Land Cover and Area Influence Bird Biodiversity in Geographically Isolated Wetlands

Jackson Barratt Heitmann, Brittany M. Mason, and Corey T. Callaghan

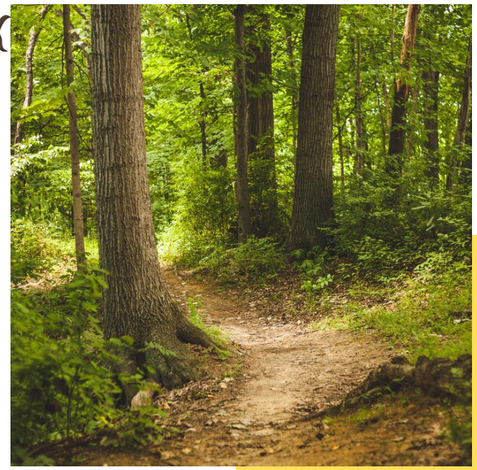
Fort Lauderdale Research Center, University of Florida

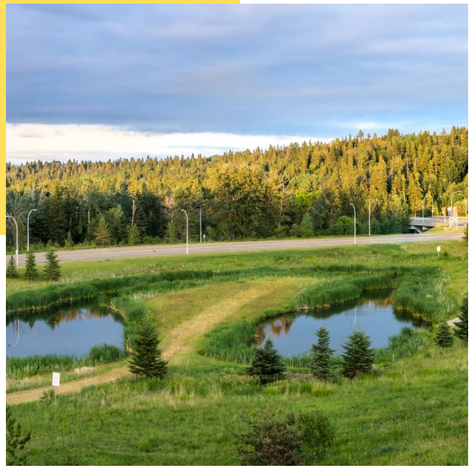
Global Ecology Research Group

What are Geographically Isolated Wetlands?

Wetlands with no surface water connection (at least part of the year)

- Characterized by: variable hydrology, vegetation, and area





Where are they found?

- Hardwood forest; Prairie; Pine Savanna; and Cities
- Embedded in Habitat Mosaics, Across the U.S.
- Continental Distribution, with Variety [ie. Carolina Bays, Prairie Potholes, Vernal Pools, etc.]

What do we know about Birds in Isolated Wetlands?

- Evidence species richness is higher in wetlands than surrounding uplands.

  *Barratt Heitmann et al. 2024, Riffel et al. 2006

- Species richness is higher in urban wetlands compared to rural ones.

  (McKinney and Paton 2009)

- **But**, we don't know how these affect different functional groups of birds...

How does land cover impact birds in these wetlands?

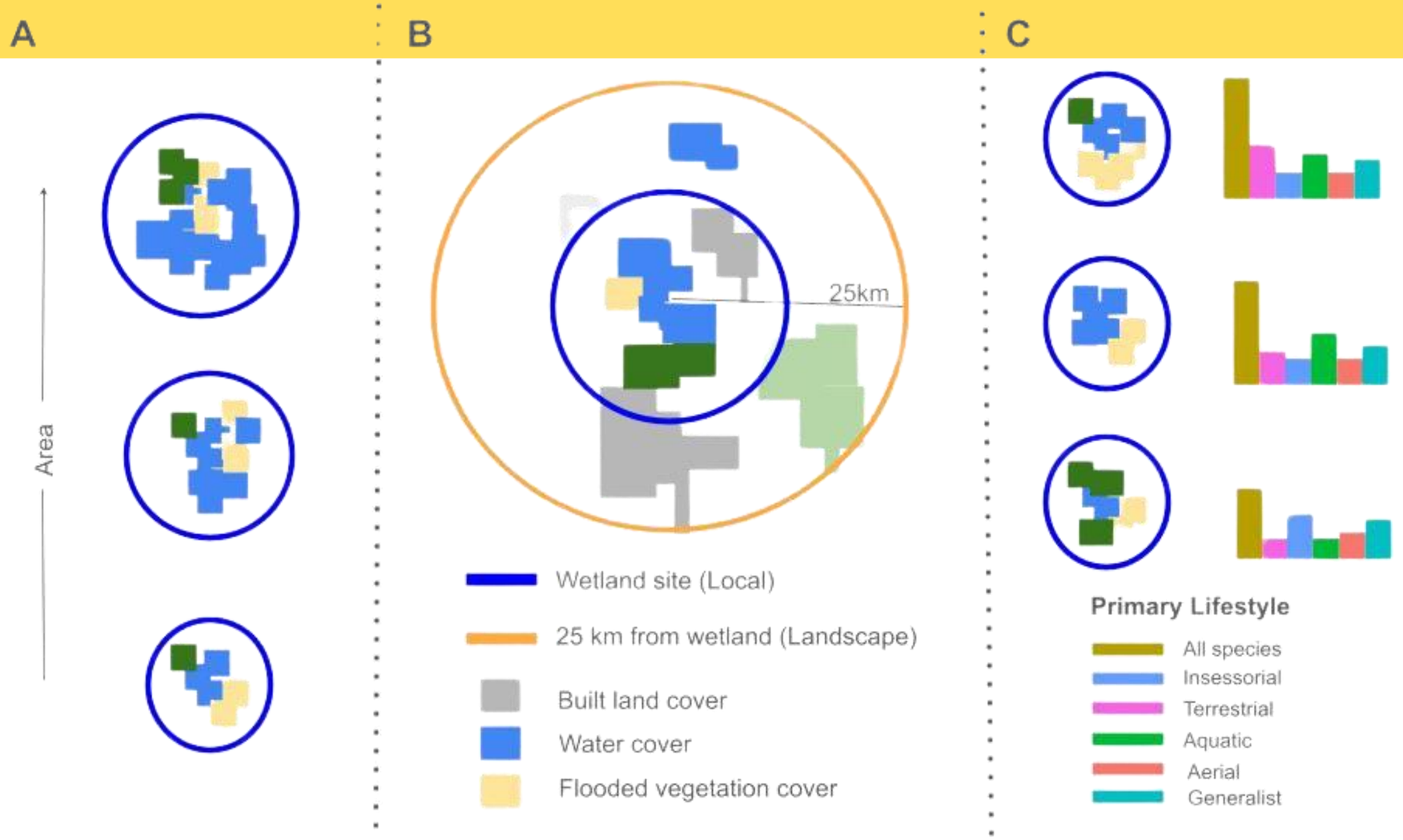
- Higher wetland area at the landscape scale (>3 km) supports higher bird biodiversity.

  (Webb et al. 2010)

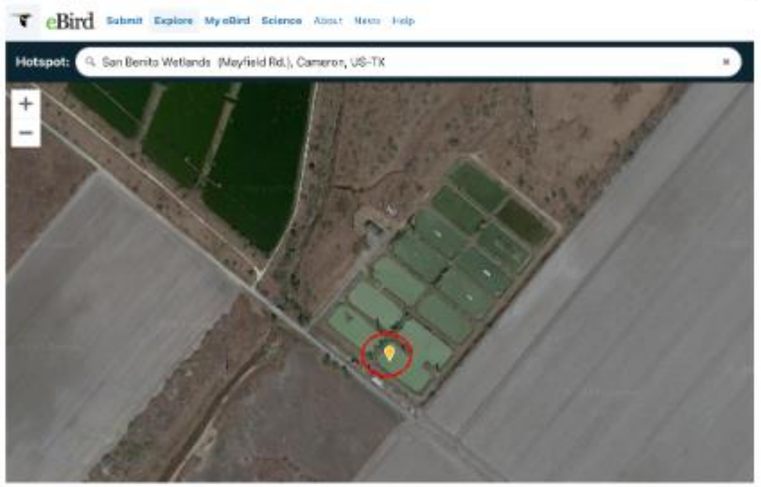
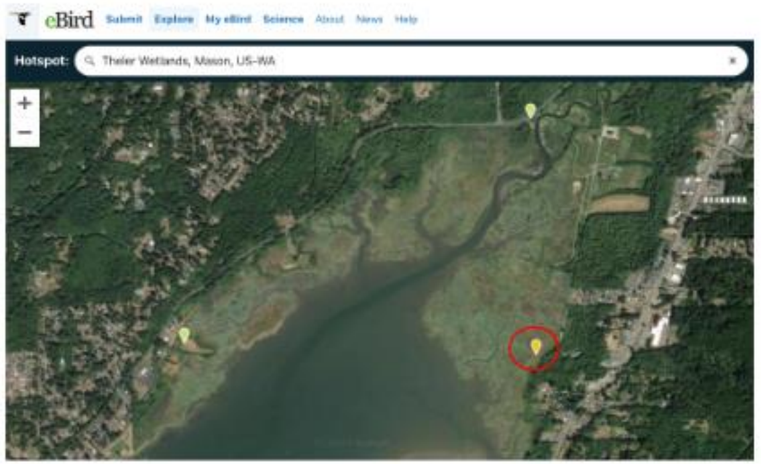
- Higher flooded vegetation land cover supports higher bird biodiversity.

  (Fairbairn and Dinsmore 2001)

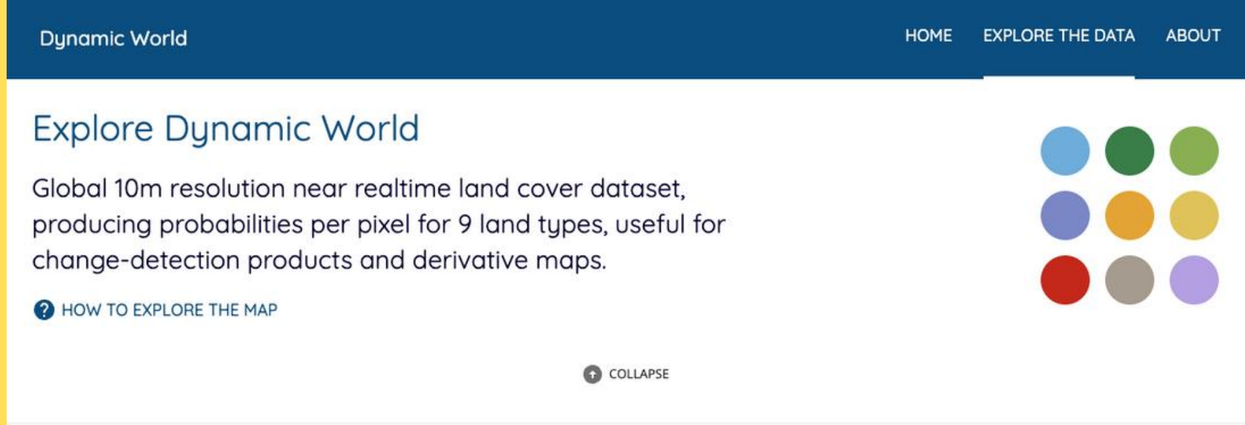
The research gaps we aim to fill:

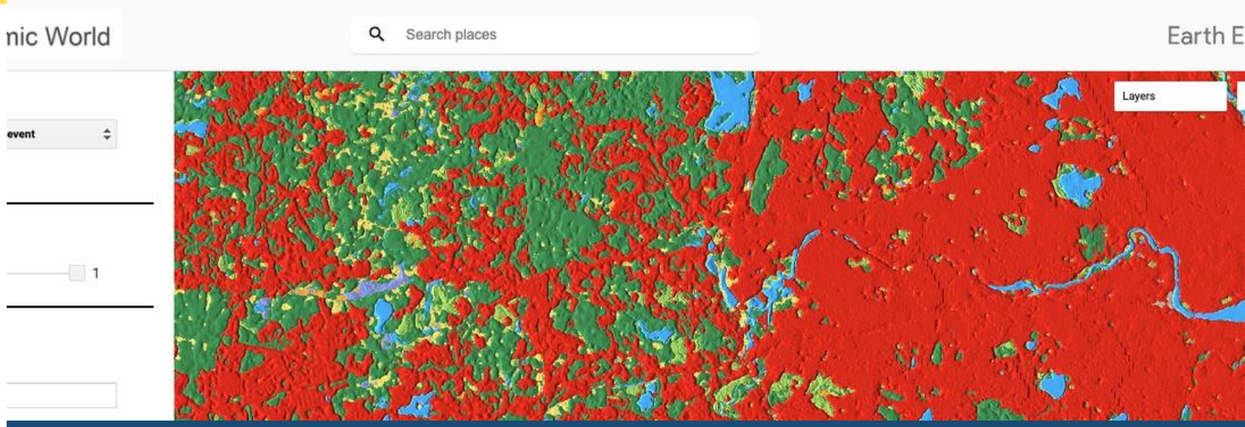


Integrating 207 wetlands with eBird hotspots across the conterminous United States

eBird hotspot	eBird hotspot screening	Wetland delineation in GeoJSON
San Benito Wetlands (L1673684)		
Theler Wetlands (L250091)		

Gathering land cover data from Google Earth Engine, and calculating species richness from eBird.





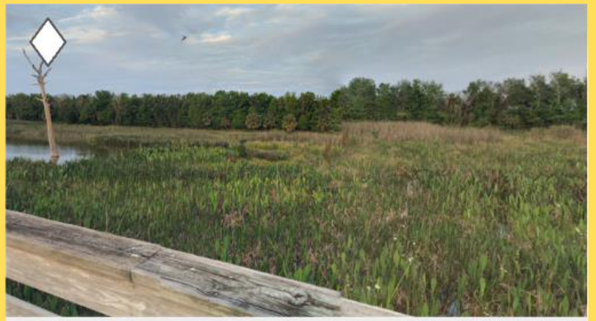
eBird Hotspot ID	Species Richness	Land Cover

Calculating overall species richness at each eBird hotspot, as well as species richness of 5 different functional groups (Tobias et al. 2022).

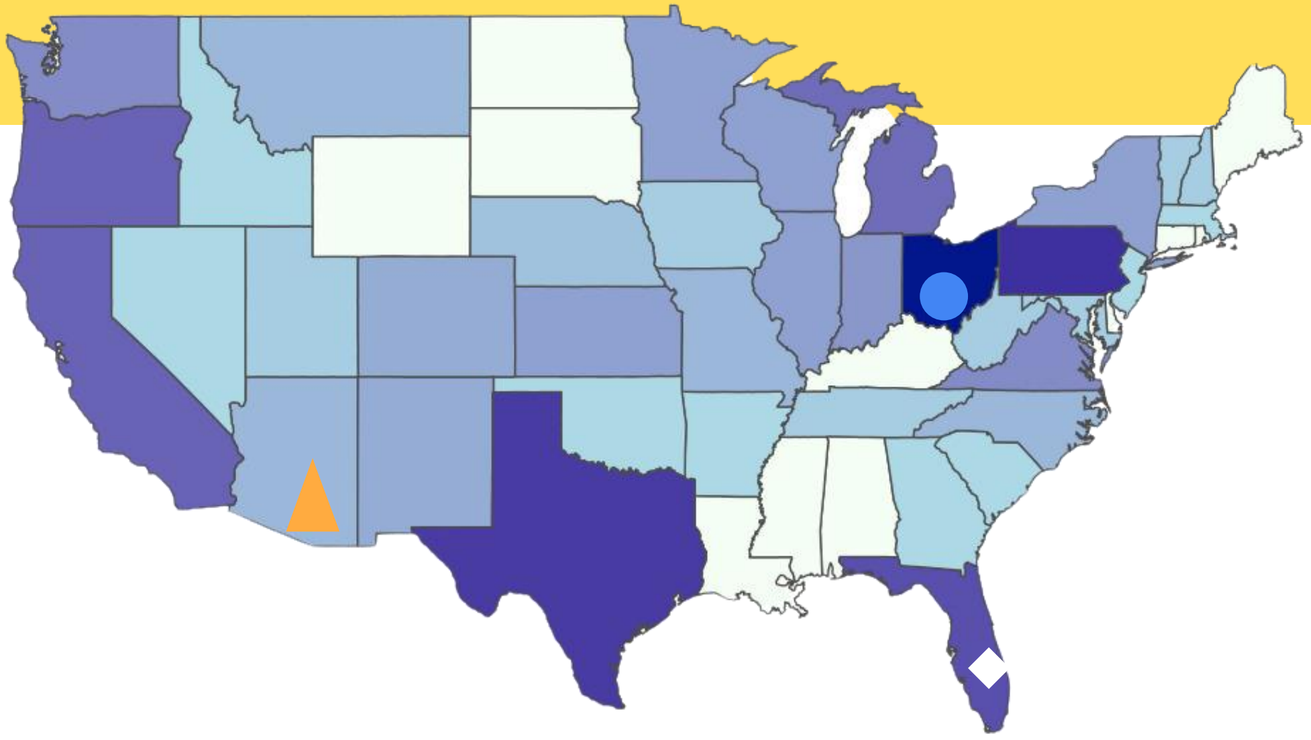
Generalized Linear Model (6 of them)

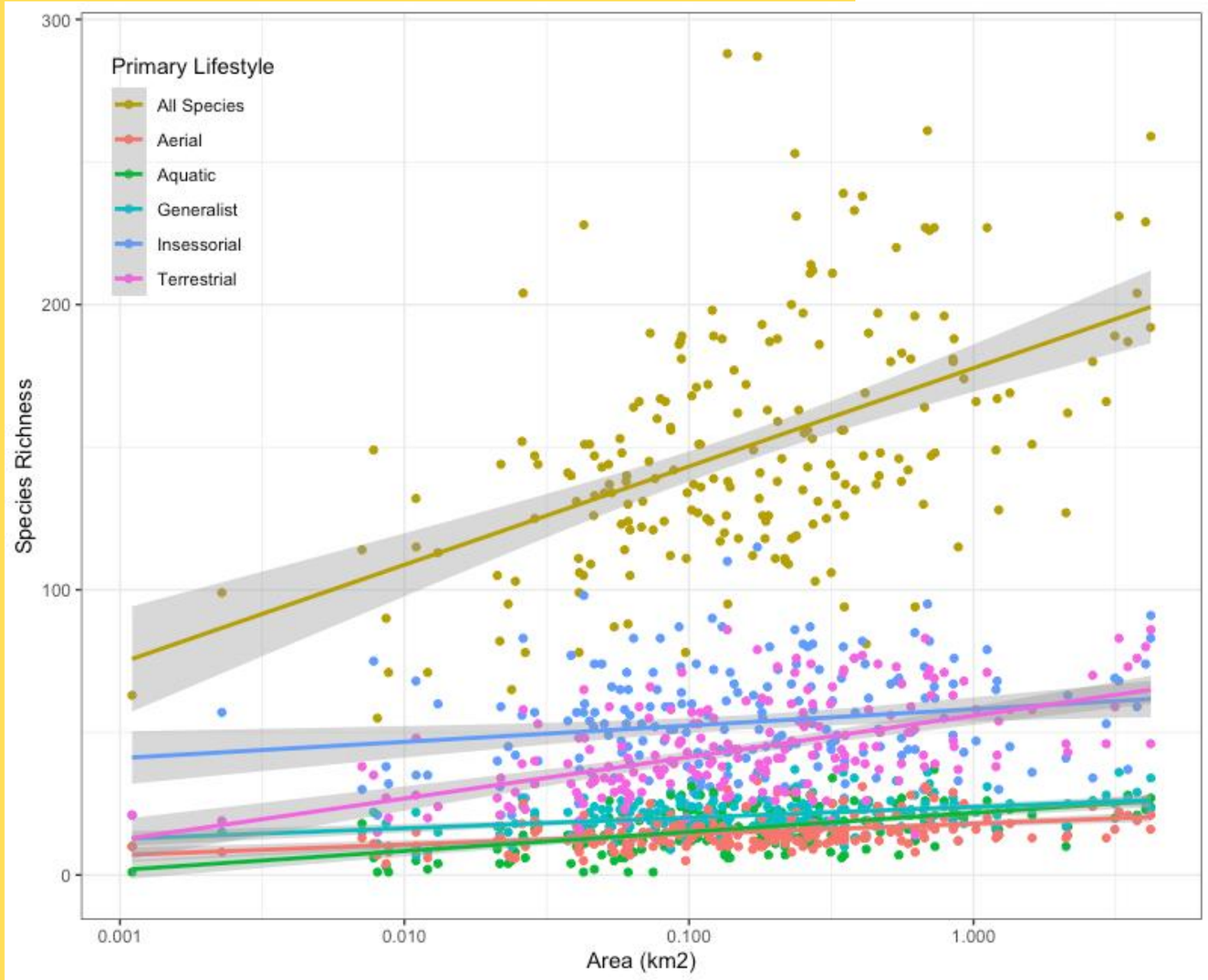
Sweetwater Wetlands Park, AZ

Ohio State University Wetlands, OH



Green Cay Wetlands Center, FL

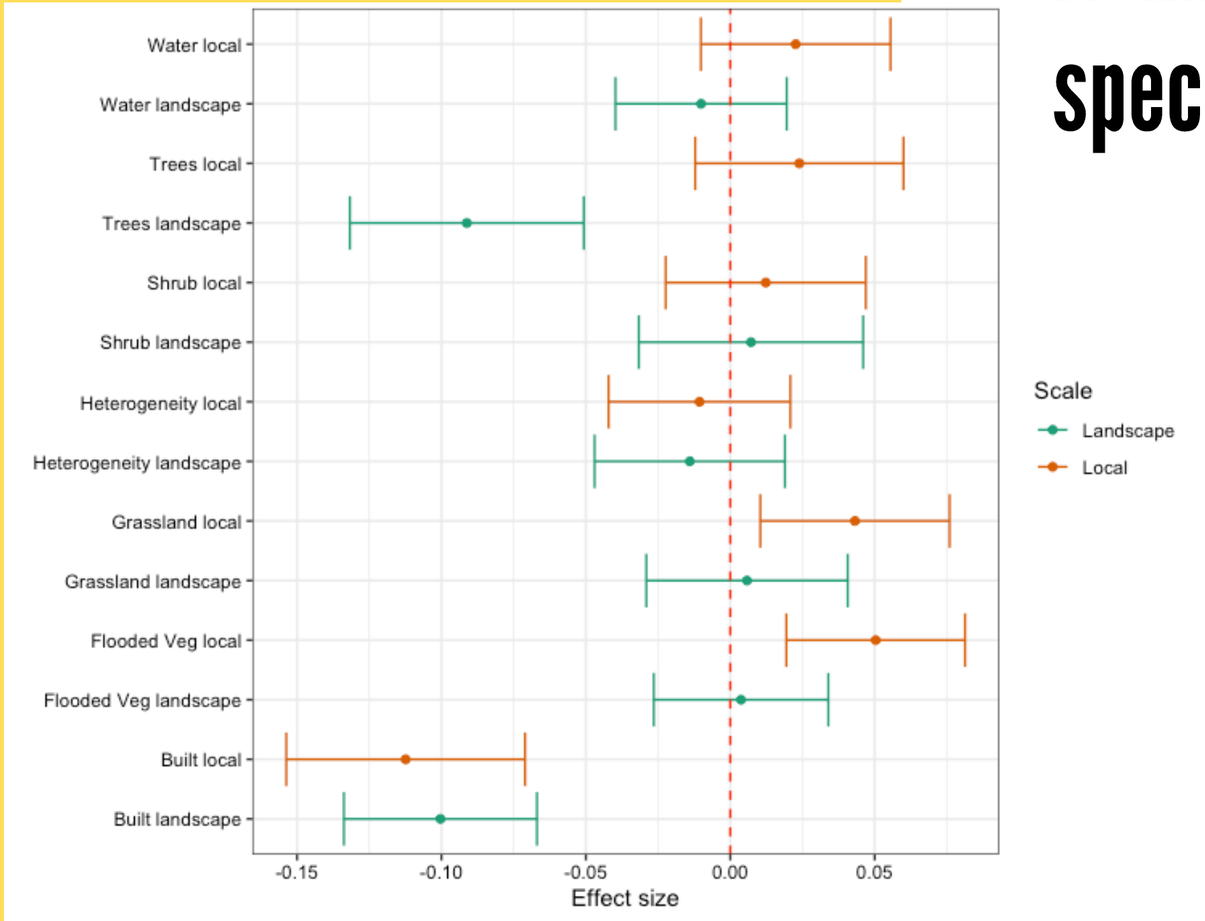




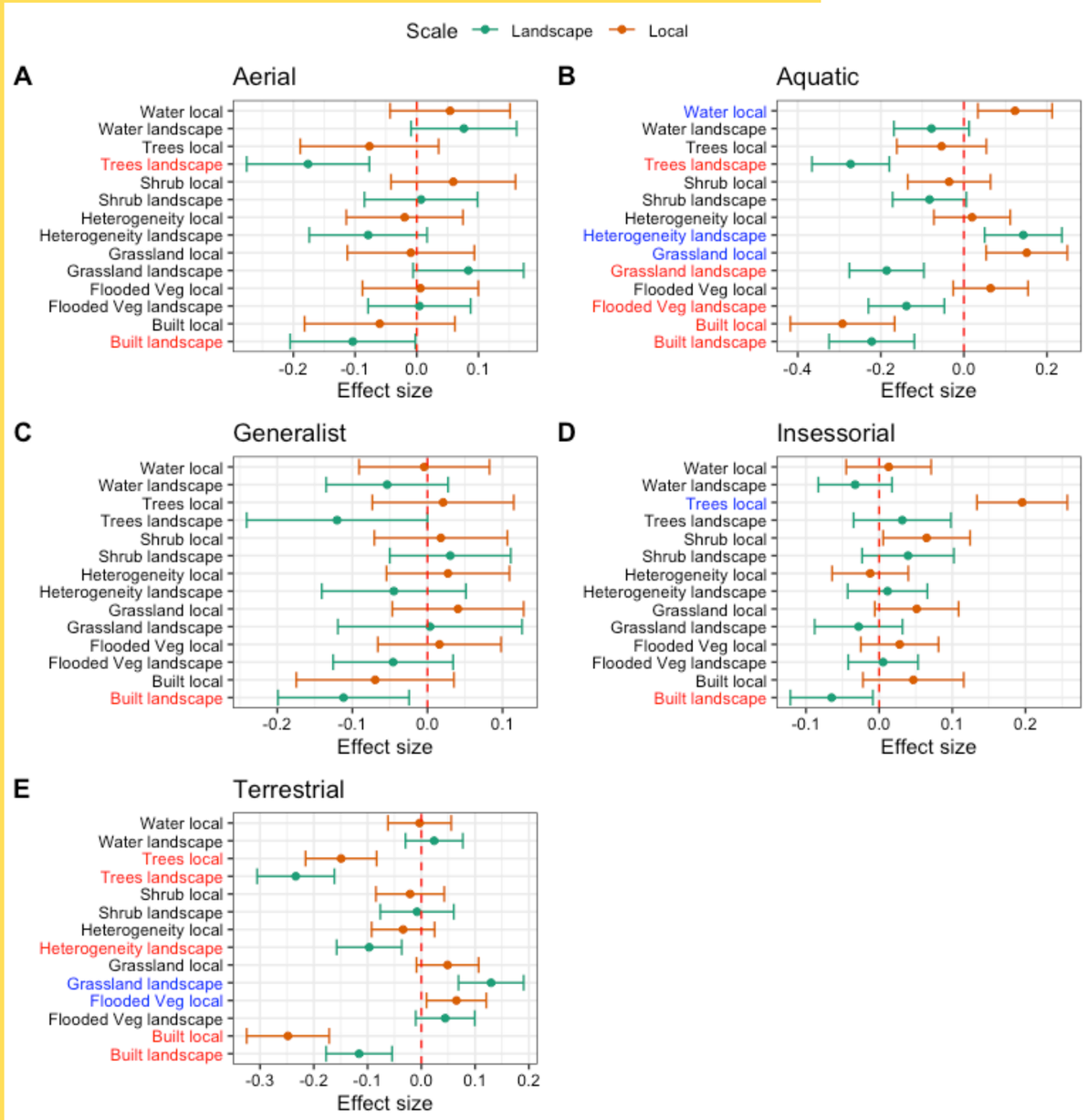
Objective 1: Species Richness Increases with Wetland Area

- We found that species richness increases as wetland area increases.
- This was most pronounced for Terrestrial and aquatic primary lifestyles.

Objective 2: Built area reduces species richness, flooded vegetation increases species richness.



- Built land area reduces richness at multiple scales.
- Trees reduced species richness, likely due to environmental filtering in the Temperate Forests of the Northeast.
- Flooded vegetation and grass cover promote richness at the local scale.



Objective 3: Land cover impacts functional group richness differently

- All species respond negatively to built land area, at multiple scales.
- Aquatic species richness.

What does this mean for birds in GIWs?

Terrestrial and aquatic species richness drive the species area realtionship in GIWs, likely due to larger wetlands being visited by a greater number of larger-bodied species compared to relatively smaller insessorial and aerial species.

Landscape variables are responsible for negative trends in richness, local variables responsible for positive predictors of species richness.

What can managers and restoration ecologists do with this information?

Prioritizing preservation/restoration/creation of larger wetlands

incorporating flooded vegetation in stormwater ponds, restoration of natrual wetlands, and created wetlands

Thanks to everyone who contributes to eBird.

Don’t forget to go birding at small isolated wetlands!

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