Angry Birds: Songbirds, Noise, and Exurban Development

Project Report to the Nuttall Ornithological Club

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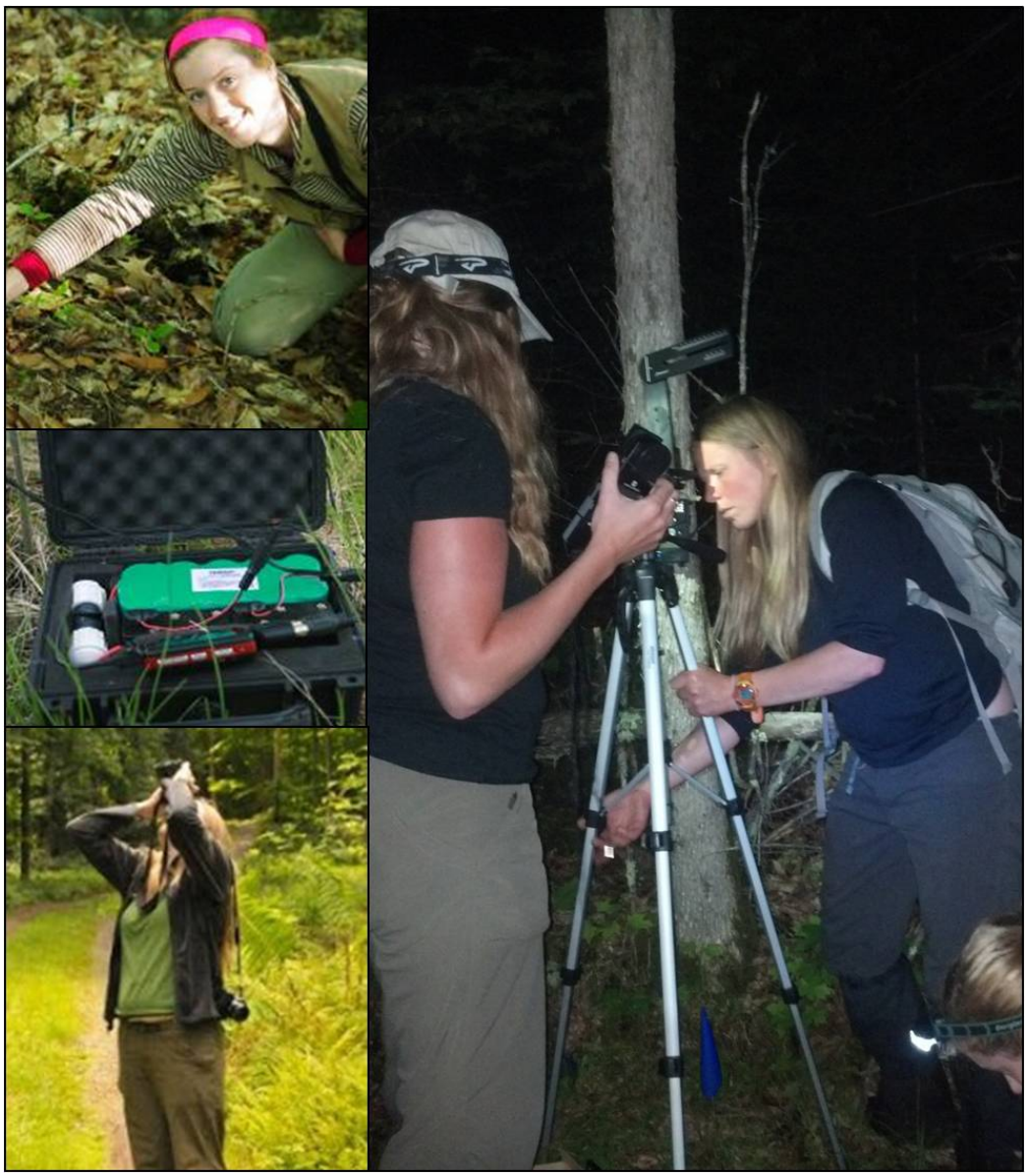
Introduction

The Wildlife Conservation Society was awarded a grant in the amount of $1,500 from the Nuttall Ornithological Club to assist us in implementing an existing National Science Foundation (NSF) project we are engaged in to examine how individual landowner choices, embedded within regional land-use and planning structures, affect the patterns and distributions of bird species found in the diverse and rapidly increasing exurban landscape. Our NSF study examines the effects of exurban development on avian communities in two structurally different habitat types (interior forest and shrubland/grassland mosaic) in the Adirondack Park of upstate New York and the Greater Yellowstone Ecosystem of southwestern Montana. The goal of this research is to examine how individual land ethics, and land-use decisions, operating within a regional land-use context, shape human impacts on biological communities, and how understanding this relationship can lead to better management and, potentially, ecologically healthier landscapes. The study will investigate: (1) how avian community structure and reproductive success relate to individual land ethics and land-use practices in an exurban context; (2) how these bird community characteristics are controlled by localized human disturbances versus overall habitat structure as well as landscape versus local habitat characteristics; and (3) the extent to which the magnitude of these effects in diverse landscapes can be explained by the overall connectivity and resilience of the encompassing regions. We hypothesize that (1) a more biocentric or anthropocentric land ethic will result in local practices and behaviors that are, respectively, more positively or negatively associated with breeding bird abundance and nest success; (2) localized human behaviors have a greater impact on abundance and nest success of breeding birds than does alteration of habitat structure in exurban subdivisions; (3) regional landscape characteristics explain more variation in the patterns of breeding bird abundance and nest success than local habitat characteristics; and (4) more robust landscapes are more resistant than less robust landscapes to the impacts of exurban development. Support from the Charles Blake fund is helping us to address hypothesis 2, and our objective is to determine the impacts of noise disturbance in residential areas in

order to identify whether localized human behaviors have a greater impact on abundance and nest success of breeding birds than does alteration of habitat structure in exurban subdivisions.

Ample literature demonstrates the potential negative impacts of noise disturbance on wildlife communities (Habib et al. 2007, Slabberkoorn and Ripmeester 2008), and various species of birds, cetaceans, primates, and rodents have been observed shifting their vocalizations to reduce the masking effects of noise. Research on birds has implicated noise specifically as one of the most important effects of roads (Forman and Alexander 1998, Rheindt 2003, Kaseloo 2005, Habib et al. 2007). Similarly, anthropogenic noise associated with exurban development (e.g., noise disturbance from construction of new homes, tree maintenance and clearing, lawnmowers, outdoor music, vehicle traffic) may have strong impacts on birds' ability to breed successfully in residential areas. Our existing NSF grant does not provide support for sampling this important aspect of exurban habitats and Blake-Nuttall Funds were used to help us execute the acoustic monitoring component of our existing research project in our Adirondack field site for the 2013 field season. This grant allowed



for the purchase of replacement batteries, microphones, and several individual components of the acoustic monitoring units that were no longer functional.

Methods

We surveyed 7 exurban subdivisions and 7 paired control sites located in Essex County in the Adirondack Park. We conducted standard 50 meter fixed radius bird counts (Ralph et al. 1995) and collected data on vegetation characteristics at the homes of 90 individual landowners and at 90 control locations for a total of 180 points in the Adirondack Park. We also conducted nest searches at a subset of our sample sites within subdivision and control areas for a total of 12 nest-searching plots. Our point count surveys are not species-specific and are aimed at detecting all individuals seen or heard within the songbird and woodpecker orders. Our nest monitoring work specifically targeted the following species in the Adirondacks: American robin, black-capped chickadee, dark-eyed junco, hermit thrush, ovenbird, white-throated sparrow, and yellow-bellied sapsucker. We also surveyed local habitat characteristics at the same locations as those used for the bird community point counts, employing the methods of Fletcher and Hutto (2008).

To assess direct anthropogenic disturbance, we measured the activity at each point count location including noise (measured with acoustic monitoring devices), light (measured on moonless nights with illuminance meter at increasing distances from individual homes), types of disturbances nearby (trails, pets outside, people walking or recreating), as well as the presence of human structures such as homes, driveways, and lawns (via visual inspection). Acoustic monitoring data are being analyzed using Raven Pro1.4 (Cornell Lab of Ornithology), which allows us to characterize the sound environment in residential and control areas and measure the relative frequency, amplitude, and variability of anthropogenic noises. We will use a combination of occupancy modeling (MacKenzie et al. 2006) and partial regression models to separately assess the relationship of human disturbance variables (including noise) and habitat structure to avian community structure and nest success.

Results and Discussion

Over the course of the 2012 and 2013 field seasons, we have made a total of 9,554 observations of 85 bird species. These observations consist primary of birds in the Parulidae family, with large numbers of observations also from the Tyrannidae, Fringillidae, Picidae, and Turdidae and proportions characteristic of Adirondack forest bird communities. Subdivisions

have generally harbored higher numbers of species than control sites, with 82 detected in subdivisions to date and 76 in controls. We have located a total of 38 nests of 11 different species in subdivisions, and 22 nests of 9 species in control sites. Proportion of nests that fledged live young was high in both cases (76% vs 82% in subdivisions and controls, respectively) and higher than observed fledging rates in our western sites.

Acoustic monitors were deployed at a total of 30 locations during the 2013 season. Some of our units are still in rotation and will come down in the next 2 weeks, but, to date, the units have recorded 1,676 hours of acoustic data in subdivisions and control sites. We collected natural habitat and anthropogenic data from all landowner residences and will pair this information with that obtained from our sociological survey, which is being deployed this fall (2013). When complete, these data sources will be used to determine whether localized human behaviors have a greater impact on abundance and nest success of breeding birds than does alteration of habitat structure in exurban subdivisions.

Our preliminary data indicate that private lands are providing critical resources for large numbers of birds in the Adirondacks, given the high species richness and apparently high fledging rates we have found. This work is part of our larger Make Room for Wildlife program (http://www.wcsnorthamerica.org/tabid/3860/Default.aspx), which provides a forum through which we can share information to promote the maintenance of healthy bird populations in residential areas in the northeast and elsewhere. Understanding the relative importance of human activities and disturbances in residential areas will help us to provide recommendations for minimizing negative impacts to birds while continuing to meet their habitat needs. We are very grateful to the Nuttall Ornithological Club for supporting our work.

Photo credits: Larry Master, Leslie Karasin, Melanie McCormack, Sarah Reed, Michale Glennon.

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