

Assessing eco-geomorphic habitat factors associated with amphibian diversity in riparian floodplains of the Lewis Creek watershed

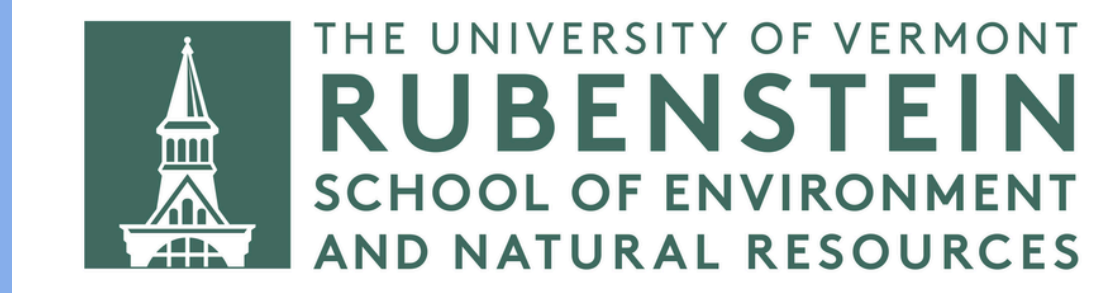
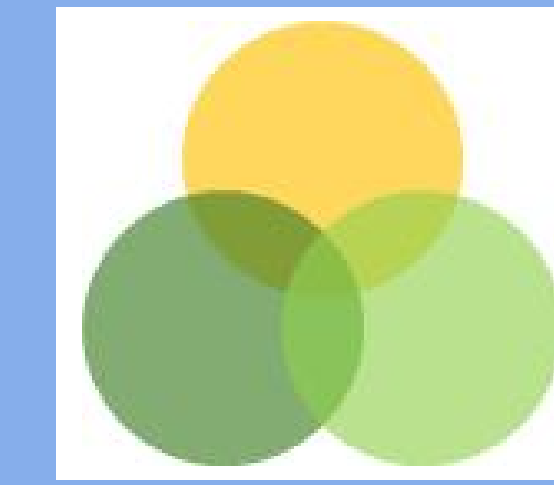
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Abstract

Functioning floodplains provide valuable habitat for a diverse array of wildlife, yet they are susceptible to threats such as altered hydrology, species invasions, and land use change. Prioritizing floodplain restoration and conservation projects for enhanced habitat objectives requires a thorough understanding of how wildlife use these habitats and respond to environmental changes. In this study, we use amphibian diversity to evaluate the habitat quality of 30 forested, agricultural, and emergent wetland floodplain sites in the Lewis Creek watershed, Vermont State, USA. Spatial analysis of site land cover composition was conducted for amphibian home ranges (23m) and dispersal ranges (300m) to account for differences in mobility among amphibian species. Using primary component analysis, we determined that our amphibian sites had three dominant land cover types: forest (deciduous and coniferous), wetland (forested, shrub/scrub, and emergent), and agriculture (hay and pasture). We hypothesized that amphibian species richness and alpha diversity would be higher at sites with dominant wetland and forest cover. Additionally, we hypothesized that amphibian diversity would be lower at sites with dominant agricultural land cover. Statistical analyses using Kruskal-Wallis and one-way ANOVA tests disproved our hypotheses—amphibian species richness and alpha diversity were not significantly higher in wetland, forest, or agricultural dominated land covers. We conclude that agriculture-dominated landscapes can be suitable habitat for amphibians, especially in heavily restored floodplains such as the Lewis Creek watershed, likely due to the presence of heterogenous, low-management fields for foraging. With the results from our analyses, we hope to demonstrate the importance of floodplain health for amphibian conservation and better inform prioritization of floodplain restoration in the Lake Champlain Basin.

Introduction

- Healthy floodplain ecosystems provide ecosystem services including wildlife habitat, nutrient cycling, flood risk reduction, pollution buffering, community livelihoods, and recreation.
- Amphibian conservation research is urgently needed to address global population declines resulting from land use change, climate change, and disease.
- Amphibians have complex life histories involving both terrestrial and aquatic systems. Thus, amphibian diversity is an important indicator of floodplain ecosystem connectivity and health.
- Understanding amphibian diversity patterns of the Lewis Creek watershed will help evaluate the success of past floodplain restoration efforts and inform the prioritization of future projects.

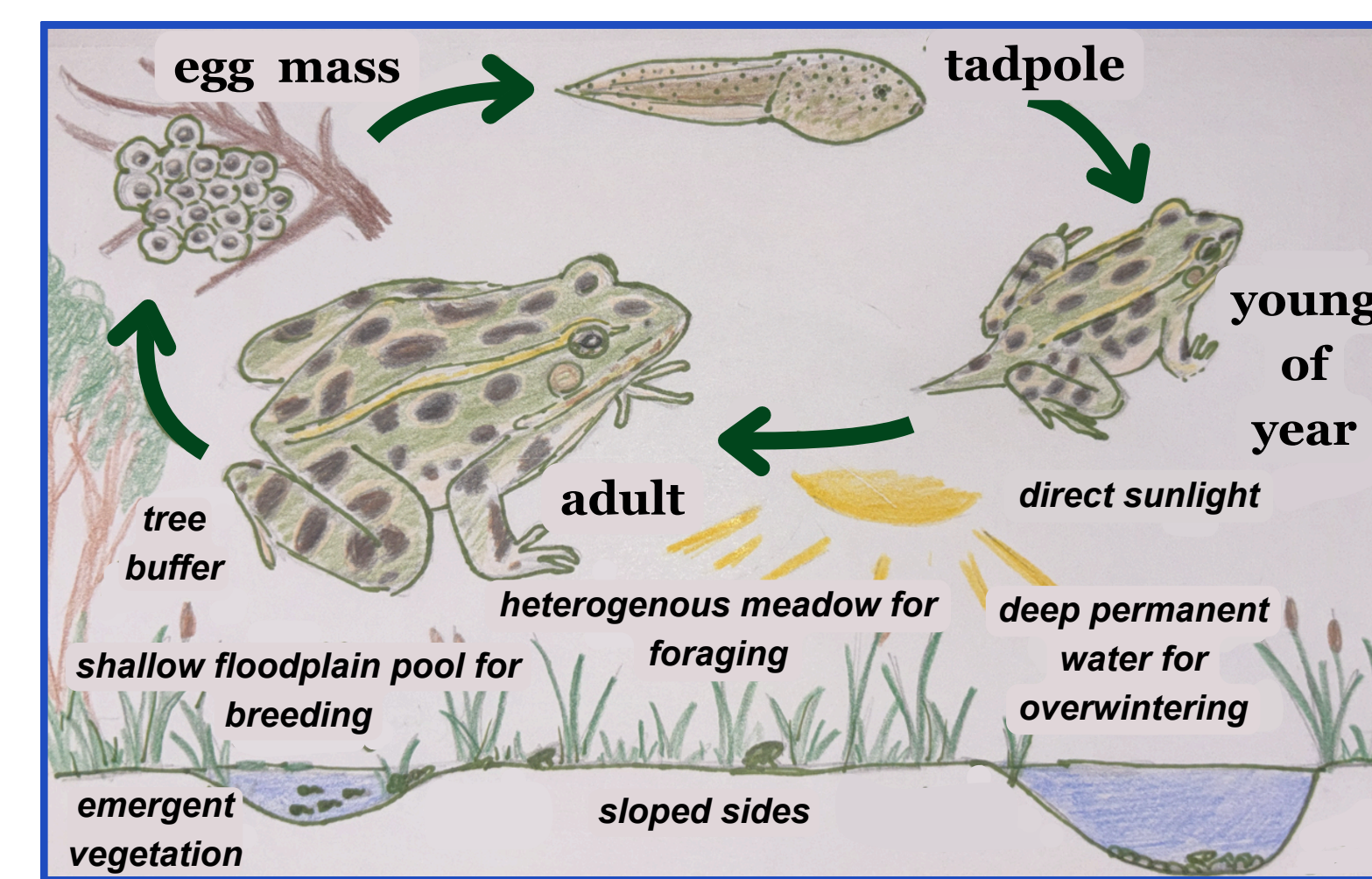


Figure 1: Northern leopard frog (*Lithobates pipiens*) life cycle and associated habitat requirements

Results

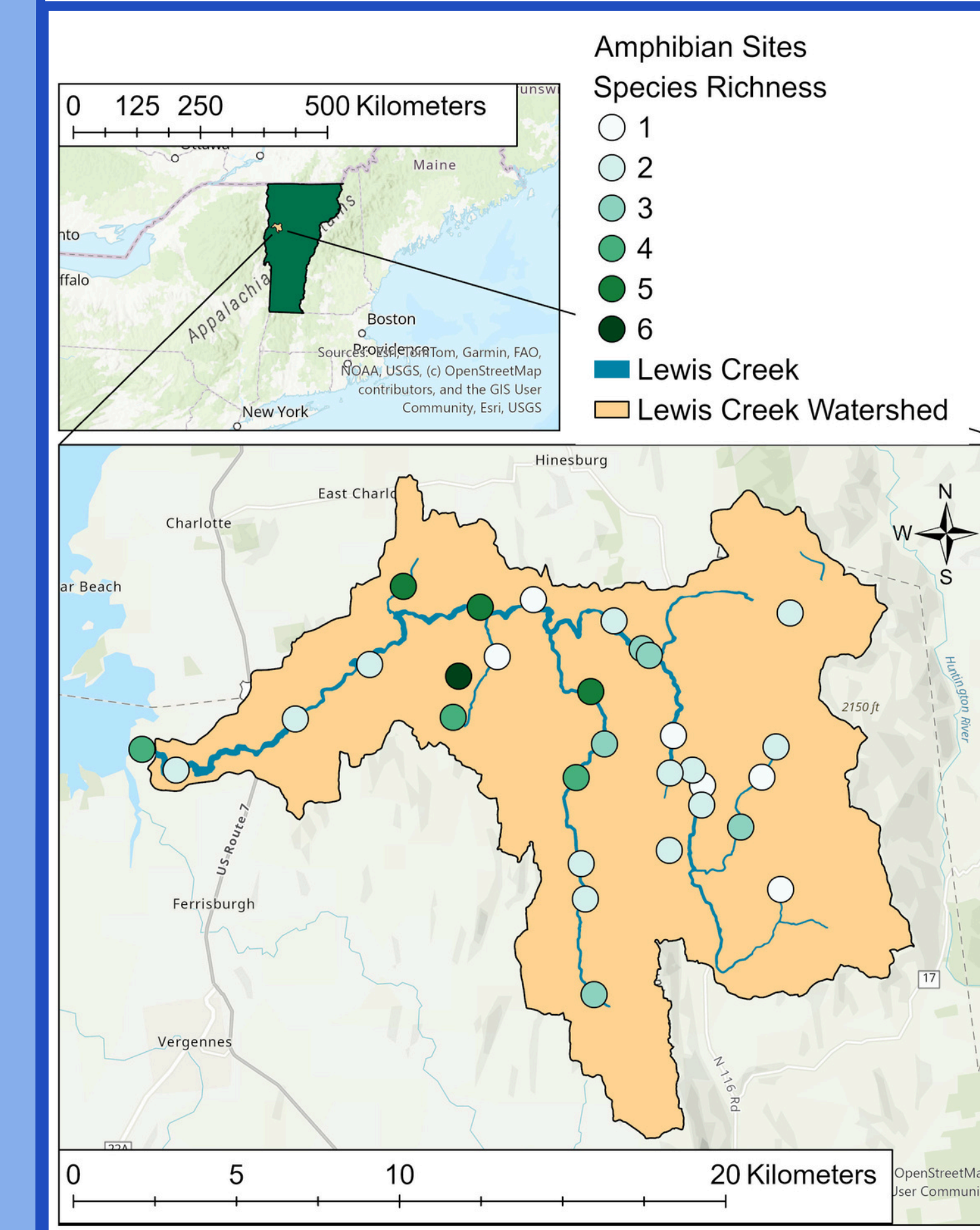


Figure 2: Locations and amphibian species richness of 30 surveyed sites within the Lewis Creek watershed, VT

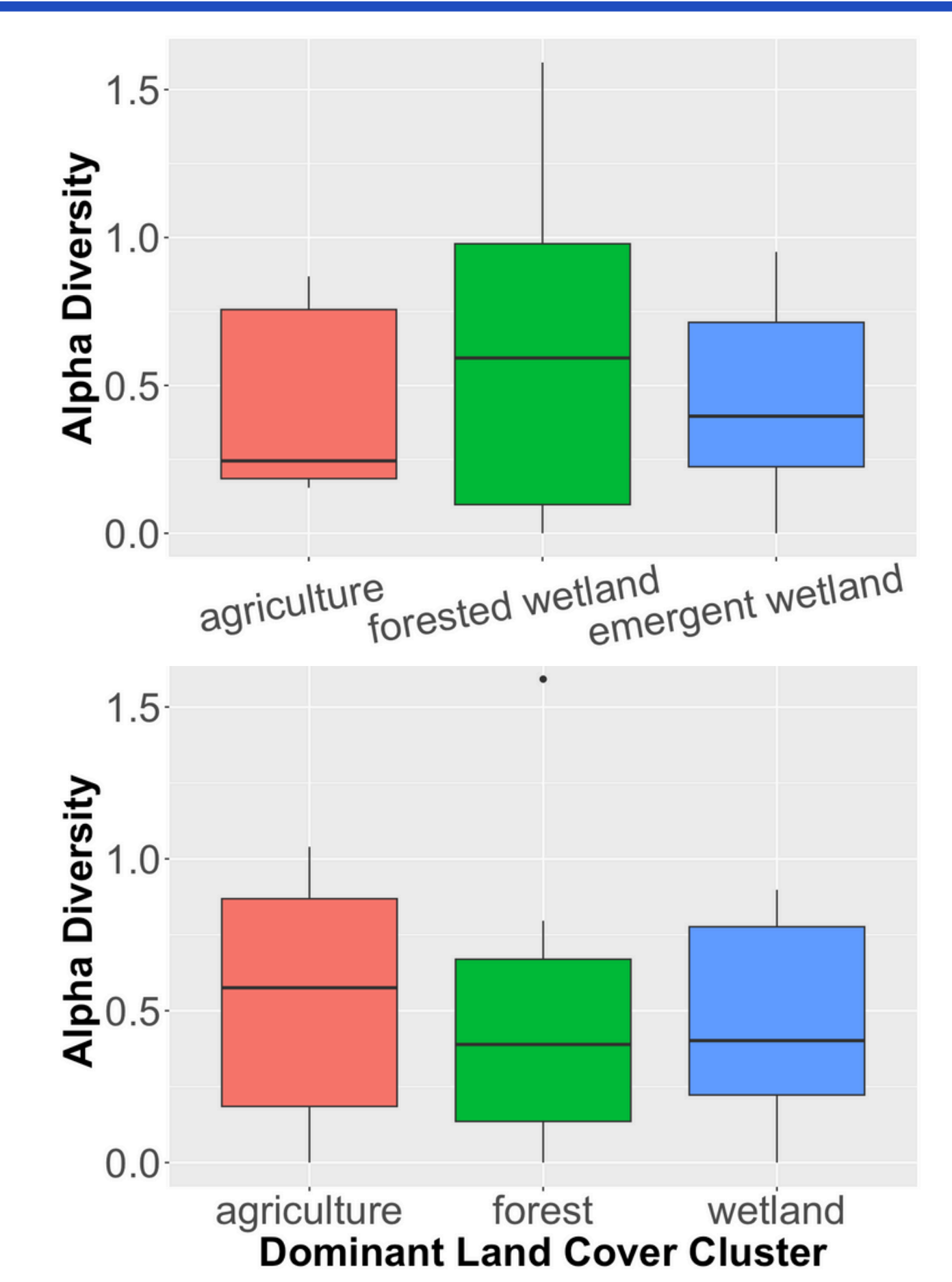


Figure 3: Amphibian alpha diversity by dominant land cover in home range (top) versus dispersal range (bottom)

Table 1: Kruskal-Wallis and one-way ANOVA tests determined no significant relationships between dominant site land cover class and amphibian species richness/alpha diversity

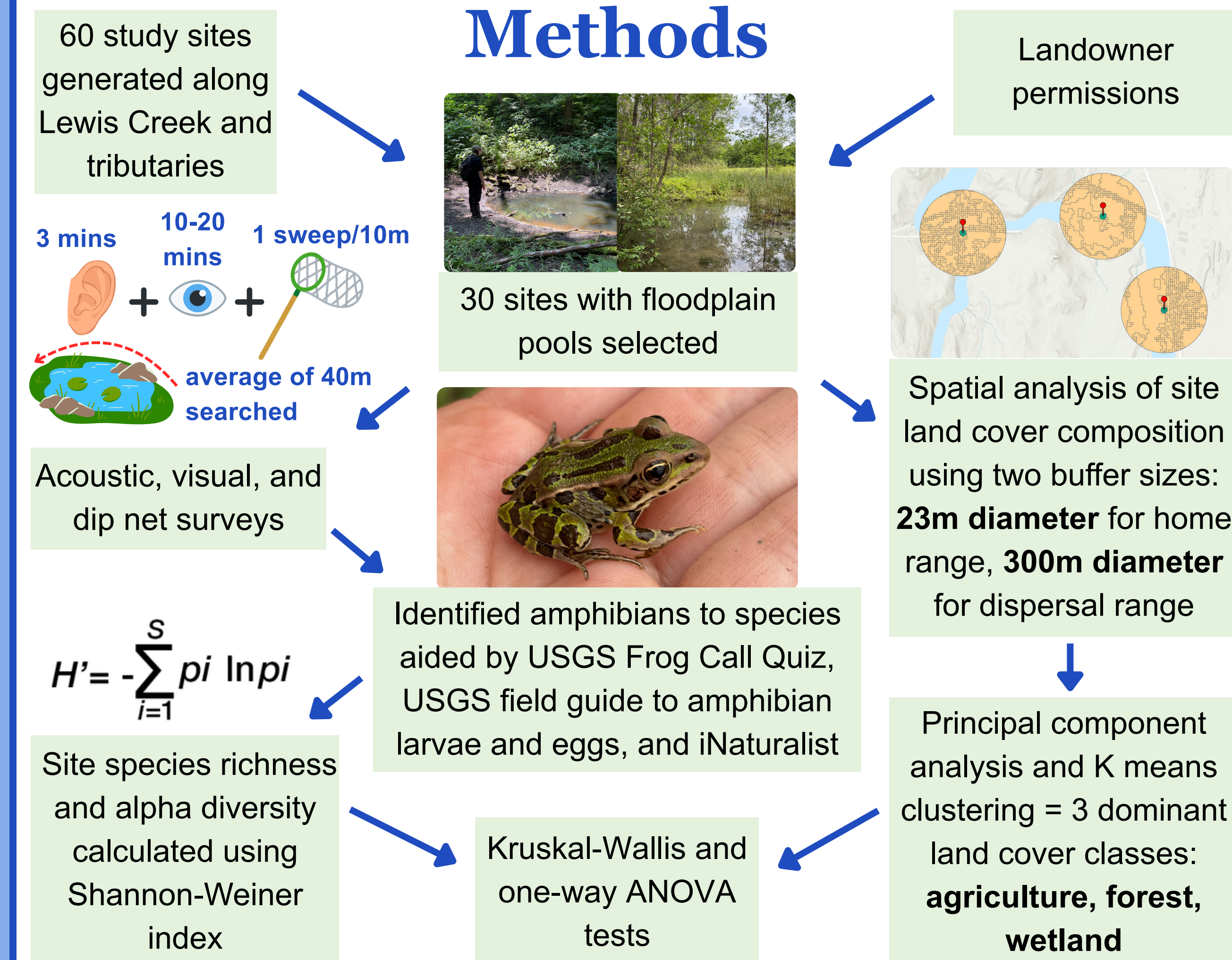
	N	df	Kruskal-Wallis H	ANOVA F	p
23m land cover (species richness)	30	2	1.836	-	0.399
300m land cover (species richness)	30	2	1.354	-	0.508
23m land cover (alpha diversity)	30	2	-	0.563	0.576
300m land cover (alpha diversity)	30	2	-	0.096	0.909

Discussion

- Results indicate that in the restored Lewis Creek watershed, dominant land cover class is not a significant predictor of amphibian diversity—wetlands associated with forest, emergent vegetation, and agriculture are all suitable habitat
- To manage for diverse amphibian communities, riparian landowners should avoid developing wet areas, plant riparian buffers to maintain water quality, and choose heterogenous vegetation patches over lawns to support amphibian foraging.
- Future analyses include an amphibian occupancy model with other site covariates: geomorphology, distance to road, vegetation community type, invasive species presence, and lateral and riverine connectivity.



Methods



References

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Acknowledgements

We would like to thank the landowners of the Lewis Creek watershed for their cooperation and enthusiasm for our project, without which this study would not have been possible. We also would like to thank Jim Andrews and the Vermont Herp Atlas for their help in amphibian identification. Funding for this project was provided by the Lake Champlain Basin Program (Grant No. LS-2023-005).