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FOR SUSTAINABLE AGRICULTURE

The value of filter strips for grassland bird communities

Abstract: Grassland birds may be attracted to filter strips for nesting. This project explores what qualities might be incorporated into filter strips to make them more effective as bird habitat and nesting sites.

Question & Answer

Q: What is the potential for CRP (filter strips in particular) to provide wildlife habitat in addition to protecting soil and water resources?

A: The CRP is a valuable conservation tool for both land managers and farmers. Because of the extreme loss of grasslands in Iowa since settlement, wildlife that depend on grasslands is of major concern. We sought to determine the characteristics of filter strips that create the best situation for grassland birds. We found that grassland birds are much more likely to nest in filter strips void of woody vegetation. Also, birds nested in similar abundances in cool-season plantings and warm-season plantings. However, warm-season plantings that had a diverse mixture of plant species also tended to have a greater diversity in the bird community. Nest success was not very high in filter strips--most likely because of the narrowness of the strips.

Background

In intensively farmed agricultural areas, strip-cover habitats such as roadsides and conservation buffers may serve as the most significant grassland habitat available for wildlife so we need to better understand how grassland birds use these habitats. Studies have shown that many grassland birds are sensitive to habitat area, some habitat designs may encourage mammalian predators, and proximity to woody vegetation may adversely affect nesting success. More information is needed to clarify the relationship of filter strips to the success of grassland birds and to point out ways to improve design and management of filter strips for the benefit of these species.

The objectives of the study were to

1. Document
- bird species,
- composition,
- abundance, and
- nesting success in filter strips, and

2. Evaluate how these are affected by
- vegetation structure and composition within the strips,
- strip width, and
- the presence of woody vegetation adjacent to the strips.

Nest searching in the summer of 2001. From left to right: Tricia Knoot, Robin Kimball, and Nate Cooper.

Principal Investigator:
Louis Best

Co-Investigator:
John C. Henningsen
Natural Resource Ecology and Management
Iowa State University

Budget:
$4,252 for year one
$9,252 for year two

Red-winged blackbird fledgling (recently left the nest) in a filter strip.

Approach and methods

Project investigators selected 33 filter strips for study in four southeast Iowa counties (Henry, Jefferson, Keokuk, and Washington). All sites used in the study met the specifications for filter strips as established by the Natural Resources Conservation Service (NRCS) in Iowa. NRCS guidelines prefer native vegetation to exotic species for filter strips. Filter strip width and base affect the ability of buffers to remove pollutants from runoff. Woody vegetation, also included in NRCS specifications and a common feature of riparian systems, may provide elevated perch sites required by some grassland bird species. These practices are not based on bird enhancement, so this research includes some vegetation analysis components.

Vegetation characteristics of the filter strips were measured six times from mid-May through late July in 2001 and 2002. Measurements were taken at six random points per study plot during each sampling round. Plant species composition was recorded on the final four sampling visits.The strips varied in planting mixture (cool-season vs. warm-season grasses), adjacent edge types (non-wooded vs. wooded), and width (8 to 36 m).

These three habitat variables are typical of filter strips in Iowa and could affect grassland bird use and productivity. Several measures of bird use, relative bird abundance, bird species richness, and nesting species density and success were compared among the types of filter strips studied.

Six counts of breeding birds were conducted each year during the same sampling periods used for vegetation sampling. Three systematic nest searches occurred each year on 24 of the 33 sites. Searchers actively scanned the filter strips (or selected portions) for nests and flushed birds. Nests were visited every 3 days until the young were able to leave the nest or the nest failed. At each visit, observers recorded nest conditions and environmental conditions.

Results and discussion

Researchers observed 18 species of grasses in filter strips over two years. Brome grass was the most common in cool-season plantings and switchgrass was most often found in warm-season plantings. Fifty-six species of forbs were found in the filter strips, but no single forb species was dominant. Percent coverage of standing dead vegetation and plant species richness were each greater in 2001 than in 2002. Dead vegetation height, litter depth, and percent cover of litter were greater in 2002.

Investigators recorded 46 bird species in the filter strips. Common yellowthroat, red-winged blackbird, dickcissel, and song sparrow composed 83 percent of all birds observed and red wing blackbirds comprised 54 percent of that total. Most bird species were more abundant in filter strips without woody vegetation than in those adjacent to a wooded edge, and mean species richness was significantly greater in non-wooded sites. Only the indigo bunting preferred adjacent woody vegetation. Filter strip width was positively associated with relative abundance for most species and species richness, but the relationships were generally weak.

Nests were found in 23 of the 24 sites that were searched. The average nest density for all species combined was 770 nests/100 hectares in the filtered strips that were examined. There were no significant differences in nest densities between cool-season and warm-season grass filter strips. Over two years, 634

nests of 11 species were found, with the red-winged blackbird being the most abundant.

Twenty-seven percent of the nests were successful and 62 percent were preyed upon. In two years, among the four treatments, apparent nest success ranged from 23 percent (warm-season, wooded) to 28 percent (cool-season, wooded). For all species combined, depredation accounted for 85 percent of nest failures. Other causes of nest loss were abandonment (6 percent), weather (5 percent), machinery (4 percent), and brown-headed cowbird parasitism (less than 1 percent).

Conclusions

There were several differences in vegetation characteristics between filter strips planted to cool-season and warm-season grasses. Though not all differences were significant in both years, warm-season sites had more vertically dense live vegetation, taller residual dead vegetation, greater forb and standing dead vegetation coverage, and greater plant species richness. Grass coverage was greater on cool-season sites, however, these sites were not always resistant to invasion from reed canarygrass, which can move in and dominate a site.

Generally, abundances and nest densities of common avian species did not differ between cool-season and warm-season filter strips, and planting mixture did not seem to affect mean bird species richness. (However, individual species may respond differently to vegetation characteristics.)

Not surprisingly, the proximity of woody vegetation was an important factor in determining species richness, bird abundances, and nest densities. Species richness was significantly higher in non-wooded than in wooded sites for at least two reasons. Some species with aversion to wooded edges (i.e., dickscissel, sedge wren) were seen more often in non-wooded sites. Also, some species were more likely to be observed perched in adjacent woody vegetation if it was available instead of perched in the filter strip (i.e., common yellowthroat, song sparrow). Of the species abundant enough to analyze, only indigo buntings were more prevalent in filter strips adjacent to woody vegetation.

Bird species richness increased with filter strip width. (Other studies have reported positive relationships between the number of bird species and the width of herbaceous riparian habitats and roadsides.) Most species in filter strips increased in abundance and nest density with strip width, though the relationships were not statistically strong.

A recently depredated ring-necked pheasant nest.

The project's nest success estimates were generally low in all treatments (planting mixture, strip width, edge type) and were comparable to other linear-herbaceous habitats studied in Iowa. Although some measures of bird use varied among the filter strip treatments, nest success did not vary much within the range of variables studied. (There is a possibility that narrow strip widths may play some role in nesting success.)

Treatment differences in incidence of cowbird parasitism also were inconsistent between species and years. The abundance and activity of cowbirds in filter strips appeared to be independent of adjacent edge type, planting mixture, or strip width. Predation rates were similar among the treatments; perhaps because the predators that prey on nests differ among treatments with some predators favoring one environment over another.

While there are concerns that filter strips offer predators an easily raided concentration of breeding birds, these strips on average are wider than most other types of grassland

strip cover, which offers better chances of nesting success. Although narrow corridors are prone to increased risk of predation and parasitism, these trends are not universal. Nest success in strip cover depends on the entire landscape and factors contributing to low nest success in filter strips are complex.

Impact of results

These findings have several impacts for filter strip management. The presence of woody vegetation adjacent to the filter strips has negative impacts on the use of filter strips by grassland birds. If management goals for filter strips include providing grassland bird habitat, especially for species of management concern, control or elimination of woody vegetation along streams where filter strips are established may need to be considered.

Strip width was positively related to bird species richness and nest density, and usually positively related to the relative abundance of birds. If filter strips are increased in width from the current maximum of 120 ft., bird species richness and the number of nesting species could increase. Densities of some edge species such as common yellowthroat and song sparrow would be negatively affected, but corresponding increases in more edge-sensitive species could occur. Investigators were unable to detect a point at which predation pressure declined among the range of widths studied. However, wider strips might reduce the likelihood that predators traveling along filter strips would discover nests.

Both cool-season and warm-season plantings provided habitat for breeding birds. Different characteristics of vegetation structure and composition were important to different species, but no single characteristic consistently determined bird use.

Although there was no substantial evidence that reed canarygrass was a direct detriment to birds in filter strips, it certainly was never positively associated with bird use of the strips. The invasive nature of reed canarygrass and its propensity to out-compete other herbaceous species that contribute to a diverse vegetative cover in filter strips should be a concern to land managers.

None of the variables (edge type, planting mixture, strip width) that were studied had a strong effect on nest success. As evidence by low species richness and nest success rates, filter strips as presently designed and managed may not be high-quality habitat for grassland birds. Where the land-use objective is conservation of grassland birds, those who design and manage filter strips will need to consider the effects of strip width, presence of woody vegetation, and vegetation heterogeneity. But even when filter strips are marginally effective as grassland bird habitat, they can make an important contribution to the amount of grassland areas subjected to intensive agriculture. Although the most common birds using filter strips are generalist species, filter strips have the potential to provide breeding habitat for some species of management concern. Thus, continued establishment of filter strips should be encouraged.

Education and outreach

A graduate thesis was written on the use of riparian filter strips by grassland birds. An article about the project results appeared in *Julien's Journal*. Manuscripts are being prepared for professional journals such as the *Journal of Wildlife Management*.

Presentations on the project were made for the Tri-state Wildlife Society, the American Ornithologists' Union, the Izaak Walton League, and the 64th Midwest Fish and Wildlife Conference.

For more information, contact
Louis Best, Natural Resource Ecology and Management, Iowa State University, Ames, Iowa 50011; (515) 294-1577,
e-mail lbbest@iastate.edu