ON THE IMPORTANCE OF LAKE ONTARIO WOODY, SHORELINE HABITAT TO NEOTROPICAL MIGRANT SONGBIRDS: 1993 PRELIMINARY RESULTS

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Introduction

Several studies have demonstrated concentrations of migrant songbirds in habitat adjacent to ecological barriers such as the Sahara Desert, the Gulf of Mexico and the Atlantic Ocean. Habitats in close proximity to these barriers are critical stop-over areas for migrants as they prepare for or recover from crossing them. This study is one of the first attempts to document concentrations of migrants in shoreline habitat in the Great Lakes region.

A large number of neotropical migrant landbirds must negotiate through the Great Lakes region to reach significant portions of their breeding ranges north of this area. The lakes may present significant barriers to migrants songbirds engaging in diurnal flight and feed behavior. Experienced bird watchers in the Lake Ontario region have observed concentrations of spring migrants feeding and resting in brushy and forested habitat close to the shoreline.

This two-year study is designed to systematically identify the characteristics of the most critical, wooded, stop-over habitats on the south and east shore of Lake Ontario. In addition to enhancing knowledge of migration patterns and stop-over habitat characteristics, the results of the study will be used to develop a songbird habitat conservation plan for the Lake Ontario shoreline.

Methods

Study sites were selected randomly from interpreted black-and-white aerial photographs. They were stratified into four groups by habitat type (brushy vs forested) and distance from Lake Ontario (within 1 km of the shoreline vs between 3 and 4 km of the shoreline). The four habitat/distance types are roughly equally represented: 39 brushy/shoreline, 45 forested/shoreline, 36 brushy/inland and 37 forested/inland (See attached map).

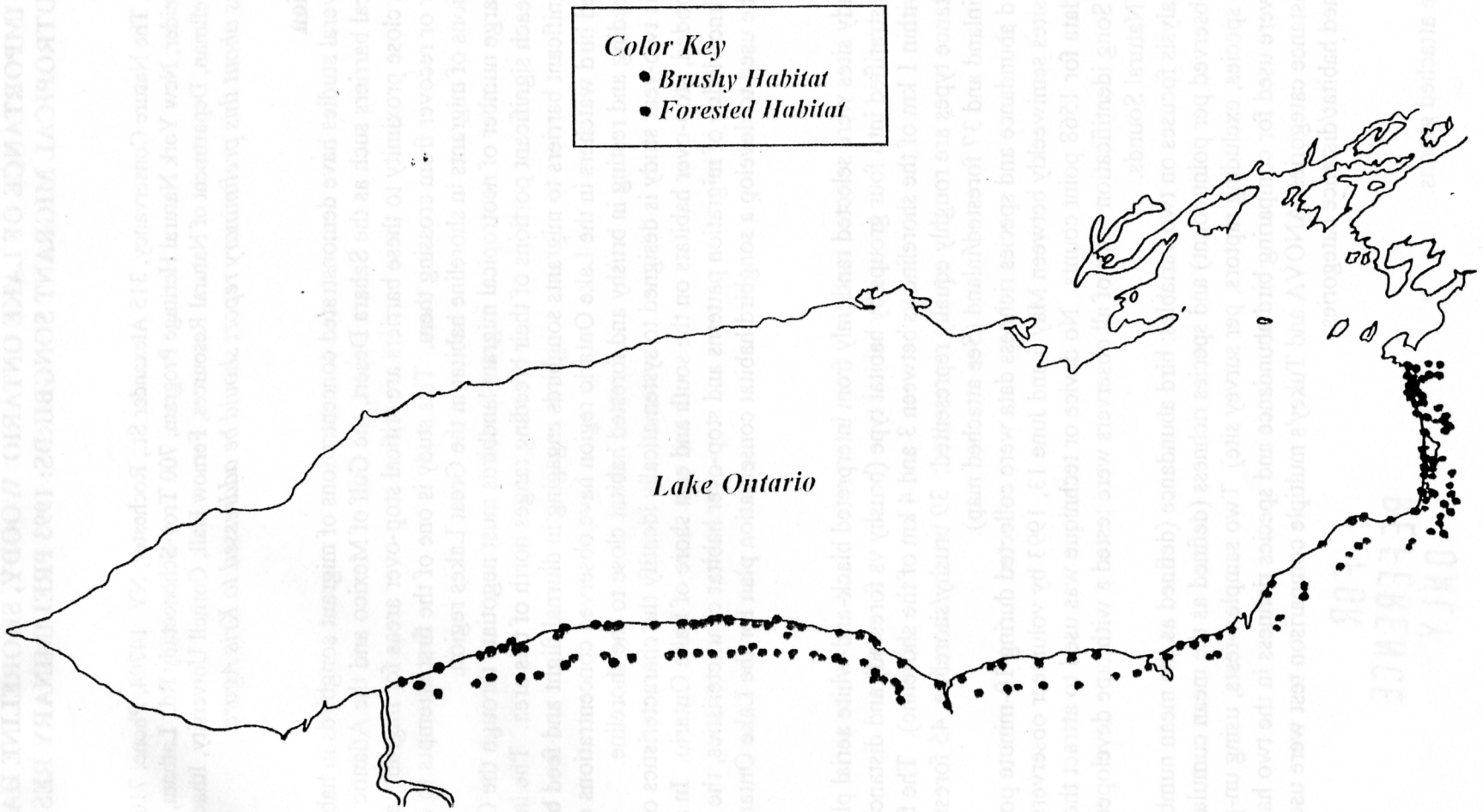
Bird abundance and species richness data were collected during 10-minute point counts at 157 study sites semiweekly between May 5 and June 13, 1993 by volunteer observers. This effort produced data for 1568 point counts. No device or technique was used to attract the birds to the observer. Song identification skills of all observers were tested a with tape developed at the Library of Natural Sounds.

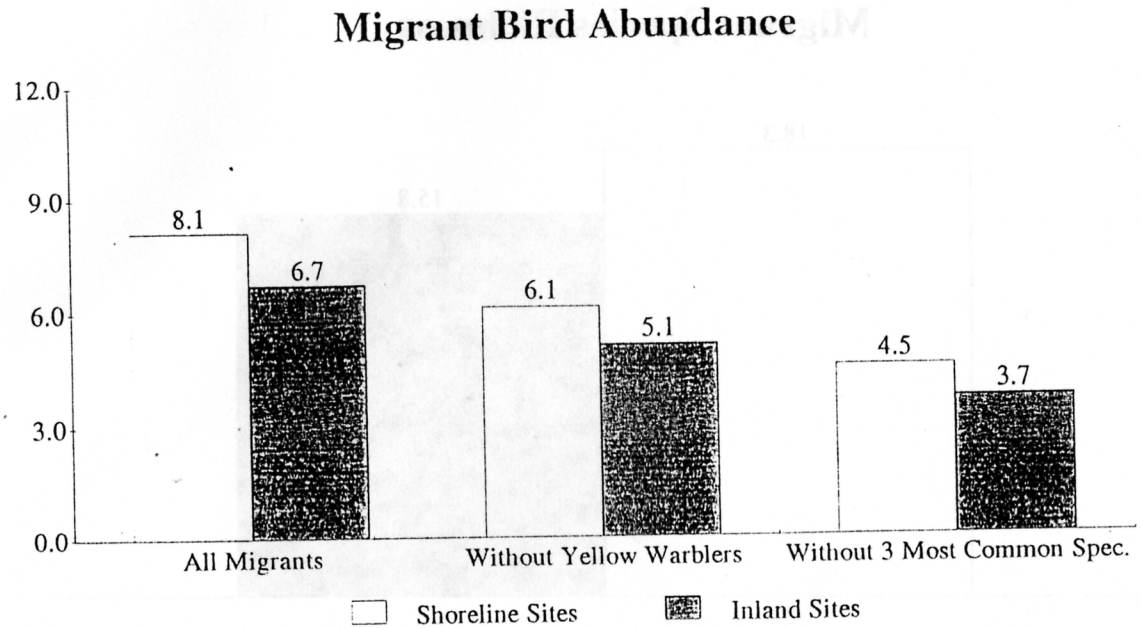
Analysis focuses on two variables: bird abundance (defined as the mean number of migrants observed per point count) and species richness (defined as the mean cumulative number of migrant species, excluding raptors, per survey site). Two sample t-tests, using un-pooled variance, were used for comparing bird abundance and species richness in the two habitat types and two distance categories. ANOVA and Tukey's multiple comparison test were used to analyze the combined habitat/distance categories.

Results

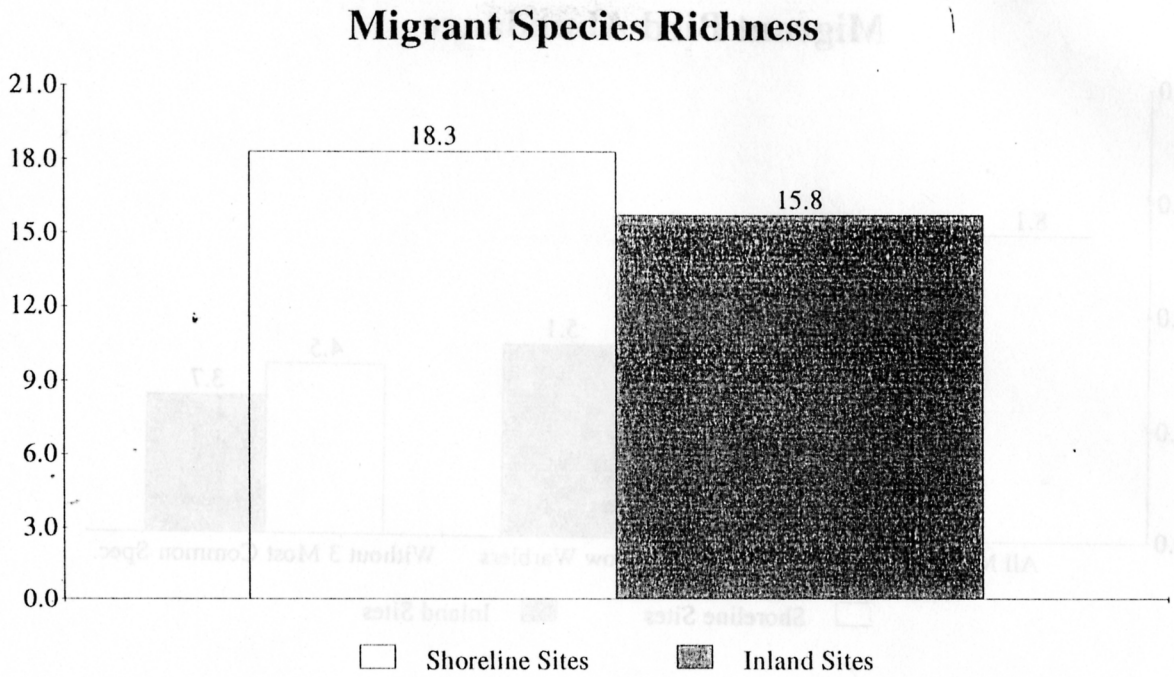
See attached graphs.

1993 Study Site Distribution

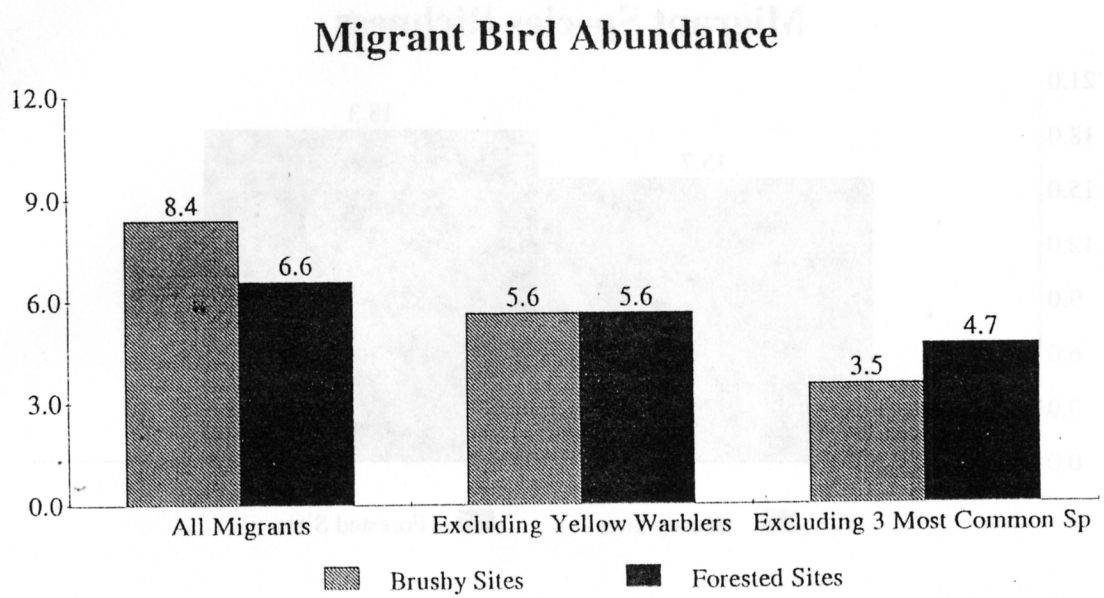




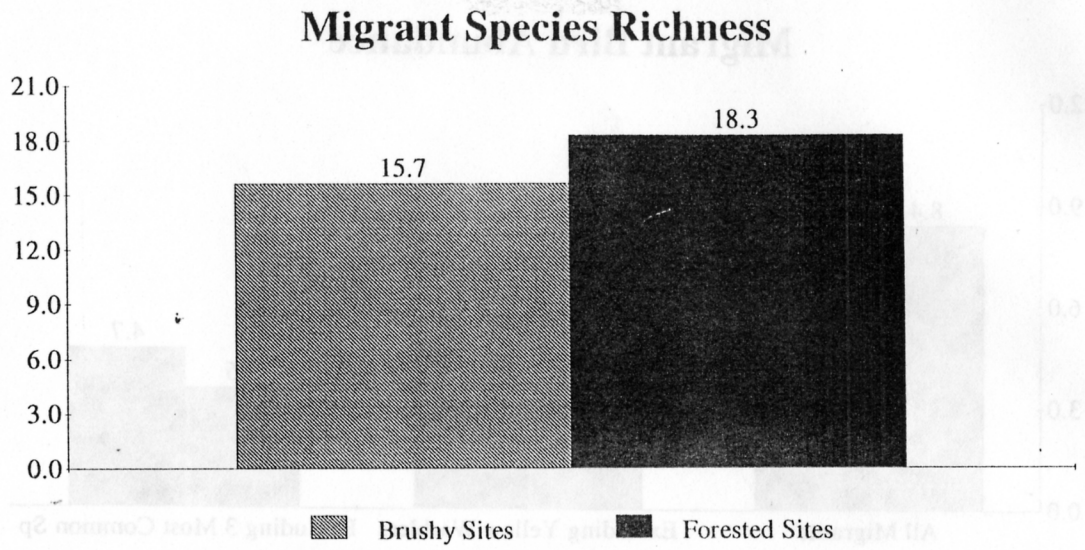
Graph 1.A To see the statistical effects of the three most common species, the analysis of bird abundance was repeated after removing Yellow Warbler (23.19% of all migrants observed), Common Yellowthroat (10.20%) and Gray Catbird (8.69%). A T-test comparison of bird abundance in shoreline versus inland sites indicates that significantly more individuals were seen at shoreline sites in all three cases ($t = 5.64$, $df = 1509$, $p < 0.0001$; $t = 4.77$, $df = 1503$, $p < 0.0001$ and $t = 4.38$, $df = 1494$ and $p < 0.0001$ respectively).



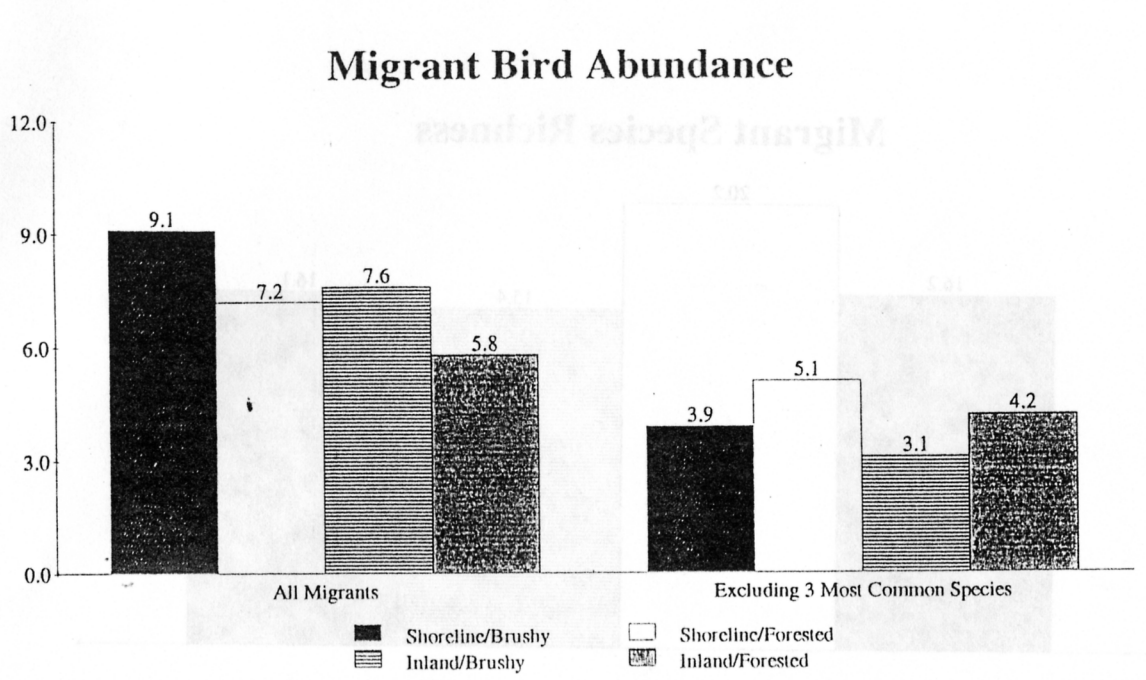
Graph 1.B A T-test comparison of the species richness at shoreline versus inland sites indicates that significantly more species were seen at shoreline sites ($t = 2.09$, $df = 139$ and $p < 0.05$).



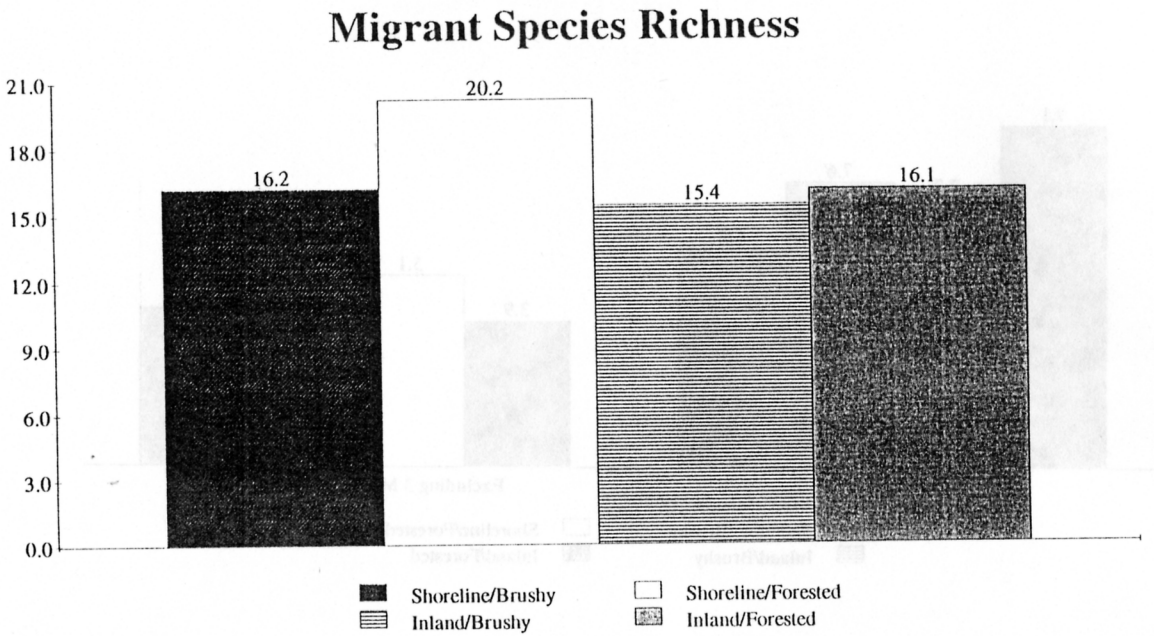
Graph 2.A A T-test comparison of bird abundance in brushy versus forested sites indicates significant differences in the first and last case only ($t = 7.29$, $df = 1546$, $p = 0.0001$; $t = -0.05$, $df = 1549$, $p = 0.96$ and $t = -6.01$, $df = 1516$, $p < 0.0001$ respectively). Note the shift in importance of habitats as common species are removed.



Graph 2.B A T-test comparison of species richness in brushy versus forested sites indicates that significantly more species were seen in forested habitat ($t = -2.91$, $df = 153$, $p < 0.005$).



Graph 3.A ANOVA on bird abundance indicates significant differences ($F = 29.21$, $p < 0.0001$, $df = 3, 1553$). Tukey's multiple comparison test revealed significant differences (all at $p < 0.01$) between all confidence intervals except between shoreline/forested versus inland/brushy. ANOVA on bird abundace excluding the three most common species indicates significant differences ($F = 17.71$, $p < 0.0001$, $df = 3, 1553$). Tükey's multiple comparison test revealed significant differences (all at $p < 0.05$ or better) between all confidence intervals except shoreline/brushy versus inland/forested.



Graph 3.B ANOVA on species richness indicates significant differences ($F = 8.42$, $p < 0.0001$, $df = 3, 151$). Tukey's multiple comparison indicates significant differences between shoreline/forested and all other distance/habitat category confidence intervals ($p < 0.01$).

Conclusions

This analysis indicates that, in all cases, sites within one kilometer of the Lake Ontario shoreline support a greater abundance and richness of migrants when compared with similar sites located between three and four kilometers inland.

Total bird abundance is highest in brushy habitat as compared to forested habitat. However, this effect seems to be caused largely by the three most common species: Yellow Warbler, Common Yellowthroat and Gray Catbird. These species all breed in brushy habitat; their abundance may be due to multiple counts of breeding individuals. When these species are removed from the data, bird abundance is higher in forested habitat. Species richness is higher in forested habitat as compared to brushy habitat.

Combined analysis of distance and habitat effects indicates that, among the four categories compared, forests within one kilometer of Lake Ontario are used by the most species. Bird abundance is concentrated in brushy shoreline areas if the common species are included; in forested shoreline areas if they are excluded.

The results of this study may have significant implications for the protection and management of woody habitat within one kilometer of Lake Ontario. Based on the data from 1993 alone, it would seem that maintaining either brushy or forested habitat within 1 kilometer of the Lake Ontario Shoreline would have a beneficial effect on migrant songbird populations. Maintining forested habitat within this 1 kilometer zone would appear to benefit the largest number of migrant species. Final results and recommendations await analysis of information gathered in 1994.

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