

BREEDING BIRD STUDY IN THE MISSISSIPPI RIVER FLOODPLAIN

Abstract:

A breeding bird study was initiated in 1992 to census birds on the U.S. Fish and Wildlife Service (USFWS) Gardner Division. The division is located in the Mississippi River floodplain north of Quincy, Illinois. The study was canceled in 1993 due to severe flooding. A more extensive study was conducted in June 1994 to include breeding birds and vegetation analysis. The purpose of the ongoing study is to: 1) estimate the number of bird species and their relative abundance; 2) analyze the vegetation after the flood. A total of 66 bird species were heard or observed on the refuge during June 1994.

The Gardner Division of the Mark Twain National Wildlife Refuge, Annada District is located 12.4 km (20 mi) north of Quincy, Illinois. The division is 2251 ha (6300 Ac) of islands and floodplains of the Mississippi River. Approximately 1891 ha (4,670 Ac) of the refuge is forested and contains large contiguous stands of bottomland hardwoods. An ornithological study on the Gardner Division was initiated in 1992 to estimate relative abundance of breeding bird species on the refuge. A follow up study was canceled in 1993 because the entire division was under approximately 3.3 m (8 feet) of water for 2 months.

An expanded study was initiated in 1994 to more intensively survey the breeding birds on the refuge. This information along with vegetation analysis will be useful in comparing pre- and post-flood conditions and the effect the 1993 flood had on the flora and fauna of the refuge.

We thank Beatrix Treiterer for her assistance with our research. We also thank the Quincy office of the USFWS for providing a boat for transportation.

STUDY AREA: A flood in 1993 greatly affected the vegetation on the Gardner Division. Understory vegetation was removed during the 2 month period that water covered the area. Large trees appeared unaffected. Shrubs and saplings that were submerged suffered high mortality.

The dominant trees on the refuge are silver maple (*Acer saccharinum*), eastern cottonwood (*Populus deltoides*), and a small number of white oak (*Quercus alba*). Other tree species include: box-elder maple (*Acer negundo*), bitternut hickory (*Carya cordiformis*), pecan (*C. illinoensis*), shellbark hickory (*C. laciniosa*), northern hackberry (*Celtis occidentalis*), green

ash (*Fraxinus pennsylvanica*), coffeetree (*Gymnocladus dioica*), eastern sycamore (*Platanus occidentalis*), butternut (*Juglans cinerea*), mulberry (*Morus spp.*), swamp oak (*Quercus bicolor*), bur oak (*Q. macrocarpa*), black willow (*Salix nigra*), and slippery elm (*Ulmus rubra*).

Shrub and vine species present after the flood included: poison ivy (*Toxicodendron radicans*), common elderberry (*Sambucus canadensis*), common winterberry holly (*Ilex verticillata*), tartarian honeysuckle (*Lonicera tartarica*), dogwood spp. (*Cornus spp.*), and grape spp. (*Vitis spp.*).

Most of the understory vegetation on the refuge consisted of forbs. The species included: clearweed (*Pilea pumila*), jewelweed (*Impatiens capensis*), trumpet-creeper (*Campsis radicans*), giant ragweed (*Ambrosia trifida*), wood nettle (*Laportea canadensis*), and small amounts of grass and sedge.

METHODS: Ten census transects were selected on the Gardner Division and Bear Creek Unit (mainland). Transects were placed at least 150 m from edges in areas having > 75% canopy cover and areas that were accessible. Transects were not selected at random because of the logistics of getting to the various locations. Transects were censused using 50 m circular point counts at least 300 m apart (Ralph 1993). Six to nine census points were spaced along each transect (Fig. 1). Census transects were conducted on the following islands: Long (transect 1-4), Flannigan (transect 5), Shandrew (transect 6 and 7), and Barns (transect 8). Transects 9 and 10 were on the Bear Creek Unit (mainland)(Fig. 1). Access to all the survey routes, except the 2 on the Bear Creek Unit, was by boat.

Observers watched and listened at each census point, for 10 minutes, recording all birds heard and observed within the first 5 minutes and the subsequent 5 minutes. Individual birds were recorded at 0-25 meters, 26-50 meters, or >50 meters from the center of the point. Censusing was conducted during the month of June 1994 on calm, non-rainy days beginning < 15 minutes after sunrise and ending > 1030 hrs. Census data were collected 4 times along each transect during the month of June 1994. Observers recorded only the minimum number of different individuals as determined by simultaneous singing, counter-singing and location. Quantitative measures to determine the mean number of detection's for survey transects were calculated using Rbase programs (J. Mattsson, unpublished data, USFWS). Results separated into North American migrants, Neotropical migrants, and resident species are in Tables 1-6.

Vegetation data were collected at each census point on all 10 transects. Methods were consistent with those used in studies being conducted in the Upper Mississippi River by Iowa Cooperative Fish and Wildlife Research Unit (ICFWRU). ICFWRU is in the process of analyzing our vegetation data using a SAS computer program.

RESULTS/DISCUSSION:

Great blue heron (*Ardea herodias*)- This species was observed feeding along the banks of the river throughout the area. They were recorded on all transects of the Garner Division. Many individuals were observed on Shandrew Island (transects 6 and 7) because a rookery consisting of 3 nest trees is on the island. Barns Island (transect 8) had a nest tree near census point 2.

Yellow-crowned night-heron (*Nyctanassa violacea*)- This species was never recorded on the transects. One was heard flying over Bear Creek Campground on 31 May.

Canada goose (*Branta canadensis*)- A single individual of this species was observed at Bear Creek Campground on 19 and 27 June. A single individual was heard flying over transect 1 on 11 June, and transect 5 and 7 on 27 June.

Wood duck (*Aix sponsa*)- This cavity nester was observed commonly on the area. It was observed on all transects except 4 and 10. It was heard most often when flushed from inland sloughs and waterways. In mid-June, water levels dropped causing areas to dry. This caused a decrease in the number of ducks observed during the second half of June.

Mallard (*Anas platyrhynchos*)- This species was not observed commonly in the area. A pair was flushed from a slough on Barns Island, transect 8:census point 2, on 3 June. A single individual was heard flying overhead on Long Island, transect 3:census point 4, on 4 June.

Hooded merganser (*Lophodytes cucullatus*)- This was a rare species. A hen was observed on 30 May west of Shandrew Island on the bank of Long Island. No other individuals were observed in the area.

Turkey vulture (*Cathartes aura*)- This species was observed commonly on the refuge. As many as 10 individuals were observed flying over Barns Island at one time.

Mississippi kite (*Ictinia mississippiensis*)- This species was observed commonly flying over Bear Creek Campground and Barns Island. It was observed most often flying as an individual.

Red-tailed hawk (*Buteo jamaicensis*)- This species was rare in the area. One was heard 5 June on transect 1-census point 1. A nest was found on transect 10, census point 5. On 28 June 2 young were in the nest and 2 had fledged and were on branches nearby.

Wild turkey (*Meleagris gallopavo*)- This species was never heard but was flushed on a few occasions. On 2 June 2 hen turkeys were flushed on Shandrew Island. One was flushed from a nest of 10-12 eggs. On 16 June a hen and 7 young were flushed at census point 4, transect 7. Two wild turkeys, sex unknown, were also observed on Long Island. One was flushed before sunrise on the East side of the open field, the other was observed along the edge of the field on transect 1.

Killdeer (*Charadrius vociferus*)- This species had sparse suitable habitat on the refuge. One individual was recorded flying over Shandrew Island (transect 7-census point 2) on 16 June. Many were observed on Long Island on 26 June after the fields were tilled.

Mourning dove (*Zenaida macroura*)- This species was heard on all transects. It was heard most often on Flannigan Island (transect 5) and Shandrew Island (transect 7). It was also prevalent along field edges on Long Island.

Yellow-billed cuckoo (*Coccyzus americanus*)- This loud species was observed and heard commonly on all transects. They were slightly more common on the mainland, transect 9 and 10.

Barred owl (*Strix varia*)- This species was commonly heard at night or just after sunrise. Individuals were heard from Barns Island as well as the mainland. This species was rarely encountered while conducting census data. It was observed on transect 6, census point 2 on 18 June. It was also heard on transect 9-census point 7 and transect 2-census point 7 and 8.

Common nighthawk (*Chordeiles minor*)- None were recorded on the transects. It was heard in the evening, on several occasions, flying over the river near Bear Creek Campground.

Chimney swift (*Chaetura pelagica*)- This species was heard overhead commonly while conducting census data. Swifts were recorded on all transects except transect 5 and 6. They were recorded most commonly on Long Island.

Ruby-throated hummingbird (*Archilochus colubris*)- This bird was not encountered often. On transect 7-census point 7 a female was observed flying near spider webs on 6 and 16 June. A female fed from a trumpet-creeper on transect 1-census point 2 on 21 June. A male flew over transect 4-census point 6 on 25 June.

Red-headed woodpecker (*Melanerpes erythrocephalus*)- This cavity nester was recorded commonly on all transects. High visibility caused this species to be observed often.

Red-bellied woodpecker (*Melanerpes carolinus*)- This was the most commonly heard woodpecker species. It was heard or observed in large numbers on all transects.

Downy woodpecker (*Picoides pubescens*)- This small woodpecker species was common on all transects.

Hairy woodpecker (*Picoides villosus*)- This species was recorded on all transects. It was slightly more common than the downy woodpecker (Table 5-6).

Northern flicker (*Colaptes auratus*)- This species was recorded on all transects. It was most common on transect 1 and transect 5 where open areas were more prevalent.

Pileated woodpecker (*Dryocopus pileatus*)- This is the largest of the woodpecker species on the refuge. It was recorded on all transects. It was easily detected due to its loud vocalizations.

Eastern wood pewee (*Contopus virens*)- This small flycatcher was very common on the refuge. It was heard at all hours of the day. It was recorded on all transects and was observed commonly throughout the refuge.

Eastern phoebe (*Sayornis phoebe*)- This was a rare flycatcher. It was recorded on 2 transects. On 4 June it was recorded on transect 3-census point 7. It was also heard on 23 June on transect 8-census point 1.

Acadian flycatcher (*Empidonax virescens*)- This was a common flycatcher. It was recorded on all transects except transect 3 and 6. It was most commonly recorded on Flannigan Island (transect 5) and Barns Island (transect 8).

Great crested flycatcher (*Myiarchus crinitus*)- This was the most common flycatcher on the refuge. It was heard and observed on all transects.

Eastern kingbird (*Tyrannus tyrannus*)- One individual was observed on the east edge of Shandrew Island. None were recorded on the transects.

Barn swallow (*Hirundo rustica*)- This species was observed commonly flying over the river just north of Shandrew Island. It was never recorded on the transects.

Purple martin (*Progne subis*)- This species was heard flying over Bear Creek Campground. It was not recorded on the transects.

Blue jay (*Cyanocitta cristata*)- This species had an even distribution throughout the refuge and was recorded on all transects. The blue jay can be heard from a great distance so actual numbers recorded may be larger than the true population.

American crow (*Corvus brachyrhynchos*)- The population of crows on the refuge is large. This species followed the river while looking for food, which resulted in many crows being recorded on each transect.

Black-capped chickadee (*Parus atricapillus*)- This species was heard and observed commonly on all transects of the refuge. In late June small groups were observed flying together.

Eastern tufted titmouse (*Parus bicolor*)- This species was common throughout the refuge on all transects. It was observed in small groups in late June.

White-breasted nuthatch (*Sitta carolinensis*)- This species was observed commonly moving up and down the trunk of trees. It was recorded on all transects.

Brown creeper (*Certhia familiaris*)- This solitary species was rare on the refuge. It was observed on 12 occasions most often in silver maple stands on Flannigan and Shandrew Island.

Carolina wren (*Thryothorus ludovicianus*)- This was a rare species on the refuge. A pair was observed near Bear Creek Campground in late May. It was recorded on 1 June on transect 9-census point 5 and on 2 occasions along transect 4, census point 6 on 20 June and census point 4 on 25 June.

House wren (*Troglodytes aedon*)- This was one of the most common bird species on the refuge. It was very common on all transects except the mainland (transect 9 and 10).

Blue-gray gnatcatcher (*Polioptila caerulea*)- This species was recorded on all transects except transect 4, but overall was not recorded in great numbers. Its greatest population was found on Long Island (transect 3).

Wood thrush (*Hylocichla mustelina*)- The population of this species varied throughout the refuge. Long Island (transect 1-4) and Flannigan Island (transect 5) had the greatest populations. The rest of refuge had few, or none at all, recorded while collecting census data.

American robin (*Turdus migratorius*)- This species was recorded commonly along most of the transects. It was uncommon on Barns Island (transect 8) and the mainland (transect 9 and 10).

Gray catbird (*Dumetella carolinensis*)- This was a rare species on the refuge. It was recorded in small numbers on 4 transects. Long Island (transect 1 and 2), Flannigan Island (transect 5), and

Barns Island (transect 8) had habitat suitable for the Gray Catbird. Individuals heard or observed were in very thick vegetation which consisted of grape vines.

Brown thrasher (*Toxostoma rufum*)- Lack of thick understory vegetation caused this species to be rare. It was recorded on transect 2-census point 8 on one occasion. It was also observed once along the west side of Long Island near transect 1-census point 1.

Cedar waxwing (*Bombycilla cedrorum*)- A small flock of this species visited Bear Creek Campground regularly. None were recorded on the transects.

European starling (*Sturnus vulgaris*)- This species was recorded commonly on Long Island (transect 1-4) primarily where field edges adjoined census points. It was not recorded commonly on Shandrew Island (transect 6 and 7) and Barns Island (transect 8). It was not recorded on the mainland (transect 9 and 10) or Flannigan Island (transect 5).

Yellow-throated vireo (*Vireo flavifrons*)- This species was recorded commonly on Long Island on all transects except transect 1. However, the highest numbers of individuals recorded were on Long Island (transect 2). This indicates the habitat, even on the same island, is different.

Warbling vireo (*Vireo gilvus*)- This species was common in some areas of the refuge. It was uncommon on Long Island (transect 3), Shandrew Island (transect 7), and the mainland (transect 9 and 10).

Red-eyed vireo (*Vireo olivaceus*)- This species sings all day long. The red-eyed vireo was found commonly throughout the refuge on all transects.

Northern parula (*Parula americana*)- This species was uncommon in most areas of the refuge. It was recorded in small numbers on Long Island (transect 1), Barns Island (transect 8), and the mainland (transect 9 and 10).

Yellow-throated warbler (*Dendroica dominica*)- This "area sensitive" species was distributed evenly throughout the refuge. Shandrew Island (transect 7) and Long Island (transect 4) had the greatest number recorded. It was recorded in small numbers on all transects except Long Island Transect 3, and mainland transect 10. The yellow-throated warbler was most often found singing from large sycamore trees.

Cerulean warbler (*Dendroica cerulea*)- This rare "area sensitive" species was not recorded while conducting census data. While conducting vegetation analysis on 15 June a singing male was

observed on Shandrew Island 150 m east of transect 7-census point 7. A singing male was also observed 22 June on the mainland near transect 9-census point 3.

American redstart (*Setophaga ruticilla*)- Abundance of this species varied between transects. It was most common on Flannigan Island (transect 5) and on the mainland, transect 9. It was recorded commonly on the remainder of the transects.

Prothonotary warbler (*Protonotaria citrea*)- This was the most common warbler species on the refuge. It was recorded commonly on all transects except Long Island (transect 2 and 4).

Common yellowthroat (*Geothlypis trichas*)- This species was not recorded commonly on the refuge. It was heard or observed only near edges of large open areas. It was recorded once at each of the following points; transect 4-census point 6 on 25 June, transect 8-census point 7 on 3 June, and transect 10-census point 1 on 22 June. It was recorded on Flannigan Island (transect 5) several times. On 16, 19, and 27 June it was recorded on census point 1. It was also recorded on 27 June at transect 5-census point 7. The number of singing males on Long Island increased along field edges on 25 and 26 June.

Scarlet tanager (*Piranga olivacea*)- The number of individuals of this species were very small. A pair was first observed on 10 June on Long Island transect 4-census point 4. Two singing males were heard on Long Island transect 4-census point 1 on 20 June. One male was also heard on Flannigan Island (transect 5-census point 6) on 27 June.

Northern cardinal (*Cardinalis cardinalis*)- This was one of the most common species throughout the refuge.

Rose-breasted grosbeak (*Pheucticus ludovicianus*)- This species was rare on the refuge. A female was observed feeding a fledgling on Long Island (transect 1-census point 4) on 5 June. A pair was observed on 10 June on Long Island (transect 4-census point 4). On 25 June 2 singing males were heard on Long Island, 1 on transect 4-census point 3 the other on transect 4-census point 6.

Indigo bunting (*Passerina cyanea*)- This species was heard commonly throughout the refuge. It was recorded commonly on all transects.

Song sparrow (*Melospiza melodia*)- This species was heard most commonly at the edge of fields. It was recorded in small numbers on all transects except Shandrew Island (transect 7) and the mainland (transect 9) where it was not recorded.

Red-winged blackbird (*Agelaius phoeniceus*)- Island edges and open fields were suitable habitat for this species. Long Island (transect 1,2, and 4) and Flannigan Island (transect 5) were the major sites where this species was recorded. On 1 occasion it was heard calling while flying over Shandrew Island (transect 7) and Barns Island (transect 8).

Common grackle (*Quiscalus quiscula*)- This species was one of the most commonly heard species in the area. It was most often heard calling while flying over the area. It was recorded many times along field edges on Long Island.

Brown-headed cowbird (*Molothrus ater*)- This nest parasite was found throughout the refuge. It was recorded commonly on all transects.

Northern oriole (*Icterus galbula*)- This species was heard commonly throughout the refuge on all transects during the month of June. The number of males heard singing declined in late June.

American goldfinch (*Carduelis tristis*)- This species was recorded, in small numbers, on half of the transects in the refuge. They were heard on transects 2, 4, 7, 8, and 9. Most individuals recorded were heard calling while flying over the census point.

Eastern meadowlark (*Sturnella magna*)- Long Island provided open fields that were prime habitat for this species. One singing male was recorded on transect 4-census point 6 on 10 June, transect 2-census point 6 on 11 and 21 June, and transect 1-census point 3 on 21 June.

Dickcissel (*Spiza americana*)- Few areas of the refuge provided open grasslands which are the preferred habitat for this species. One signing male was recorded 22 June on transect 10-census point 2. Grassy fields, on Long Island, supported pairs of this species. These fields were tilled the last week of June so this species left the area.

The total number of bird species heard or observed on the refuge during the month of June 1994 was 66. Funding has been received to conduct a 1995 ornithological study. Results of the 1995 ornithological study will be compared to 1994 results to compare bird species relative abundance.

LITERATURE CITED

Ralph, C.J. 1993. Handbook of field methods for monitoring land birds. US Dept. Agr., Gen. Tech. Rep. PSW-GTR-144. 41pp.

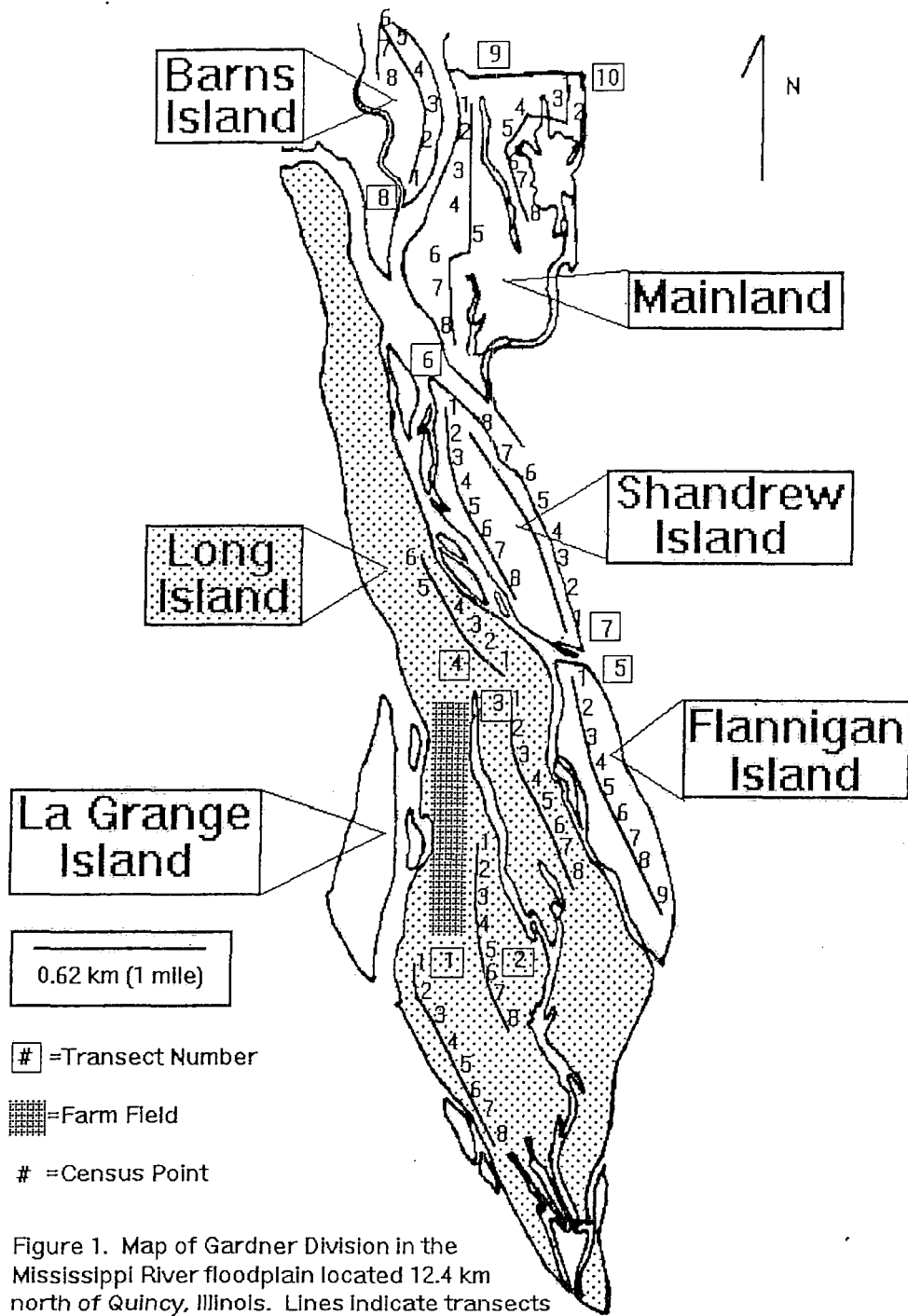


Figure 1. Map of Gardner Division in the Mississippi River floodplain located 12.4 km north of Quincy, Illinois. Lines indicate transects and numbers indicate bird census points.

Table 1. Mean number of detections for North American migrant species during June 1994 in the Mississippi River floodplain 12.4 km north of Quincy, Illinois. Results for Survey 1 and 2 conducted on 10 transect (79 census points).

North American Migrants	Survey 1 Mean				Survey 2 Mean			
	0-5 min.	5-10 min.	TOT min.	N Individuals	0-5 min.	5-10 min.	TOT min.	N Individuals
AMERICAN GOLDFINCH	0.037	0.012	0.049	4	0.025	0.025	0.050	4
AMERICAN ROBIN	0.291	0.088	0.379	30	0.303	0.139	0.442	35
BROWN CREEPER	0.000	0.000	0.000	0	0.025	0.000	0.025	2
BROWN THRASHER	0.000	0.000	0.000	0	0.000	0.000	0.000	0
BROWN-HEADED COWBIRD	0.265	0.101	0.366	29	0.303	0.240	0.543	43
CANADA GOOSE	0.000	0.000	0.000	0	0.000	0.012	0.012	1
COMMON GRACKLE	0.468	0.215	0.683	54	0.860	0.303	1.163	92
COMMON YELLOWTHROAT	0.025	0.000	0.025	2	0.000	0.012	0.012	1
EASTERN MEADOWLARK	0.000	0.000	0.000	0	0.025	0.000	0.025	2
EASTERN PHOEBE	0.012	0.012	0.024	2	0.012	0.000	0.012	1
GRAY CATBIRD	0.000	0.012	0.012	1	0.037	0.000	0.037	3
GREAT BLUE HERON	0.569	0.101	0.670	53	0.632	0.177	0.809	64
KILLDEER	0.000	0.000	0.000	0	0.000	0.000	0.000	0
MALLARD	0.025	0.012	0.037	3	0.000	0.000	0.000	0
MOURNING DOVE	0.113	0.050	0.163	13	0.139	0.050	0.189	15
NORTHERN CARDINAL	1.000	0.430	1.430	113	1.050	0.481	1.531	121
NORTHERN FLICKER	0.063	0.037	0.100	8	0.164	0.101	0.265	21
PILEATED WOODPECKER	0.126	0.126	0.252	20	0.164	0.088	0.252	20
RED-HEADED WOODPECKER	0.341	0.139	0.480	38	0.240	0.265	0.505	40
RED-TAILED HAWK	0.012	0.000	0.012	1	0.000	0.000	0.000	0
RED-WINGED BLACKBIRD	0.063	0.037	0.100	8	0.037	0.025	0.062	5
SONG SPARROW	0.063	0.000	0.063	5	0.037	0.012	0.049	4
WILD TURKEY	0.000	0.000	0.000	0	0.101	0.000	0.101	8
WOOD DUCK	0.177	0.088	0.265	21	0.050	0.037	0.087	7
YELLOW-THROATED WARBLER	0.101	0.063	0.164	13	0.126	0.037	0.163	13

Table 2. Mean number of detections for North American migrant species during June 1994 in the Mississippi River floodplain 12.4 km north of Quincy, Illinois. Results for Survey 3 and 4 conducted on 10 transect (79 census points).

North American Species	Survey 3 Mean				Survey 4 Mean			
	0-5 min.	5-10 min.	TOT min.	N Individuals	0-5 min.	5-10 min.	TOT min.	N Individuals
AMERICAN GOLDFINCH	0.042	0.042	0.084	7	0.085	0.014	0.099	8
AMERICAN ROBIN	0.385	0.228	0.613	48	0.371	0.100	0.471	37
BROWN CREEPER	0.028	0.014	0.042	3	0.085	0.000	0.085	7
BROWN THRASHER	0.014	0.000	0.014	1	0.000	0.000	0.000	0
BROWN-HEADED COWBIRD	0.442	0.257	0.699	55	0.485	0.171	0.656	52
CANADA GOOSE	0.000	0.000	0.000	0	0.000	0.028	0.028	2
COMMON GRACKLE	1.185	0.542	1.727	136	1.500	0.457	1.957	155
COMMON YELLOWTHROAT	0.028	0.000	0.028	2	0.028	0.028	0.056	4
EASTERN MEADOWLARK	0.028	0.000	0.028	2	0.000	0.000	0.000	0
EASTERN PHOEBE	0.000	0.000	0.000	0	0.000	0.014	0.014	1
GRAY CATBIRD	0.057	0.000	0.057	5	0.042	0.028	0.070	6
GREAT BLUE HERON	0.942	0.214	1.156	91	0.842	0.185	1.027	81
KILLDEER	0.000	0.000	0.000	0	0.000	0.000	0.000	0
MALLARD	0.000	0.000	0.000	0	0.000	0.000	0.000	0
MOURNING DOVE	0.242	0.042	0.284	22	0.271	0.100	0.371	29
NORTHERN CARDINAL	1.214	0.542	1.756	139	1.114	0.428	1.542	122
NORTHERN FLICKER	0.285	0.114	0.399	32	0.200	0.057	0.257	20
PILEATED WOODPECKER	0.228	0.100	0.328	26	0.242	0.142	0.384	30
RED-HEADED WOODPECKER	0.357	0.171	0.528	42	0.257	0.200	0.457	36
RED-TAILED HAWK	0.000	0.000	0.000	0	0.000	0.000	0.000	0
RED-WINGED BLACKBIRD	0.042	0.028	0.070	6	0.014	0.042	0.056	4
SONG SPARROW	0.114	0.042	0.156	12	0.085	0.014	0.099	8
WILD TURKEY	0.000	0.000	0.000	0	0.000	0.000	0.000	0
WOOD DUCK	0.000	0.028	0.028	2	0.000	0.014	0.014	1
YELLOW-THROATED WARBLER	0.057	0.071	0.128	10	0.071	0.028	0.099	8

Table 3. Mean number of detections for Neotropical migrant species during June 1994 in the Mississippi River floodplain 12.4 km north of Quincy, Illinois. Results for Survey 1 and 2 conducted on 10 transect (79 census points).

Neotropical Migrant Species	Survey 1 Mean				Survey 2 Mean			
	0-5 min.	5-10 min.	TOT min.	N Individuals	0-5 min.	5-10 min.	TOT min.	N Individuals
ACADIAN FLYCATCHER	0.227	0.063	0.290	23	0.341	0.050	0.391	31
AMERICAN REDSTART	0.354	0.113	0.467	37	0.316	0.101	0.417	33
BLUE-GRAY GNATCATCHER	0.025	0.037	0.062	5	0.265	0.037	0.302	24
CHIMNEY SWIFT	0.000	0.025	0.025	2	0.000	0.000	0.000	0
DICKCISSEL	0.000	0.000	0.000	0	0.000	0.000	0.000	0
EASTERN WOOD-PEWEE	0.645	0.240	0.885	70	0.708	0.227	0.935	74
GREAT-CRESTED FLYCATCHER	1.075	0.303	1.378	109	0.974	0.392	1.366	108
INDIGO BUNTING	0.341	0.101	0.442	35	0.430	0.088	0.518	41
LEAST FLYCATCHER	0.000	0.000	0.000	0	0.012	0.000	0.012	1
NORTHERN ORIOLE	0.139	0.139	0.278	22	0.253	0.063	0.316	25
NORTHERN PARULA	0.012	0.000	0.012	1	0.088	0.012	0.100	8
PROTHONOTARY WARBLER	0.569	0.151	0.720	57	0.607	0.227	0.834	66
RED-EYED VIREO	0.240	0.088	0.328	26	0.189	0.088	0.277	22
ROSE-BREASTED GROSBEAK	0.025	0.000	0.025	2	0.000	0.012	0.012	1
RUBY-THROATED HUMMINGBIR	0.012	0.000	0.012	1	0.012	0.000	0.012	1
SCARLET TANAGER	0.000	0.000	0.000	0	0.000	0.000	0.000	0
WARBLING VIREO	0.101	0.088	0.189	15	0.227	0.050	0.277	22
WOOD THRUSH	0.164	0.075	0.239	19	0.101	0.088	0.189	15
YELLOW-BILLED CUCKOO	0.354	0.240	0.594	47	0.278	0.139	0.417	33
YELLOW-THROATED VIREO	0.037	0.037	0.074	6	0.139	0.075	0.214	17

Table 4. Mean number of detections for Neotropical migrant species during June 1994 in the Mississippi River floodplain 12.4 km north of Quincy, Illinois. Results for Survey 3 and 4 conducted on 10 transect (79 census points).

Neotropical Migrant Species	Survey 3 Mean				Survey 4 Mean			
	0-5 min.	5-10 min.	TOT min.	N Individuals	0-5 min.	5-10 min.	TOT min.	N Individuals
ACADIAN FLYCATCHER	0.228	0.071	0.299	24	0.214	0.071	0.285	23
AMERICAN REDSTART	0.400	0.071	0.471	37	0.300	0.142	0.442	35
BLUE-GRAY GNATCATCHER	0.171	0.028	0.199	16	0.142	0.142	0.284	22
CHIMNEY SWIFT	0.000	0.000	0.000	0	0.028	0.000	0.028	2
DICKCISSEL	0.000	0.000	0.000	0	0.000	0.014	0.014	1
EASTERN WOOD-PEWEE	0.600	0.300	0.900	71	0.685	0.142	0.827	65
GREAT-CRESTED FLYCATCHER	0.928	0.271	1.199	95	0.700	0.428	1.128	89
INDIGO BUNTING	0.557	0.271	0.828	65	0.742	0.300	1.042	82
LEAST FLYCATCHER	0.000	0.000	0.000	0	0.000	0.000	0.000	0
NORTHERN ORIOLE	0.100	0.085	0.185	15	0.071	0.057	0.128	10
NORTHERN PARULA	0.100	0.042	0.142	11	0.000	0.000	0.000	0
PROTHONOTARY WARBLER	0.771	0.128	0.899	71	0.142	0.057	0.199	16
RED-EYED VIREO	0.185	0.071	0.256	20	0.300	0.114	0.414	33
ROSE-BREASTED GROSBEAK	0.014	0.014	0.028	2	0.014	0.014	0.028	2
RUBY-THROATED HUMMINGBIR	0.000	0.014	0.014	1	0.014	0.000	0.014	1
SCARLET TANAGER	0.028	0.000	0.028	2	0.028	0.000	0.028	2
WARBLING VIREO	0.285	0.085	0.370	29	0.342	0.071	0.413	33
WOOD THRUSH	0.214	0.042	0.256	20	0.157	0.014	0.171	14
YELLOW-BILLED CUCKOO	0.328	0.185	0.513	41	0.257	0.214	0.471	37
YELLOW-THROATED VIREO	0.142	0.057	0.199	16	0.114	0.114	0.228	18

Table 5. Mean number of detections for resident species during June 1994 in the Mississippi River floodplain 12.4 km north of Quincy, Illinois. Results for Survey 1 and 2 conducted on 10 transect (79 census points).

Resident Species	Survey 1 Mean				Survey 2 Mean			
	0-5 min.	5-10 min.	TOT min.	N Individuals	0-5 min.	5-10 min.	TOT min.	N Individuals
AMERICAN CROW	0.936	0.265	1.201	95	0.898	0.227	1.125	89
BARRED OWL	0.012	0.000	0.012	1	0.000	0.012	0.012	1
BLACK-CAPPED CHICKADEE	0.455	0.139	0.594	47	0.379	0.227	0.606	48
BLUE JAY	0.493	0.253	0.746	59	0.556	0.202	0.758	60
CAROLINA WREN	0.012	0.000	0.012	1	0.000	0.000	0.000	0
DOWNY WOODPECKER	0.075	0.025	0.100	8	0.215	0.037	0.252	20
EUROPEAN STARLING	0.037	0.101	0.138	11	0.075	0.037	0.112	9
HAIRY WOODPECKER	0.101	0.075	0.176	14	0.253	0.088	0.341	27
HOUSE WREN	1.139	0.303	1.442	114	0.924	0.265	1.189	94
RED-BELLIED WOODPECKER	0.481	0.291	0.772	61	0.493	0.215	0.708	56
TUFTED TITMOUSE	0.316	0.113	0.429	34	0.253	0.088	0.341	27
WHITE-BREASTED NUTHATCH	0.278	0.189	0.467	37	0.341	0.151	0.492	39

Table 6. Mean number of detections for resident species during June 1994 in the Mississippi River floodplain 12.4 km north of Quincy, Illinois. Results for Survey 3 and 4 conducted on 10 transect (79 census points).

Resident Species	Survey 3 Mean				Survey 4 Mean			
	0-5 min.	5-10 min.	TOT min.	N Individuals	0-5 min.	5-10 min.	TOT min.	N Individuals
AMERICAN CROW	0.871	0.228	1.099	87	1.028	0.357	1.385	109
BARRED OWL	0.028	0.000	0.028	2	0.000	0.000	0.000	0
BLACK-CAPPED CHICKADEE	0.557	0.357	0.914	72	0.800	0.185	0.985	78
BLUE JAY	0.485	0.185	0.670	53	0.542	0.257	0.799	63
CAROLINA WREN	0.014	0.000	0.014	1	0.000	0.014	0.014	1
DOWNY WOODPECKER	0.142	0.114	0.256	20	0.314	0.171	0.485	38
EUROPEAN STARLING	0.057	0.042	0.099	8	0.085	0.000	0.085	7
HAIRY WOODPECKER	0.285	0.271	0.556	44	0.371	0.200	0.571	45
HOUSE WREN	1.085	0.185	1.270	100	1.114	0.185	1.299	103
RED-BELLIED WOODPECKER	0.542	0.271	0.813	64	0.442	0.214	0.656	52
TUFTED TITMOUSE	0.342	0.128	0.470	37	0.414	0.114	0.528	42
WHITE-BREASTED NUTHATCH	0.471	0.214	0.685	54	0.357	0.214	0.571	45