

# Characterizing Physio-climatic Variables Across a Network of Coordinated Research Sites with the Salamander Population and Adaptation Research Collaboration



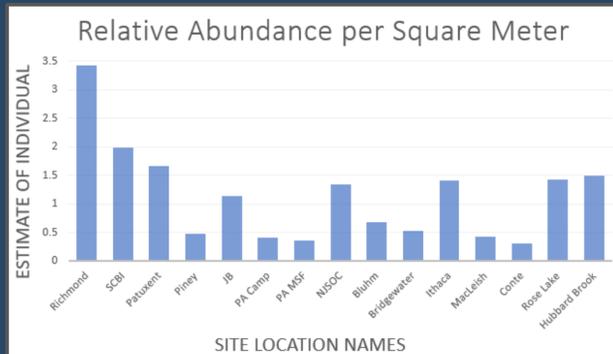
**Network (SPARCnet)**  
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**SPARCnet**  
 Huber Woods Plot Two  
 capture mark-recapture  
 plot study design

## Objectives of this Study

- Evaluate patterns of physio-climatic variables (e.g., precipitation, temperature and slope angle)
- Compare remotely sensed data against SPARCnet sites
- Examine correlative relationships between physio-climatic variables landscape factors and salamander density



Red-backed salamander (*Plethodon cinereus*)

## Methods

- SPARCnet coordinates and density variables were grouped together by site using RStudio
- Sites were plotted on a map, where density was represented by point size at each location
- Slope steepness is used to identify if runoff has correlation to salamander density
- Each map was analyzed in significance to terrain factors and whether they are effective in supporting salamander populations

## Discussion

- Salamander sites should have a predictable relationship to habitats that are associated with annually cool and moist conditions
  - Hubbard Brook (~1.495 (ind/m<sup>2</sup>) salamander estimate density) shows a colder mean temperature and higher precipitation suggesting salamanders would favor terrain factors in colder, wetter environments
- Richmond is an exception as the site shows a higher density in higher mean minimum temperature
- Sites with a slope of 2 degrees show density ranges from ~0.5-2 ind/m<sup>2</sup> that identifies a site with a relative even terrain allows for less runoff, higher moisture, tends to have higher density
- Other environmental factors like proximity to suburban development, annual soil temperatures and wind speed are not taken into consideration with this study
- A future study should consider these factors to predict the effect of climate change on salamander density

# Red-backed Salamander Density Relate to Physio-climatic Variables

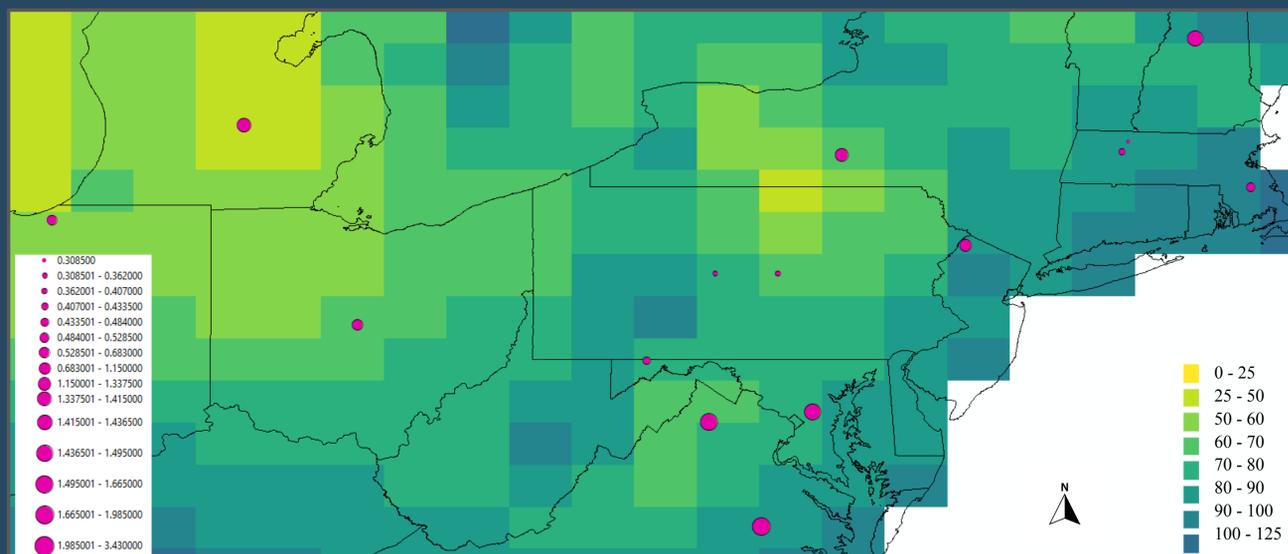


Figure 1. Annual Precipitation CRUTS Data by Millimeters Compared to Density of SPARCnet Sites

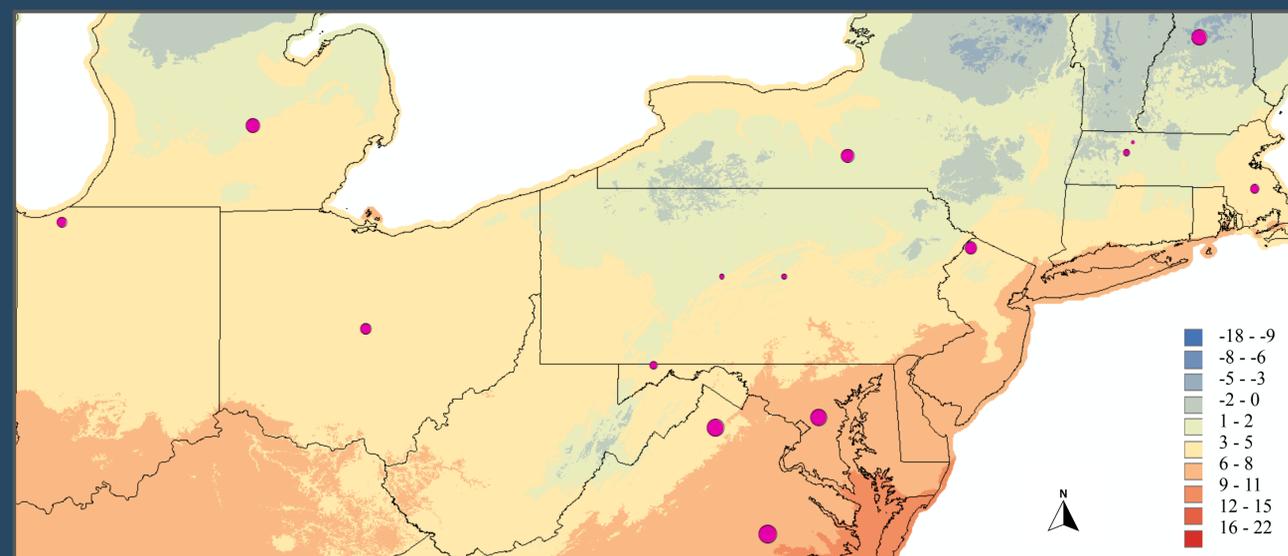


Figure 2. Annual Mean Minimum Temperature USGS indicated by °Celsius Compared to Density of SPARCnet Sites

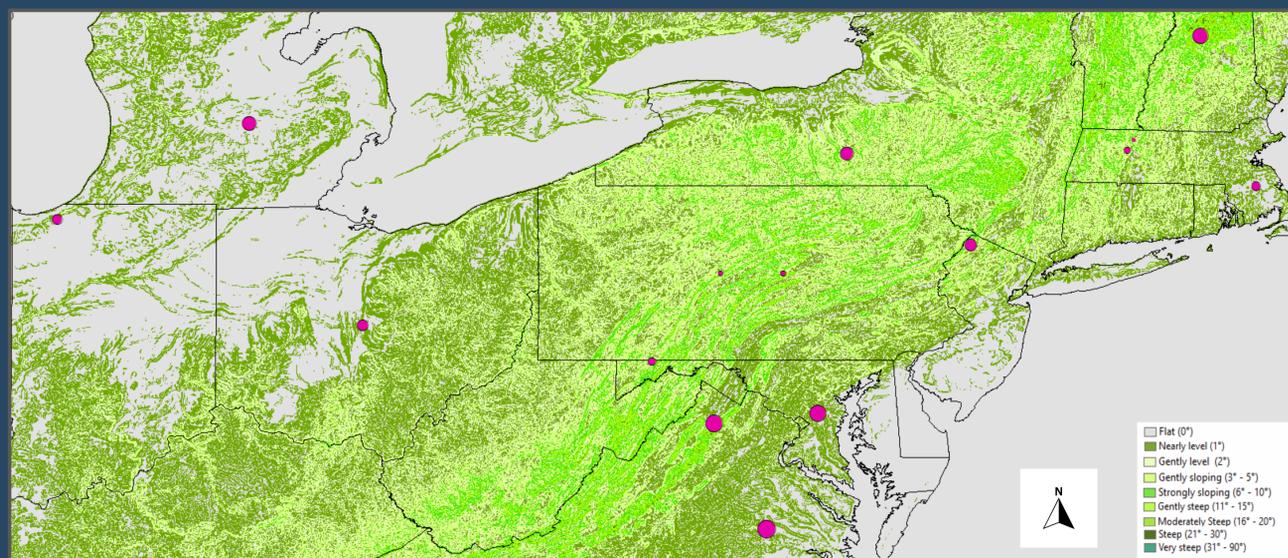


Figure 3. Degree of Slope Steepness Compared to Density of SPARCnet Sites

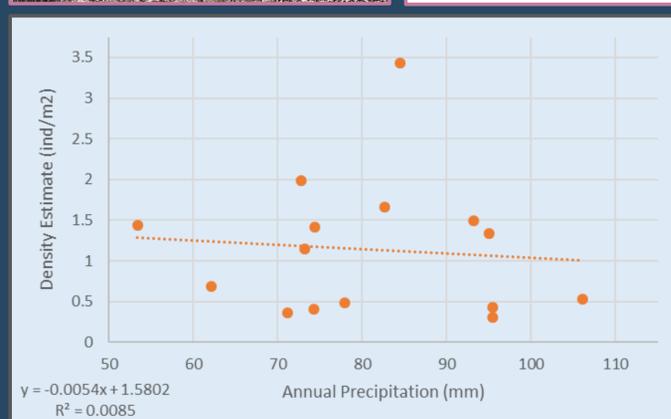


Figure 1. Precipitation  
 • We found no measurable pattern between precipitation and salamander density across SPARCnet sites

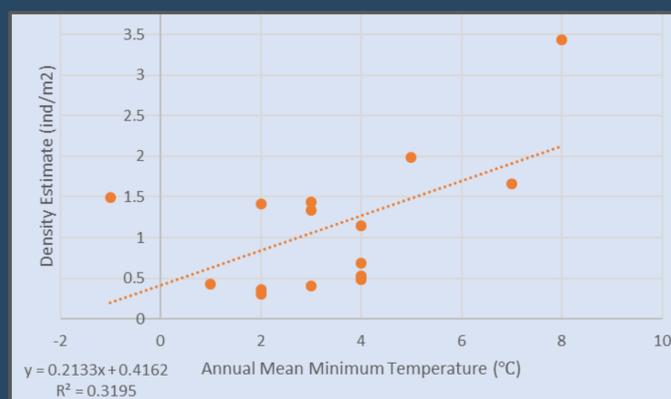


Figure 2. Temperature  
 • Annual mean temperature shows a weak correlation to density  
 ○ Hubbard Brook is the coldest site at -1°C with a density of ~1.495 (ind/m<sup>2</sup>)  
 ○ Richmond is the warmest site at 8°C with a density of ~3.43(ind/m<sup>2</sup>)

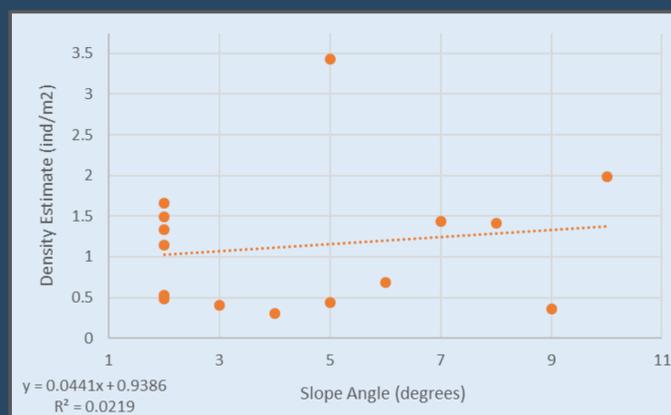


Figure 3. Slope Steepness  
 • Slope steepness shows a weak correlation between plots  
 ○ As plots increase in slope (4 to 10 degrees), density increases