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From: Derric Pennington
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To: Jim Mundy – Land Management Assistant
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Re: Final Report: November 2005

Project Title: **Land Use Effects on Avian Stopover and Breeding Habitat for Urban Riparian Areas**

Background

This report represents avian riparian surveys conducted April 4 to July 20, 2005 at Sharon Woods and Glenwood Gardens as part of an ongoing research project investigating land use effects on the stopover and breeding habitat of riparian bird communities of the Mill Creek watershed. This research differs from previous urban studies in that it examines patterns of habitat use by landbirds during the migratory and breeding season using local habitat characteristics and landscape and socioeconomic metrics across multiple spatial scales. The specific research goals are to (1) identify local habitat characteristics associated with habitat use by spring migrants and summer breeding residents, (2) identify landscape and socioeconomic metrics associated with habitat use across multiple spatial scales, (3) identify quality stopover habitats for landbird migrants in an urbanizing landscape, and (4) compare habitat use patterns between migratory and breeding season avian communities. A third year of avian surveys will be completed during the spring and summer of 2006. We plan on applying for HCPD support again for field assistants in 2006. Final analysis and project completion are expected by 2007, whereby this project will represent partial fulfillment of Derric Pennington's PhD. We anticipate peer-reviewed publications based on our work, and will acknowledge all support provided by Hamilton County Park District. We currently have one article in review to *Landscape and Urban Planning*, which was supported by a HCPD research grant in 2002.

Funding by the 2005 HCPD research grant provided support for one field assistant to conduct avian surveys within the study area. Jeff Brown, a graduate student at Miami University and expert birder, was hired to survey along Sharon Creek in Sharon Woods. He was paid \$10 an hour, and surveyed three days a week for seven weeks. Derric Pennington, who was supported by the University of Minnesota and US Environmental Protection Agency, conducted all other avian surveys.

2005 Avian Surveys

Forty-one of the 103 study plots are located on Hamilton County Park District land (19 plots in Glenwood Gardens and 22 in Sharon Woods) (Figure 1). Plots located within the parks serve as the best representation of an "undisturbed" reference condition within the study area. We used a variable circular plot method (Reynolds et al. 1980, Bibby et al. 2000), counting all birds heard

Urban Riparian Biodiversity: Cincinnati Metropolitan Study Plots



Legend

• Study Sites

0 500 1,000 2,000 3,000 4,000
Meters

Figure 1. Aerial photo of 103 study plots and political jurisdictions for avian and habitat survey in Cincinnati metro area.

or seen within a 50-meter radius. We surveyed six times during a six-week period between April and May to capture en-route migrants during the spring migratory season, and four times over six weeks during June-July to capture the breeding season. For this preliminary analysis we used all detections to provide a general overview of the riparian avian communities associated with Sharon Woods and Glenwood Gardens. This report only contains the 2005 field season data. Data from 2002, 2004 (breeding only), 2005, and 2006 will be analyzed together and presented in future reports.

Sharon Woods

For 2005, we surveyed 22 plots along Sharon Creek south of the unregulated dam, and along a tributary. We had a total of 3629 detections and 94 species for Sharon Woods. Examination based on migratory guilds for all detections resulted in 20% Neotropical migrants, 41% short-distance migrants, and 39% permanent residents. Of the 94 species surveyed, 48 were Neotropical migrants, 28 short-distance migrants, and 17 permanent residents. The ten most abundant species for the Sharon Woods survey were: American Robin, Northern Cardinal, European Starling, Carolina Chickadee, Brown-headed Cowbird, House Sparrow, Eastern-tufted Titmouse, Blue-grey Gnatcatcher, Red-bellied Woodpecker, and Carolina Wren. Species of conservation concern observed breeding were: Wood Thrush, Louisiana Waterthrush, Red-eyed Vireo, Warbling Vireo, Scarlet Tanager, Summer Tanager, Acadian Flycatcher, Eastern Wood Pee-wee, Great-crested Flycatcher, Yellow-billed Cuckoo, Gray Catbird, Pileated Woodpecker, and Cooper's Hawk. Several species of conservation concern did utilize the park during stopover, and were either en-route species or species that did not find suitable breeding habitat: American Redstart, Black-and-white Warbler, Bay-breasted Warbler, Blackpoll Warbler, Black-throated Green Warbler, Blackburnian Warbler, Canada Warbler, Cerulean Warbler, Chestnut-sided Warbler, Kentucky Warbler, Hooded Warbler, Magnolia Warbler, Northern Parula, Orange-crowned Warbler, Ovenbird, Worm-eating Warbler, Rose-breasted Grosbeak, Least Flycatcher, Blue-headed Vireo, Eastern Kingbird, Veery, Winter Wren, Yellow Warbler, and Yellow-throated Warbler. A complete species list for Sharon Woods can be found in Table 1.

Glenwood Gardens

For 2005, we surveyed 19 plots along West Fork Mill Creek south of the regulated dam for the reservoir. We had a total of 2991 detections and 93 species for Glenwood Gardens. Breakdown of detections based on migratory guilds resulted in 21% Neotropical migrants, 42% short-distance migrants, and 37% permanent residents. Of the 93 species surveyed, 49 were Neotropical migrants, 29 short-distance migrants, and 15 permanent residents. The ten most abundant species for the Glenwood Gardens survey were: Northern Cardinal, American Robin, Brown-headed Cowbird, Red-winged Blackbird, European Starling, Song Sparrow, American Goldfinch, Carolina Chickadee, Blue-gray Gnatcatcher, and Cedar Waxwing. Species of conservation concern observed breeding were: Brown Thrasher, Common Yellowthroat, Yellow-throated Warbler, Red-eyed Vireo, Warbling Vireo, Eastern Wood Pee-wee, Eastern Kingbird, Orchard Oriole, Great-crested Flycatcher, Yellow-billed Cuckoo, Gray Catbird, Pileated Woodpecker, and Field Sparrow. Species of conservation concern that did not breed but utilized the park during stopover were: Solitary Sandpiper, Acadian Flycatcher, Alder Flycatcher, Least Flycatcher, American Redstart, Black-and-white Warbler, Bay-breasted Warbler, Blackpoll Warbler, Black-throated Green Warbler, Blackburnian Warbler, Cerulean Warbler, Chestnut-sided Warbler, Magnolia Warbler, Northern Parula, Orange-crowned Warbler, Ovenbird, Yellow

Warbler, Louisiana Waterthrush, Yellow-breasted Chat, Hermit Thrush, Wood Thrush, Bobolink, Veery, Winter Wren, and Eastern Meadowlark. All species observed for Glenwood Gardens can be located in Table 2.

Seasonal habitat use

Seasonal differences in the avian community were noticeable between April-May and June-July surveys. In general, the presence of Neotropical migrants peaked in mid-May (Figure 2, e.g. Glenwood Gardens, similar results were found for Sharon Woods). The rise and fall shown for Neotropical migrants in late April and towards the end of May represented the peak time period for migrating en-route individuals. Southwest Ohio is located along a heavily traveled migratory route for long-distance migrating birds en-route to summer breeding territories. Both parks appeared to be valuable stopover habitat for migrants during this period. Earlier results suggest that the percentage of tree cover and native vegetation surrounding a stream is important predictors of Neotropical migrant presence (Pennington 2002). Further analyses will investigate the role of urban parks compared with other land uses of riparian areas within the study area.

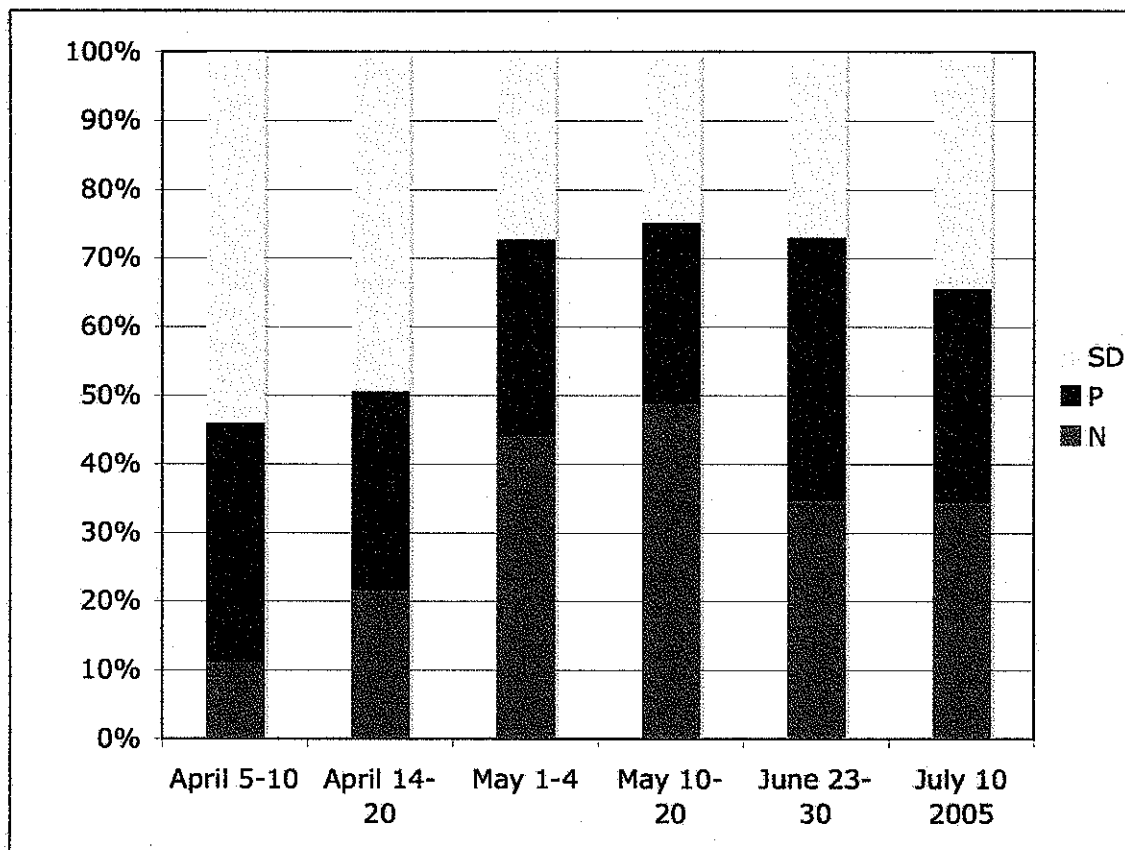


Figure 1. Temporal comparison of the percentage each migratory guild contributed to the total species detected for Glenwood Gardens across surveys April – July 2005 (N = Neotropical migrant, SD = Short-distance migrant, and P = Permanent resident).

Discussion and Conclusions

It should be noted that the results presented here are preliminary with more intense and in-depth analyses to be carried out in the future. Given we only report results for one season, the general

patterns observed for species composition are quite similar to previous years, as well as, other avian studies of urban environments. Overall, both Sharon Woods and Glenwood Gardens represent valuable areas of habitat for numerous avian species within the Mill Creek watershed. Both parks surpassed our expectations for the number of species surveyed, especially during the breeding season. There were noticeable differences in the riparian avian communities between both parks. In general, Sharon Woods contained more forest-dwelling species and Glenwood Gardens more species preferring open-shrubby habitat. For both parks, development-sensitive species were found further away from areas of high levels of human activities during the breeding season. For Sharon Woods, areas within the Nature Preserve contained the most species of conservation concern. Glenwood Garden's long association with agriculture and sewer infrastructure, along with the highly disturbed flood regime induced by West Fork Mill Creek Dam, has impacted the amount of riparian forests and quality of native vegetation. However, the park has little human activity near riparian areas and management practices limiting development and restoring native vegetation should continue to promote a diverse avian community throughout the park's riparian areas. Of note, since the 2002 surveys, the number of nesting Common Yellowthroats has dropped during the 2004 and 2005 surveys for plots near the new maintenance structures, which are within 200 meters of the stream. We would like to stress caution with regards to further development near the stream in the future.

During migration, both parks displayed a diverse assemblage of Neotropical migrants (Table 1 and 2). Assessing habitat quality for species during migration is very difficult, given the high variability of stopover duration. We believe our methods of visiting plots once per week provided an accurate estimate of community composition. High numbers of individuals for several migrating species suggested that both parks were potentially important stopover areas in 2005. Some en-route migrants were quite abundant, such as, Tennessee Warbler, Nashville Warbler, and Blackpoll Warbler; other species were not so frequent, but are rare even in more natural areas: Cerulean Warbler, Worm-eating Warbler, Orange-crowned Warbler, and Canada Warbler. As areas within Mill Creek watershed continue to develop, the value of urban parks will only increase. Migrating birds searching for places to land and refuel while en-route to their breeding grounds may be increasingly dependent on these "green oases". Final results from this study hope to elucidate potential mechanisms influencing where migrants stopover within metropolitan areas.

We look forward to continue working with the Hamilton County Park District in the future and thank you for all your support.

Sincerely,

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Table 1. Species list for birds surveyed from April – July 2005 along Sharon Creek in Sharon Woods. N = native, E = exotic, RNM = resident Neotropical migrant, ENM = en-route Neotropical migrant, SD = short-distance migrant, and P = permanent resident (Ehrlich et al. 1988, Peterjohn and Sauer 1993, Keller et al. 1999).

Common name	Scientific name	Origin	Migratory guild
great blue heron	<i>Ardea herodias</i>	N	SD
Canada goose	<i>Branta canadensis</i>	N	SD
wood duck	<i>Aix sponsa</i>	N	RNM
mallard	<i>Anas platyrhynchos</i>	N	SD
Cooper's hawk	<i>Accipiter cooperii</i>	N	SD
red-tailed hawk	<i>Buteo jamaicensis</i>	N	SD
Solitary sandpiper	<i>Tringa solitaria</i>	N	SD
Spotted sandpiper	<i>Actitis macularius</i>	N	SD
mourning dove	<i>Zenaida macroura</i>	N	SD
yellow-billed cuckoo	<i>Coccyzus americanus</i>	N	RNM
chimney swift	<i>Chaetura pelagica</i>	N	RNM
belted kingfisher	<i>Ceryle alcyon</i>	N	SD
red-bellied woodpecker	<i>Melanerpes carolinus</i>	N	P
downy woodpecker	<i>Picoides pubescens</i>	N	P
hairy woodpecker	<i>Picoides villosus</i>	N	P
Northern flicker	<i>Colaptes auratus</i>	N	SD
pileated woodpecker	<i>Dryocopus pileatus</i>	N	P
Eastern wood-pewee	<i>Contopus virens</i>	N	RNM
Acadian flycatcher	<i>Empidonax virescens</i>	N	RNM
Least flycatcher	<i>Empidonax minimus</i>	N	ENM
Eastern phoebe	<i>Sayornis phoebe</i>	N	SD
great crested flycatcher	<i>Myiarchus crinitus</i>	N	RNM
Eastern kingbird	<i>Tyrannus tyrannus</i>	N	RNM
Blue-headed vireo	<i>Vireo solitarius</i>	N	RNM
warbling vireo	<i>Vireo gilvus</i>	N	RNM
red-eyed vireo	<i>Vireo olivaceus</i>	N	RNM
blue jay	<i>Cyanocitta cristata</i>	N	SD
American crow	<i>Corvus brachyrhynchos</i>	N	SD
tree swallow	<i>Tachycineta bicolor</i>	N	RNM
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	N	RNM
Carolina chickadee	<i>Poecile carolinensis</i>	N	P
tufted titmouse	<i>Baeolophus bicolor</i>	N	P
white-breasted nuthatch	<i>Sitta carolinensis</i>	N	P
brown creeper	<i>Certhia americana</i>	N	SD
Carolina wren	<i>Thryothorus ludovicianus</i>	N	P

house wren	<i>Troglodytes aedon</i>	N	RNM
winter wren	<i>Troglodytes troglodytes</i>	N	SD
golden-crowned kinglet	<i>Regulus satrapa</i>	N	SD
ruby-crowned kinglet	<i>Regulus calendula</i>	N	SD
blue-gray gnatcatcher	<i>Poliottila caerulea</i>	N	RNM
Eastern bluebird	<i>Sialia sialis</i>	N	SD
Veery	<i>Catharus fuscescens</i>	N	ENM
Swainson's thrush	<i>Catharus ustulatus</i>	N	ENM
Gray-cheeked thrush	<i>Catharus minimus</i>	N	ENM
Wood thrush	<i>Hylocichla mustelina</i>	N	RNM
American robin	<i>Turdus migratorius</i>	N	SD
Brown thrasher	<i>Toxostoma rufum</i>	N	SD
gray catbird	<i>Dumetella carolinensis</i>	N	RNM
Northern mockingbird	<i>Mimus polyglottos</i>	N	P
European starling	<i>Sturnus vulgaris</i>	Ex	SD
cedar waxwing	<i>Bombycilla cedrorum</i>	N	SD
Tennessee warbler	<i>Vermivora peregrina</i>	N	ENM
Nashville warbler	<i>Vermivora ruficapilla</i>	N	ENM
Northern parula	<i>Parula americana</i>	N	ENM
yellow warbler	<i>Dendroica petechia</i>	N	RNM
chestnut-sided warbler	<i>Dendroica pensylvanica</i>	N	ENM
magnolia warbler	<i>Dendroica magnolia</i>	N	ENM
Orange-crowned warbler	<i>Vermivora celata</i>	N	ENM
black-throated blue warbler	<i>Dendroica caerulescens</i>	N	ENM
yellow-rumped warbler	<i>Dendroica coronata</i>	N	SD
black-throated green warbler	<i>Dendroica virens</i>	N	ENM
blackburnian warbler	<i>Dendroica fusca</i>	N	ENM
yellow-throated warbler	<i>Dendroica dominica</i>	N	ENM
palm warbler	<i>Dendroica palmarum</i>	N	ENM
bay-breasted warbler	<i>Dendroica castanea</i>	N	ENM
blackpoll warbler	<i>Dendroica striata</i>	N	ENM
black and white warbler	<i>Mniotilta varia</i>	N	ENM
American redstart	<i>Setophaga ruticilla</i>	N	RNM
prothonotary warbler	<i>Protonotaria citrea</i>	N	ENM
ovenbird	<i>Seiurus aurocapilla</i>	N	RNM
Louisiana waterthrush	<i>Seiurus motacilla</i>	N	RNM
Kentucky warbler	<i>Oporornis formosus</i>	N	RNM
common yellowthroat	<i>Geothlypis trichas</i>	N	RNM
Worm-eating warbler	<i>Helmitheros vermivorum</i>	N	RNM
summer tanager	<i>Piranga rubra</i>	N	RNM
scarlet tanager	<i>Piranga olivacea</i>	N	RNM

Eastern towhee	<i>Pipilo erythrophthalmus</i>	N	SD
field sparrow	<i>Spizella pusilla</i>	N	SD
song sparrow	<i>Melospiza melodia</i>	N	SD
white-throated sparrow	<i>Zonotrichia albicollis</i>	N	SD
Northern cardinal	<i>Cardinalis cardinalis</i>	N	P
rose-breasted grosbeak	<i>Phœnicurus ludovicianus</i>	N	ENM
indigo bunting	<i>Passerina cyanea</i>	N	RNM
red-winged blackbird	<i>Agelaius phoeniceus</i>	N	SD
common grackle	<i>Quiscalus quiscula</i>	N	SD
brown-headed cowbird	<i>Molothrus ater</i>	N	SD
Baltimore oriole	<i>Icterus galbula</i>	N	RNM
house finch	<i>Carpodacus mexicanus</i>	N	SD
American goldfinch	<i>Carduelis tristis</i>	N	SD
house sparrow	<i>Passer domesticus</i>	Ex	P

Table 2. Species list for birds surveyed from April – July 2005 along West Fork Mill Creek in Glenwood Gardens. N = native, E = exotic, RNM = resident Neotropical migrant, ENM = en-route Neotropical migrant, SD = short-distance migrant, and P = permanent resident (Ehrlich et al. 1988, Peterjohn and Sauer 1993, Keller et al. 1999).

Common name	Scientific name	Origin	Migratory guild
great blue heron	<i>Ardea herodias</i>	N	SD
turkey vulture	<i>Cathartes aura</i>	N	SD
Canada goose	<i>Branta canadensis</i>	N	SD
wood duck	<i>Aix sponsa</i>	N	RNM
mallard	<i>Anas platyrhynchos</i>	N	SD
Northern harrier	<i>Circus cyaneus</i>	N	SD
red-tailed hawk	<i>Buteo jamaicensis</i>	N	SD
Solitary Sandpiper	<i>Tringa solitaria</i>	N	SD
mourning dove	<i>Zenaida macroura</i>	N	SD
yellow-billed cuckoo	<i>Coccyzus americanus</i>	N	RNM
chimney swift	<i>Chaetura pelagica</i>	N	RNM
belted kingfisher	<i>Ceryle alcyon</i>	N	SD
red-bellied woodpecker	<i>Melanerpes carolinus</i>	N	P
downy woodpecker	<i>Picoides pubescens</i>	N	P
hairy woodpecker	<i>Picoides villosus</i>	N	P
Northern flicker	<i>Colaptes auratus</i>	N	SD
pileated woodpecker	<i>Dryocopus pileatus</i>	N	P
Eastern wood-pewee	<i>Contopus virens</i>	N	RNM
Acadian flycatcher	<i>Empidonax virescens</i>	N	RNM
Least flycatcher	<i>Empidonax minimus</i>	N	ENM
Alder flycatcher	<i>Empidonax alnorum</i>	N	ENM
Eastern phoebe	<i>Sayornis phoebe</i>	N	SD
great crested flycatcher	<i>Myiarchus crinitus</i>	N	RNM
Eastern kingbird	<i>Tyrannus tyrannus</i>	N	RNM
warbling vireo	<i>Vireo gilvus</i>	N	RNM
White-eyed vireo	<i>Vireo griseus</i>	N	ENM
red-eyed vireo	<i>Vireo olivaceus</i>	N	RNM
blue jay	<i>Cyanocitta cristata</i>	N	SD
American crow	<i>Corvus brachyrhynchos</i>	N	SD
tree swallow	<i>Tachycineta bicolor</i>	N	RNM
Northern rough-winged swallow	<i>Steigodopteryx serripennis</i>	N	RNM
barn swallow	<i>Hirundo rustica</i>	N	RNM
Carolina chickadee	<i>Poecile carolinensis</i>	N	P
tufted titmouse	<i>Baeolophus bicolor</i>	N	P
white-breasted nuthatch	<i>Sitta carolinensis</i>	N	P

brown creeper	<i>Certhia americana</i>	N	SD
Carolina wren	<i>Thryothorus ludovicianus</i>	N	P
house wren	<i>Troglodytes aedon</i>	N	RNM
winter wren	<i>Troglodytes troglodytes</i>	N	SD
golden-crowned kinglet	<i>Regulus satrapa</i>	N	SD
ruby-crowned kinglet	<i>Regulus calendula</i>	N	SD
blue-gray gnatcatcher	<i>Polioptila caerulea</i>	N	RNM
Eastern bluebird	<i>Sialia sialis</i>	N	SD
Veery	<i>Catharus fuscescens</i>	N	ENM
Swainson's thrush	<i>Catharus ustulatus</i>	N	ENM
hermit thrush	<i>Catharus guttatus</i>	N	SD
wood thrush	<i>Hylocichla mustelina</i>	N	RNM
American robin	<i>Turdus migratorius</i>	N	SD
gray catbird	<i>Dumetella carolinensis</i>	N	RNM
Northern mockingbird	<i>Mimus polyglottos</i>	N	P
brown thrasher	<i>Toxostoma rufum</i>	N	SD
European starling	<i>Sturnus vulgaris</i>	Ex	SD
cedar waxwing	<i>Bombycilla cedrorum</i>	N	SD
Tennessee warbler	<i>Vermivora peregrina</i>	N	ENM
Nashville warbler	<i>Vermivora ruficapilla</i>	N	ENM
Northern parula	<i>Parula americana</i>	N	ENM
yellow warbler	<i>Dendroica petechia</i>	N	RNM
chestnut-sided warbler	<i>Dendroica pensylvanica</i>	N	ENM
magnolia warbler	<i>Dendroica magnolia</i>	N	ENM
yellow-rumped warbler	<i>Dendroica coronata</i>	N	SD
black-throated green warbler	<i>Dendroica virens</i>	N	ENM
blackburnian warbler	<i>Dendroica fusca</i>	N	ENM
yellow-throated warbler	<i>Dendroica dominica</i>	N	ENM
palm warbler	<i>Dendroica palmarum</i>	N	ENM
blackpoll warbler	<i>Dendroica striata</i>	N	ENM
black and white warbler	<i>Mniotilta varia</i>	N	ENM
American redstart	<i>Setophaga ruticilla</i>	N	RNM
ovenbird	<i>Seiurus aurocapilla</i>	N	RNM
Northern waterthrush	<i>Seiurus noveboracensis</i>	N	ENM
Louisiana waterthrush	<i>Seiurus motacilla</i>	N	RNM
common yellowthroat	<i>Geothlypis trichas</i>	N	RNM
yellow-breasted chat	<i>Icteria virens</i>	N	RNM
scarlet tanager	<i>Piranga olivacea</i>	N	RNM
Eastern towhee	<i>Pipilo erythrophthalmus</i>	N	SD
field sparrow	<i>Spizella pusilla</i>	N	SD
song sparrow	<i>Melospiza melodia</i>	N	SD

white-throated sparrow	<i>Zonotrichia albicollis</i>	N	SD
Northern cardinal	<i>Cardinalis cardinalis</i>	N	P
indigo bunting	<i>Passerina cyanea</i>	N	RNM
red-winged blackbird	<i>Agelaius phoeniceus</i>	N	SD
Bobolink	<i>Dolichonyx orzivorus</i>	N	SD
Eastern meadowlark	<i>Sturnella magna</i>	N	RNM
common grackle	<i>Quiscalus quiscula</i>	N	SD
brown-headed cowbird	<i>Molothrus ater</i>	N	SD
orchard oriole	<i>Icterus spurius</i>	N	RNM
Baltimore oriole	<i>Icterus galbula</i>	N	RNM
house finch	<i>Carpodacus mexicanus</i>	N	SD
American goldfinch	<i>Carduelis tristis</i>	N	SD
house sparrow	<i>Passer domesticus</i>	Ex	P

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