Bird and Arthropod Surveys at Embarras River Bottoms State Habitat Area, Illinois

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Background

Embarras River Bottoms State Habitat Area (ERBSHA) is an approximately 930 ha site located southeast of Lawrenceville, Illinois. In 2011, the site was transferred to the state of Illinois as a result of a settlement related to contamination from the former Indian Refinery in Lawenceville, Illinois. Since that time, the Illinois Department of Natural Resources (IDNR) and Illinois Environmental Protection Agency (IEPA) has implemented restoration and management activities at the site, which contains a mix of forests, grasslands, shrublands, and both herbaceous and forested wetlands. Starting in 2014, the Illinois Natural History Survey began conducting surveys on a variety of taxa at ERBSHA in an effort to provide baseline information for monitoring populations of conservation priority species as this site continues to be restored. This report includes information on bird and arthropod surveys conducted at ERBSHA in 2014 and 2015.

Methods

We conducted bird and arthropod surveys at 11 pre-determined points within ERBSHA (Figure 1) in the summer of 2014. We also attempted to collect bird and arthropod data at the same points in 2015, but were unable to complete sampling due to significant flooding. We used standardized methods that we employ with the Critical Trends Assessment Program (CTAP) in Illinois, where we sample 90 randomly selected sites throughout the state each year, including 30 sites classified as forests, grasslands, and wetlands. For our bird sampling, these methods include conducting point-count surveys during the breeding season (May, June, and July), and for terrestrial arthropods we conduct sweep-netting transects. The point-count surveys are each 10 minutes in duration, where the observer records all birds seen or heard within an unlimited radius. For each individual bird observed, the observer records the bird species identity, the minute of the survey on which the individual was first detected, the sex and/or age of the individual (if this can be determined), the method of detection (i.e., what combination of visual, song, and call was used to detect the individual), as well as the distance of the bird from the observer. Bird surveys are not conducted during high winds or rain.

Our methods for sampling arthropods consist of two parallel transects at each point, each approximately 40-50 m in length. We sample understory arthropods on each transect using a sweep net, and each transect consists of 100 sweeps. After the sweeps on each transect are completed, arthropods are prevented from escaping from the net by cinching it closed, and the contents of the net are placed into a Photo Tactic Utility Insect Extractor (PTUIE). The PTUIE is a dark container with a single opening through which light can enter. A bottle is placed at the single opening, and a whirl-pack bag containing 70% ethyl alcohol is attached to the bottom of the bottle. After the contents from a sweep-netting transect are placed into the PTUIE, it is placed on a level surface for at least 30 minutes; during this time, the arthropods move toward the light of the single opening and fall into the preservative. This standardized approach is intended to separate arthropods from the debris that is commonly captured by sweep nets during sampling. Importantly, the sweep-net sampling approach is intended to focus on understory dwelling arthropods, and therefore undersamples other groups such as terrestrial, bark-dwelling, or canopy arthropods. Each sample is returned to the lab where arthropods are identified and enumerated with the aid of a dissecting scope.

Results

We classified four of the sample points as forests, and the remaining seven as early successional and consisting of both herbaceous and woody vegetation (i.e., shrublands). Despite multiple attempts, we were unable to complete bird sampling during the 2015 breeding season as significant flooding made the sample points inaccessible. We observed 37 different bird species using the sample points at ERBSHA in 2014, including 11 that are considered Species in Greatest Conservation Need in the Illinois Wildlife Action Plan (Table 1). The majority of these species were likely breeding ERBSHA, although four species (Bald Eagle, Chimney Swift, Great Blue Heron, Turkey Vulture) were observed using the area but likely not breeding in the immediate vicinity. These species may be breeding elsewhere at ERBSHA, or perhaps just using the site for foraging.

Points located in forests contained a number of fairly common breeding species, including non-migratory species such as Red-bellied Woodpeckers, Carolina Chickadees, White-breasted Nuthatches, and Tufted Titmice, and migratory species such as Northern Parula, Eastern Wood-Pewee, Blue-gray Gnatcatcher, Red-eyed Vireo, Northern Cardinal, and Indigo Bunting (Table 1). Importantly, these areas also included a number of conservation priority species, including Prothonotary Warblers, Acadian Flycatchers, and Yellow-billed Cuckoos.

Shrubland points included a number of reasonably common short- or long-distance migrants with fairly generalized habitat requirements, including Red-winged Blackbirds, Northern Cardinals, Song Sparrows, Indigo Buntings, and Common Yellowthroats (Table 1). These points also included one resident species of conservation concern, Northern Bobwhite, and numerous conservation-priority migrants: Dickcissel, Yellow-breasted Chats, Field Sparrows, Eastern Towhees, Bell's Vireos, and Yellow-billed Cuckoos (Table 1).

Our arthropod samples included representatives of 10 different orders (Table 2). As with bird sampling, significant flooding prevented full sampling in 2015, so these results are restricted to 2014 data. The most common insects in the samples included various species of flies (Diptera) and beetles (Coleoptera), as well as common representation of leafhoppers (Homoptera), true bugs (Hemiptera), wasps (Hymenoptera; some ants and bees as well), and grasshoppers (Orthoptera). Many samples also included caterpillars (Lepidoptera) and spiders (Araneae); dragonflies/damselflies (Odonata) and mantids (Mantodea) were infrequently included in samples.

Conclusions

Our results provide baseline data that suggest ERBSHA is providing suitable habitat for a number of conservation-priority bird species. We observed a total of 11 bird species that are listed as Species in Greatest Need of Conservation in the Illinois Wildlife Action Plan, including species inhabiting both forested and early successional habitats. Four of these species were quite common: Acadian Flycatcher, Dickcissel, Field Sparrow, and Yellow-breasted Chat. Three of

these species (all except Acadian Flycatcher) are dependent on early successional habitats. Accordingly, the abundance of these species is likely to remain high as long as restoration efforts are providing newly created habitats; over time, these species are likely to decline as succession proceeds and forested areas become more common. Acadian Flycatchers, Prothonotary Warblers, and Yellow-billed Cuckoos are likely to become more common as succession proceeds.

Although few definitive conclusions can be made based on the arthropod samples, these data do provide a useful baseline for future investigations and for comparison with comparable samples (e.g., CTAP data). Global concerns about declines in insect populations make these data important for such future comparisons. These arthropod and bird data from ERBSHA will serve as a useful baseline for assessment of restoration success as management efforts continue

Figure 1. Location of points sampled for birds and insects at Embarras River Bottoms State Habitat Area, Illinois.

Table 1. Bird species recorded during point counts at Embarras River Bottoms State Habitat Area, including the percent of points each species was observed at, and the density of birds (standard error [SE]) based on data collected within a 100-m radius at each point. Species that are recognized as in Species in Greatest Conservation Need by the Illinois Wildlife Action Plan are annotated in bold, and species without density estimates are those observed at points but outside of a 100-m radius.

Common name	Scientific name	% of points	Density (birds/ha)	SE
Acadian Flycatcher	***Empidonax virescens***	**45%**	**0.23**	**0.11**
American Crow	*Corvus brachyrhynchos*	36%	0.06	0.04
American Goldfinch	*Spinus tristis*	36%	0.14	0.07
Bald Eagle	***Haliaeetus leucocephalus***	**9%**	**--**	**--**
Bell's Vireo	***Vireo bellii***	**18%**	**0.03**	**0.03**
Blue-gray Gnatcatcher	*Polioptila caerulea*	18%	0.09	0.06
Brown-headed Cowbird	*Molothrus ater*	9%	0.03	0.03
Blue Jay	*Cyanocitta cristata*	9%	--	--
Carolina Chickadee	*Poecile carolinensis*	18%	0.09	0.06
Carolina Wren	*Thryothorus ludovicianus*	36%	0.12	0.06
Chimney Swift	***Chaetura pelagica***	**9%**	**--**	**--**
Common Yellowthroat	*Geothlypis trichas*	45%	0.46	0.17
Dickcissel	***Spiza americana***	**36%**	**0.35**	**0.16**
Downy Woodpecker	*Picoides pubescens*	18%	0.03	0.03
Eastern Towhee	***Pipilo erythrophthalmus***	**27%**	**0.06**	**0.04**
Eastern Wood-Pewee	*Contopus virens*	18%	0.03	0.03
Field Sparrow	***Spizella pusilla***	**73%**	**0.38**	**0.11**
Great Blue Heron	*Ardea herodias*	9%	--	--
Gray Catbird	*Dumatella carolinensis*	9%	0.03	0.03
Green Heron	*Butorides virescens*	9%	0.03	0.03
Indigo Bunting	*Passerina cyanea*	82%	0.55	0.11
Killdeer	*Charadrius vociferus*	9%	0.03	0.03
Mourning Dove	*Zenaida macroura*	45%	0.14	0.05
Northern Bobwhite	***Colinus virginianus***	**9%**	**0.03**	**0.03**
Northern Cardinal	*Cardinalis cardinalis*	73%	0.29	0.08
Northern Parula	*Setophaga americana*	27%	0.12	0.06
Prothonotary Warbler	***Protonotaria citrea***	**18%**	**0.09**	**0.06**
Red-bellied Woodpecker	*Melanerpes carolinus*	36%	0.14	0.07
Red-eyed Vireo	*Vireo olivaceus*	36%	0.09	0.04
Red-winged Blackbird	*Agelaius phoeniceus*	45%	0.41	0.20
Song Sparrow	*Melospiza melodia*	18%	0.09	0.06
Tufted Titmouse	*Baeolophus bicolor*	27%	0.20	0.11
Turkey Vulture	*Cathartes aura*	9%	--	--
Warbling Vireo	*Vireo gilvus*	18%	0.06	0.04
White-breasted Nuthatch	*Sitta carolinensis*	18%	0.09	0.06
Yellow-billed Cuckoo	***Coccyzus americanus***	**36%**	**0.09**	**0.06**
Yellow-breasted Chat	***Icteria virens***	**55%**	**0.32**	**0.11**

Table 2. Frequency of occurrence, average number of individuals per sample, and the standard error of this abundance estimate (SE) for arthropod orders collected using sweep-net sampling in Embarras River Bottoms State Habitat Area, Illinois.

Order	% of samples	Average abundance (per sample)	SE
Araneae	82%	4.68	1.06
Coleoptera	100%	8.41	1.87
Diptera	95%	22.73	3.75
Hemiptera	77%	4.55	1.10
Homoptera	91%	5.05	1.36
Hymenoptera	77%	2.82	0.62
Lepidoptera	55%	1.73	0.61
Mantodea	5%	0.05	0.05
Odonata	9%	0.18	0.14
Orthoptera	82%	3.14	0.96