United States Department of Agriculture
Natural Resources Conservation Service

CEAP Conservation Insight
Conservation Effects Assessment Project
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Landscape Context Affects Bird Use of Conservation Practices in Delmarva

Summary Findings

- Response of birds to conservation practices involving establishment of early-successional vegetation such as filter strips and herbaceous conservation cover was assessed in agricultural landscapes in eastern Maryland and Delaware.
- Early-successional birds in filter strips were positively associated with agricultural landscapes and with low landscape cover type diversity.
- Targeting early-successional habitat establishment practices (e.g., herbaceous filter strips, whole-field CRP enrollments) in agriculture-dominated landscapes improves habitat potential for northern bobwhites and other grassland birds.
- Landscapes with greater proportions of herbaceous cover practices supported more bobwhites.
- Increasing the amount of herbaceous cover in local landscapes (within approximately 1 km) through conservation programs may provide additional bobwhite habitat and increase bobwhite abundance.

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Background

U.S. Department of Agriculture (USDA) conservation programs provide incentives for landowners to implement conservation practices that address soil, water, wildlife, and other natural resource concerns. Filter strips, field borders, conservation cover and other practices implemented through USDA programs such as the Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program (WHIP), and Conservation Reserve Program (CRP) involve establishment of long-term resource conserving cover. Herbaceous vegetation established through these practices provides early-successional habitat required by grassland-nesting birds and other wildlife. Land associated with these practices is frequently the only uncultivated herbaceous habitat available to early-successional wildlife in agricultural landscapes of the Delmarva Peninsula (Delaware, the Eastern Shore of Maryland, and the Eastern Shore of Virginia).

Filter strips (NRCS Code 393; CP 21) are strips of herbaceous vegetation designed to remove particulates from surface water runoff and are commonly planted along agricultural field margins in Maryland and Delaware (fig. 1). Delmarva filter strips are typically planted to native warm- or cool-season grasses, with the addition of native wildflowers or introduced legumes (usually clovers). Herbaceous cover established through filter strips has been shown to provide breeding and wintering habitat for grassland and shrubland birds in Delmarva agricultural landscapes (Blank et al. 2011).

Land-use and habitat conditions in landscapes surrounding herbaceous plantings influence bird community composition. For example, grassland bird density may be negatively related to landscape cover diversity (Ribic and Sample 2001). Uncertainties remain regarding how local landscape factors affect the value of herbaceous conservation practices to early-successional bird communities.

Assessment Approach

From 2005 to 2007, University of Maryland personnel assessed early-

Figure 1 A warm-season grass filter strip between a soybean field and a forested wetland

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successional breeding bird response to established filter strips and associated local landscape attributes in Maryland. Also assessed was the response of northern bobwhites (*Colinus virginianus*) to the amount and distribution of filter strips and other herbaceous habitats established through the USDA CRP and Conservation Reserve Enhancement Program in Maryland and Delaware and the influence of various landscape attributes on bobwhite abundance.

Particular attention was given to the bobwhite because it is an important game bird and a species of conservation concern due to declining populations (Brennan 1991, Burger 2002, Sauer et al. 2011). Bobwhite declines have been linked to various factors including weather, harvest, disease, and land cover changes (Burger 2002). However, the primary cause of bobwhite population declines is habitat loss and deterioration (Brennan 1991, Burger 2002). Early-successional habitats associated with conservation practices established on private lands through USDA conservation programs contribute to meeting nesting, brood-rearing, and roosting habitat requirements of bobwhites (Burger et al. 1990, Puckett et al. 2000). Population gains from these practices could potentially slow or even reverse the decline in bobwhite abundance in Delmarva landscapes.

Assessment area. The assessment was conducted in four counties (Caroline, Dorchester, Queen Anne's, and Talbot) on the Eastern Shore of Maryland (the area of the State east of the Chesapeake Bay) and in Kent County, Delaware. The region is dominated by row crop agriculture interspersed by blocks of upland forest and forested wetlands. Filter strips and other herbaceous conservation practices are common practices applied in Delmarva agricultural landscapes. Early-successional bird surveys were conducted in 38 filter strips, and bobwhite surveys were conducted at 139 roadside locations (fig. 2) adjacent to fields with and without herbaceous conservation cover practices.

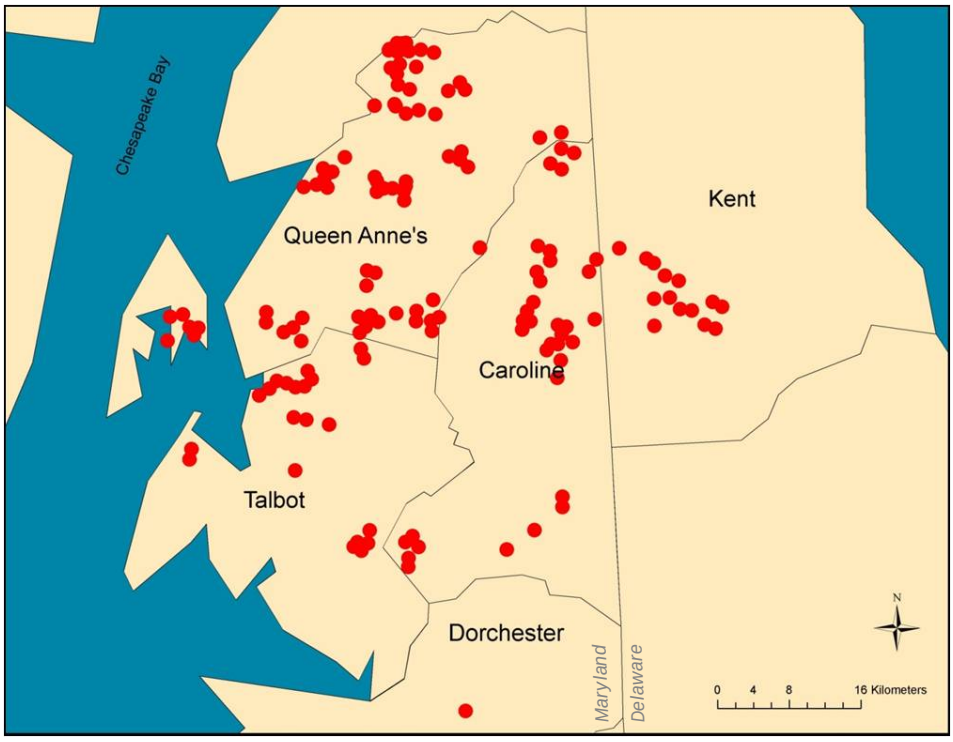
Bird surveys. Early-successional bird surveys in filter strips were conducted in 2005 and 2006 by using a strip transect method with multiple observers (Blank et al. 2011). Northern bobwhite surveys were conducted from 2005 to 2007 following a modified version of the CP33—habitat buffers for upland birds monitoring protocol (Burger et al. 2006). Surveys were conducted once in May-June and once in June-July each year.

Spatial analysis. The 2001 National Land Cover Data Set (NLCD) was used to classify the land cover types around each survey site. In ArcGIS 9.2 (ESRI, Redlands, CA), the NLCD raster image was converted to a polygon shapefile and the land cover classes were reclassified into open water and emergent wetlands, developed and barren land, forest, and agricultural land (including cropland and pastureland). The reclassified land cover shapefile was then merged with a shapefile containing the spatial extent and geographic locations of herbaceous conservation cover and filter strips enrolled in CRP (fig. 3). Land enrolled in the CRP serves as a proxy for any land in long-term conserving cover. Landscape metrics—including the percent cover of forest, agriculture, filter strips and other herbaceous cover; the length of total edge separating cover types; the diversity of land cover types; and patch density—were calculated within 1 km of each filter strip surveyed and within 500 m of each bobwhite survey location.

Data analysis. Assessment investigators used partial redundancy analysis, a constrained form of principal component analysis, to assess the effects of landscape variables on the early-successional bird community. Stepwise multiple regressions were used to assess individual species' responses to landscape attributes around filter strips. An information-theoretic model selection approach was used to compare competing models of bobwhite abundance as a function of multiple covariates.

Further details of this assessment can be found in Blank (2010) and Blank et al. (2011).

Figure 2. Northern bobwhite survey locations in Maryland and Delaware



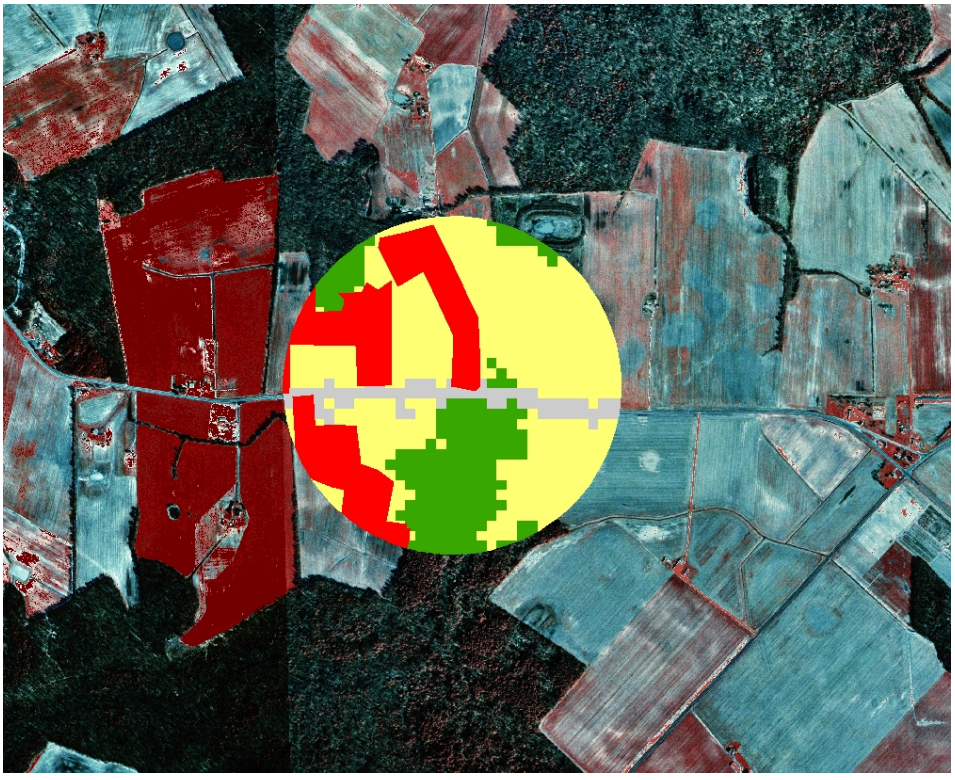
Findings

Early-successional birds use herbaceous filter strips. Sixteen early-successional bird species were recorded in filter strips during the breeding seasons of 2005 and 2006. Three of these species, northern bobwhite, field sparrow (*Spizella pusilla*), and grasshopper sparrow (*Ammodramus savannarum*), are listed as species of greatest conservation need in Maryland (Maryland DNR 2004). Indigo buntings (*Passerina cyanea*) had the highest densities, followed by American goldfinches (*Carduelis tristis*), red-winged blackbirds (*Agelaius phoeniceus*), and common yellowthroats (*Geothlypis trichas*).

Early-successional birds are associated with agricultural landscapes. The early-successional bird community observed in filter strips was positively related to the amount of land in agricultural land use in the surrounding landscape. Common yellowthroats and indigo buntings had higher densities in filter strips in landscapes with more agriculture which also had lower cover type diversity than other landscapes. These findings agree with other studies that have found that some early-successional birds are more common in herbaceous habitats in agriculture-dominated landscapes compared to forest-dominated landscapes (Riddle 2007, Riffell et al. 2008). Others have found that landscapes with more agriculture and less forest cover were associated with higher bobwhite densities during the breeding season (Veech 2006, Riddle et al. 2008). This suggests that targeting herbaceous cover practices (filter strips, CRP enrollments) to agriculture-dominated settings in the Mid-Atlantic region optimizes habitat potential for bobwhites and other early-successional bird species.

Some birds were associated with herbaceous cover in the surrounding landscape. Bobwhite abundance was positively related to the amount of herbaceous cover in the local landscape surrounding survey points. However, the amount of herbaceous cover in landscapes surrounding buffers had little effect on the overall bird community observed in filter strips. Yet field sparrows were seen in greater densities in filter strips where there was more herbaceous cover in surrounding landscapes. This implies that for some species such as field sparrows and bobwhites, a local landscape-scale threshold amount of early-successional habitat is needed whereas local habitat factors alone drive presence of other early-successional bird species.

Figure 3. Land cover classification within a 500-m radius landscape around a bobwhite survey location. Colors in the study landscape represent the following: Red–herbaceous filter strips, yellow–agricultural crop fields, green–forest, and gray–developed land.



Conclusion

Herbaceous filter strips and conservation cover practices have created additional habitat for early-successional birds, including northern bobwhites, in Maryland and Delaware. Early-successional bird habitat may be further improved by targeting herbaceous plantings in agricultural landscapes with low landscape cover type diversity. Landscapes with greater proportions of herbaceous cover will likely support higher bobwhite abundance.

Occasional disturbance of herbaceous habitat is required to reduce litter and vegetation density and to maintain areas of annual weeds and bare ground essential for bobwhite nesting and brood rearing (Burger et al. 1990, Brennan 1991). However, vegetation disturbance should be balanced with water quality and erosion control purposes of filter strips and other herbaceous conservation practices.

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The Conservation Effects Assessment Project: Translating Science into Practice

The Conservation Effects Assessment Project (CEAP) is a multi-agency effort to build the science base for conservation. Project findings will help to guide USDA conservation policy and program development and help farmers and ranchers make informed conservation choices.

One of CEAP's objectives is to quantify the environmental benefits of conservation practices for reporting at the national and regional levels. Because fish and wildlife are affected by conservation actions taken on a variety of landscapes, the wildlife national assessment draws on and complements the national assessments for cropland, wetlands, and grazing lands. The wildlife national assessment works through numerous partnerships to support relevant studies and focuses on regional scientific priorities.

This assessment was conducted through a cooperative agreement between NRCS and the University of Maryland, Department of Entomology. Primary investigators on this project were Peter Blank and Galen Dively.

For more information:
www.nrcs.usda.gov/technical/NRI/ceap/