

Recommendations

The results of the Migrant Bird Habitat Study underscore the need for a diversity of tree species within a given park, preserve, or natural area. Specific recommendations are as follows:

- 1) **Elms** and **oaks** appear to be the most important genera for migrant birds in the Chicago area. **Trees that flower during the migration period**, especially **hawthorns**, but also including **horse chestnut, Ohio buckeye and crabapple**, are also used heavily while they are flowering.
- 2) Other trees that are used heavily enough to recommend their inclusion in planting include: **ashes, hickories, hackberry, honey locust**, and possibly sugar maple.
- 3) In natural areas management, the most important recommendation is to **reverse the maple takeover** in our natural areas by restoring woodland health so that oak reproduction can occur.
- 4) In creating or enhancing plantings for migrant habitat, plan for a **high diversity of trees**. In general, the more kinds of trees at a site, the more options that migrant birds will have in response to variable and unpredictable conditions.
- 5) **Use maples and lindens sparingly.**

Recommendations from other Great Lakes area studies that are likely also appropriate to our region and that were generally supported by our observations during the study:

- 1) **Forested riparian corridors** are important habitat for migrant birds.
- 2) As much as possible, plantings should be designed to provide different **layers of vegetation**, including a shrub layer (below 5 feet), a small tree layer (5-25 feet), and a canopy layer (25 feet +). The different layers attract a variety of species, and are used in different ways depending on weather conditions.
- 3) Birds use species most heavily when the leaves are just coming out and also use flowers (including wind-pollinated flowers). It is best to plan for a variety of species, so that a few will be in these **critical stages** in each week of the season. The period from late April through the end of May is the most important time for spring migrants.
- 4) Any **wooded area within 1 mile of the lakefront** is likely to

Migrant Bird Habitat Study Final Report

Prepared by Judy Pollock and Karen Glennemeier, Audubon Chicago Region,
and Doug Stotz, Field Museum
September 30, 2004

The Migrant Bird Habitat Study was planned by the *Urban Conservation Treaty for Migratory Birds* partners. The goal of the study was to identify tree species that are used more often than others by foraging migrant birds. Spring is a time when migrating insectivorous birds scour our area, feeding on insects that are emerging at that time. Food can be scarce, depending on weather conditions. Tree phenology varies across our region, with trees at the lakefront leafing out a week or two later than inland trees. A better understanding of how migrants are using our trees (and the insects they support) in the spring would help us to make plantings that will sustain birds during migration. We took data in both landscaped and natural settings, so that the results could inform both urban tree planting initiatives and natural areas restoration.

In 2000, the protocol was developed by a group of local scientists, including Doug Stotz of the Field Museum, Jim Steffen of the Chicago Botanic Garden, and Rickie White of Audubon. Scott Robinson (Illinois Natural History Survey) and Chris Whelan (U.S. Forest Service) were among those who contributed. The protocol was based in part on a study done by Aaron Gabbe, a graduate student of Scott Robinson's, in Southern Illinois. Suzanne Malec of the Chicago Department of the Environment also helped with the planning. The methods were field tested in the fall of 2000. A copy of the protocol is enclosed with this report.

A few minor changes were made to the protocol after analysis of our first year data and in response to comments received from Bob Russell of the U.S. Fish and Wildlife Service and Charlie Paine of Max McGraw Wildlife Foundation. The most important change was to ask monitors for specific information about the proximity to water of trees containing foraging birds.

In winter and spring of 2001, we recruited and trained 31 volunteers to conduct the study at 18 sites. Data were collected in April and May of 2001, 2002, and 2003. To increase the amount of data collected from individual sites, monitors focused in 2003 on nine of these sites that contained a large number and diversity of tree species.

Data was analyzed by Doug Stotz and Karen Glennemeier in the winter and spring of 2004, with help from Fred Ramsey, Jeff Brawn, Jim Steffen and Dave Ewert.

areas a bit later than inland areas; this timing is associated with a later leafout lakeside, presumably due to the lake breeze and lower daytime temperatures on the lakefront. Similarly, until mid-May or so there is a noticeable lag in the leafout of trees in the northern part of the Chicago area compared to the southern part. Within Chicago itself, this north to south variation seems minimal.

The Migrant Bird Habitat Study has focused on spring migration because migrants are more stressed by weather and food resources in the spring. For example, warbler migration peaks near the middle of May in the spring and in mid-September in the fall. Temperatures average about 10 degrees higher in mid-September than mid-May in Chicago. Additionally, insect populations are higher in the fall than spring, having built up over the summer.

Field Methods

Each monitor chose a route among the trees of a landscaped or natural wooded area. The major requirement in locating a transect was that it was a place where the monitors would find numerous birds and a good variety of trees. Sample locations included lakefront and inland parks and natural areas throughout the Chicago Wilderness region and included a wide distribution of the tree species naturally occurring and planted in the region (see Appendix). Transects were mapped so that they could be used in succeeding years by different volunteers. The species and size were recorded for all trees greater than 4-inches diameter at breast height (dbh), within five meters of the transect.

Data were collected by pairs of volunteers, one trained in tree identification and the other in bird identification, who walked the transect together and observed each tree in turn. A minimum of three visits were made to the sample location (late April, early May, late May) and the following information was recorded: bird species and tree species for all migrant birds observed foraging in trees, phenology of all tree species (flowering, fruiting, budding, size of leaf, etc.), weather, time spent monitoring, and general proximity to water.

Data Analysis

Data were analyzed by comparing the observed and expected frequencies with which birds were found in a particular tree species. For example, if a particular tree species constituted 10% of the summed diameter-at-breast-height (DBH) for all trees at all sites in the study, then the null hypothesis predicted that 10% of the observed birds would be seen foraging in trees of that species. Chi-squared analysis was used to determine whether deviations from the null prediction were statistically significant. Variables such as proximity to water or leaf phenology at time of sighting were considered in the interpretation of results.

Because birds' use of certain tree species tended to vary depending on the mix of tree species at a particular site, we also analyzed tree use on a site-by-site level. This analysis decreased our sample size but increased our ability to draw ecologically meaningful conclusions.

Data were also analyzed using tree abundance, rather than dbh, because of concerns that using dbh as an approximation of total leaf cover would overestimate the biomass of the

larger trees. Using tree abundance did not change the results significantly.

We also looked at tree use by individual bird species, to identify any affinity certain bird species might have for particular tree species. Our sample size was not large enough to perform this analysis at each site, so the data from all sites were combined, and we did not consider the relative abundance of tree species in determining bird affinities. This analysis is thus a coarse measure of species use.

Results and Discussion

During the three-year study we recorded the tree species in which a landbird migrant was observed for 1925 individual spring migrants. We recorded birds of 89 species in 44 species of trees at 19 sites in the Chicago region. The most abundant tree species varied with site, but overall oaks made up 33 percent of the tree sample (with red oak the most abundant species at 10 percent of the sample as measured by diameter at breast height (DBH)).

Tree species preferences of migrants

If we examine the entire data set, we had at least 40% more observations of migrants than expected based on the tree abundance in the sample for four tree species, and 2/3 or fewer observations than expected for seven species (Table 1)

Table 1. Tree species strongly over- or underutilized by birds in study, with percentage of expected.

<u>Preferentially used by migrants</u>		<u>Underutilized by migrants</u>	
Ulmus americanus	175%	Acer platanoides	14%
Acer saccharum	160%	Quercus palustris	25%
Crataegus sp.	142%	Populus deltoides	29%
Quercus macrocarpus	142%	Robinia pseudoacacia	34%
		Acer saccharinum	50%
		Tilia americana	53%
		Fraxinus pennsylvanica	66%

These overall numbers mask substantial variability among sites, years, and even periods within the year. However, the species that are underutilized by migrants are consistently underutilized across sites, years, and time of year. Exceptions to this are that Black Locust (*Robinia pseudoacacia*) appears to be used more heavily late in the season, and ashes (*Fraxinus*) seem to be variable across year, season, and site, without a clear pattern. The most consistently underutilized species were *Tilia americana* and *Acer saccharinum*.

Of the species that are preferentially used, one deserves particular comment. The preferential use of Sugar Maple (*Acer saccharum*) is due to data from one site, from where

overall were underutilized weakly. The reason for the distinctiveness of this site in the migrants' use of sugar maples is unclear.

Buckthorn greater than 4-inches DBH was rare at most sites and typically underutilized. It was abundant at one site and heavily used where it was near the water.

Tree use by individual species of migrants

There is strong variation in the tree species that different species of migrants use during migration. Much of this variation centers around oaks. A number of species use oaks much more frequently than they occur in the tree sample, and much more frequently than the average migrant. Similarly, a set of species strongly underutilizes oaks. Overall, during the study, migrants used oaks in the same proportion in which they occurred in the tree samples (33% of observations in oaks, 33% of tree DBH).

Table 2. The bird species found to use oaks most heavily. The percentage of observations in oaks, and the sample size, are given. Only species with at least 10 observations in at least one year of the study were considered.

Rose-breasted Grosbeak	83% (41)
Blackburnian Warbler	76% (31)
Bay-breasted Warbler	61% (18)
Palm Warbler	53% (77)
Baltimore Oriole	52% (44)
Blue-gray Gnatcatcher	49% (53)
Tennessee Warbler	48% (37)
Black-throated Green Warbler	47% (73)

Table 3. The species that were observed infrequently in oaks. The percentage of their observations in oaks, and their sample size, are given.

Wilson's Warbler	9% (22)
American Redstart	15% (110)
Yellow Warbler	16% (19)
Chestnut-sided Warbler	18% (98)
Magnolia Warbler	18% (94)
Canada Warbler	21% (24)
Ruby-crowned Kinglet	23% (57)
Yellow-rumped Warbler	23% (158)

Although the extent of oak use varied within

species, and no genus was used strongly disproportionately to its abundance, although none of the observations were in maples. In 2002, 43% of the observations were in maples (*Acer*), mainly sugar maples, and only 5% were in elms (*Ulmus*). But in 2003, 28% of the observations were in elms, and 14% in maples.

One of the strongest patterns noted from the Migrant Bird Habitat Study to date was a high degree of variation among sites and observation dates, in terms of which tree species are used most by migrants. This variation may be due to landscape-level influences, such as degree of fragmentation, proximity to large water bodies, or nearby traffic. Or it may be due to transect-specific factors. Certainly, weather conditions strongly affect foraging behavior. Nonetheless, we can confidently recommend that planting and maintaining a diversity of tree species and structures is the best strategy for assuring that plantings will

Recommendations

The results of the Migrant Bird Habitat Study underscore the need for a diversity of tree species within a given park, preserve, or natural area. Specific recommendations are as follows:

1. Elms and oaks appear to be the most important genera for migrant birds in the Chicago area. Trees that flower during the migration period, especially hawthorns, but also including horse chestnut, Ohio buckeye and crabapple, are also used heavily while they are flowering.
2. Other trees that are used heavily enough to recommend their inclusion in planting include: ashes, hickories, hackberry, honey locust, and possibly sugar maple.
3. In natural areas management, the most important recommendation is to reverse the maple takeover in our natural areas by restoring woodland health so that oak reproduction can occur.
4. In creating or enhancing plantings for migrant habitat, plan for a high diversity of trees. In general, the more kinds of trees at a site, the more options that migrant birds will have in response to variable and unpredictable conditions.
5. Use maples and lindens sparingly. Sugar maple is probably the best choice among the maples.

Recommendations from other Great Lakes area studies that are likely also appropriate to our region and that were generally supported by our observations during the study:

1. Forested riparian corridors are important habitat for migrant birds.
2. As much as possible, plantings should be designed to provide different layers of vegetation, including a shrub layer (below 5 feet), a small tree layer (5-25 feet), and a canopy layer (25 feet +). The different layers attract a variety of species, and are used in different ways depending on weather conditions. Having the layers in close proximity allows the birds to move between layers easily.
3. Birds use species most heavily when the leaves are just coming out and also use flowers (including wind-pollinated flowers). It is best to plan for a variety of species, so that a few will be in these critical stages in each week of the season. The period from late April through the end of May is the most important time for spring migrants.
4. Any wooded area within 1 mile of the lakefront is likely to be important for sustaining spring migrants, and riparian corridors anywhere in the Chicago Region will also likely play an important role.

References

- Ewert, D.N. and M. J. Hamas. 1995. **Ecology of Migratory Landbirds During Migration in the Midwest.** Pages 200-208 in F. R. Thompson, III, ed. Management of midwestern landscapes for the conservation of neotropical migratory birds. U.S. For. Serv., Gen. Tech. Rep. NC-187. North Central For. Exp. Sta., St. Paul, MN.
- Ewert, D. N. 2005 **Stopover Site Attributes In The Western Lake Erie Basin.** Unpubl. Report, The Nature Conservancy.
- Post, S. 2004. **Species Spotlight: Bur Oak.** INHS Reports No. 380:6.

**Tree Species that
represented more than
2% of the total DBH
for any transect.**

Acer negundo
Acer platanoides
Acer saccharinum
Acer saccharum
Aesculus glabra
Aesculus hippocastanum
Carya cordiformis
Carya ovata
Celtis occidentalis
Crataegus
Fraxinus americana
Fraxinus pennsylvanica
Ginkgo biloba
Gleditsia triacanthos
Juglans nigra
Malus
Morus alba
Platanus occidentalis
Populus deltoides
Prunus serotina
Quercus alba
Quercus bicolor
Quercus rubra
Robinia pseudoacacia
Salix
Tilia americana
Ulmus americana
Ulmus pumila
Ulmus rubra

Names of volunteer monitors:

Anne Oiler, Kathy Pingry, Jerry and Jody Zamirowski, Elizabeth Plonka, Toni Spears, Karen Lustig, Donnie Dann, Jan Underwood, June Keibler, Greg Carlson, Brad and Nancy Harris, Sigrid Schmidt, Leslie Borns, Tadas Birutis, Steve Frankel, Terry Schilling, Terry Radke, Judy Pollock, Stephen Packard, Jeff Chapman, Christine Williamson, Art Plotnik, Jerry Garden, Elizabeth DeLaBaume, Marianne Kozlowski, Marian Thill, Phillip Miler, Sue Robert, Libby Hill, Mary Ann McLean, Pat Braker, John and Dorothy Collins, Wayne Svoboda, Diane Aoki, /Cindy Schweisthal, Liz Aicher, Matthew and Veronica Cook, Robert Hughes, Rickie White, Scott Carpenter, Stan Stec, Joan Bruchman, Steve Phillips, Roger Shamley, John and Jane Balaban, Julie Sacco, Doug Stotz