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Final Report - Year 1

Effects of Adjacent Habitats on Avian Communities Along Illinois Highways

James D. Paruk

William E. Southern

Department of Biological Sciences

Northern Illinois University

DeKalb, Illinois 60115

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INTRODUCTION

Roadsides have been recognized as being of potential botanical and zoological interest (Way 1977). Little effort, however, has been directed at managing highway rights-of-way (ROW) vegetation for wildlife (Leedy 1975). Maintenance procedures consist primarily of mowing, herbicidal spraying, haying, and, in a few cases, allowing vegetation to grow undisturbed (Voorhees 1980). These procedures are selected primarily on the basis of safety and beautification. A thorough management plan, however, should take all factors into account, including wildlife.

In Illinois, roadsides and their management are potentially important to wildlife because of recent changes in farming practices that have altered or eliminated valuable wildlife habitats (David 1979). Because of these changes, the grassland avifauna has declined sharply over the last 20 years (Roadsides for Wildlife Newsletter 1983). In 1973, the Illinois Department of Conservation (IDOC) established a Roadsides for Wildlife Program (RWP) to investigate the use of roadsides by wildlife and to restore natural populations along roadsides. The RWP, in cooperation with the Illinois Department of Transportation (IDOT), has attempted to benefit wildlife by reducing roadside mowing, planting shrubs and trees within the ROW, and by seeding brome/alfalfa along many of the secondary roads and interstates throughout the state.

The RWP thus far has been very successful in east-central Illinois. Increased numbers of pheasants and songbirds have been recorded nesting in plots that had been reseeded to brome/alfalfa or had delayed mowing practices (David 1979, David and Warner 1981). Nest searches conducted by the Illinois Natural History Survey (INHS) (1977-1980) along FAI-I near Odell (Livingston County) produced an average of 2 songbird nests per acre

of interstate highway (1981). These densities were comparable to densities of songbird nests reported along managed rural road ROW during the same period (D. Warner, pers. comm.). These investigators found approximately 95% of the songbird nests along interstate and secondary road ROW belonged to Red-winged Blackbirds (Agelaius phoeniceus). They also found that songbirds nested significantly more often in brome-alfalfa than in fescue-mix vegetation. The management of Interstate 5 (I-5) in Whiteside county, north-western Illinois, was part of this initial program. In 1973, most of the ROW was seeded to smooth brome (Bromus inermis) and alfalfa (Medicago sativa). Some of it was seeded to tall fescue (Festuca elaitor). Fescue, however, has been reported to be of low wildlife value (Leiter 1977, David 1979). In addition, parts of the ROW was planted with shrubs and trees. The effect of woody vegetation within the ROW on bird species diversity and nest density have not been investigated (D. Wandell, pers. comm.).

There are little data concerning the use of ROW by birds adjacent to different habitat types. For example, how does bird species diversity and nesting density within the ROW adjacent to forested areas compare to ROW adjacent to farm areas? Clark and Karr (1979) reported only two species of birds were abundant enough to report along interstates next to agricultural areas, but found 11 species abundant within and/or adjacent to the ROW next to an upland forest. They did not, however, investigate the effects these dissimilar habitat types had on bird nesting density within the ROW.

The objectives of my study were to: 1) examine the effects of woody vegetation and different dominant cover types on bird nesting density and diversity within the ROW and, 2) investigate the effects of different adjacent habitat types on bird species diversity along the ROW.

METHODS

The ROW bordering I-5 in Whiteside county between Rock Falls and Erie, Illinois was investigated. Study plots along I-5 were selected relative to adjacent habitat types, e.g. forest, wetland, brush/seral, farm (Appendix A). Fourteen line transects, of variable length, (range 120-1680 m, mean 479 m) were distributed randomly within these plots. A total of 6,710 m of roadside were studied. Plots were monitored from 3 April to 2 August 1985 as this period includes the peak nesting season for nearly all bird species likely to use roadsides (Graber and Graber 1963). Length and width of each plot are provided in Appendix A. The amount of roadside acreage was determined by multiplying the width times the length of each plot. Width of ROW was determined by taking the average of 3 measurements from the fenceline to the edge of the pavement at the beginning, middle, and end of each plot.

Bird surveys were conducted 2 to 3 days each week from 3 April through 14 July; thereafter, once a week until 2 August 1985. Surveys were accomplished by slowly walking within the ROW halfway between the road edge and fenceline (which was used to delineate the ROW from the adjacent habitat type) with frequent stops to record data or just to look and listen. Three minute stops were taken at 75 m intervals to give shy birds a chance to be detected. If a bird was heard, but never seen, it was recorded as heard. If a bird was heard first and then later seen it was recorded as seen. Estimates of birds present were made only when a flock was too large to count individuals. No attempt was made to predict the presence of bird species that were neither seen or heard on a plot.

Counts were made under satisfactory weather conditions, i.e. good visibility, little or no precipitation, light winds (< 19 km/hr). Fog,

steady drizzle, and prolonged rain were avoided so counts could be compared. Surveys began within 15 minutes of local sunrise and continued for 4-4.5 hours (time required to complete at least half of the study plots).

The entire area between the road and fenceline was thoroughly searched for bird nests once or twice a week from 26 April through 15 July with the help of field assistants. Nests were identified, plotted, and the number of eggs and type of nest substrate also were recorded. Once located, 1 m wooden stakes were placed 1 m east of each nest. Nests were checked every 3 to 4 days to monitor the development of the eggs and young. Visits to each nest lasted just long enough to gather the pertinent information (about 30 seconds) so as not to disturb the birds anymore than necessary. Evidence of mortality was recorded for each nest (e.g. crushed or empty eggs, feathers left in and around the next, dead birds). Overall reproductive success as defined by Francis (1971) (the ratio of young fledged to eggs laid) was determined for Red-winged Blackbirds (Table 5). Hatching success was defined as the number of eggs that hatched divided by the total number of eggs laid (Wallace and Mahan 1975). Fledging success was defined as the ratio of the number of young that fledged (i.e. a young bird that has recently left the nest, is feathered, and still depends on its parents for food) to the number of young that were born.

Vegetation analysis was conducted from 4-14 August 1985, using the line-intercept method (Brower and Zar 1984). All plots were sampled for species composition and effective height within the ROW. Effective height is a measure of the height density distribution of vegetation. It was obtained by placing a meter stick vertically into the vegetation, standing 1 m away, and recording the height below which the stick was more than 90% obscured by the vegetation (Wiens 1969). Linear and relative coverage

indices were calculated for each plot according to Brower and Zar (1984). Dominant grass(es) within the ROW was determined by the relative coverage index. Presence or absence of shrubs/small trees within the ROW was noted for each plot. Plots with the same dominant grass(es) and presence or absence of shrubs were joined for comparison (Table 7, Appendix C).

Adjacent land was categorized as forest, brush seral, wetland, and farm. The 'forest-type' (plots 6, 7) consisted of a long, narrow (30 m) tract of abandoned railroad right-of-way which harbored relatively mature forest growth (there was no true upland forest near the ROW). Ash (Fraxinus sp.), mountain ash (Sorbus americanus) and elm (Ulmus americana) were the dominant tree species. Behind this quasi-forest was a long expanse of corn (Zea mays). Brush seral (plots 11, 14) was characterized by being predominately covered with shrubs under 3 m tall and having intermittent open areas of grass or weeds. These areas were only 60 m and 100 m wide (away from the ROW), respectively, and land immediately behind these areas was seeded to corn. Wetland (plots 1b, 5, 10, 13) was characterized by burrow pits being mostly covered with willows (Salix spp.) and usually having some marshy areas, i.e. cattails and sedges. Farm (plots 1a, 2, 3, 4, 8, 9, 12) was land planted to corn or soybean (Glycine max).

Birds that were recorded within or adjacent to the ROW on more than 3 censuses (after 1 May) were considered as using either the adjacent habitat, the ROW, or both and were included in the species diversity list (Table 3, Appendix D). This procedure (limits of 3 censuses after 1 May) was arbitrarily chosen to exclude birds that were not utilizing the adjacent habitat or ROW for cover, foraging, or nesting to any great extent (i.e. early migrants, occasional visitors).

RESULTS

Fourteen plots, covering 6,710 m of an interstate right-of-way were thoroughly searched for bird nests from 26 April through 15 July 1985 (Appendix A). A total of 173 nests with eggs was found (Table 1). Of these, 94.8% were made by Red-winged Blackbirds. Other species found nesting within the ROW included the American Robin (Turdus migratorius); 4 (2.3%), Mallard (Anas platyrhynchos); 2(1.2%), Field Sparrow (Spizella pusilla); 1 (0.6%), Song Sparrow (Melospiza melodia); 1 (0.6%), and Common Grackle (Quiscalus quiscula); 1 (0.6%) (Table 1). Species other than Red-wings made up on 5.2% of all nests found within the ROW. Nearly all Red-winged Blackbird nests were found in shrubs (70.7%) or alfalfa (16.5%) (Table 2). The majority of the nests (94.2%) were found beyond 15 m from the road edge (Table 4). Ten nests were located between 5 m and 15 m of the road edge and none were found within 5 m of the pavement (Table 4). The overall reproductive success for the Red-winged Blackbird was 57.4% (Table 5). In non-roadside habitats, Red-winged Blackbird success varied from 37 to 67 percent (Francis 1971). Meanley and Webb (1963) found an average of 57% of active nests in the marshes of Chesapeake Bay, Maryland, were successful in fledging one or more young. Brenner (1966), in a Pennsylvania marsh, found that 53% of active nests were successful from 1960-64. The majority of my nests (87%) ranged from 0.1 to 0.99 m above the ground. Fourteen (8.6%) nests were found between 1 m and 1.5 m, and 7 (4.3%) nests were found over 1.5 m above the ground (Table 5). There was no correlation between nest height and success of rearing at least one fledgling (Table 5). The overall clutch size for Red-winged Blackbird was 3.26 eggs/nest. Hatching success was 71.5% and fledgling success was 84.5% (Table 6).

Brome/Alfalfa, Brome, and Fescue were the 3 dominant cover types found within the ROW (Appendix C). Five of the 14 (35.7%) plots investigated had

shrubs or small trees within the ROW (Appendix C). Plots with shrubs present within the ROW had significantly more nests/acre ($t=1.86$, $p<0.05$) than plots without shrubs (6.13 to 2.63) nests/acre respectively; Table 7). Of the 5 other species found nesting in the ROW, 4 of them (Mallard, American Robin, Field Sparrow, Common Grackle) were found only in ROW plots that contained shrubs. The robin, Field Sparrow, and grackle nested in shrubs whereas the Mallard nested on the ground. The Song Sparrow was the only species that nested in a plot without shrubs in the ROW. Thus, the presence of woody vegetation within the ROW not only increased bird densities, but also influenced avifaunal diversity of nesting species.

There was little difference between the density of nests found in plots with brome/alfalfa in the presence or absence of shrubs (6.39 to 4.99 nests/acre respectively, Table 7). Red-winged Blackbirds often made nests in alfalfa when no shrubs were absent (J. Paruk, pers. obs.). Red-winged Blackbirds, however, nested more frequently in plots of brome with shrubs (11.10 acre) than in plots without shrubs (2.90 acre). Twenty-seven (16.6%) Red-winged Blackbird nests were found in alfalfa while only 2 (1.2%) were in brome (Table 2). Alfalfa is sturdier than brome and undoubtedly served as a better substrate for supporting nests. Furthermore, brome/alfalfa plots had taller and denser cover than plots with only brome (effective height: 37.7 cm and 12.5 cm respectively, Appendix C). It did not matter whether Fescue dominated plots had shrubs (0.90 nests/acre) or not (0.00 nests/acre) within the ROW as these areas were seldom visited by nesting species (Table 7).

Plots adjacent to forested areas had the greatest number of species even though they only made up 12.7% of the total adjacent habitat types. Twenty-seven (73%) bird species were recorded within or adjacent to these

plots in contrast to plots adjacent to wetland (17 species; 45.9%), brush seral (15 species; 40.5%) and farm (13 species; 35.1%). It should be noted, however, that only 420 m of roadside surveyed (6.3%) was adjacent to brush seral habitat types. Graber and Graber (1963) found this habitat type had the greatest bird diversity of 11 other habitat types he investigated and no doubt the small size of the areas surveyed had an effect on the number of species recorded here.

DISCUSSION

Songbirds avoided nesting in fescue and made significantly more nests in plots with brome or brome/alfalfa ($p < 0.001$) (Table 7). Preliminary findings by the INHS from 1977-1980 reported similar findings (Warner 1981). Fescue, although shown by researchers to be toxic to mammals (Tookey et al. 1972, Leiter 1977), simply does not provide ground nesting birds with the necessary cover they need for hiding their nests. Fescue's average effective height was 6.3 cm as compared to brome's 12.5 cm and brome/alfalfa's 37.7 cm. Even plot 12 (fescue dominated) which had shrubs, albeit immature, located within the ROW, did not harbor many nests (Table 7). No solid conclusions can be drawn from these data, however, because only 450 m of roadside was surveyed with fescue dominated ROW having shrubs and more time is needed to see if shrubs within fescue dominated ROW have considerably less nests than brome or brome/alfalfa areas with shrubs.

Birds are still nesting in early June and mowing at this time can be destructive to nests close to the road edge (David 1979). Warner (1981) reported nearly 25% (N=48) of the songbird nests the INHS discovered were within 3 m of the road edge and suggested IDOT should maintain their current policy of delayed mowing on the foreslopes of some interstate and secondary ROW until after 1 August. During our study, the IDOT mowed a 5 m strip on

the foreslopes of the ROW in early June for safety purposes. No nests (N=173) were found within 5 m of the road edge before or after mowing. Thus, the current policy by IDOT of mowing the foreslopes in early June, at least along I-5 in Whiteside county, can be continued with the assurance that few nests are being destroyed.

The INHS found 2 nests/acre along ROW with brome/alfalfa as the dominant cover type (no shrubs). I (senior author) found 4.99 nests/acre in plots with similar dominants without shrubs. Although the latter figure is considerably higher, it should be kept in mind that the INHS searched for bird nests only twice during the summer whereas I conducted 10 weekly censuses. Thus, more nests might have been discovered because the searching period was considerably longer. The INHS, however, found considerable year to year variation and their figure of 2 nests/acre is an average for a 4-year period. Interestingly enough, plots with shrubs in the ROW had significantly more nests/acre ($p < 0.05$) than plots without shrubs (Table 7). Arnold (1983) had similar results in England and found more Blackbirds nesting in areas with shrubs than without shrubs. Thus, woody vegetation present within ROW greatly increased nesting density of this species.

David and Warner (1979) reported an additional six species of birds nesting in the ROW that I did not find, however, they were in low abundance. These included the Eastern Meadowlark (Sturnella magna), Dickcissel (Spiza americana), Savannah Sparrow (Passerculus sandwichensis), Grasshopper Sparrow (Ammodramus savannarum), Vesper Sparrow (Pooecetes gramineus) and Sedge Wren (Cistothorns platensis). Warner (1981) found approximately 95% of the songbird nests along interstate ROW were established by Red-winged Blackbirds. I found that 94.8% were made by Red-winged Blackbirds. Few other bird species utlized the ROW for nesting and those that were

present here were in low numbers. It appears from these data that most songbirds tend to avoid nesting in the long, narrow ROW. At present, only the Red-winged Blackbird is using ROW habitat extensively for nesting.

Red-winged Blackbirds, unlike many other birds, have adapted quite well to nesting along the interstate and, to some extent, rural ROW (Clark and Karr 1979, David and Warner 1979, Adams and Geis 1981). From 1965-1981 in North and South Dakota, Red-winged Blackbird populations dropped from 2 million breeding males to 1.2 million (Besser et al. 1984). Of this decrease, the number of breeding males dropped 47% in non-roadside habitats to only 18% along roadside habitats. Nationwide, however, Red-winged Blackbird are increasing and it is not known if the increase in superhighway ROW habitat nationally (1 to 1.5 million acres) is a contributory cause (Adams and Geis 1981). Clark and Karr (1979) working in east-central Illinois reported increased abundance of Red-winged Blackbirds along interstate highways and fewer Red-winged Blackbirds in association with county roads. At the present time it is not known what habitat features Red-winged Blackbirds find attractive. It is possible that males find utility wires and fences attractive singing sites.

Red-winged Blackbirds are increasing along Illinois roadsides, although to what extent is not known. Increases in Red-winged Blackbird populations along interstates may cause significant damage to crops. The IDOC may want to monitor Red-winged Blackbird abundance, especially in roadside vs. non-roadside areas, to see if Red-winged Blackbird populations are increasing along roadsides and if so, to what extent are they causing damage to agricultural crops.

Roadside management has been shown to be important to certain species of wildlife (Joselyn et al. 1968, Bruner et al. 1978, David 1979, Adams and Geis 1978), however, not all kinds of wildlife are adapting to

the long, narrow habitat corridor that ROW provide (Oxley et al. 1974, Zande et al. 1980, Adams and Geis 1981, Laursen 1981). Of all the songbirds, only the Red-winged Blackbird appears to have adapted to this habitat. Few other bird species are utilizing the ROW for nesting. The RWP was established to benefit all types of wildlife, including a board array of birds. At present, however, it appears only one species of bird is utilizing the ROW to any significant extent. Two questions that current managment for ROW might want to address are the following: 1) Are there any alternative ways to make ROW habitat appealing to other bird species and if so, how?; and 2) Can anything be done to decrease the use of ROW by Red-winged Blackbirds?

Altogether there are over 460,000 acres of roadside turf (excluding medians) in Illinois (David 1979). The greatest wildlife value for this area to birds is in nest cover. At present, the overall value of roadside habitats to a wide array of birds is low. Red-winged Blackbirds appear to be the only bird that has adapted to this habitat in Illinois. The long, narrow ROW corridor simply does not provide most songbirds with the habitat and cover they need for survival. Similarly, noise levels are exceedingly high along highways and most songbirds exhibit a negative response to them (Adams and Geis 1981). Mowing during the nesting season can be detrimental if the entire ROW is mowed, however, if only a small area is mowed next to the road edge (for safety purpose) it appears that few songbird nests will be destroyed.

SUMMARY

The right-of-way along Interstate-5 in Whiteside county was predominantly used for nesting (94.8%) by Red-winged Blackbirds. Five other species of birds were found nesting in the ROW (Mallard, American Robin,

Field Sparrow, Song Sparrow, Common Grackle), but combined they made up only 5.2% of all nests found. Woody vegetation present in the ROW greatly increased bird nesting density from 2.63 to 6.13 nests/acre. Plots with brome or brome/alfalfa as the dominant cover type had significantly more nests/acre ($p < 0.001$) than plots with fescue as the dominant cover type. Plots adjacent ot forested areas had a greater species diversity of birds within and adjacent to the ROW than either of the other habitat types studied.

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TABLES

Table 1. Total number of nests of species found within 6,710 m of right-of-way on I-5 between Rock Falls and Erie (Whiteside County), Illinois.

Species	No. of Nests	%
Red-winged Blackbird	164	94.8
American Robin	4	2.3
Mallard	2	1.2
Common Grackle	1	0.6
Field Sparrow	1	0.6
Song Sparrow	1	0.6
Total	173	100.1

Table 2. Total number of nests for each species found nesting in the right-of-way and its substrate.

Red-winged Blackbird Substrate	No. of Nests	%
Honeysuckle (*Lonicera* sp.)	116	70.7
Alfalfa (*Medicago sativa*)	27	16.5
Prairie Milkweed (*Asclepias sullivantii*)	4	2.4
Black Locust (*Robinia pseudoacacia*)	2	1.2
Willow (*Salix* sp.)	2	1.2
Bull Thistle (*Cirsium vulgare*)	2	1.2
White Mulberry (*Morus alba*)	2	1.2
Smooth Brome (*Bromus inermis*)	2	1.2
Reed Canary Grass (*Phalaris arundinacea*)	1	0.6
Hawthorn (*Crataegus* sp.)	1	0.6
Cattail (*Typha* sp.)	1	0.6
Winter Cress (*Barbarea vulgaris*)	1	0.6
Aster (*Aster pilosus*)	1	0.6
Wild Grape (*Vitis* sp.)	1	0.6
Common Raspberry (*Rubus occidentalis*)	1	0.6
Total	164	99.8
Robin		
Honeysuckle (*Lonicera* sp.)	2	50.0
Wild Grape (*Vitis* sp.)	1	25.0
White Mulberry (*Morus alba*)	1	25.0
Total	4	
Mallard		
Ground	2	100.0

Table 2 continued.

Field Sparrow Substrate	No. of Nests	%
Hawthorn (*Crataegus* sp.)	1	100
Song Sparrow		
Ground	1	100
Common Grackle		
Black Locust (*Robinia pseudoacacia*)	1	100
Total all nests	173	

Table 3. Total number of bird species recorded adjacent to or within the right-of-way on I-5 for a particular adjacent habitat type in, Whiteside County, between 3 May and 1 August 1985.

Adjacent Habitat	Length of roadside bordering habitat	No. of bird species
Forest	850	27
Wetland	1,840	17
Brush seral	420	15
Farm	3,600	13
	6,710	

Table 4. Number and location of nests found along the right-of-way of I-5, Whiteside county.

Number of nests	Distance from Roadside (m) 0-4.9	5.0-14.9	15.0+
Red-winged Blackbird	0	10	154
Robin			4
Mallard		1	1
Field Sparrow			1
Song Sparrow			1
Common Grackle			1
Total	0	11	162

Table 5. Reproductive success for Red-winged Blackbirds nesting at three different height intervals along the I-5 right-of-way, Whiteside County, Illinois.

		Nest Height (m)			
		0.1-0.99	1.00-1.49	1.50+	$\bar{x}$
Red-winged Blackbird	N	472	45	14	
	%	54.3	59.1	58.8	57.4

Table 6. Average clutch size, hatching success, and fledging success for all bird species nesting within the I-5 right-of-way between Rock Falls and Erie, Illinois.

Species	No. of Nests	$\bar{x}$ Clutch Size	Hatching Success (%)	Fledging Success (%)
Red-winged Blackbird	164	3.26	71.5	84.5
American Robin	4	2.75	54.5	83.0
Mallard	2	9.50	47.4	100.0
Field Sparrow	1	3.00	100.0	?
Song Sparrow	1	3.00	100.0	100.0
Common Grackle	1	3.00	33.3	100.0
	173			

Table 7. Total number of nests/acre in various dominant cover types within the right-of-way along I-5 between Rock Falls and Erie, Illinois.

Dominant Cover Type	Plots	Total # Nests	Length of Roadside(m)	Nest/ Acre
Brome/alfalfa (shrubs)	1,2	79	2,230	6.39
Brome/alfalfa (no shrubs)	4,5,11	27	960	4.99
Brome (shrubs)	8,9	40	650	11.10
Brome (no shrubs)	3,6,7	25	1,450	2.90
Fescue (shrubs)	12	2	450	0.90
Fescue (no shrubs)	10,13,14	0	970	0.00
Total		173	6,710	4.20
Plots with shrubs		121	3330	6.13*
Plots without shrubs		52	3380	2.63

* Plots with shrubs had significantly more nests/acre than plots without shrubs, $p < 0.05$ (one-tailed t-test).

Table 8. Total number of nests/acre for plots with brome or brome/alfalfa and fescue as the dominant cover type within the I-5 right-of-way between Rock Falls and Erie, Illinois.

Brome or brome/alfalfa	171	5290	6.34*
Fescue	2	1420	0.45

*Plots with brome or brome/alfalfa as the dominant cover type had significantly more nest/acre than pltos with fescue as the dominant cover type, $p < 0.001$ (two-tailed t-test).

FIGURES

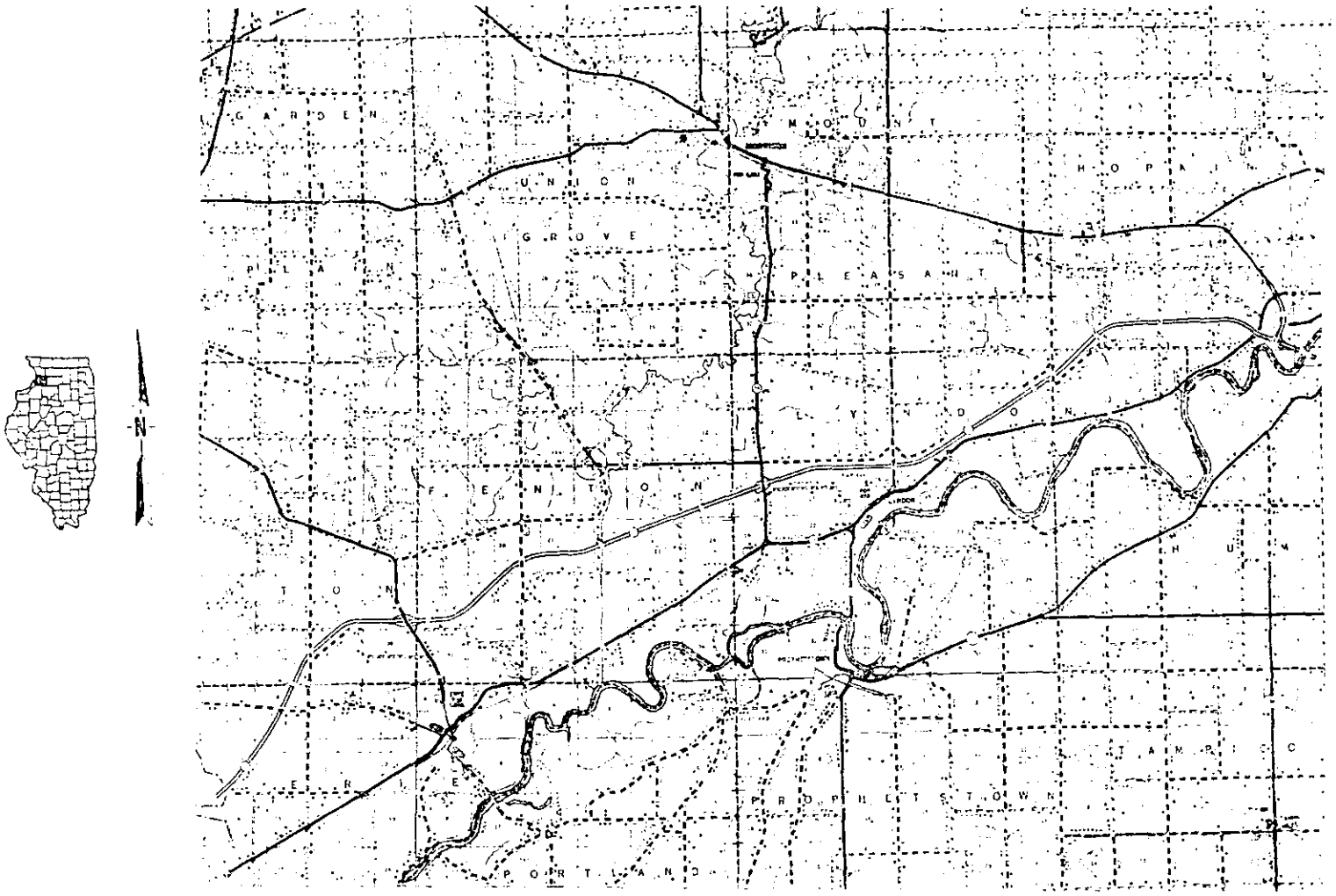

Figure 1. Location of bird surveys along Interstate-5 in Whiteside county, Illinois.

Appendix A. Length and width of each plot and its adjacent habitat on I-5, Whiteside county.

Plot	Adjacent Habitat	Length (m)	Width of ROW (m)
[1]A	Farm	900	22.1
[1]B	Wetland	780	22.1
2	Farm	550	22.5
3	Farm	600	21.4
4	Farm	450	22.3
5	Wetland	210	27.3
6	Forest	450	22.9
7	Forest	400	28.4
8	Farm	300	21.8
9	Farm	350	22.5
10	Wetland	400	25.8
11	Brush seral	300	19.6
12	Farm	450	19.7
13	Wetland	450	20.0
14	Brush seral	120	19.0
		6,710	

[1]A and [1]B were both part of one long transect, but were further subdivided because they were adjacent to two different habitat types.

Appendix B. Vegetation composition for each plot and its linear and relative coverage index.

Table B_{1-14}. Vegetation composition for plot 1.

Plant species	Linear Index (ICi*)	Relative Coverage (RCi**)
Smooth Brome (Bromus inermis)	9215	65.8
Alfalfa (Medicago sativa)	4145	29.6
Honeysuckle (Lonicera sp.)	200	1.4
Downy Aster (Aster pilosus)	135	1.0
Wood Nettle (Laportea canadensis)	115	0.8
Wild Lettuce (Lactuca canadensis)	90	0.6
Bull Thistle (Cirsium vulgare)	57	0.4
Dandelion (Taraxacum officinale)	35	0.2
Morning Glory (Ipomoea purpurea)	32	0.2
Common Milkweed (Ascleplas syriaca)	15	0.1

*ICi=li/L, where li is the sum of the intercept lengths for species i and L is the total length of all transects sampled.

**RCi=li/sum of l, where l is the sum of the intercept length for all species.

Table B_{2-14}. Vegetation composition for plot 2.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	4705	78.4
Alfalfa (Medicago sativa)	1215	20.2
Honeysuckle (Lonicera sp.)	695	11.6
Bull Thistle (Cirsium vulgare)	180	3.0
Wood Nettle (Laportea canadensis)	105	1.8
Spreading Dogbane (Apocynum androsaemifolium)	62	1.0
Morning Glory (Ipomoea purpurea)	26	0.4
Dandelion (Taraxacum officinale)	17	0.3
Common Milkweed (Ascleplas syriaca)	14	0.2

Table B_{3-14}. Vegetation composition for plot 3.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	3395	67.9
Bull Thistle (Cirsium vulgare)	130	2.6
Alfalfa (Medicago sativa)	85	1.7
Pigweed (Amaranthus retroflexus)	85	1.7
Parsnip (Pastinaca sativa)	42	0.8
Common Milkweed (Asclepias syriaca)	35	0.7
Wood Nettle (Laportea canadensis)	29	0.6
Morning Glory (Ipomoea purpurea)	20	0.4
Whorled Milkweed (Asclepias verticillata)	19	0.4
Canadian Thistle (Cirsium arvense)	12	0.2

Table B_{4-14}. Vegetation composition for plot 4.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	3630	60.5
Alfalfa (Medicago sativa)	1840	30.7
Pigweed (Amaranthus retroflexus)	160	2.7
Bluegrass (Poa pratensis)	110	1.8
Compass plant (Silphium laciniatum)	74	1.2
Goldenrod (Solidago sp.)	70	1.2
Rose (Rosaceae sp.)	65	1.1
Bull Thistle (Cirsium vulgare)	50	0.8
Common Milkweed (Asclepias syriaca)	20	0.3
Wild Lettuce (Lactuca canadensis)	15	0.2
Horsetail (Equisetum sp.)	11	0.2
Honeysuckle (Lonicera sp.)	10	0.2

Table B_{5-14}. Vegetation composition for plot 5.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	2855	57.1
Alfalfa (Medicago sativa)	1368	27.4
Goldenrod (Solidago sp.)	210	4.2
Downy Aster (Aster pilosus)	50	1.0
Wild Lettuce (Lactuca canadensis)	30	0.6
Morning Glory (Ipomoea purpurea)	5	0.1

Table B_{6-14}. Vegetation composition for plot 6.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	4610	92.2
Alfalfa (Medicago sativa)	151	3.0
Black Locust (Robinia pseudoacacia)	150	3.0
Quackgrass (Agropyron repens)	85	2.0
Goldenrod (Solidago sp.)	35	0.7
Wild Lettuce (Lactuca canadensis)	10	0.2

Table B_{7-14}. Vegetation composition for plot 7.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	4730	94.6
Goldenrod (Solidago sp.)	37	0.7
Alfalfa (Medicago sativa)	30	0.6
Bull Thistle (Cirsium vulgare)	5	0.1
Wild Lettuce (Lactuca canadensis)	3	0.1

Table B_{8-14}. Vegetation composition for plot 8.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	2090	34.8
Bluegrass (Poa pratensis)	1391	23.2
Goldenrod (Solidago sp)	93	1.6
Parsnip (Pastinaca sativa)	90	1.5
Downy Aster (Aster pilosus)	70	1.2
Honeysuckle (Lonicera sp.)	53	0.9
Vervain (Verbena sp.)	50	0.8
Whorled Milkweed (Asclepias verticillata)	20	0.3
Wild Lettuce (Lactuca canadensis)	12	0.3
Canadian Thistle (Cirsium arvense)	8	0.1
Common Milkweed (Asclepias syriaca)	7	0.1

Table B_{9-14}. Vegetation composition for plot 9.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	4134	51.7
Bluegrass (Poa pratensis)	226	2.8
Joe-pye-weed (Eupatorium maculatum)	161	2.0
Honeysuckle (Lonicera sp.)	86	1.1
Downy Aster (Aster pilosus)	75	0.9
Pigweed (Amaranthus retroflexus)	63	0.8
Marigold (Tagetus sp.)	44	0.6
Tall Fescue (Festuca elaitor)	38	0.5
Wild Lettuce (Lactuca canadensis)	38	0.5
Common Milkweed (Asclepias syriaca)	22	0.3
Goldenrod (Solidago sp.)	8	0.1
Wintercress (Barbarea vulgaris)	5	-

Table B_{10-14}. Vegetation composition for plot 10.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Tall Fescue (Festuca elaitor)	3694	73.9
Wheat grass (Agropyron sp.)	116	2.3
Bluegrass (Poa pratensis)	115	2.3
Smooth Brome (Bromus inermis)	104	2.1

Table B_{11-14}. Vegetation composition for plot 11.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Smooth Brome (Bromus inermis)	2893	57.9
Alfalfa (Medicago sativa)	1903	38.1
Tall Fescue (Festuca elaitor)	40	0.8
Common Milkweed (Asclepias syriaca)	29	0.6
Wood Nettle (Laportea canadensis)	23	0.5

Table B_{12-14}. Vegetation composition for plot 12.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Tall Fescue (Festuca elaitor)	1948	32.5
Bluegrass (Poa pratensis)	1431	23.9
Wheat grass (Agropyron sp)	217	4.0
Red clover (Tiitoliam pratense)	115	1.9
Honeysuckle (Lonicera sp.)	37	0.6
Bull Thistle (Cirsium vulgare)	27	0.5
Horsetail (Equisetum sp.)	74	1.2
Vervain (Verbena sp.)	4	0.1

Table B_{13-14}. Vegetation composition for plot 13.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Tall Fescue (Festuca elaitor)	2230	37.2
Bluegrass (Poa pratensis)	202	3.4
Willow (Salix sp.)	135	2.3
Common Milkweed (Asclepias syriaca)	12	0.2

Table $B_{14\text{-}14}$. Vegetation composition for plot 14.

Plant species	Linear Index (ICi*)	Relative Coverage (RC**)
Tall Fescue (*Festuca elaitor*)	3768	75.4
Vervain (*Verbena* sp.)	385	7.7
Bluegrass (*Poa pratensis*)	315	6.3
Wheat grass (*Agropyron* sp.)	25	0.5

Appendix C. Dominant cover type, effective height, and presence/absence of shrubs within the right-of-way for each plot.

Plot	Dominant Cover Type	Effective Height (cm)	Woody Vegetation
1	Brome/alfalfa	39.0	x
2	Brome/alfalfa	45.1	x
3	Brome	12.2	
4	Brome/alfalfa	37.2	
5	Brome/alfalfa	44.2	
6	Brome/alfalfa	34.0	
7	Brome	14.4	
8	Brome	12.8	x
9	Brome	10.8	x
10	Fescue	6.0	
11	Brome/alfalfa	26.8	
12	Fescue	7.0	x
13	Fescue	7.3	
14	Fescue	4.9	

Effective Height (cm)	$\bar{x}$ (cm)
Brome/Alfalfa	37.7
Brome	12.5
Fescue	6.3

Appendix D. List of species recorded adjacent to or within the right-of-way on I-5 for particular habitat types.

Species	Farm	Brush seral	Wetland	Forest
Mallard	X	X	X	
Killdeer	X		X	
Ring-billed Gull			X	
Herring Gull			X	
Rock Dove	X	X	X	X
Mourning Dove		X		X
Chimney Swift		X	X	X
Black-capped Chickadee				X
Eastern Kingbird		X		
Ruby-throated Hummingbird				X
Northern Flicker				X
Tree Swallow		X	X	X
Barn Swallow	X	X	X	X
Blue Jay				X
American Crow	X		X	X
American Robin	X	X	X	X
House Wren				X
Gray Catbird		X		X
Brown Thrasher				X
Cedar Waxwing				X
European Starling				X
Red-eyed Vireo				X
Yellow Warbler			X	X
Common Yellowthroat		X	X	X

Appendix D. continued.

Species	Farm	Brush Seral	Wetland	Forest
Horned Lark	X		X	
Indigo Bunting		X		
Northern Cardinal				X
Rose-breasted Grosbeak				X
Dickcissel	X			
Song Sparrow	X	X	X	X
Red-winged Blackbird	X	X	X	X
Eastern Meadowlark	X			
Common Grackle	X	X	X	X
Brown-headed Cowbird				X
Northern Oriole				X
American Goldfinch		X	X	
House Sparrow	X			X
Total	13	15	17	27

Appendix E. Species composition of road-killed animals on I-5 between Rock Falls and Erie, Illinois, during April through August 1985.

Birds

Ring-necked pheasant (Phasianus colchicus)

Horned lark (Eremophila alpestris)

Barn Swallow (Hirundo rustica)

American Robin (Turdus migratorius)

Song Sparrow (Melospiza melodia)

Red-winged Blackbird (Agelaius phoeniceus)

Common Grackle (Quiscalus quiscula)

House Sparrow (Passer domesticus)

Mammals

White-tailed Deer (Odocoileus virgianus)

Raccoon (Procyon lotor)

Striped Skunk (Mephitis mephitis)

Opossum (Didelphis marsupialis)

Eastern Woodchuck (Marmota monax)

Eastern Cottontail (Sylvilagus floridanus)

Fox Squirrel (Sciurus niger)

Thirteen-lined Ground Squirrel (Citellus tridecemlineatus)

Reptiles

Ornate box turtle (Terrapene ornata)

Eastern garter snake (Thamnophis sirtalis)

Appendix F. Common and scientific names of birds reported in the paper.[a]

Common Name	Scientific Name
Mallard	Anas platyrhychos
Killdeer	Charadrius vociferus
Ring-billed Gull	Larus delawarensis
Herring Gull	Larus argentatus
Rock Dove	Columbia livia
Mourning Dove	Zenaida macroura
Chimney Swift	Chaetura pelagica
Black-capped Chickadee	Parus atricapillus
Eastern Kingbird	Tyrannus tyrannus
Ruby-throated Hummingbird	Archilochus colubris
Northern Flicker	Colaptes auratus
Tree Swallow	Iridoprocne bicolor
Barn Swallow	Hirundo rustica
Blue Jay	Cyanocitta cristata
American Crow	Corvus brachrhynchos
American Robin	Turdus migratorius
House Wren	Troglodytes aedon
Gray Catbird	Dumetella carolinensis
Brown Thrasher	Toxostoma rufum
Cedar Waxwing	Bombycilla cedrorum
European Starling	Sturnus vulgaris
Red-eyed Vireo	Vireo olivaceus
Yellow Warbler	Dendroica petechia
Common Yellowthroat	Geothlypis trichas

Common Name	Scientific Name
Horned Lark	*Eremophila alpestris*
Indigo Bunting	*Passerina cyanea*
Northern Cardinal	*Cardinalis cardinalis*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Dickcissel	*Spiza americana*
Song Sparrow	*Melospiza melodia*
Red-winged Blackbird	*Agelaius phoeniceus*
Eastern Meadowlark	*Sturnella magna*
Common Grackle	*Quiscalus quiscula*
Brown-headed Cowbird	*Molothrus ater*
Northern Oriole	*Icterus spurius*
American Goldfinch	*Carduelis tristis*
House Sparrow	*Passer domesticus*

[a]Scientific names according to American Ornithologists Union (1981).