Investigating the Influence of Habitat Heterogeneity on Diversity of Insectivorous Birds in a River-Floodplain Mosaic

Paige C. Miller[1], Jade E. Ortiz, Colden V. Baxter, Jeremy M. Starkey
Stream Ecology Center, Department of Biological Sciences, Idaho State University
[1]millpai2@isu.edu

BACKGROUND

- River-floodplains (e.g., Figure 1) are biophysically complex, and are characterized by strong land-water linkages.


Figure 1

- One terrestrial-aquatic linkage occurs via emergence of adult aquatic insects, which are an energy resource for terrestrial insectivores, such as many bird species (e.g., Figures 2 & 3).
- Spatial heterogeneity of habitats may influence insect emergence, which could have consequences for such birds.
- If complex river-floodplains harbor diverse insect communities with asynchronous emergence patterns, we expect the landscape to support a diverse array of insectivorous birds.

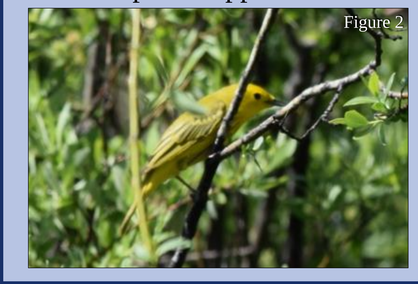
Figure 2


Figure 3

OBJECTIVE

- The purpose of our study was to assess the significance of habitat heterogeneity for the overall density and species richness of insectivorous birds across seven unique habitats in the Fort Hall Bottoms of the Snake River-floodplain.
- We hypothesized that increased spatial heterogeneity causes asynchronous patterns of insect emergence, which results in a greater abundance and species richness of insectivorous birds.

RESULTS

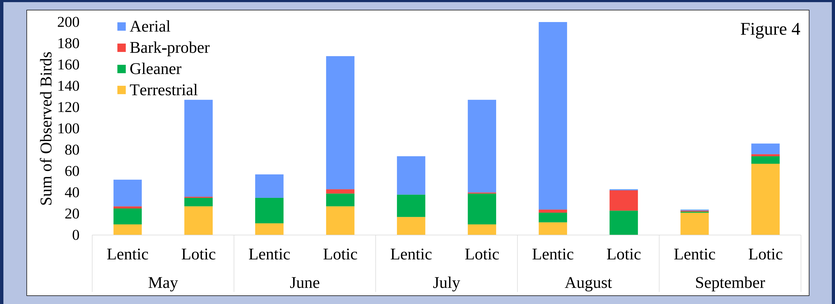

Figure 4

- Overall, bird species richness increased throughout the summer, and declined in the fall.
- We observed higher bird abundance at flowing water (lotic) habitats versus standing water (lentic) habitats (Figure 4).
- This pattern was largely driven by aerial-foraging birds in the summer, and terrestrial-foraging birds (especially migratory populations) in the fall (Figure 4).

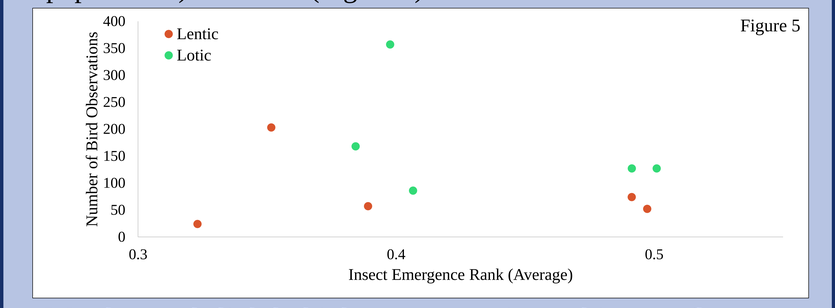

Figure 5

- We observed slightly higher emergent insect biomass (by a visual, categorical method) at lotic versus lentic habitats, but emergence was variable across time and site (Figure 5).
- The habitat with the overall highest biomass of insect emergence, a groundwater-fed spring brook, also had the highest abundance of birds, namely cliff and bank swallows.

METHODS

- Insect emergence was sampled weekly from May to September 2017, using floating and sticky traps (Figure 6).
- Birds were surveyed monthly.
- Surveys consisted of three point-count circles (radius: 100 m) separated by 50-m line transects, wherein observers identified all birds seen or heard.


Figure 6

SPECIES RICHNESS

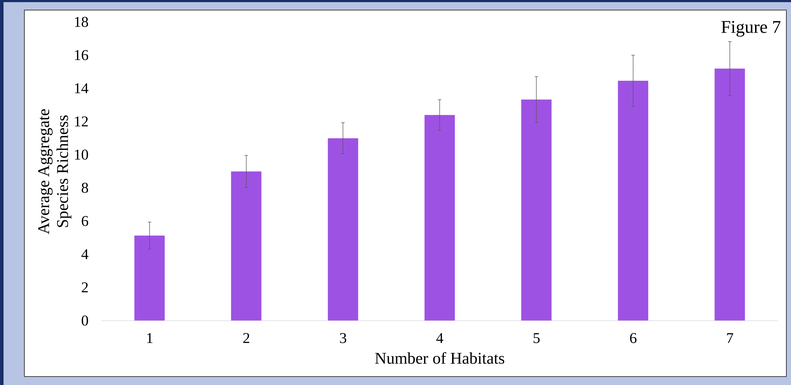

Figure 7

- We conducted a thought experiment, whereby we sequentially and randomly aggregated bird species richness with increasing number of habitats included. Averages among the five months are shown in Figure 7.
- In all months, species richness increased curvilinearly as more habitat complexity was added.

DISCUSSION

- Our observations suggest that river-floodplains with greater habitat complexity may have higher bird species richness than those with reduced habitat complexity.
- We speculate this may be linked to asynchrony of insect emergence among habitats, such that complexity of the mosaic sustains elevated diversity of insectivorous species by providing more abundant and consistent prey.
- Our observations also reflect bird migratory and nesting behaviors.
- This study is part of a broader evaluation of related hypotheses.


Figure 8

ACKNOWLEDGMENTS

This MILES research was made possible by the NSF Idaho EPSCoR Program (award number IIA-1301792) and Idaho State University. We thank Drs. David Delehanty and Ken Aho for their assistance in categorizing and analyzing data.