Linking Declines in Wetland Birds to Urbanization: an Evaluation of Potential Mechanisms

Brian G. Tavernia
Department of Biology, Tufts University, Medford, MA 02155 USA

Introduction
Urbanization can reduce the quantity of wetland habitat and degrade the quality of remnant wetland patches. These changes place wetland dependent bird species at risk of decline and, consequently, extinction. During 2007, I documented a negative effect of urbanization on the number of specialist bird species using a wetland. Although this knowledge will allow for the identification of urban areas particularly impacting wetland plants and invertebrates, thus reducing the nesting and food resources available to breeding birds. For example, increased salinity levels may favor invasive plant species, e.g., Phragmites australis, whose tendency to form dense monotypic stands may inhibit bird nesting and foraging. To evaluate potential mechanisms driving the effect of urbanization on wetland birds, I tested the following hypotheses in 2008: 1) wetland specialists show a temporarily consistent negative response to urbanization, potentially indicating a consistent pattern and mechanism, 2) exotic, invasive plants (e.g. P. australis) will be more prevalent in urban areas, and 3) aquatic invertebrate abundance will decrease in urban landscapes.

Methods

Aquatic Invertebrate Surveys
We sampled aquatic invertebrate from 10 wetlands using activity traps. Five activity traps were placed within each site at the interface of vegetation and water as a relatively large amount of aquatic invertebrates occur here. Traps were left in place for 24 hours before aquatic invertebrates were removed and frozen for later identification. Trapping occurred during two periods, the final weeks of May and June. These two periods correspond to the time when wetland birds are making habitat selection decisions and attempting to meet the energetic demands of their broods, respectively. All invertebrates were sorted and counted within six months of collection.

Invasive Plant Surveys
Following bird surveys, we quantified local habitat information at each survey point using a line-intercept method. Two 25 m transects were laid out at 60° angles on opposite sides of a line bisecting the semi-circular point count stations. We walked each transect and determined the length that ran through the invasives purple loosestrife (Lythrum salicaria) and phragmites (Phragmites australis). The represention of each habitat type at a site was quantified as a proportion of the total transect length covered.

Species Targeted During Surveys

- mute swan (Cygnus olor)
- wood duck (Aix sponsa)
- American black duck (Anas rubripes)
- mallard (Anas platyrhynchos)
- least bittern (Ixobrychus exilis)
- great egret (Ardea alba)
- green heron (Butorides virescens)
- Virginia rail (Rallus limicola)
- sora (Porzana carolina)
- common moorhen (Gallinula chloropus)
- marsh wren (Cistothorus palustris)
- swamp sparrow (Melospiza georgiana)

Results
Results of my analysis are currently being prepared for publication. A copy of my paper will be available from the Tufts Institute of the Environment.

Summary
Urbanization may negatively impact wetland bird communities by degrading overall habitat quality. The species richness of wetland bird specialists displays a negative response to urbanization in surrounding Massachusetts landscapes. I investigated the possibility that this negative response may be due to either: 1) an increase in invasive plant cover in urban wetlands (loss of native nesting substrate) or 2) a decrease in the abundance of aquatic invertebrates (loss of food). During 2008, I surveyed breeding bird communities, plant communities, and aquatic invertebrates from eastern Massachusetts wetlands varying in the degree of surrounding urbanization. Results from my analysis are being prepared for publication and copies of my paper will be available from the Tufts Institute of the Environment.

Species Targeted During Surveys

- mute swan (Cygnus olor)
- wood duck (Aix sponsa)
- American black duck (Anas rubripes)
- mallard (Anas platyrhynchos)
- least bittern (Ixobrychus exilis)
- great egret (Ardea alba)
- green heron (Butorides virescens)
- Virginia rail (Rallus limicola)
- sora (Porzana carolina)
- common moorhen (Gallinula chloropus)
- marsh wren (Cistothorus palustris)
- swamp sparrow (Melospiza georgiana)

Acknowledgements
Funding: Tufts Institute of the Environment, The Garden Club of America, Norcross Wildlife Foundation, Sigma Xi, Nutall Ornithological Club, USGS through Massachusetts Water Resources Research Center; Fieldwork: Tracey Dalonte, Emily Rockwell, Nick Skaff; Statistical Support: Durwood Marshall; GIS support Barbara Parminter, Patrick Florance; Public and private landowners for access to properties.