Annual Report

Grassland Bird Abundance and Nest Success in Canaan Valley, WV: Preliminary Results From the Summer of 1999

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by

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Background

Populations of North American grassland songbirds have experienced steeper, more consistent declines than any other bird populations (Askins 1997, Herkert 1995, Jones and Vickery 1997, Kantrud and Higgins 1992, Knopf 1994). Declines in grassland birds and their habitats indicate that greater conservation attention for grassland habitats and their associated breeding bird populations are required (Herkert et al. 1996). Habitat fragmentation due to changes in agricultural practices, increases in urbanization, and woody encroachment negatively impacted many populations of neomigratory grassland birds.

There is little information on the nesting characteristics and habitat affinities of most upland nesting birds of the grasslands of the northern U.S. and Canada (Kantrud and Higgins 1992). In the northeastern U.S., grassland and shrubland birds have been identified as the habitat community groups showing the most widespread declines in abundance (Wells and Rosenberg 1999). Very little research has been conducted to know the conclusive cause of these declines in the Northeast. Loss of habitat and early mowing of hayfields have frequently been cited as leading causes of declines (Bollinger et al. 1990, Herkert et al.1996). Unfortunately, research implicating these factors has been recent and data on pre-population decline is minimal.

In the eastern U.S. most research on grassland birds has been conducted on active hayfields and pastures, and reclaimed mines (Bollinger et al. 1990, Whitmore and Hall 1978, Wray et al. 1978). Bollinger et al. (1990) found grassland songbirds in the hayfields and pastures of New York. Idle hayfields and pastures are increasing in New York due to changes in farming practices and the purchase of farmlands for other uses

(Bollinger et al. 1990). These new and changing habitats present excellent opportunities to enhance the quality of habitat for declining grassland birds (Farris and Cole 1981). Many grassland bird species adapted and expanded their populations throughout the Northeast in the 1800s as land was cleared for timber harvest and agriculture (Jones and Vickery 1997). Wray et al. (1978) found grassland species of the reclaimed mine community included vesper sparrow (*Pooecetes gramineus*), savannah sparrow (*Passerculus sandwichensis*), horned lark (*Eremophila alpestris*), red-winged blackbird (*Agelaius phoeniceus*), and eastern meadowlark *(Sturnella magna*). Additional species found in pastures and hayfields of West Virginia include bobolink (*Dolichonyx oryzivorus*), grasshopper sparrow (*Ammodramus savannarum*), field sparrow (*Spizella pusilla*), and chipping sparrow (*Spizella passerina*) (Wray et al. 1978). Unfortunately, little is known about the success of these species or their ability to maintain or increase their populations on these newly exploited habitats. It is possible these areas are serving as a sink for grassland bird populations, on the other hand productivity may be stable or increasing.

The Canaan Valley National Wildlife Refuge (CVNWR) in Canaan Valley, West Virginia offers a unique opportunity to conduct research on grassland bird species and develop management plans for their future success. The refuge grasslands consists of 7-8 tracts (295 ha) of land, all previously under farm management practices. One of the goals for the refuge is to understand the importance of these different habitat types for grassland birds. Herkert (1994) stated that management practices need to provide quality nesting cover in abandoned fields and pastures to stabilize the decline of grassland sparrows and other songbirds. Our research was conducted to determine bird abundance,

diversity, nest success, and nest site selection on different grassland habitats on the refuge so that management plans can be developed to increase bird diversity and productivity.

Objectives

The specific objectives of the study were to:

1) compare breeding bird density by species, and overall diversity and richness by species between idle hayfields and pastures;
2) estimate composition of vegetation of idle hayfields and pastures and its relation to grassland bird density, diversity, and richness;
3) determine invertebrate species composition that may provide foraging opportunities for grassland birds; and
4) develop management recommendations for the grasslands on the CVNWR.

Study site and methods

The study was conducted on the CVNWR in Tucker County, West Virginia. The study site was divided into 6 separate plots with a total grassland area of 231 ha, consisting of old fields, wet meadows and scrub/shrub habitats. The plots were divided according to previous land usage. Currently, the study consists of 3 hayfields and 3 pastures.

Vegetation Sampling

Vegetation sampling was conducted once per month in June, July, and August of 1999. Analyses of these data should indicate grassland bird habitat preference and differences in vegetative growth and coverage throughout the breeding season. On each plot, transects placed 25 m apart were established with outside transects >50 m from field edges. Transects were permanently marked so sampling could take place each month and

for use in conducting bird counts. The number of transects and the number of measurements per transect was based on field size. Vertical density, maximum height, and canopy coverage were measured using a Robel pole and Daubenmire frame. The Robel pole, height of 1 m, was used to obtain visual obstruction readings at a 4 m distance away from the pole (Robel et al. 1970). The maximum height of either living or dead plant material was recorded within 5 cm of the Robel pole. Vegetative canopy coverage was determined using a Daubenmire (1959) sampling frame. These measurements were recorded every 5-20 m depending on transect size. Canopy coverage was classified into the following groupings: living or standing-dead vegetation; and forbs, grasses, or woody vegetation (Best et al.1997). Ground coverage was classified as litter, bare ground, standing-dead vegetation, and mosses. Litter included all dead plant material above the soil surface, including decomposing material. Standing-dead vegetation included dead plant material standing above the soil surface; therefore, dead plants were considered in maximum height and visual obstruction readings. Also, species of vegetation were recorded every 1 m on each transect, which provides a measure of vegetation frequency (Owensby 1973).

Counts

Bird counts were conducted using strip transects on each tract through the months of May, June, July, and August of 1999 to estimate breeding bird populations (Best et al. 1997). Surveys were conducted within 5 hours of sunrise because bird activity was highest at this time (Gates 1995). Counts were not conducted when wind speeds exceeded 16 km/hr or when it was raining (Best et al. 1997). Once a week, the transects were walked and all birds within 25 m of the transect were recorded, providing a strip

width of 50 m. Bird species and behavior (e.g., singing, calling) were recorded when possible. We chose strip transects over point-count surveys so we could cover more area, because we suspected relatively low densities of birds would occur in West Virginia.

Fields were searched for nests by walking and observing nesting behaviors. Additionally, any nests or nesting behavior observed during surveys were used for nest location. Nest searches were conducted each week and nests found were flagged 5 m north of the nest to minimize disturbance (Davis and Sealy 1998). Nests were then monitored every 3-5 days to determine clutch size and nest fate.

Once a nest became inactive, nest site characteristics were recorded. With the use of a Robel pole and Daubenmire (1959) frame, vertical density, maximum height, and canopy coverage were measured. Also, within the Daubenmire (1959) frame all nest site vegetation were recorded to species. This process was repeated in a random direction away from the nest site.

Invertebrate Sampling

Invertebrate sampling was conducted based on methods outlined by O'Leske et al. (1997). Samples were collected by sweepnet once each month in June, July, and August of 1999. Samples were collected between 1000-1500 hours on days where cloud cover was <50%, wind speed <20 mph, and ambient temperature was between 16-50°C (Robel et al. 1996, O'Leske et al 1997). Sweepnet sampling occurred along strip transects. At each plot, 3 samples were taken consisting of 50 full sweeps through the upper level of vegetation per sample. The contents of the sweepnet were placed in ethyl-acetate kill jars; after invertebrates died, they were transferred to labeled plastic bags and frozen.

Invertebrate numbers and biomass are currently being determined by separating the thawed invertebrates from vegetative debris, allowing them to air dry, and then sorting them to family (O'Leske et al. 1997). Once separated to family, they are dried at 70°C for ≥ 48 hours to a constant mass. Once these measurements are determined they will be recorded to 0.0001 g by taxon.

Results and Discussion

A total of 11 species was observed: 7 on idle hayfields and 8 on idle pastures (Table 1). The predominant grassland bird species present on the refuge were bobolinks, savannah sparrows, and eastern meadowlarks, which corresponds to the predominant grassland species found in West Virginia. Our preliminary data suggests that species density/ha for idle hayfields ($\bar{x}$ = 0.23, S.E.= 0.12) and idle pastures ($\bar{x}$ = 0.48, S.E.=0.25) were similar (P>0.05) and low. Additional data suggests the number of birds/ha for idle hayfields ($\bar{x}$ = 0.81, S.E.= 0.43) and idle pastures ($\bar{x}$ = 1.1, S.E. = 0.61) also was similar (P>0.05). Preliminary results from the weekly bird surveys indicate the number of birds on the refuge increased from the beginning of the season to the end of season (Fig. 1). This nearly linear increase may be attributed to flocks of bobolinks and red-winged blackbirds that began forming in middle to late July.

Preliminary nest data suggests that number of nests/ha for idle hayfields ($\bar{x}$ = 0.14, S. E. = 0.09) and idle pastures ($\bar{x}$ = 0.65, S. E. = 0.52) were similar (P>0.05). A total of 39 nests were found during the summer of 1999. Savannah sparrows, red-winged blackbirds, cedar waxwings (*Bombycilla cedrorum*), and chipping sparrows (*Spizella passerina*) were the dominant nesting species (Table 2). Of these, 22 were successful (56.4%) and 17 failed (43.6%). Nest success for idle hayfields ($\bar{x}$ = 44.5, S. E. = 15.5)

and idle pastures ($\bar{x}$ = 55.7, S. E. = 29.4) were similar (P>0.05). Nest failure for idle hayfields ($\bar{x}$ = 55.5, S. E. = 15.5) and idle pastures ($\bar{x}$ = 44.3, S. E. = 29.4) also were similar (P>0.05).

While data from the plant and invertebrate samples is at present being analyzed, records of plant (Appendix 1) and invertebrate (Appendix 2) exist. Dominant plant species include: glade St. John's wort (*Hypericum densiflorum*), meadowsweet (*Spirea alba*), wrinkle-leaved goldenrod (*Solidago*), bog goldenrod, orchard grass (*Dactylis glomerata*), timothy (*Phleum pratense*), and cinquefoil. Dominant invertebrate orders are: Coleoptera, Hemiptera, Homoptera, and Orthoptera. In order Coleoptera, the dominant families are Chrysomelidae and Coccinellidae. The dominant families in order Hemiptera are Miridae, Pentatomidae, and Reduviidae. The dominant families in Homoptera include Cercopidae, Cicadellidae, Flatidae, and Membracidae. In Orthoptera the dominant families include Acrididae and Tettigoniidae. Many of these insects families and plant species provide an important food source for grassland birds. Additionally, the quality of the cover provided varies by plant species.

Prospectus for 2000

Work conducted during the summer of 1999 will be continued during the summer of 2000. In addition to the work being conducted, an artificial nest study will be added. The artificial nest study will measure nest depredation rates along trails, remnant fence lines, interior edges, and overall nest depredation within the grassland regions of the refuge.

We are hesitant to make any solid conclusions based on 1999 data alone due to the drought conditions. We hope by adding a second year of data, annual variation can

be accounted for and we can make some solid recommendations based on at least 2 years of data.

Presentations

The following presentation was made during 1999 based on the first year data.

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TOTAL SPECIES COUNTED DURING SURVEYS COMPARED TO PRESENCE OR ABSENCE ON TWO PREVIOUS LAND-USE TYPES

Hayfield	Species	Pasture
X	Bobolink	X
X	Savannah Sparrow	X
X	Eastern Meadowlark	X
	Field Sparrow	
X	Chipping Sparrow	X
	Common Yellowthroat	X
X	Starling	
	Vesper Sparrow	X
	American Goldfinch	X
X	Indigo Bunting	X
X	Canada Goose	

Table 1: Total bird species found during count surveys during the summer of 1999 in Canaan Valley, WV. Species occurrence is delineated based on previous land use classification.

CANAAN VALLEY WEEKLY GRASSLAND BIRD SURVEYS

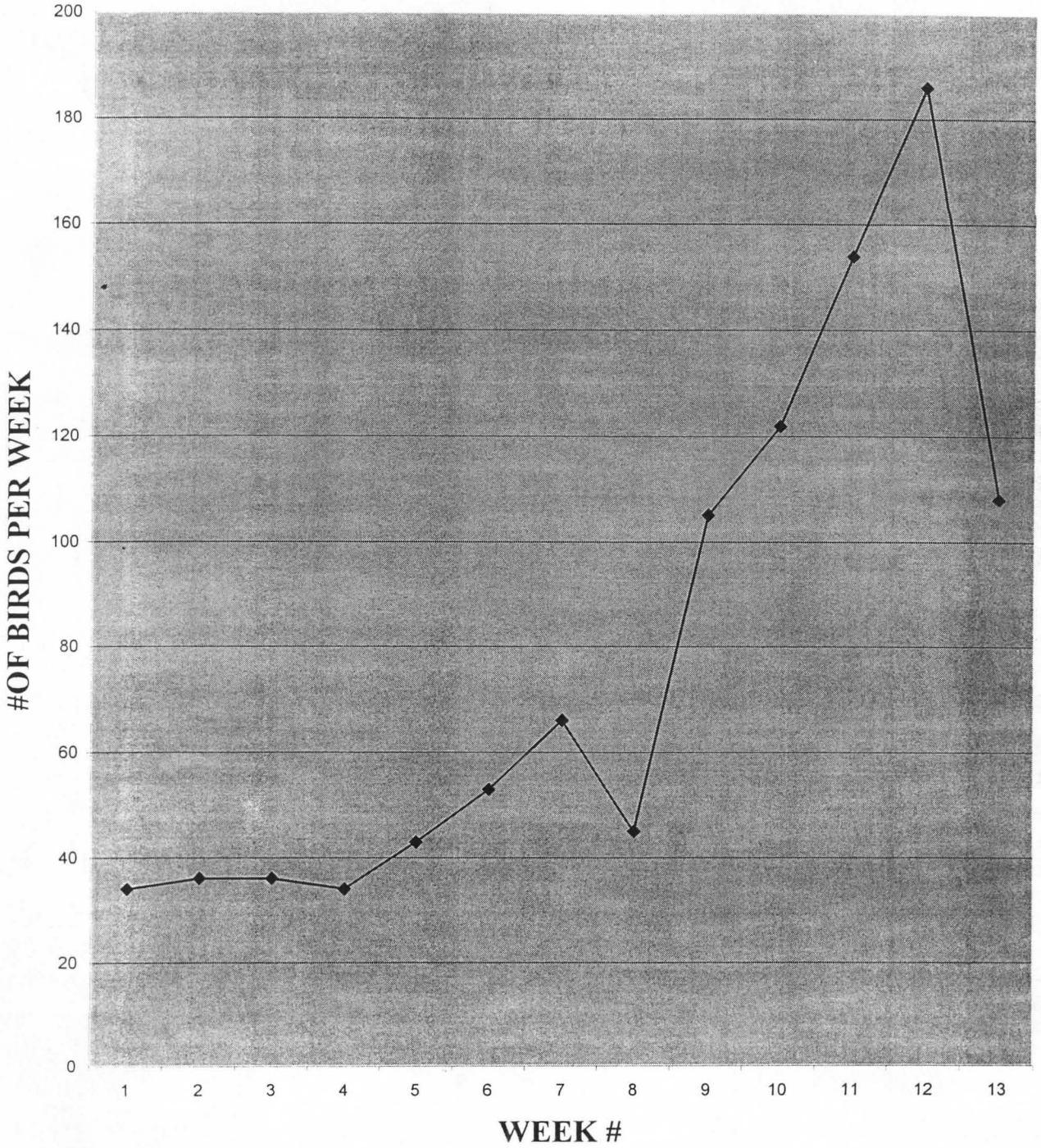

Fig 1: The table represents weekly bird survey data. The surveys were conducted on the Canaan Valley National Wildlife Refuge and the plots surveyed consisted of 3 hayfield and 3 pasture tracts.

TABLE 2: NUMBER AND PERCENTAGE OF NESTS FOUND ON THE CANAAN VALLEY NATIONAL WILDLIFE REFUGE, CANAAN VALLEY, WV SUMMER 1999

SPECIES	# OF NESTS PER SPECIES	%age OF NESTS PER SPECIES	
Savannah Sparrow	8	0.21	
Red-winged Blackbird	6	0.15	
Cedar Waxwing	6	0.15	
Chipping Sparrow	6	0.13	
Eastern Meadowlark	4	0.11	
Bobolink	3	0.08	
American Robin	2	0.05	
Common Yellowthroat	1	0.03	
Eastern Kingbird	1	0.03	
House Wren	1	0.03	
Unknown	1	0.03	
TOTAL	**39**	**1**	

APPENDIX I: PLANT TAXA

Class	Order	Family	Genus	Species
		Asclepiadaceae		
			Asclepias	syriaca
		Compositae		
			Solidago	graminifolia
			Solidago	rugosa
			Solidago	uliginosa
		Ericaceae		
			Vaccinum	spp.
		Gentianaceae		
			Gentiana	spp.
		Gramineae		
			Agrostis	alba
			Anthoxanthum	odoratum
			Bouteloua	curtipendula
			Dactylis	glomerata
			Digitaria	spp.
			Panicum	clandestinum
			Phalaris	canariensis
			Triodia	flava

Guttiferae		
	Hypericum	densiflorum
	Hypericum	mutilum
Iridaceae		
	Sisyrinchium	mucronatum
Labiatae		
	Prunella	vulgaris
Lycopodiaceae		
	Lycopodium	spp.
	Lycopodium	flabelliforme
Polypodiaceae		
	Pteridium	aquilinum
	Thelypteris	noveboracensis
Rosaceae		
	Potentilla	spp.
	Spiraea	alba
Salicaceae		
	Salix	sericea
	Salix	spp.
Zizia Koch		
	Zizia	aptera

APPENDIX II: INVERTEBRATE TAXA

Phylum	Class	Order	Family
Arthopoda			
	Insecta		
		Coleoptera	
			Cantharidae
			Carabeidae
			Chysomelidae
			Coccinellidae
			Curculionidae
			Elateridae
			Scarabaeidae
		Dermaptera	
			Forficulidae
		Diptera	
		Hemiptera	
			Lygaeidae
			Miridae
			Nabidae
			Pentatomidae
			Reduviidae