MAXIMIZING THE IMPACT OF FIELD BORDERS FOR QUAIL AND EARLY-SUCCESSION SONGBIRDS: WHAT'S THE BEST DESIGN FOR IMPLEMENTATION?

INVESTIGATOR INFORMATION

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INTRODUCTION

Northern bobwhite (*Colinus virginianus*) and other early-succession bird populations declined during the past half-century primarily because of changes in land-use that led to habitat loss and degradation. A popular management practice to assist these species is the creation of linear field borders along cropland peripheries and ditch banks. These narrow borders, although shown to increase quail numbers locally, may concentrate quail and songbird nest predators as well as brood parasite activity. Nonlinear field borders (blocks of fallow habitat) created in odd corners or unproductive areas of crop fields may be at lower risk of these negative edge effects. Additionally, the creation of field border habitat, including that supported by Farm Bill programs, traditionally has been implemented with little consideration for landscape characteristics surrounding the area of management. Recent research indicates that the creation of additional usable space for quail may have the greatest impact in "suitable" landscapes already high in usable space. We proposed to determine the effects of field border shape, landscape context, and the interaction of field border shape and landscape context on bobwhite quail and early-succession songbird density and reproductive success. We initiated a study of bird response to the creation of linear field borders on 12 farms (6 in suitable landscapes and 6 in unsuitable landscapes) and nonlinear field borders on 12 farms (6 in suitable landscapes and 6 in unsuitable landscapes) in the southeastern Coastal Plain of North Carolina. These field border practices are used by the Conservation Reserve Program (i.e., CP33) and the North Carolina Wildlife Resources Commission (i.e., Cooperative Upland Habitat and Restoration Programs I and II), and may be refined based on results of our research.

OBJECTIVES

1.) Determine if field border shape (linear vs. nonlinear) affects northern bobwhite and early-succession songbird density and reproductive success.

2.) Determine if landscape context (suitable vs. unsuitable) affects northern bobwhite and early-succession songbird density and reproductive success.
3.) Determine if the effects of field border shape on bird density and reproductive success are influenced by landscape context.

PROGRESS TO DATE

We employed a balanced 2 x 2 factorial treatment combination with landscape suitability and field border shape as the two main effects. We selected 12 farms in suitable landscapes and 12 in unsuitable landscapes. Secondly, we created fallow linear borders on 12 farms (6 in each landscape suitability class) and fallow nonlinear borders on 12 farms (6 in each landscape suitability class). For linear borders, we used PVC pipe to mark off approximately 10-ft wide areas to go fallow at the edge of crop fields. We located linear borders parallel to crop rows when possible to allow room for farm equipment to turn around and to prevent destruction of border habitat. For nonlinear borders, we marked off nonlinear areas to go fallow in the corners or ends of fields. All nonlinear borders were at least 0.08 ha. Location of fallow areas is based on patterns of waste application and advice given by farm managers and other Murphy-Brown, LLC personnel. Fallow areas began to come out of crop production during the 2004 summer growing season as the various crops (e.g., wheat, soybeans, corn) were harvested, and all field borders were delineated and out of production by the 2005 summer growing season. Acreage of both linear and nonlinear fallow field borders is approximately 2-3% of the total crop acreage on each individual farm.

In 2004, we collected pretreatment data on quail and songbird density, quail covey density, songbird nest success rates, brood parasitism frequency, and vegetation characteristics of the proposed border areas. In 2005, we collected data on quail and songbird density, quail covey density, songbird nest success rates, brood parasitism frequency, real quail nest success, artificial quail nest success, and field border vegetation characteristics. In 2006, to date we have collected data on the same variables as in 2005 with the exception of quail covey density, which currently is being collected. In addition, we conducted surveys of major habitat types within 4 km of each farm to ground truth recently acquired satellite data which will be used for finer scale landscape analyses. Quail and songbird density and quail covey density were collected on all 24 farms, while all nest data were collected on a subset (12) of these farms.

Preliminary results suggest minimal effects of field border shape on real songbird nests or artificial quail nests (not enough real quail nests were located for analysis). Indigo bunting/blue grosbeak nest success rates and brood parasitism frequency do not appear to be influenced by the creation of field borders or their shape. Similarly, indigo bunting/blue grosbeak nest parasitism frequency did not differ between landscapes. However, indigo bunting/blue grosbeak nest success was higher in suitable (37%) than in unsuitable (20%) landscapes ($F_{0.05,1,10} = 5.38$, $P = 0.049$).

It is possible that we did not convert enough land to field border habitat to cause a field border effect on nest success. Nevertheless, it is encouraging that the same landscapes that are considered most promising for bobwhites also appear to have the highest management potential for indigo buntings/blue grosbeaks. However, these preliminary results should be treated with

caution as we are in the midst of more formal analyses. Analyses of treatment effects on bird densities are currently under way and these results should be available soon.

PRESENTATIONS

Riddle, J., and C.E. Moorman. Effects of Landscape Context on Early-succession Songbird Nest Success in the Coastal Plain of North Carolina. NC Partners in Flight, Blue Jay County Park, NC, March 28, 2006.

Riddle, J., and C.E. Moorman. Maximizing the Impact of Field Borders for Birds. Wildlife and Water Quality on NC Farms Workshop – Jones Lake State Park, NC, August 16, 2006.

Riddle, J., and C.E. Moorman. Early-Succession Songbird Nest Success and Parasitism Rates in Two Landscapes in North Carolina. 13th Annual Conference of the Wildlife Society, Anchorage, AK, September 26, 2006.

PUBLICATIONS

None to date

PARTICIPATING AGENCIES AND LANDOWNERS

David Cobb, Chief of Wildlife Management Division, North Carolina Wildlife Resources Commission. Dr. Cobb helped us to acquire funding for pretreatment data collection. He is also a member of Jason Riddle's graduate committee.

Terry Sharpe, Agriculture Liaison Biologist, North Carolina Wildlife Resources Commission. Terry is a liaison between the North Carolina Wildlife Resources Commission, Murphy-Brown, LLC, and the investigators of this project. Terry helped us to acquire funding for pretreatment data collection and an additional research vehicle. Terry is a technical consultant on Jason Riddle's graduate committee.

Dawn Williamson, Technical Specialist, Murphy-Brown, LLC. Dawn supervises the land technicians on our study sites. She is the primary liaison between Murphy-Brown, LLC and the investigators of this project. She also played a critical role in GIS information exchange and study site selection.

Craig Westerbeak, Agronomist, Murphy-Brown LLC. Craig helped provide partial funding for pretreatment data collection. He supervises farming activities on our study sites.

NRCS INVOVLEMENT

Matt Flint, State Biologist-NC. Matt was involved in the initial development of this study, providing insight to NRCS needs regarding refinement of practices.