again, I would use a premade 1x1 meter frame to use as the boundaries of the plot to streamline the setup process. I would also like to do a longer study at a different time of year, and I would like to scale up the project and have a team of people helping me.



Figure 3. The number of salamanders of each species found at each distance from the hiking trails in Arcata Community Forest, Arcata California, March-April 2022.

Management Implications

The hiking trails may be acting as ecological traps for the salamanders in the forest. The trails and their associated human activities may still be harming the salamanders, despite the salamanders seemingly being drawn to the trails instead of staying away from them like I thought they would. Follow up studies are needed to determine if this is a case of an ecological trap. If it is then appropriate mitigation efforts can then be taken.