

A. Title: Effect of habitat and weather on regional patterns of abundance of Rusty Blackbirds in Arkansas

B. Project summary: I will use Christmas Bird Count data to determine effects of habitat changes in Arkansas on the distribution and abundance of rusty blackbirds. I will also evaluate the impact of rainfall and temperature on rusty blackbirds. The results of my investigation will help to determine whether changes in habitat availability are driving the downward population trend of rusty blackbirds or whether rainfall and temperature are more important. The results will help guide future management strategies for rusty blackbirds.

C. Project Leader: Dr. Chris Kellner, Professor of Wildlife Science, Arkansas Tech University, Biology Department, Arkansas Tech University, Russellville, AR 72801; email: ckellner@atu.edu
Phone: (479) 964-0830

D. Project Partners: None

E. Budget:

SWG amount requested:	\$32,360.00
Match amount	\$17,424.00
Total Cost	\$49,784.00

Project Statement

A. Need

Populations of rusty blackbirds (*Euphagus carolinus*) have been declining for at least a century (Greenberg and Droege 1999). Analyses of Christmas Bird Count and Breeding Bird Survey data indicate the population has declined by 95% over the past 40-50 years (Niven et al. 2004). This decline is alarming because we do not know what is causing it (Greenberg and Matsuoka 2010). However, one of the most commonly cited hypotheses for the population decline is habitat loss on the wintering range (ex, Greenberg and Droege 1999, Hamel et al. 2009, Greenberg and Matsuoka 2010, Greenberg et al. 2011). Unlike other North American blackbirds, rusty blackbirds are somewhat restricted to flooded forests during breeding and overwintering seasons (Greenberg and Droege 1999, Lusnier 2007). This habitat centered hypothesis is tenable because flooded forests habitats have been converted to agriculture and other uses during the period in which rusty blackbird populations have declined. However, as Greenberg and Droege (1999) point out, the magnitude in the population crash has exceeded the magnitude of habitat conversion. Also, Lusnier et al. (2010) found that rubl in Arkansas were not as habitat specific as previously reported. So, that hypothesis should be examined further before it is accepted.

B. Objectives

The overriding goal of this research is to determine the role habitat plays in driving patterns of change in overwintering populations of rusty blackbirds. Specific objectives include: 1), assessing the changes in availability of flooded forest habitats in Arkansas, 2, evaluating the changes in rusty blackbird populations in Arkansas 3), determining the degree to which the population change is associated with habitat loss 4), determining the degree to which rusty blackbird abundance is associated with the distribution of flooded forest habitat 5), determine the role of temperature and precipitation as influences on CBC counts of rubl.

C. Location

The work will focus on regions within Arkansas that have consistently reported rusty blackbirds. Those include the Arkansas River Valley, the Mississippi Alluvial Plain and the Gulf Coast Plain.

However, I will also look at any individual CBC that has ever recorded a substantial number of rusty blackbirds (for example Fayetteville).

D. Approach

I will use Christmas Bird Count data collected after 1970 to evaluate population fluctuations within Arkansas. Those data will be paired with data on habitat within count circles to determine whether changes in habitat within the count circle influence population changes. The primary mode of evaluating habitat change within count circles will be to use aerial photos and satellite imagery. I will follow the methodology of Hamel et al. (2009) in evaluating habitat change on the landscape. Thus, I will partition the data into different physiographic regions within Arkansas including the Arkansas River Valley, the Mississippi Alluvial Plain and the Gulf Coast Plain and will use counts within those regions as independent samples to evaluate the region. Habitat change within those regions will be determined by searching wetland status and trend data, land use change data available through the Natural Resource Conservation Service and The Department of Agriculture. To identify areas in Arkansas that have higher than expected frequency of occurrence I will adapt the filtering technique described by Hamel and Ozdeneral (2009). Temperature and precipitation will be obtained from National Oceanic and Atmospheric Administration so that I can evaluate temperature and precipitation influences both for the year and also the previous year on populations.

E. Expected Results

In a preliminary examination of CBC data in Arkansas, I found that rubl have not exhibited consistent declines on any of the count circles. The pattern is surprising and does not reflect the perceived population decline of the species. For example, the Jonesboro, Pine Bluff, and Holla Bend CBC's all report their highest effort-adjusted counts of rubl within the past 5 years. Further, most of the other counts I examined report high effort-adjusted counts within the past 5-10 years and the general summary for Arkansas shows an apparent slight increase since the 1998/1999 count. This may reflect an overall reduction in pace of the population decline as reported by Greenberg et al. (2011). Further, population fluctuation on many of the count circles appears to be increasing in magnitude, which is

counter to the observed trend reported by Greenberg et al. (2017) for other parts of the wintering range. The large fluctuations in count numbers are probably related to patterns in temperature and rainfall and I expect to be able to document that association. Further, the spate of high counts in the past 5-10 years could be due to reforestation efforts that are occurring in the state.

The mystery behind the decline in populations of rusty blackbirds has stimulated research in both the wintering and breeding portions of the range. However, we currently, cannot point to a definitive reason for the population decline. Consequently, we will not be able to come up with a management strategy to halt the decline. I hope to determine the degree to which populations are responding to habitat change and weather patterns in Arkansas. Although we cannot manage weather, we might be able to manage hydrology to compensate for low rainfall years. Since the species will respond to reforestation and hydrological management (USFWS 2005) that would allow management to influence populations. Further, if I found that reforestation efforts were associated with population change, that would also point to a possible management strategy.

Literature Cited

- Greenberg, R., D. W. Demarest, S. M. Matsuoka, C. Mettke-Hofmann, D. Evers, P. B. Hamel, J. Lusnier, L. L. Powell, D. Shaw, M. L. Avery, K. A. Hobson, P. J. Blancher, and D. K. Niven. 2011. Understanding declines in Rusty Blackbirds. Pp. 107– 126 in J. V. Wells (editor). *Boreal birds of North America: a hemispheric view of their conservation links and significance*. Studies in Avian Biology (no. 41), University of California Press, Berkeley, CA.
- _____, and S. M. Matsuoka 2010. Mysteries of a species in decline (*Euphagus carolinus*). *Condor* 112: 770-777.
- _____, and S. Droege. 1999. On the decline of the rusty blackbird and the use of ornithological literature to document long-term population trends. *Conservation Biol.* 13: 553-559.
- Hamel, P. B., D. De Steven, T. Leininger, and R. Wilson. 2009. Historical trends in rusty blackbird nonbreeding habitat in forested wetlands. Proceedings of the 4th international Partners in Flight Conference, McAllen, Texas.

Luscier, J. D. 2007. Presence/absence surveys for estimating occupancy as a system state variable for wintering Rusty Blackbirds (*Euphagus carolinus*). International Rusty Blackbird Technical Group Workshop, 12-13 April 2007, Stoneville, MS.

Niven, D. K., J. R. Sauer, G. S. Butcher, and W. a. Link. 2004. Christmas bird count provides insights into population change in land birds that breed in the boreal forest. *American Birds* 58: 10-20.

F. Budget

Graduate Research Assistant Stipend.....	\$20,460.00
Benefits.....	\$20.00
Indirect Costs (45% of GA Stipend).....	\$11,880.00
 Amount requested from Arkansas Game and Fish	 \$32,360.00
 ATU Match	
Faculty Salary Match.....	\$ 1,270.00
Benefits Match.....	\$ 346.00
GA Tuition.....	\$ 9,864.00
GRA.....	\$5,944.00
Total Match.....	\$17,424.00
 TOTAL COST.....	 \$49,784.00

Qualifications:

I am very familiar with the Christmas Bird Count data and have directed many students in projects involving evaluation of avian population changes. I am also quite familiar with program R and can do all of the statistical analyses required for this project. I also directed a student in a project to evaluate the influence of temperature and drought on population changes of several avian species in the Ouachita National Forest.

I also have also used Landsat imagery and aerial photos to model avian habitat and am familiar with procedures that can identify flooded forests as well as different vegetation types.