EFFECT OF VEGETATION STRUCTURE ON BREEDING TERRITORY SELECTION BY RED-WINGED BLACKBIRDS IN A FLOODPLAIN FOREST RESTORATION PROJECT

Maria A. Furey, Dirk E. Burhans, Hong He, Michael A. Gold, and Bruce E. Cutter[1]

Our research investigates the role of vegetation structure in the selection of breeding territories by red-winged blackbirds (*Agelaius phoeniceus*) in two floodplain oak-restoration sites. Perches are used extensively by red-winged blackbirds in territorial display during the spring (Yasukawa and Searcy 1995). We hypothesized that breeding territory size may be determined by perch availability, and that breeding territories with few perches would require a larger area for male red-winged blackbirds to defend against other males. We predicted that breeding territories exhibiting high perch densities would be smaller than breeding territories with low perch density. Additionally, we were able to test the importance of perch availability in a floodplain restoration setting in which oaks were planted in varying patterns, and in which a cover crop in one plot type reduced availability of natural perches.

The larger study objectives are to determine:
1) how the availability of perches determines the size of breeding territories in Red-winged blackbirds,
2) how the availability of perches determines the spatial location of breeding territories within a plot type,
3) how occupied areas compare in vegetation composition and structure from unoccupied areas within the plots.

In this paper we present preliminary results concerning the first objective.

Our research is being conducted in the central region of Missouri on two sites located within the Missouri River floodplain. Plowboy Bend Conservation Area (PBB) is a row crop agriculture/floodplain ecosystem. The research area resides west of the Missouri River's main channel within a levee-protected floodplain. Smoky Waters Conservation Area (SW) resides between the main channel of the Missouri and the Osage River, a major tributary of the Missouri River. Smoky Waters floodplain has not been protected by a levee since the levee was breached in the 1993 and 1995 great floods.

Both study areas contain three 40-acre research plots of distinct vegetation treatments established in 1999 for a separate research project examining hard mast (oak acorn) restoration (Shaw and others 2003). "Redtop" plots consist of a random block design featuring oak saplings of swamp white oak (*Quercus bicolor* Willd.) and pin oak (*Quercus palustris* Muenchh.) of varying greenhouse methods, seedbed treatments, and a uniform ground cover of grass (*Agrostis gigantea* Roth). The redtop ground cover has reduced infiltration of other herbaceous vegetation used as perches by red-winged blackbirds. "No Redtop" plots contain the same random block design of treatments without a seeded ground cover. "Control" plots do not have any of the vegetation treatments found in Redtop or No Redtop plots.

We identified breeding territories by monitoring male red-winged blackbirds performing mating display and territory defense behaviors. Territory delineation was accomplished using consecutive flushing (Wiens 1969), a technique in which the bird is approached and followed until he alights on perches defining his territory. Perch data were collected using visual observation and a height pole. Perch density (vegetation exceeding 1.5 m heights) was measured using belt transects placed in two cardinal directions within the territory. We analyzed effect of site and plot type and stem density on territory area by analysis of covariance.

Mean breeding territories at Plowboy Bend were 2,417 ± 354 m^2 (SE; n = 20) and at Smoky

[1] Research Associate (MAF) and Director of Research (MAG), Center for Agroforestry; Post-doctoral Fellow (DB), Department of Fisheries and Wildlife Sciences; Assistant Professor (HH) and Professor (BEC), Department of Forestry, 203 Natural Resources Building, University of Missouri, Columbia, MO 65211-7270. MAF and DEB are corresponding authors: to contact, call (573) 882-4295 or (573) 875-5341 or e-mail at maf261@mizzou.edu or burhansd@missouri.edu, respectively.

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Waters were 1,743 ± 153 m² (n = 36). There was no effect of stem density, site, and plot type on size (area) of red-winged blackbird breeding territories (table 1; overall $F_{4,48}$ = 1.60, P = 0.19; site: $F_{1,48}$ = 3.08, P = 0.09; plot: $F_{2,48}$ = 1.14, P = 0.33; stem density: $F_{1,48}$ = 0.05, P = 0.82).

Mean perch densities within breeding territories were 1.6 ± 0.3 m² (n = 18) at Plowboy Bend and 3.0 ± 0.6 m² (n = 35) at Smoky Waters (table 2). We did not find an effect of perch density on size (area) of red-winged blackbird breeding territories. We also did not find an effect of plot type on breeding territory size; however, results suggested the possibility of a difference in territory area between the two sites, and perch density may vary between the two sites as well.

Future work during the 2002 field season will increase sample size to further test for these effects. In addition, we will test the effects of horizontal and vegetation structure on breeding territory area, and determine the relationships of these aspects to breeding territory area.

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Table 1.—*Mean ± standard error (n) of breeding territory area within two conservation areas by plot type*

	Mean territory area and SE (m²)	
Plot Type	Plowboy Bend	Smoky Waters
Control	3,731 ± 3,557 (2)	2,156 ± 246 (8)
No redtop	2,260 ± 284 (15)	1,638 ± 277 (8)
Redtop	2,326 ± 527 (3)	1,621 ± 230 (20)

Table 2.—*Mean ± standard error (n) of perch density within breeding territories at two conservation areas by plot type*

	Perch density (# stems/m²)	
Plot type	Plowboy Bend	Smoky Waters
Control	0.98 ± 0.72 (2)	1.16 ± 0.40 (8)
No redtop	1.49 ± 0.36 (13)	3.46 ± 1.50 (7)
Redtop	2.29 ± 0.21 (3)	3.60 ± 0.79 (20)