Breeding Bird Use of Minnesota Filter Strips in Relation to Width, Planting Mixture, and Surrounding Land Use

NRCS

Midwestern filter strip

Conservation buffers have become a major component of the Midwestern landscape

Conservation buffers (grassed waterways, filter strips, riparian forest buffers, shelterbelts, and windbreaks) have been actively promoted in the Midwest to address regional water quality concerns. Indeed, buffers were an important component of Minnesota's first Conservation Reserve Enhancement Program (MNCREP) which sought to improve water quality in the Minnesota River Basin. The Minnesota River Basin encompasses some of the most productive farmland in the world. Under MNCREP (1998–2003), USDA conservation programs were combined with the State's Reinvest in Minnesota program to retire almost 100,000 acres of environmentally sensitive land in the Minnesota River watershed. Regionwide, millions of acres of buffers have been established such that they have become a major component of Iowa, Minnesota, and Illinois landscapes dominated by row crop agriculture.

Previous studies have documented high bird use of narrow bands of perennial cover (hereafter, strip-cover) in intensive agricultural regions (Best 2000). Thus, although implemented primarily for the purpose of improving water quality, the addition of perennial grass cover to landscapes dominated by row crop agriculture also has potential benefits for grassland-dependent wildlife.

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Filter strip in midwestern agricultural setting

Grassland bird use of filter strips assessed in relation to buffer width, native versus nonnative planting mixtures and surrounding land use

In support of NRCS Minnesota and its CREP partners, the Wildlife Habitat Management Institute enlisted the assistance of Iowa State University (ISU) researchers in the Department of Natural Resource Ecology and Management to assess wildlife responses to MNCREP. Specifically, ISU researchers were asked to assess wildlife use of filter strips in the project area relative to site characteristics and surrounding land uses. MNCREP provided incentives for landowners to expand the width of buffers beyond 120 feet and plant diverse mixtures of native plants, so partners were particularly interested in wildlife responses to added width and diverse seeding mixtures. Researchers here chose to study grassland birds because they are valuable indicators of ecosystem health and population declines associated with land use changes in the upper Midwest are well documented. In 2003 and 2004, ISU researchers surveyed 39 southwestern Minnesota filter strips to determine if the occurrence and nesting success of birds were affected by buffer width, planting mixture, and surrounding land uses. Investigators predicted that bird use would be greatest in the widest buffers with diverse native plantings embedded in unfragmented landscapes with substantial amounts of grass.

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Selected filter strips ranged in width from 20 to more than 450 feet (average 120 ft) and all were more than 3-years-old. Filter strips with more than 15 percent woody cover along the waterway were excluded from the study. Fourteen sites were dominated by cool-season grasses. Filter strips planted with warm-season grasses included 13 sites with switchgrass-dominated (*Panicum virgatum*) monocultures and 12 sites with diversified mixes of native grasses and forbs. Vegetation characteristics of filter strips measured by researchers included vertical density; height of live and dead vegetation; litter depth; canopy coverage of grass, forbs, standing dead vegetation, litter, and bare ground; and plant species richness.

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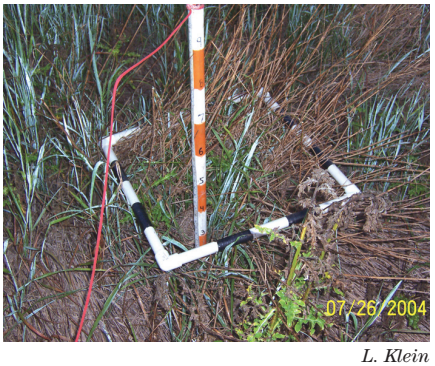
Savannah sparrow feeding young

Conservation value of filter strips for birds was estimated

Researchers calculated a conservation value for filter strips by multiplying the maximum recorded abundance of each species at each site by the species' Partners-in-Flight (PIF) prioritization score for the Prairie Pothole Region, then summing these products for all species to obtain a single value per site per year. PIF scores are derived by evaluating species in various Bird Conservation Regions (BCRs) with respect to the following six criteria:

- global relative abundance, usually based on Breeding Bird Survey (BBS) data
- global scores for North American breeding distribution and wintering distribution
- global score for threats in the nonbreeding season
- threats to successful breeding in the BCRs
- importance of BCRs for breeding of the species calculated, if possible, by comparing relative abundance on the BBS within the BCR to the species' highest relative abundance in other BCRs
- population trend for the BCRs, usually determined from the BBS (Carter et al. 2000).

PIF scores for BCRs throughout North American are accessible at: *http://www.rmbo.org/pif/pifdb.html*.



L. Klein

Equipment used to measure vegetation

Vegetation characteristics of filter strips with cool- and warm-season plantings were compared

Smooth brome (*Bromus inermis*), reed canarygrass (*Phalaris arundinacea*), and quackgrass (*Agropyron repens*) were common in nonnative filter strip sites. Among native sites, Canada wild rye (*Elymus canadensis*), Indiangrass (*Sorghastrum nutans*), and big and little bluestem (*Andropogon* spp.) were the most common species observed. Common forbs observed in all filter strips included Canada thistle (*Cirsium canadense*), alfalfa (*Medicago sativa*), and sweet clover (*Melilotus* spp.).

Standing height of dead vegetation was greater in warm- than in cool-season stands, but other vegetational differences between planting mixtures were inconsistent. Mean (range) measurements for filter strip vegetation

taken in midsummer were 1.6 feet (0.6–3.1) for vertical density, 3.9 feet (2.1–5.1) for live vegetation height, 2.4 feet (0.0–5.3) for dead vegetation height, 2 inches (0.4–4.8) for litter depth, 52.7 (5.3–95.0) percent grass cover, 13.0 (0.0–71.3) percent forb cover, 5.6 (0.0–29.4) percent standing dead vegetation cover, 90.5 (21.9–100.0) percent litter cover, and 7.3 (0.0–55.0) percent bare ground. Plant species richness in filter strips averaged 4.5 (2.0–11.0) species per 0.5 square meters.

Because of extensive overlap in vegetation characteristics among planting mixtures, researchers dropped the original mixture categories and combined information using a statistical procedure that accounted for relationships among variables to define dominant vegetation gradients.

W. Hohman

Male red-winged blackbird

Minnesota filter strips received high use by breeding grassland birds

Twenty-four bird species were observed in southwestern Minnesota filter strips during surveys; songbirds accounted for 19 of these species. An additional 21 species were seen in flight above filter strips or adjacent waterways. Red-winged blackbirds (*Agelaius phoeniceus*) were by far the most abundant species (35%) recorded using filter strips, followed by common yellowthroats (*Cistothorus platensis*, 19%), song sparrows (*Melospiza melodia*, 14%), and sedge wrens (*Cistothorus platensis*, 13%).

Bird use of filter strips was influenced by site characteristics, especially buffer width. Compared to narrow filter strips, wide filter strips had greater abundance and diversity of all birds and grassland specialists. The vegetation gradient describing stand structure was positively associated with overall bird abundance and diversity.

Bird use of filter strips was also influenced by uses and configuration of the surrounding landscape. The abundance and diversity of all birds and grassland specialists in filter strips were positively associated with the proportion of grassland but negatively affected by the amount of edge and proportion of developed areas within 0.6 miles of the buffer.

As predicted, bird conservation value of filter strips was greatest in wider buffers containing a more diverse vegetation structure. Conservation value was also greatest for those filter strips embedded in unfragmented landscapes with substantial amounts of grass.

N. Davros

Parasitized red-winged blackbird nest

Nest success was generally low

Researchers found 238 nests of 14 songbird species. Eleven songbird species accounted for 90 percent of the nests. Red-winged blackbird nests were most common (65%), followed by song sparrows (8%), sedge wrens (6%), and common yellowthroats (5%). Three or fewer dickcissel, chipping sparrow, vesper sparrow, clay-colored sparrows, American goldfinch, bobolink, and savannah sparrow nests were found. Fourteen ring-necked pheasant and eight mallard nests were found. One northern harrier nest was also found.

Apparent nest success for all songbirds was 25 percent (20% for red-winged blackbirds and 37% for other songbirds). Sixty-two percent of all active songbird nests were depredated. Causes of nest failure were depredation (82%), weather (7%), abandonment (4%), machinery (4%), and brown-headed cowbird parasitism (4%). Thirty-one percent of red-winged blackbird nests and 23 percent of other songbird nests were parasitized by brown-headed cowbirds. Apparent nest success for ring-necked pheasants and mallards was 29 percent and 25 percent, respectively. Predation accounted for all gamebird nest failures. The lone northern harrier nest was also depredated.

N. Davros

Sedge wren nest

Filter strips have potential to provide habitat for some species of conservation interest

Buffer width, vegetation characteristics, and surrounding land uses are important considerations for planners and managers seeking to optimize grassland bird use of filter strips. Consistent with previous studies of strip-cover in intensive agricultural areas, researchers documented high use but reduced success by birds nesting in southwestern Minnesota filter strips. Attractiveness of buffers may be increased by maximizing buffer width and establishing and maintaining tall, structurally diverse plant stands. Locating buffers in unfragmented landscapes with perennial herbaceous cover will further enhance the use of buffers by songbirds. Reduced nesting success by birds settling in filter strips remains problematic.

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