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Wood Frog and Spotted Salamander Abundance Across Pool Types and Wetland Networks at Fort A.P. Hill, VA

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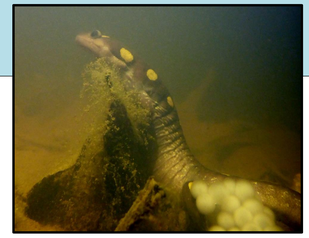

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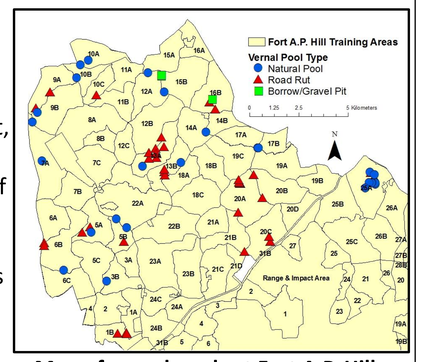
INTRODUCTION

• Effective management of pond breeding amphibians requires identifying suitable breeding habitat and its use by different species.

• Suitable breeding habitat is largely characterized by pool type, physical habitat, and position within the landscape. Parameters such as vegetative cover, hydrology, and water chemistry are known to influence amphibian occupancy of vernal pools.

• While seasonal vernal pools have been the focus of conservation efforts, pools that are an artifact of anthropogenic disturbance, such as road ruts, may be an important component of the landscape for amphibians.

• The role of wetland isolation within a landscape has been well studied, but less consideration has been given to the structure of breeding pool networks.



Map of vernal pools at Fort A.P. Hill, VA located in 2015 created by Lily Thompson

QUESTIONS

1) **Does pond type influence wood frog and spotted salamander occupancy and abundance?**

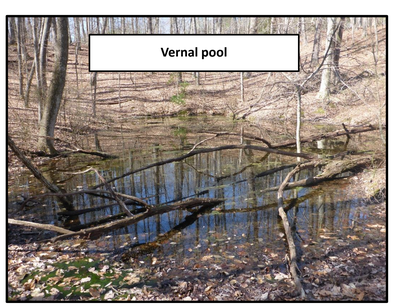
2) **How does wetland network structure influence occupancy and abundance for wood frogs and spotted salamanders?**

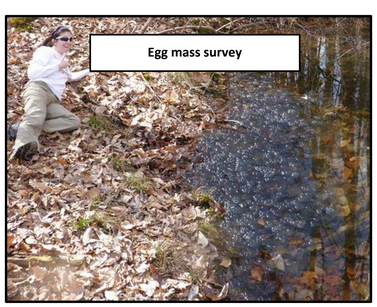
METHODS

• At Fort AP Hill, 73 vernal pools and road ruts were surveyed twice during 2015 using double observer egg mass counts

• Wetland network structure was quantified using threshold dispersal distances from the literature (2,530m for wood frogs and 756m for spotted salamanders)

  • Given the species-specific threshold, models included the number of neighbors within the threshold distance(NN) and wetland connectivity index (WCI)

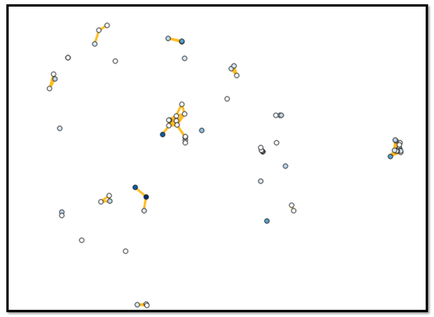




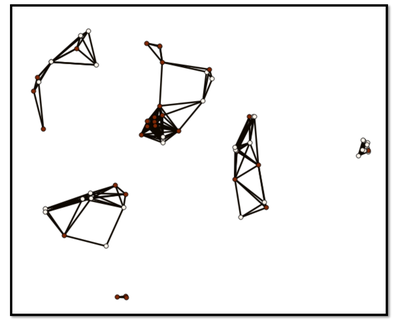
•Wetland depth, pool type, pH, conductivity, submerged and emergent vegetation, shrub and canopy cover were measured at sampling sites, and the overall gradients in wetland depth were described with a principal components analysis.

• Bayesian hierarchical abundance models were fit for both species

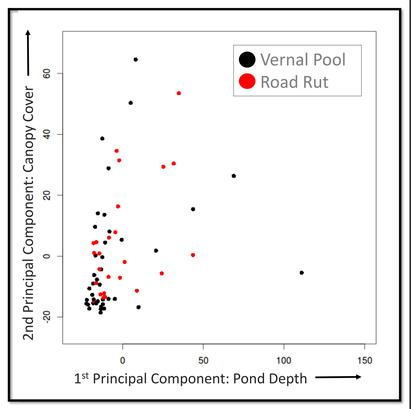
RESULTS: Spatial Linkages and Habitat Variables



Spotted salamander nearest neighbor linkages (at 756m, yellow) at and abundance. Darker circle = greater abundance

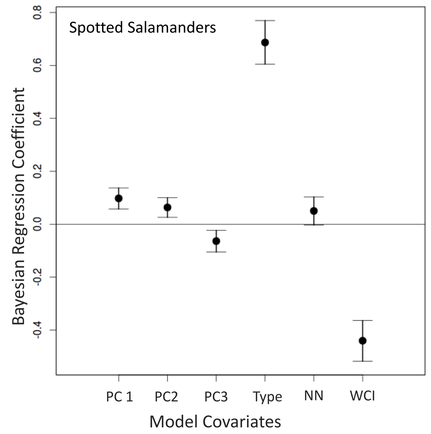


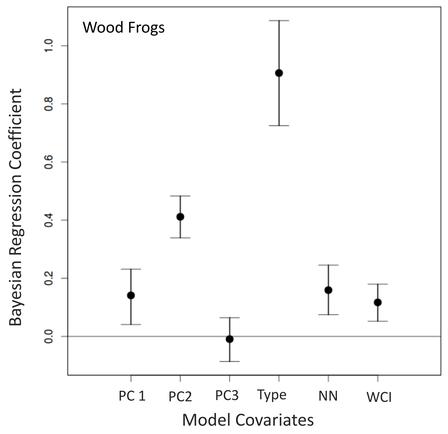
Wood frog nearest neighbor linkages (at 2530m, black) and occupancy (darker circle = present)



Principal component comparisons between pool types

RESULTS: Abundance Models





Left: Importance of model covariates for abundance models shown with quantiles 0.025-0.975. PC1 is largely represented by pond depth, PC2 is largely represented by canopy cover, PC3 is largely represented by shrub cover, Type = vernal pool (+) or road rut (-), NN = number of neighbors within the threshold distance, WCI = wetland connectivity index

DISCUSSION

- Pool type may have additional implications for larval development and success. In a metapopulation context, road ruts may act as sinks or provide necessary wetland connectivity. These distinctions require understanding the available landscape network for amphibians.
- Spotted salamanders were found in nearly all of the sites while wood frogs were only present at ~42% of the sites. Detection probability was high for our study due to general concordance between independent observer counts. Our models indicate that vernal pools had greater spotted salamander and wood frog abundance than road ruts.
- Vernal pools and road ruts were not partitioned along the physical and habitat parameters measured. Both pool types contained gradients in size and vegetation structure.
- Spotted salamander egg masses were less abundant in sites with a high wetland connectivity index. Wood frogs showed the opposite pattern, but the wetland connectivity index was species specific, and it treated road ruts and vernal pools as the same. Further research will examine how both species respond to connectivity indices calculated with different distance thresholds and different weighting schemes for vernal pools and road ruts.

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