BIRD AND HERPETOFAUNAL INVENTORY ON ST. LOUIS COUNTY LANDS

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INTRODUCTION

Neotropical migrant birds have recently received much attention following reported declines in many species that breed in eastern North America. Probable causes for such declines include events such as habitat alteration, occurring on both breeding and wintering grounds. Changes in forest species composition and age structure, and the spatial arrangement of these forest components may influence bird communities in both regions. The consequences of these changes to birds and other wildlife in Minnesota are not well understood.

Minnesota's forests harbor a greater diversity of songbirds than anywhere else in North America. Birds represent more than 70% of the more than 150 terrestrial vertebrate species in northern Minnesota forests. Development of forest management plans designed to sustain the diversity of these forests should address bird communities occupying them.

To better understand the effects of forest management activities on bird communities in southern St. Louis County, bird census points were established in and around 24 sites which had been previously logged. Herpetofaunal sampling was also established on two of the 24 sites chosen for bird censuses. Results of these surveys were used to determine the use of recently harvested sites (and areas immediately surrounding them) by birds and herpetofauna and to establish baselines for continued monitoring of bird and herpetofaunal communities on these and additional sites.

Objectives: The objectives of this initial year of surveying bird and herpetofaunal communities in regenerating habitats were to: (1) survey at least 20 recently-logged sites for breeding birds; (2) establish herpetofaunal sampling on two of these sites; and (3) establish a baseline for continued research on species associations in regenerating and other habitats in southern St. Louis County.

METHODS

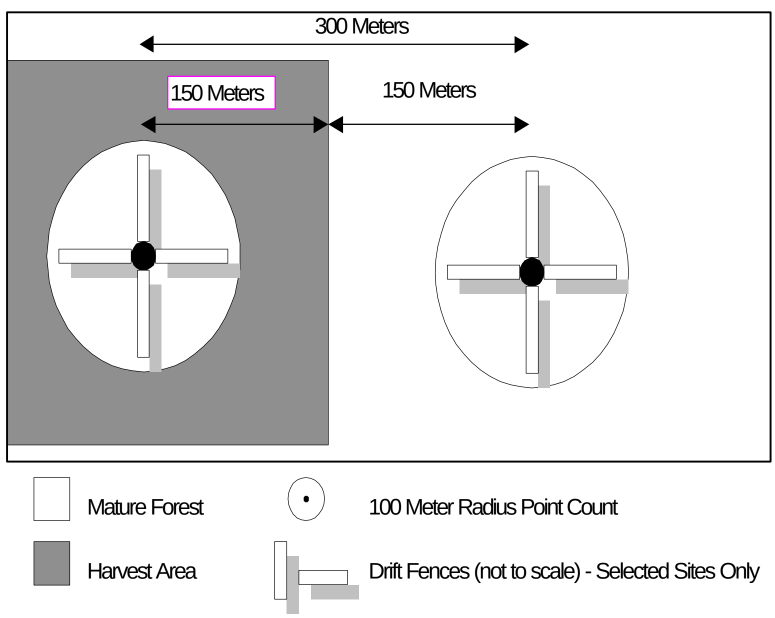
Plot selection. Twenty-four sites were selected and surveyed for breeding birds during 1997, with two of these sites also chosen for herpetofaunal surveys. These sites included regenerating habitats large enough to position bird census points at least 150 m from any harvest boundaries and surrounding habitats of mature and relatively homogeneous aspen and birch composition. Regenerating habitats were stratified during selection to achieve a sequence of ages from stand origin through advanced regeneration. Sites were also selected to represent a balance of deciduous and coniferous habitats. Deciduous sites were most often represented by naturally regenerating aspen whereas red pine and white spruce plantations typified coniferous sites (Table 1). Efforts were also made to locate these sites in or near previously surveyed bird census points on biophysical plots when possible (see Montgomery and Niemi 1995, 1996).

Table 1. Age and species composition of selected plots (11 plots not included).

	Years since stand origin													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Deciduous Plots	1				1		2		1		2	1		
Coniferous Plots					1		1		1		1	1		
total (13)	1				2		3		2		3	2		

Bird census points. Two bird census points were established within each site. One point was placed within the logged area, approximately 150 m from the nearest edge of the harvest boundary. The second point was placed in the surrounding mature habitat 150 m from the harvest boundary and at least 150 m from any other active or recent timber harvest areas. Both bird census points were placed along a single compass bearing to maintain a distance of 300 m between points (Figure 1).

Figure 1. Graphical representation of a generalized plot layout.



Census points were marked with orange paint and flagging, on a prominent tree when possible, and travel routes between sample points were marked using pink flagging. Tags were placed at the census points which included a toll-free telephone number for the Natural Resource Research Institute to which questions or concerns could be directed.

Once bird census points were established at a site, maps were drawn of the site which included the distances to site access points from prominent features (e.g., road intersections, bridges, section markers), routes of travel to bird census points, habitat and landscape features, and estimated driving time to the plot. These maps will minimize the time needed to relocate sites and census points during future censuses.

Bird surveys. Surveys were conducted at each point using the point count method (Reynolds et al. 1989, Howe et al. 1998). All birds seen or heard 100 m or less from the census point were recorded during a ten minute period. When possible, these birds were identified to sex. This method is most effective for determining the relative abundance of singing birds; the majority of species and individuals in the forested areas of Minnesota. Birds which were heard outside of the 100 m radius were also recorded, but were not included in the relative abundance estimates for the census point.

Each point was censussed three times for breeding birds from 3 June to 9 July, 1997. Censuses were stratified during the breeding season with the initial census of each point taking place early in the breeding season (3 June to 9 June), the second census during the middle of the breeding season (14 June to 24 June), and the final census late in the breeding season (26 June to 9 July). All censuses were begun 0.5 hr before sunrise and continued no later than 4 hrs after sunrise. No censuses were conducted on mornings when weather conditions (precipitation and winds > 24 kph) may have affected the birds. Weather conditions were recorded during each survey to verify acceptable conditions for censussing birds.

Herpetofaunal monitoring. Herpetofauna were sampled at two of the 24 sites (identified as plot T and plot N) using drift fences in combination with pitfall and funnel traps. Eight drift fences were placed at each plot with four fences located in the regenerating habitats (identified as subplots TC and NC) and four in the mature habitat (identified as subplots TM and NM). Drift fences were located approximately 25 m from the bird census points in each of the cardinal directions (Figure 1). Each fence consisted of a fifty foot roll of three foot wide aluminum valley flashing buried approximately eight inches in the ground and supported by seven metal posts fastened to the flashing with electrical cable ties and wood lath. These fences acted as a barrier to direct the movement of small animals (frogs, toads, salamanders, and mammals) into the pitfall and funnel traps placed along each fence.

Four pitfall traps and four funnel traps were placed along each drift fence. Pitfall traps consisted of #10 cans buried against the drift fence, flush with the surface of the soil. Funnel traps were constructed of quarter inch square hardware cloth and electrical cable ties. Each funnel trap consisted of a cylindrical body and two cones inverted into either end of the cylinder. Pitfall and funnel traps were alternated with one another along the length of the fence.

Drift fences were constructed from mid- to late-June and monitored every other day through the end of August. All fences were inspected for captures every other morning throughout this period to minimize trap loses. Captured animals were identified to species, measured, marked by clipping a toe, and released. Marks applied to the animals have been shown to persist for periods greater than the sampling period of this project.

Observer training. Censuses of breeding birds on the biophysical plots were conducted by one observer (K. Montgomery) with six years experience conducting extensive, systematic point counts throughout northern Minnesota, including censusing breeding birds on St. Louis County biophysical plots from 1994 to 1996. All observers are also required to undergo an auditory screening to determine hearing acuity and to pass an identification test of the songs of 75 regional bird species with 85% accuracy or better (Hanowski and Niemi 1994).

Drift fences were constructed and monitored by K. Montgomery and four students. K. Montgomery had previously constructed and monitored drift fences in St. Louis County during biophysical plot inventories completed in 1996. K. Montgomery also trained students in the monitoring protocol and herpetofaunal identification.

Habitat data. Recently harvested areas were classified as either regenerating deciduous or regenerating coniferous habitat. Age of the harvested areas (defined as time since timber harvest) was determined by consulting with St. Louis County Land Department personnel. Mature habitats surrounding these areas were classified by the predominant tree species represented in the forest canopy. Where possible, aspen and birch cover types, the most common cover types in the area, were selected as mature habitats.

Data management. All bird census data were entered into a Paradox file and herpetofaunal data into an Excel spreadsheet directly from field data sheets. The data files were checked against the field data sheets for accuracy.

RESULTS

Table 2. Number of individuals observed by habitat type on St. Louis County lands in 1997.

		Habitat type			
	Total	Coniferous		Deciduous	
Species	individuals†	Regenerating	Mature	Regenerating	Mature
Common Snipe	3	1	0	2	0
Killdeer	1	0	0	1	0
Ruffed Grouse	5	1	1	2	1
Broad-winged Hawk	1	0	0	0	1
Hairy Woodpecker	2	0	0	1	1
Downy Woodpecker	6	2	1	2	1
Yellow-bellied Sapsucker	5	1	0	0	4
Northern Flicker	3	1	0	1	1
Common Nighthawk	1	1	0	0	0
Ruby-throated Hummingbird	2	1	0	0	1
Eastern Kingbird	1	0	0	1	0
Great Crested Flycatcher	2	0	0	2	0
Eastern Wood Pewee	1	0	0	0	1
Yellow-bellied Flycatcher	1	0	0	0	1
Alder Flycatcher	11	8	0	3	0
Least Flycatcher	16	0	6	3	7
Blue Jay	10	2	2	5	1
American Crow	2	2	0	0	0
Brown-headed Cowbird	1	1	0	0	0
Red-winged Blackbird	4	0	2	2	0
Common Grackle	1	0	0	1	0
Evening Grosbeak	3	0	1	2	0
Purple Finch	3	0	2	0	1
American Goldfinch	16	10	2	3	1
White-throated Sparrow	24	12	3	6	3
Chipping Sparrow	5	3	1	1	0
Clay-colored Sparrow	3	2	0	1	0
Song Sparrow	31	19	3	9	0
Lincoln’s Sparrow	6	4	1	1	0
Swamp Sparrow	4	0	1	2	1
Rose-breasted Grosbeak	7	1	0	5	1
Indigo Bunting	4	3	0	1	0
Scarlet Tanager	1	0	0	0	1
Tree Swallow	4	2	0	2	0
Cedar Waxwing	10	5	3	2	0

Red-eyed Vireo	44	5	16	8	15

Table 2. Continued.

		Habitat type			
	Total	Coniferous		Deciduous	
Species	individuals†	Regenerating	Mature	Regenerating	Mature
Solitary Vireo	3	0	0	2	1
Black-and-white Warbler	10	3	1	3	3
Golden-winged Warbler	6	3	0	3	0
Nashville Warbler	64	28	13	12	11
Northern Parula	2	0	0	1	1
Yellow-rumped Warbler	2	0	0	1	1
Magnolia Warbler	7	2	3	1	1
Chestnut-sided Warbler	60	28	4	26	2
Blackburnian Warbler	14	1	6	2	5
Black-throated Green Warbler	15	0	4	1	10
Pine Warbler	1	0	1	0	0
Ovenbird	52	5	22	3	22
Mourning Warbler	51	18	8	21	4
Common Yellowthroat	19	13	1	5	0
Canada Warbler	5	0	2	1	2
American Redstart	6	3	1	1	1
Gray Catbird	1	1	0	0	0
Winter Wren	9	0	1	3	5
Sedge Wren	1	0	0	1	0
Brown Creeper	13	1	4	1	7
Red-breasted Nuthatch	17	2	7	2	6
Black-capped Chickadee	9	2	3	2	2
Veery	23	5	6	8	4
Swainson’s Thrush	1	0	1	0	0
Hermit Thrush	6	0	2	2	2
American Robin	14	5	4	4	1

† highest number of individuals recorded during any of the three sample periods.

Birds. A total of 655 individual birds representing 62 species were identified during all 1997 censuses. The most common species observed included (in order of decreasing abundance): Nashville warbler, chestnut-sided warbler, ovenbird, mourning warbler, red-eyed vireo, song sparrow, white-throated sparrow, and veery. The composition and relative abundance of these species primarily reflects the types of habitats sampled. For instance, most of these species are highly associated with early-successional and shrubby habitats which were heavily sampled during the 1997 period. Of the species listed above, all are highly associated with young, regenerating forests, except for the red-eyed vireo and ovenbird.

Herpetofauna. Fifty-two individual amphibians (Table 3) representing four species (Table 4) were captured during herpetofaunal sampling conducted during 1997. This included a total of 8,303 trap nights. None of the individuals that were marked were recaptured.

The most common amphibian captured was the American toad (*Bufo americanus*) in which 34 individuals or 65 % of all amphibians captured were of this species. Other species captured included 12 wood frogs (*Rana sylvaticus*), 4 spring peepers (*Hyla crucifer*), and 2 blue-spotted salamanders (*Ambystoma laterale*) (Table 4).

Table 3. Summary of 1997 St. Louis County drift fence by trap night from 20 June to 29 August.

	Trap Nights		
Fence	Funnels	Pitfalls	Total Captures
TC1	288	240	1
TC2	292	240	0
TC3	292	276	0
TC4	292	288	2
TM1	285	288	7
TM2	288	288	6
TM3	288	172	8
TM4	284	240	1
NC1	284	240	0
NC2	274	240	0
NC3	284	240	1
NC4	284	240	1
NM1	240	240	3
NM 2	184	240	8
NM3	252	240	10
NM4	240	240	4
Totals	4351	3952	52

Large differences were observed in the catch rates among the paired habitats in both research plots (T and N). A total of 3 captures per 2208 trap nights were made in subplot TC or a capture rate of .00135 per trap night. Similarly, only 2 captures per 2086 trap nights were made in subplot NC or a capture rate of .00095 per trap night. In contrast, 22 captures per 2133 trap nights (.0103 per trap night) were made in subplot TM and 25 captures per 1876 trap nights (.0133 per trap night) in subplot NM. Hence, capture rates in the mature habitats were on the order of 7-14 times those in the regenerating habitats.

Table 4. Species information for 1997 St. Louis County herp sampling.

Fence	Species	Total Individuals
TC1	American Toad	1
TC4	American Toad	2
TM1	American Toad	6
	Wood Frog	1
TM2	American Toad	3
	Spring Peeper	3
TM3	American Toad	5
	Wood Frog	1
	Spring Peeper	1
	Blue Spotted Salamander	1
TM4	Wood Frog	1
NC3	American Toad	1
NC4	American Toad	1
NM1	American Toad	1
	Wood Frog	2
NM2	American Toad	6
	Wood Frog	1
	Blue-spotted Salamander	1
NM3	American Toad	4
	Wood Frog	6
NM4	American Toad	4

BRIEF DISCUSSION

Birds. The bird species identified during the censuses of St. Louis County lands were typical for bird species of the region and relatively consistent with other previous publications on the distribution and relative abundance of breeding birds in this general area (e.g., Niemi and Pfannmuller 1979, Niemi and Hanowski 1984, Green 1995, Hawrot and Niemi 1996). These species tend to be associated with the dominant cover types and age classes (e.g., aspen-birch-balsam forests) that are common in the region and the overall community tends to be somewhat transitional between Region 5, the hardwood-conifer forest region, and Region 6, the Great Lakes forest region, identified by Niemi et al. (1998).

Amphibians. Little research has been completed on the herpetofauna of northern Minnesota and especially in the terrestrial, forested habitats. No reptiles were found in the traps during more than 8,000 trap nights of sampling and, hence, the predominant herpetofauna of this region include the amphibian component. Even though sampling for the herpetofauna has been very limited in this region, the information available on the general distribution and abundance of the herpetofauna in this area would indicate that the following species and groups may be present: about 3 species of salamanders/newts, 1 toad species (American toad), 7 species of frogs, 3 snake species with only the garter and red-bellied snake likely to be common, and 4 species of turtles (Breckenridge 1944, Vogt 1981, Oldfield and Moriarty 1994). A more thorough assessment of the herpetofauna of the region would need to cover a much wider variety of habitats and use a variety of search and trapping techniques to thoroughly assess the distribution and relative abundance of this group of species.

The data gathered with the drift fences, however, do indicate a potentially low level of use by amphibians of the regenerating habitats compared with mature forests. This is likely related to the relative degree of cover in the mature forests since the risk of dessication for amphibians is greater in the regenerating forests.

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