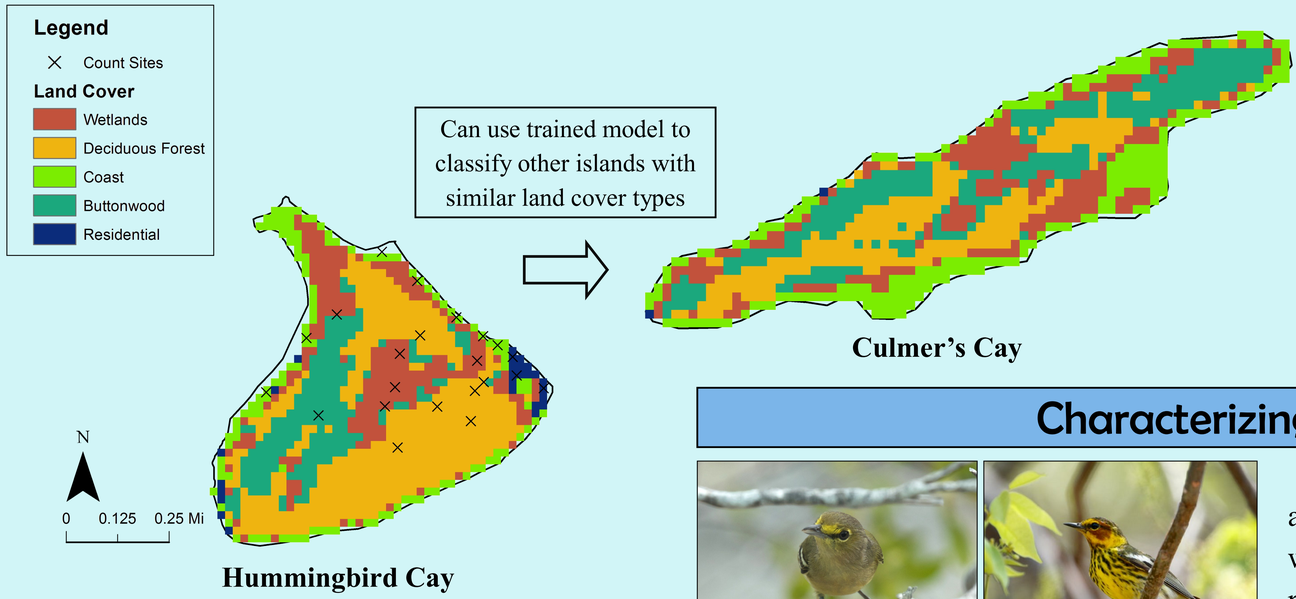
Habitat Use of Winter Avian Communities on Hummingbird Cay, Bahamas

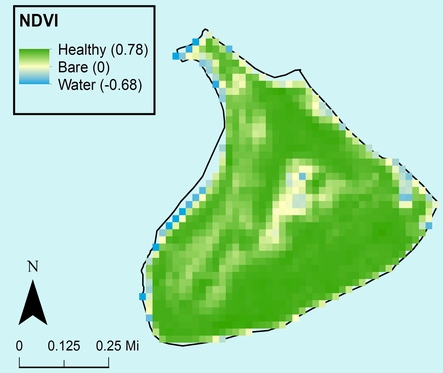
Introduction

Every winter in the Bahamas, neotropical migrants add complexity to a relatively simple community of resident birds[1]. Many of these birds winter exclusively in the Bahamas, and while their general occurrence is well documented, their distribution and habitat use within and among islands is not[1,2]. Recently, some of these migrant species have suffered population declines, but the extent is not well understood. Quantifying baseline winter communities and understanding how populations are distributed across habitats could offer insights for effective management of declining populations. Here, I characterize the winter bird community on Hummingbird Cay, Bahamas and examine the effect of habitat and vegetation on species distribution and specialization.

Land Cover Classification



Vegetation Health



Methodology

Hummingbird Cay (hereafter HBC) is a small (~3 sq. km.) island near Georgetown, Great Exuma, Bahamas. From March 17-25, 2016, I visited the HBC Tropical Field Station and documented land cover and distribution of the avian community.

Land cover and vegetation I characterized land cover with a supervised classification using Landsat 8 data (30m resolution). I trained the model using ground-truthed data to five land cover types. The resulting classification scheme was used to characterize Culmer's Cay, a nearby island, which was expected to have similar land cover to HBC. I used red and near-infrared bands to calculate a normalized difference vegetation index (NDVI) to measure vegetation health.

Avian community survey I haphazardly selected 21 sites stratified by land cover across the island and performed three 10-minute, fixed-radius (25m) point counts at each. Counts occurred throughout the day until 1800 EDT. No playbacks were used, and I recorded the abundance of all observed birds.

Habitat use I analyzed the effect of the majority land cover class and mean vegetation health within a 50m buffer on species richness. I also examined community differences between five habitats: wetlands, deciduous forest, coast, buttonwood meadow, and residential.

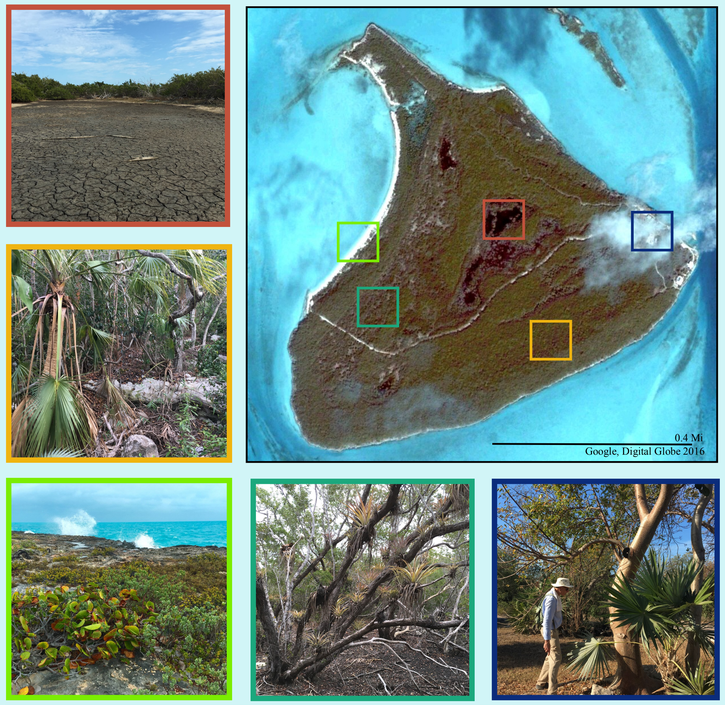
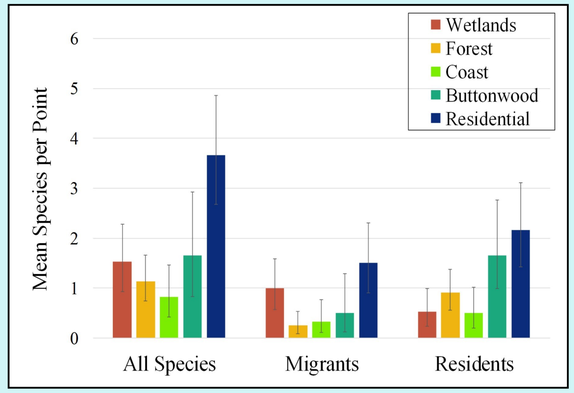


Figure 1. Distribution of five habitat types across HBC (see legend for colors).

Characterizing Habitat Use

Figure 2. Left: Thick-billed Vireo, the most common resident of HBC. Right: Cape May Warbler, a handsome neotropical migrant. I recorded 38 species of birds on HBC, and 61% are migratory.

Mean Species Richness by Habitat



Percent Dissimilarity of Avian Communities Between Habitats

	W	F	C	B	R
W	0				
F	73.1	0			
C	65.7	74.4	0		
B	60.0	59.1	55.5	0	
R	74.4	39.0	81.5	62.9	0

By creating land cover maps of HBC, I was able to examine how winter avian communities were distributed across habitats. Species richness per point varied with land cover, but not vegetation. Residential supported the highest species richness, which is likely due to its structural complexity and reliable supply of resources. Note that although many of the island's wetlands were dry this year, they usually have high species richness.

Bird communities differed across habitat types. High dissimilarity values indicate only a few species are shared between sites. Proximity of habitats and very abundant species are two factors that likely affect this finding.

Migrants showed a higher degree of habitat specialization than residents. Therefore, migrants are likely to suffer more than residents under habitat loss. This finding contradicts previous work that found residents were more specialized[1].

This project creates a framework for repeatable sampling and long-term monitoring of avian communities on HBC and nearby islands. Future work should focus on avoiding habitat edges and increasing species detection[1].

References

1.Wunderle, J. M., & Waide, R. B. (1993). Distribution of Overwintering Nearctic Migrants in the Bahamas and Greater Antilles. *The Condor*, *95*(4), 904–933.

2.Murphy, M. T., Pierce, A., Shoen, J., Murphy, K. L., Campbell, J. A., & Hamilton, D. A. (2001). Population structure and habitat use by overwintering neotropical migrants on a remote oceanic island. *Biological Conservation*, *102*(3), 333–345.

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Sources: USGS Landsat 8 OLI/TIRS, Flickr CC, Google Digital Globe

Projection: WGS 1984, UTM Zone 18N

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