

Avian Diversity on an Urban Prairie Fragment
By Colleen M. Crank

Introduction

A prairie ecosystem consists of perennial grasses and forbs and very few trees. Missouri prairies are considered tallgrass prairies due to the warm season grasses that dominate the upland and bottomland sites (Nelson 2005). Historically, Missouri tallgrass prairies were part of a bigger tallgrass prairie region that reached as far north as southern Manitoba down to southern Texas and from central Nebraska out to Ohio. Missouri's prairie's covered nearly 15 million acres or 1/3 of the state during the time of European settlement. Today, of the 70,000 acres of fragmented prairie found in North America, only 22,000 acres remain protected (Nelson 2005). Most of the prairie habitat has been destroyed for agricultural purposes and continued threats include fragmentation, over seeding with non-native forage plants, overgrazing, road building and fire suppression (Nelson 2005).

The populations of birds that forage, find shelter and nest primarily in the prairie have suffered serious declines during the last half of the century. Habitat loss is often cited as the major cause of decline (Nelson 2005). Current data trends from North American Breeding Bird Surveys indicate that grassland birds are the most imperiled birds in North America (Johnson 1985) with no other bird group or guild suffering the severe population decline as the grassland species (Johnson 1985).

Litzinger Road Ecology Center, (LREC) under the direction of the Missouri Botanical Garden, has been restoring 12 acres of tallgrass prairie in St. Louis County since 1989 through planting native prairie forbs and grasses and periodic burns to destroy non-native plants. A line of trees divides the prairie into a north and south lot. LREC alternates the burns each year between the North Prairie (4.5 acres) and South Prairie (2.7 acres). Studies on prairie burns found that most birds preferred those areas that were burned less often than every 2 years (Reinking 2005). Several studies on avian prairie ecology have been performed on study sites larger than 12 acres and this underscores the importance of

the research on birds in small tracts of restored prairie. The objectives of this study are to monitor the migrant, resident, and summer birds inhabiting the prairie, observe the dynamic changes prescribed burning has on the avian community, and monitor the longevity of birds with the use of federal bands. Methods employed were weekly mist netting, and bird census.

Procedure

The study took place on the North Prairie and South Prairie at LREC (N 38.6213540° W 90.3741410°). LREC is located 10 miles west of downtown St. Louis and sits on 34 acres of combined bottomland forest, restored prairie and urban creek (Litzinger Road Ecology Center 2009).

Birds were categorized as Migrating, Resident, and Summer species in the same manner as they are listed in field guides such as Sibley Guide to Birds (Sibley 2000). Migrating birds are defined as those birds who travel from their wintering grounds and stop in St. Louis for a brief time in the spring before resuming their trek to their breeding grounds in another part of the country. Any winter birds were tallied under the migrant category. It is not uncommon for birds to migrate through St. Louis during the late winter and spring when they theoretically spend the cold months in our city (WGNSS 1998). For example, White Crowned Sparrows (*Zonotrichia leucophrys*) and Swamp Sparrows (*Melospiza georgiana*) have been reported to spend their winters in St. Louis but are spotted more often during spring migration than the winter months. Resident bird species are those birds found in the St. Louis area year round. Birds that are considered Resident species may be short distant migrants, with individuals traveling a short distance elsewhere for the winter (Sibley 2000), but the species itself is found in St. Louis all year. For example, an American Robin (*Turdus migratorius*) may fly up to Minnesota for the spring, but return to St. Louis in the winter or vice versa, but American Robins are found in the St. Louis area all year. Summer bird species are the birds that breed and raise their young in St. Louis during the summer months but travel to a different location for the winter. If a bird species has been assigned to more than one category, such as the American Robin, they were

randomly assigned a category by the flip of a coin.

Mist netting involved placing two 12-meter nets at the SE woodland edge of the South Prairie and two 12-meter nets at the SE corner of the North Prairie along the burn line facing the South Prairie. An additional net was added to the NW side of the burn line in the middle of the 2009 season. Mist netting is helpful in capturing those birds that forage quietly within the grasses and may be overlooked during weekly census periods. Each session began at dawn during the peak of bird activity and lasted approximately 4 hours. The nets were checked every 15-30 minutes depending on the volume of birds at the nets. Each bird was aged, sexed, and banded with a federal band. Banding is helpful in determining migratory habits, lifespan and survival rate, reproductive success and population growth of songbirds (USGS Patuxent Wildlife Research Center. 2003).

A point count census was performed in the following manner, weekly May through August. The North and South Prairie were divided into a grid pattern with each census point approximately 45 meters apart with each point marked with a rebar pole. Efforts were made to avoid counting a single bird twice in adjacent census points. If a bird was heard or seen outside of the 45 meter perimeter of a given census point, it was not counted. Five minutes was spent at each point and all birds seen and heard were recorded and not assumed to be duplicated. Each census began around dawn at the peak of bird activity and the start locations alternated between the North Prairie and South Prairie. A paired, two-tailed T-test was performed on the birds most sighted over the last 2 years to determine whether or not they demonstrated a significant preference for the recently burned prairie plot or the prairie plot that was burned 2 years ago.

Results

Mist netting

2008 mist netting produced 6 migrating, 3 resident and 10 summer songbird species. Of the 127 birds captured, 115 were adult (AHY) birds, and 12 were hatch year (HY) birds with 5 of the total

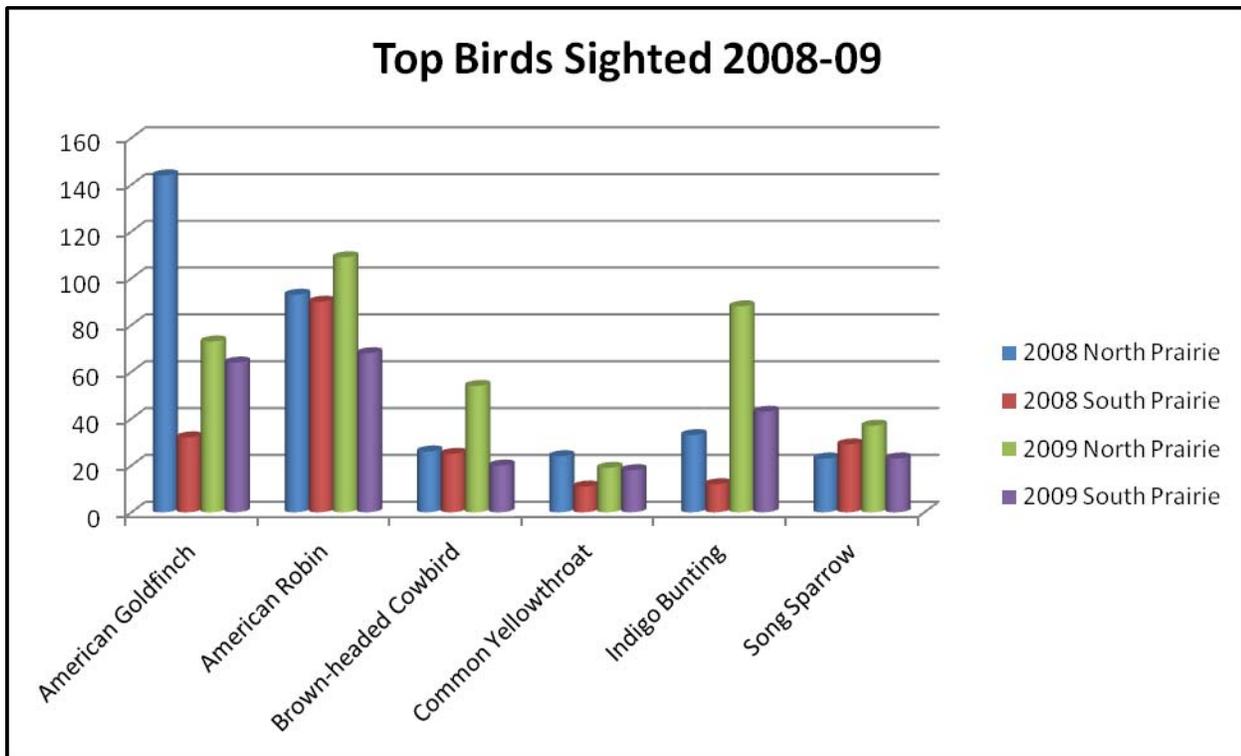
birds caught being recaptures. A hatch year bird is defined as a bird in its first calendar year of life (Pyle 1997). A bird that has been previously banded and caught again is termed a recapture. 2009 brought 2 migrating, 2 resident and 15 summer songbird species to the nets. Of the 72 birds captured in 2009, 53 were AHY birds, 19 were HY birds and 8 of the total birds caught were recaptures. One recapture, a Eurasian Tree Sparrow, was banded as a nestling in 2008 and was caught in the mist nets in 2009. All the other recaptures were banded as adults in 2008.

Data from net five was omitted from the totals because the net was not used in 2008. See table 1 for a detailed list of birds, including a separate list of the birds caught in net 5.

MISTNETTING SPECIES

<i>2008</i>		
SUMMER SPECIES	RESIDENT SPECIES	MIGRANT SPECIES
American Goldfinch	Carolina Chickadee	Least Flycatcher
Carolina Wren	Cedar Waxwing	Mourning Warbler
Common Yellowthroat	Song Sparrow	Palm Warbler
Eastern Phoebe		Tennessee Warbler
Eurasian Tree Sparrow		Swamp Sparrow
House Wren		White Crowned Sparrow
Indigo Bunting		
Prairie Warbler		
Red-eyed Vireo		
Tufted Titmouse		
<i>2009</i>		
SUMMER SPECIES	RESIDENT SPECIES	MIGRANT SPECIES
Acadian Flycatcher	American Robin	Least Flycatcher
American Goldfinch	Song Sparrow	Swamp Sparrow
Brown-headed Cowbird		
Carolina Wren		
Common Yellowthroat		
Eastern Phoebe		
Eastern Wood Peewee		
Eurasian Tree Sparrow		
Gray Catbird		
House Wren		
Indigo Bunting		
Northern Cardinal		
Red-eyed Vireo		
Tufted Titmouse		
Yellow Warbler		
<i>Net 5 (totals not included in results)</i>		
SUMMER SPECIES	RESIDENT SPECIES	MIGRANT SPECIES
American Goldfinch	American Robin	Chestnut-sided Warbler
Common Yellowthroat	Song Sparrow	
Eastern Phoebe		
Eurasian Tree Sparrow		
Gray Catbird		
House Wren		

Table 1



Graph 1

Census

The birds most sighted over the last 2 years were: American Goldfinch (*Carduelis tristis*), American Robin, Brown-headed Cowbird (*Molothrus ater*), Common Yellowthroat (*Geothlypis trichas*), Indigo Bunting (*Passerina cyanea*) and Song Sparrow (*Melospiza melodia*). The data suggest the community as a whole does not exhibit a preference for burned versus unburned prairie. See Graph 1. The bird population for the North Prairie in 2008 was not significantly different in 2009 ($t = 0.6336$, $df = 6$, $p \text{ value} = 0.5497$), nor was the bird population different in 2008 or 2009 for the South Prairie ($t = 0.3576$, $df = 6$, $p \text{ value} = 0.3576$). However, the Indigo Bunting appeared to prefer the unburned prairie segment (12 sightings on South Prairie vs. 33 sightings on North Prairie in 2008; 43 sightings on South Prairie vs. 88 sightings on North Prairie in 2009). For a complete listing and sightings of bird species, see the Additional Tables at the end of this paper.

Discussion

2009 was the second year studying avian preferences for burned or unburned prairie sites. For mist netting, the birds caught in nets 1 and 2 dropped somewhat from 2008 to 2009. (Net 1 in 2008 caught 19 birds and in 2009 caught 12. Net 2 caught 19 birds in 2008 and 15 birds in 2009). It was interesting to note the number of hatch year birds caught in the nets increased in 2009. The nets in 2009 were in the same location as in 2008. However, the increase in recaptures from 2008 to 2009 (4% to 8.8% respectively) was the anticipated result. Recapturing birds banded in 2008 tells us these birds survived one year to the next and are exhibiting site fidelity. In this instance site fidelity is a bird returning to the same location to breed each summer. Site fidelity implies the bird finds the resources suitable for their needs to live and reproduce.

In the census portion of the study birds were divided and counted separately on each prairie to see whether or not they favor the burned portion of the prairie. It does appear that the birds do not exhibit a preference for burned or unburned prairie. This may suggest that the prairie site is too small for the birds to be partial to one site over the other. It may simply be that this small tract of restored prairie, despite its benefits to the current avian community, is not large enough to support a larger number of species for a variety of reasons, such as limited food supply and the fact that it does not meet the territory size requirements for some prairie species such as Eastern Meadowlark (*Sturnella magna*). While this may be the plausible explanation, there was no control sites used to rule out burn management practices as the definite influencing factor. The 2010 season will have 2 bottomland prairie sites of similar size but with different management techniques.

Conclusion

Research examined the diversity of avian species and their preferences for burned or unburned segments on a small urban prairie fragment. It is possible that the LREC prairie habitat is too small for the birds to select one fragment over the other but additional years of research are required before a

suitable conclusion can be reached. This project serves as an encouragement for continuing research on species diversity on this small prairie fragment.

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North Prairie 2009		North Prairie 2008	
Summer Bird Species	Sightings	Summer Birds	Sightings
Acadian Flycatcher	1	Acadian Flycatcher	0
American Goldfinch	73	American Goldfinch	144
American Redstart	1	American Redstart	0
Baltimore Oriole	1	Baltimore Oriole	0
Barn Swallow	1	Barn Swallow	0
Black and White Warbler	2	Black and White Warbler	1
Blue-gray Gnatcatcher	17	Blue-gray Gnatcatcher	8
Brown Thrasher	1	Brown Thrasher	0
Brown-headed Cowbird	54	Brown-headed Cowbird	26
Carolina Wren	10	Carolina Wren	9
Chimney Swift	25	Chimney Swift	5
Common Grackle	0	Common Grackle	21
Common Yellowthroat	19	Common Yellowthroat	24
Downy Woodpecker	19	Downy Woodpecker	3
Eastern Kingbird	8	Eastern Kingbird	2
Eastern Phoebe	1	Eastern Phoebe	0
Eastern Wood Peewee	2	Eastern Woodpeewee	1
Eurasian Tree Sparrow	42	Eurasian Tree Sparrow	22
Gray Catbird	0	Gray Catbird	1
Great Crested Flycatcher	10	Great Crested Flycatcher	2
House Finch	18	House Finch	3
House Wren	0	House Wren	4
Indigo Bunting	88	Indigo Bunting	33
Mourning Dove	2	Mourning Dove	12
Northern Cardinal	60	Northern Cardinal	30
Northern Flicker	1	Northern Flicker	2
Northern Parula	8	Northern Parula	2
Northern Rough-winged Swallow	3	Northern Rough-winged Swallow	0
Prairie Warbler	1	Prairie Warbler	0
Red-eyed Vireo	2	Red-eyed Vireo	4
Red-shouldered Hawk	1	Red-shouldered Hawk	2
Red-winged Blackbird	10	Red-winged Blackbird	4
Ruby-throated Hummingbird	21	Ruby-throated Hummingbird	12
Tufted Titmouse	4	Tufted Titmouse	7
White-breasted Nuthatch	5	White-breasted Nuthatch	1
White-eyed Vireo	1	White-eyed Vireo	0
Yellow Warbler	1	Yellow Warbler	0
Yellow-throated Warbler	3	Yellow-throated Warbler	1

North Prairie 2008		North Prairie 2009	
Resident Species	Sightings	Resident Species	Sightings
American Robin	93	American Robin	109
Belted Kingfisher	1	Belted Kingfisher	0
Blue Jay	3	Blue Jay	8
Carolina Chickadee	7	Carolina Chickadee	20
Cedar Waxwing	7	Cedar Waxwing	20
Cooper's Hawk	0	Cooper's Hawk	1
Eastern Bluebird	11	Eastern Bluebird	0
European Starling	9	European Starling	0
Pileated Woodpecker	0	Pileated Woodpecker	1
Red-bellied Woodpecker	5	Red-bellied Woodpecker	9
Red-tailed Hawk	0	Red-tailed Hawk	1
Song Sparrow	23	Song Sparrow	37
Wild Turkey	10	Wild Turkey	31

North Prairie 2008		North Prairie 2009	
Migrant Bird Species	Sightings	Migrant Bird Species	Sightings
Least Flycatcher	1	Least Flycatcher	1
Marsh Wren	0	Marsh Wren	1
Mourning Warbler	0	Mourning Warbler	1
Nashville Warbler	6	Nashville Warbler	2
Swamp Sparrow	5	Swamp Sparrow	2
Tennessee Warbler	1	Tennessee Warbler	0
White Crowned Sparrow	1	White Crowned Sparrow	0
White-throated Sparrow	1	White-throated Sparrow	2
Wilson's Warbler	1	Wilson's Warbler	0

South Prairie 2009		South Prairie 2008	
Summer Species	Sightings	Summer Species	Sightings
American Goldfinch	64	American Goldfinch	32
Barn Swallow	2	Barn Swallow	0
Blue-gray Gnatcatcher	16	Blue-gray Gnatcatcher	9
Brown Thrasher	1	Brown Thrasher	0
Brown-headed Cowbird	20	Brown-headed Cowbird	25
Carolina Wren	5	Carolina Wren	5
Chimney Swift	9	Chimney Swift	10
Common Grackle	0	Common Grackle	9
Common Yellowthroat	18	Common Yellowthroat	11
Downy Woodpecker	8	Downy Woodpecker	5
Eastern Kingbird	3	Eastern Kingbird	1
Eastern Wood Peewee	1	Eastern Wood Peewee	2
Eurasian Tree Sparrow	58	Eurasian Tree Sparrow	16
Gray Catbird	0	Gray Catbird	1
Great Crested Flycatcher	1	Great Crested Flycatcher	3
House Finch	2	House Finch	5
House Wren	5	House Wren	5
Indigo Bunting	43	Indigo Bunting	12
Mourning Dove	0	Mourning Dove	4
Northern Cardinal	49	Northern Cardinal	20
Northern Flicker	0	Northern Flicker	5
Northern Parula	6	Northern Parula	3
Northern Rough-winged Swallow	3	Northern Rough-winged Swallow	0
Red-eyed Vireo	6	Red-eyed Vireo	0
Red-shouldered Hawk	1	Red-shouldered Hawk	3
Red-winged Blackbird	2	Red-winged Blackbird	1
Ruby-throated Hummingbird	30	Ruby-throated Hummingbird	5
Tufted Titmouse	7	Tufted Titmouse	11
Warbling Vireo	1	Warbling Vireo	0
White-eyed Vireo	1	White-eyed Vireo	0
Wood Thrush	1	Wood Thrush	0
Yellow Warbler	1	Yellow Warbler	0
Yellow-throated Warbler	5	Yellow-throated Warbler	5

South Prairie 2008		South Prairie 2009	
Resident Bird Species	Sightings	Resident Bird Species	Sightings
American Robin	90	American Robin	68
Blue Jay	5	Blue Jay	5
Carolina Chickadee	6	Carolina Chickadee	13
Cedar Waxwing	2	Cedar Waxwing	0
Eastern Bluebird	1	Eastern Bluebird	0
Red-bellied Woodpecker	4	Red-bellied Woodpecker	8
Song Sparrow	29	Song Sparrow	23
Wild Turkey	6	Wild Turkey	16

South Prairie 2008		South Prairie 2009	
Migrant Bird Species	Sightings	Migrant Bird Species	Sightings
Black-throated Green Warbler	1	Black-throated Green Warbler	1
Blackpoll Warbler	1	Blackpoll Warbler	0
Chestnut-sided Warbler	0	Chestnut-sided Warbler	1
Least Flycatcher	7	Least Flycatcher	1
Nashville Warbler	3	Nashville Warbler	5
Ruby-crowned Kinglet	2	Ruby-crowned Kinglet	0
Swamp Sparrow	1	Swamp Sparrow	4
Tennessee Warbler	3	Tennessee Warbler	5
White Crowned Sparrow	1	White Crowned Sparrow	0
White-throated Sparrow	0	White-throated Sparrow	4

