Breeding Bird Survey of the Delair Division of the Mark Twain National Wildlife Refuge, Annada District

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ABSTRACT: Breeding birds were inventoried using the point count method during the peak breeding season on the Delair Division of the Mark Twain National Wildlife Refuge, Annada District. No survey of breeding birds had yet been done, and these data were needed to guide management decisions for the future. Each of the nine transects, which covered all habitat types on the 1,737 acre, were surveyed four times. A total of 82 species were recorded for the area. The habitat types were categorized as bottomland hardwoods, agriculture, grasslands, wetlands and scrub/shrub. Ten species of concern were found on the area including the Yellow-billed Cuckoo, Black-billed Cuckoo, Wood Thrush, Prothonotary Warbler, Hooded Warbler, Dickcissel, Grasshopper Sparrow, Bobolink and Yellow-breasted Chat.

Introduction:

The Delair Division of the Mark Twain National Wildlife Refuge was purchased in 1965 and 1976 as a wildlife sanctuary with no public access. Prior to the purchase by the U.S. Fish and Wildlife Service, the area was operated as a private hunting club. Ditches and levees were constructed to manipulate water levels in order to farm the area and provide waterfowl habitat during the fall migration.

The 1,737 acre area is located just south of Pike Station, in Pike County, Illinois, adjacent to Pool No. 24 on the Mississippi River. The division is bordered on the west be the Mississippi River, by the Sny levee on the east and by private land on the north and extreme south borders (Fig. 1).

The area has been managed primarily as a migratory waterfowl refuge. The cooperative farming program maintains approximately 500 acres in agricultural production, one third of which is left for wildlife. Habitat on the refuge includes stands of bottomland hardwoods (15%), native grass prairie (5%), permanent water (30%), moist soil units/cropland (45%) and abandoned fields (5%).

Declines in forest songbird populations have recently been documented across the country (Askins et al. 1990, James et al. 1989, Robbins et al. 1989, Terbough 1989). The bottomland forests of the upper Mississippi River may provide important breeding areas for many forest interior species. Although the Delair Division contains a relatively small percentage of bottomland hardwoods, future management plans need to take into consideration the importance of this resource. Preliminary studies documenting breeding species presence are also needed to guide management decisions in other habitats such as grasslands and wetlands on the area.

Purpose

The objective of this study was to inventory the breeding birds, both game and nongame, present within the boundaries of the refuge, and to identify habitat types being used. Given the fractured habitat and agricultural impact, abundance of species whose preferred habitat consists of large stands of hardwoods were of particular interest, as were species which might be favored by the fragmentation. The presence of endangered, threatened and State species of concern was also of interest. The data obtained by this study will be used in future management decisions.

Methods:

The point count method described in Ralph et al. (Unpubl.) In Managing and Monitoring Birds Using Point Count: Standards and Applications was used to inventory the bird species present. The survey was conducted from 8 June through 6 July 1993, the peak breeding period in this region. Surveys were begun within 15 minutes of dawn (5:00 - 5:30 AM) and completed before 10:00 AM. Surveys were not run if rain or wind interfered with data collection. Species were identified both visually and by song, with the aid of binoculars when necessary.

Censuses were conducted along six transects, each containing between five to 12 census points. Two of the transects were driving routes along tertiary roads within the refuge and were done from a vehicle. The distance between census points on these routes was 0.3 miles. The other four transects were done on foot and each station was 300 meters apart. Transect locations were chosen in an attempt to cover all habitat types within the entire area.

At each station, data were collected relative to two aspects: time and distance. A total of 10 minutes was spent at each station, and data were recorded according to those species identified within the first three minutes, the ensuing two minutes, and the last five minutes. Also, species were noted according to their distance from the census point, either within or outside a 50 meter radius, or if the birds flew over the station (see attached sample data collection sheet).

All individuals were identified by species only, with no regard to sex, age or breeding status, and tallied at each census station. It was assumed that the 300 meter span was sufficient to prevent counting the same individual from two separate census points. However in some instances, flyovers (e.g. a circling hawk) could be spotted from two or more census points. In these instances, the individual was recorded only at the point to which

it maintained the closest distance.

The walking time between census stations was never more than five minutes, driving time never more than two minutes. A list was kept of species noted between points, but without reference to location and only if the species was one which had not previously been recorded at any of the census points. Each of the transects was censused four times, with the exception of transect F, which was made inaccessible by the flooding which closed roads leading to the area on the last scheduled day of data collection. Treatment of data for this missing day will be discussed in the results section. Data were collected by a single observer, who was responsible for identification of species and recording of data.

As previously stated, the driving routes followed tertiary roads. The walking routes usually followed old levees or edge habitat. Given the fragmented nature of the area, some juxtaposition of habitat types was present at nearly all census points. Habitat types are as follows:

*Wetland (W) - characterized by hydric soil types and associated vegetation such as cattails, lotus, three-square sedge, smartweeds, etc.
*Agriculture (A) - cultivated fields of corn, soybeans or wheat.
*Grass (grassland)(G) - prairie, hayfield, cultivated grassland.
*Shrub (shrub-sapling)(S) - shrub swamp, oldfield seedling and sapling forest.
*Bottomland Hardwood (B) - lowland-bottomland mature deciduous forest, predominantly oaks (Quercus spp.), silver maple (Acer spp.), cottonwood (Populus deltoides).

Table 1 shows the predominant habitat type at each census point. Because transects often ran along dikes and ditches and roads, census points are described relative to the two types of habitat which create the edge within a 10 meter radius of the census point (i.e. B-A would indicate a census point located along the edge between bottomland hardwood and agricultural habitat).

However, individual birds could be identified at distances exceeding 100 meters. For this reason, some species were recorded at census points which would seem to indicate habitat out of the ordinary for that species (e.g. Red-headed Woodpeckers (Melanerpes erythrocephalus) present in shrub-wetland habitat). Thus general descriptions of the transects are in order both to clarify the types of habitat present along the transects and to aid in location of the transects should future replication be desirable. The attached maps may also prove useful in clarification. General descriptions of each transect are as follows:

Transect A: This driving route consisted of five census points 0.3 miles apart. The first point is at the eastern most entrance to the refuge, and proceeds southeasterly, skirting the south end of Lower Swan Lake at its final two points. The first three stations bisect grass and wetland habitats. Open water is found south of stations three and four in a portion of Cattail Marsh. Point 5 is flanked by the shrub-lined shore of Lower Swan Lake to the west and an agricultural field to the east.

Transect B: The first point of this walking transect is approximately 0.3 miles past point five of transect A. The nine point transect follows an old drainage levee north towards its terminus near the railroad tracks. Point nine is along the edge of an agricultural edge less than 100 meters from the tracks, while all other points are on the levee itself. This transect is bordered by agricultural fields to the west and bottomland hardwoods to the east except at point four, which is located between a stand of native grasses and a small (0.25 acre) wetland, and point nine, which is a shrub-agricultural edge.

Transect C: This walking transect meanders south from its starting point 300 meters from census point A-1, near the entrance gate. Points one and two are along a grass-agricultural edge, with a mature deciduous fencerow within 25 meters. Points three, four and five are in grasslands surrounded by wetlands dominated by Cattails (Typha latifolia) and River Bulrush (Scirpus fluviatilis). Point three is along a drainage ditch to the east of point two.

Transect D: This 6 point walking transect headed due west along a levee through Cattail Marsh. It begins where the levee meets the sharp turn in the road. Point one is at the water control structure near the road, and point six is within 300 meters of the road running parallel to the Mississippi River. The levee is covered by fescue and is flanked immediately on either side by dense shrubs for the entire length of the transect. These shrubs border large wetlands with open water. Large dead trees (6-12 meters) are scattered throughout the marshes. Point six is typical except that it is bordered to the south by grassland instead of the shrub and wetland habitats.

Transect E: This driving transect consists of six points. Point one is located approximately 0.25 miles further along the road from point D-1. Point two is along a shrub-agricultural edge, with a small tree and shrub encircled pond (1 acre) within 50 meters. Points three through six follow the road along the Mississippi levee. The levee is covered with fescue, with shrubs growing alongside the ditch on either side of the road. Mature

bottomland hardwoods are present along the banks of the river, and grassland are found east of these points.

Transect F: This is the most diverse transect. The twelve census points head south from the origin near the junction of the access road and the Sny Levee. Points one through four follow an old levee, bordered by flooded bottomland hardwoods. Points five through nine and eleven are along the edge of bottomland hardwoods and agricultural fields. Small interspersed areas of marsh are present to the east of points one through nine. Point ten is the only point in the study which is surrounded completely by bottomland hardwoods with no edge within 200 meters. Point 12 is along the edge of a large marsh area (10 acres) surrounded by bottomland hardwoods.

Results and Discussion:

A total of 77 species were recorded at the six transects (Table 2). The following five species were also recorded on the area, Virginia Rail (Rallus limicola), Bobolink (Dolichonyx oryzivorus), Horned Lark (Eremophila alpestris), Northern Mockingbird (Mimus polyglottos) and Louisiana Waterthrush (Seiurus motocilla), for a total of 82 breeding species. A complete list of species including migrants would require additional surveys throughout the year.

Results in Table 2 are presented as relative abundance in regards to habitat types. Of the total number of individuals recorded, 45% were noted within a 50 meter radius, 43% were outside the radius and 12% were recorded as flyovers. This should be kept in mind when looking at the types of habitat that the individuals were recorded in. The purpose of the relationship expressed between species and habitat types is intended to show trends and tendencies. But if taken to literally the data may prove misleading. For example, Red-headed Woodpeckers may be listed as being present in a shrub-agricultural habitat type, a decidedly uncharacteristic habitat. This could be due to the presence of a single large tree in the vicinity of the census point or the ability to identify the individual from a great distance away, and should not be construed as meaning that the individual preferred that specific habitat.

The data (Table 2) are presented in gross numbers of individuals identified. The intent is to show relative abundance of species, not to inventory the actual quantity of birds present. Consideration was given to using an average number of individuals (total individuals divided by number of opportunities to counted (4)), but I determined that this would simply reduce the degree of difference between species at no benefit. For this reason, it may at first glance appear that there is a larger number of

individuals of any given species present than would be expected. In fact, it could have been the same group of birds being counted on four separate occasions, thus yielding a number four times higher than the average number of birds present at any given time.

The data for the fourth census of Transect F require some discussion. As stated, the flooding which occurred along the Mississippi River during this time made it impossible to reach the area on the final day of sampling. The absence of this set of data would have skewed the data in favor of the other three transects. In order to provide an additional survey, a substitute set was created to accurately reflect an actual count. This was accomplished by taking data from the first three censuses and averaging the number of species present at any given census point. The average number likely reflects the number of individuals that would have been recorded on the fourth census. For example, at point A-1, a total of five Common Yellowthroat (Geothlypis trichas), were counted over the first three censuses, yielding an average of 1.67 birds per census. Numbers were rounded to the nearest whole number (in this case two). Thus, two was used as the number of Common Yellowthroats noted at point A-1 on the fourth census. Temporal or spatial relationships were not taken into consideration when creating this fourth data set.

Species distribution by habitat type is also shown in Table 2. Data regarding temporal or spatial relationships are not presented due to its lack of bearing on the actual results. Information related to collection data (e.g. number of individuals noted relative to amount of time spent at a point) are not be presented, but may be obtained by contacting the author. These data may prove useful in planning future studies, but in no way affect the results as related to overall relative abundance.

The proportions of types of habitat and species can be determined from Tables 1 and 2. These proportions are as follows:

Habitat	Number of Stations	Percent (habitat)	Number of Species	Percent* (species)
B-A	12	27.26	43	55.8
S-W	6	13.64	47	61.0
G-W	6	13.64	38	49.4
B	5	11.36	35	45.5
B-G	5	11.36	40	51.9
G-A	4	9.09	30	39.0

Habitat	Number of Stations	Percent (habitat)	Number of Species	Percent* (species)
B-W	2	4.55	32	41.6
S-A	2	4.55	27	35.0
S-G	2	4.55	26	33.8
	44	100.00		

*Number of species/Total number of species (77).

Agriculturally related habitat makes up 40% of the census points, with the majority of this being in the bottomland-agricultural habitat type. The fact that between 35% and 61% of all species were found in the different habitat types may be a result of the fragmented nature of the area and the close juxtaposition of different habitat types. It is worth noting that the bottomland hardwood habitat included 45.5% of all species, yet consisted of only five census points equalling 11.36% of the total. Relative proportions of each of the habitats should be taken into consideration when looking at species distribution and relative abundance within the habitat types.

The Midwest Working Group on Neotropical Migrant Birds ranked species of neotropical migrant landbirds by decreasing management concern based on the mean score of seven criteria (See Thompson et. al. 1992 for details). Ten species found on the Delair Division had scores which indicate these birds are of special concern. Six of the species (Yellow-billed Cuckoo, Black-billed Cuckoo, Wood Thrush, Prothonotary Warbler and Hooded Warbler) were associated with lowland or bottomland deciduous hardwoods. Three species (Dickcissel, Grasshopper Sparrow and Bobolink) are associated with grasslands. The Yellow-breasted Chat is associated with shrub habitat.

Conclusions and Recommendations:

The various habitats and amount of edge provide food, water and cover for a variety of species. In areas where larger stands of mature bottomland hardwoods exist, species such as the Black-billed Cuckoo, Yellow-billed Cuckoo, Wood thrush, White-breasted Nuthatch and a variety of woodpeckers were recorded. Turkeys were noted nesting in areas of extensive hardwoods. In wetland areas, Mallards, Wood ducks and Canada geese were present with young, evidence of successful breeding in the area. Detection of Marsh Wren, Virginia Rail, Bobolink and numerous warbler species, and both Red-tailed and Broad-wing Hawks on the area warrant careful management of the land to maintain critical habitats for

these species. The fractured nature of the area and amount of land in agriculture production provide the habitat requirements for a number of less desirable species such as the Brown-headed Cowbird, Common Grackle and European Starling.

I recommend returning most of the southern and eastern regions of the area to bottomland hardwood forest, excluding agriculture altogether. This would provide a larger contiguous tract of bottomland hardwood forest, a rare commodity along the Mississippi River. The central and northern regions of the area should be managed in a manner similar to what is currently being done, with agriculture used as minimally as possible. Although the refuge was created as a migratory bird refuge, the importance of other habitat types should be integrated into management plans. The refuge should emphasize the "resting" purpose of the area as related to waterfowl and stress its potential importance as a breeding ground for species which require mature hardwood forests and grassland habitats.

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Table 1. Habitat types along the six transects on the Delair Division of the Mark Twain National Wildlife Refuge, Annada District.

Transect	Census Points	Habitat Types*								
		S-W	G-W	B-W	G-A	S-A	B-A	B-G	S-G	B
A	1								X	
	2		X							
	3		X							
	4	X								
	5					X				
B	1			X						
	2						X			
	3						X			
	4							X		
	5						X			
	6						X			
	7						X			
	8						X			
	9					X				
C	1				X					
	2				X					
	3		X							
	4		X							
	5		X							
	6		X							
D	1	X								
	2	X								
	3	X								
	4	X								
	5	X								

Transect	Census Points	Habitat Types*								
	6								X	

Transect	Census Points	Habitat Types								
		S-W	G-W	B-W	G-A	S-A	B-A	B-G	S-G	B
E	1				X					
	2				X					
	3							X		
	4							X		
	5							X		
	6							X		
F	1									X
	2									X
	3									X
	4									X
	5						X			
	6						X			
	7						X			
	8						X			
	9						X			
	10									X
	11						X			
	12			X						
	Totals	6	6	2	4	2	12	5	2	5

*Habitat types (see text for details):
S-W Shrub-wetland
G-W Grassland-wetland
B-W Bottomland hardwood-wetland

G-A Grassland-agriculture
S-A Shrub-agriculture
B-A Bottomland hardwood-agriculture
B-G Bottomland hardwood-grassland
S-G Shrub-grassland
B Bottomland hardwood

Table 2. Species of birds and their distribution in nine habitat types on the Delair Division of the Mark Twain National Wildlife Refuge, Annada District during the month of June.

Species*	Habitat Type										
	S-W	G-W	B-W	G-A	S-A	B-A	B	S-G	B-G	F/O	Total
Double-crested Cormorant	25	2								44	71
Great Blue Heron	28	1	4	2		10	2	1	3	42	93
Green-backed Heron	6	2						1		3	12
Little Blue Heron	14									1	15
Great Egret	1									2	3
Canada Goose	8									1	9
Mallard	53	3		17						39	112
Wood Duck	17	1		1		6	13			14	52
Turkey Vulture								1			1
Red-tailed Hawk										7	7
Broad-winged Hawk									1		1
Common Bobwhite	5	31	1	21	2	5	15	9	8		97
Wild Turkey		2		7		8		7			24
Killdeer	5	1				7			2	4	19
Mourning Dove	3	1		16	8	4			2	9	43
Yellow-billed Cuckoo			3			13	9	1	5		31
Black-billed Cuckoo							3				3
Great Horned Owl		1				1					2
Barred Owl					1		2				3
Common Nighthawk										5	5

Species	S-W	G-W	B-W	G-A	S-A	B-A	B	S-G	B-G	F/O	Total
Brown Thrasher	1							1			2
American Robin	1	2	5	2	1	11	4	1	15	1	43
Wood Thrush						1					1
Blue-gray Gnatcatcher				1					1		2
Cedar Waxwing	2	5					1		1		9
Yellow-throated Warbler					1						1
Red-eyed Vireo			1			1	4				6
Warbling Vireo		1	1		2	2	4		1		11
Prothonotary Warbler	2	1		2	2	6	1				14
Northern Parula Warbler	1						1				2
Yellow Warbler	4	2		1		3		2	2		14
Cerulean Warbler			1				1				2
Common Yellowthroat	25	53	7	15	7	28	14	9	30	1	189
Yellow-breasted Chat	2										2
Hooded Warbler						1	1				2
Eastern Meadowlark	4	10	1	11		3		2	11		42
Red-winged Blackbird	111	177	5	125	29	50	33	62	105	118	815
Orchard Oriole									1		1
Baltimore Oriole	6		6		3	6	1		7	1	30
Common Grackle	9	5	2	42	15	10		6	8	33	130
European Starling							4				4
Northern Cardinal	14	10	9	13	6	67	20	8	17	1	165

Species	S-W	C-W	B-W	C-A	S-A	B-A	B	S-C	B-C	F/O	Total
Belted Kingfisher		1	1								2
Common Flicker	9	2	4		1	12	8	2	15	7	50
Pileated Woodpecker	1								1		2
Red-bellied Woodpecker	4	3	3	1		16	1		7		35
Red-headed Woodpecker	24	5	4	9	1	30	15	2	9	2	101
Hairy Woodpecker	1	5	3	1	1	13	7		2		33
Downy Woodpecker	4	3	5	3	1	21	2		3		42
Eastern Kingbird	3			1	1				2		7
Great-crested Flycatcher				4		1				1	6
Eastern Phoebe	1		1						1		3
Acadian Flycatcher	1										1
Eastern Pewee			1			13	16		1		31
Tree Swallow	8			1				1		14	24
Barn Swallow	2									1	3
Blue Jay	4	4	6	6	2	28	12		4	4	70
American Crow			4	2		6		1		7	21
Black-capped Chickadee	4	7	1	4	5	47	6	4	5		83
Tufted Titmouse	2		7			27	4	1	5		46
White-breasted Nuthatch			3		3	6	3				15
House Wren									1		1
Carolina Wren					1	2	2	1	1		7
Marsh Wren					1						1
Gray Catbird	18	1					1	3	1	1	25

Rose-breasted Grosbeak		1				1					2
Indigo Bunting	33	20	10	23	9	72	26	12	25		230
Dickcissel	2	15		12	3	5		2	4		43
Purple Finch	1	1				1					3
Species	S-W	G-W	B-W	G-A	S-A	B-A	B	S-G	B-G	F/O	Total
American Goldfinch	3	7				1			2	4	17
Rufous-sided Towhee							1				1
Grasshopper Sparrow		3		1							4
Chipping Sparrow	2	1	1								4
Field Sparrow			1		4	2					7
Swamp Sparrow	1		3			1	3				8
Song Sparrow	27	9		7	1	3	4	3	5		59
Total Birds/Habitat	506	403	110	355	114	588	244	144	324	370	3158
Total Species/Habitat	47	30	32	30	27	43	35	26	40	20	

*The following species were identified at locations other than at census points (not included in table):
Virginia Rail (with nine chicks), Bobolink, Horned Lark, Northern Mockingbird, and Louisiana Waterthrush.
F/O indicates a flyover.