Factors Affecting Butterfly Use of Filter Strips in Southwest Minnesota

Landowners in Minnesota plant linear buffers that mimic historical conditions

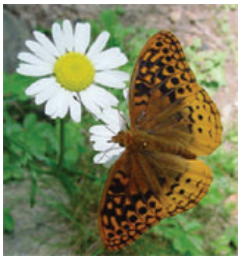
Grassland in the Midwestern United States was dramatically reduced in the past century as native vegetation was converted to row crop agriculture. In Minnesota, loss of tallgrass prairie has been estimated at 99.6 percent. Since 1985, Federal and state governments have been partnering with landowners to establish permanent vegetative cover on erodible cropland. Cost-share programs such as the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP) promote linear buffer plantings such as shelterbelts and living snow fences, grassed waterways, riparian buffer strips, and filter strips. While these buffers are being established primarily to improve water quality and to control soil erosion, additional benefits gained from buffers may include enhanced aesthetics and creation of wildlife habitat.

Researchers at Iowa State University assessed the effects of filter strip characteristics on butterfly communities

We chose to study butterflies because they are an important part of the pollinator community, and can serve as valuable indicators of ecosystem function. In 2002 and 2003, we studied several factors about filter strips in the Minnesota and Des Moines River watersheds and how these affected the butterfly community. We sampled 50 filter strips, measuring filter strip width, vegetation structure, and planting mix to determine whether adult butterfly abundance and diversity were affected. We categorized each butterfly species as either disturbance-tolerant or habitat-sensitive. Disturbance-tolerant butterflies are species that can be found commonly in areas altered by humans such as suburban lawns and gardens. Habitat-sensitive species have more specific requirements for habitat, either due to larval hostplant requirements or the needs of other life stages, and are often found only in relatively natural areas.

Disturbance-tolerant butterflies do not respond to differences in filter strip width, but they do respond to abundance of flowering plants

We found that the width of the filter strip does not affect the number of disturbance-tolerant butterflies (abundance) or the number of disturbance-tolerant species that use the planting (richness). The abundance and richness of disturbance-tolerant butterflies such as *Colias eurytheme* (the Orange Sulphur) were positively correlated with the abundance of flowering plants.



Habitat-sensitive butterflies respond to differences in filter strip width, planting type, vegetation structure

The abundance and richness of habitat-sensitive species such as *Speyeria cybele* (Great Spangled Fritillary) is positively correlated with filter strip width. Habitat-sensitive butterflies were found more often in native grass plantings than in non-native plantings. Also, increased vegetation height and density resulted in more species of habitat-sensitive butterflies.

The overall butterfly community responded to flowering plant density and number of flowers

Overall butterfly abundance and richness increased with increasing forb (flowering plant) cover and number of flowering ramets (stalks of flowers) in the filter strip.

Implications for management

Even narrow filter strips are used by butterflies
Our research indicates that even narrow filter strips are used by butterflies. However, wider plantings support a higher diversity of butterflies, as well as a larger abundance of habitat-sensitive butterflies. Species adapted to tallgrass prairie and sensitive to disturbance may not benefit from narrow plantings. Therefore, increased filter strip width may appeal to managers wishing to provide habitat for species beyond that which we may see in our suburban yards.

Planting native species will result in more species of butterflies
Any of the three planting types examined in this research (non-native, switchgrass-dominated, and diverse mixtures of native species) will provide habitat for butterflies, but the non-native strips do not satisfy the demands of all species. Planting native species will result in greater numbers of habitat-sensitive butterflies.

Vegetation structure affects habitat-sensitive species richness
Vegetation structure is very important for habitat-sensitive butterflies. Increasing the vegetation height and vertical density may increase the richness of habitat-sensitive species.

Plant wide strips of warm-season grasses and forbs for best results
Abundance of forbs (flowering plants) and the availability of nectar resources may affect a filter strip's ability to support a higher abundance of butterflies overall. We recommend enhancing filter strips by the use of wider plantings consisting of more warm-season grasses (which are taller) and forbs whenever financially possible.

Cautionary note: There is not enough information on butterfly reproduction or mortality in strip-cover habitat to justify an assertion that filter strips provide quality habitat. The filter strips in our study may be populated from nearby non-linear habitats such as CRP fields rather than operating as self-sustaining systems. More work is needed on these questions to ensure that we are not unintentionally attracting butterflies into linear habitats which may represent ecological traps.

Issued January 2006

Information in this note was adapted from graduate research conducted by **Katy Reeder** under the supervision of **Drs. Diane Debinski** and **Brent Danielson**, Ecology, Evolution, and Organismal Biology Department, Iowa State University. Funding was provided by the NRCS Wildlife Habitat Management Institute and Iowa State University. **Amanda Hetrick**, **Bill Hohman**, and **Lynn Owens** assisted authors with development, layout, and editing of the document.

Contact information:

Katy Reeder
Liberal Arts and Sciences Administration
402 Catt Hall
Iowa State University
Ames, IA 50011-1301
(515) 294-2566
E-mail: reederka@iastate.edu

Diane M. Debinski
Ecology, Evolution, and Organismal Biology
253 Bessey Hall
Iowa State University
Ames, IA 50011
(515) 294-2460
E-mail: debinski@iastate.edu

Brent Danielson
Ecology, Evolution, and Organismal Biology
253 Bessey Hall
Iowa State University
Ames, IA 50011
(515) 294-5248
E-mail: brent@iastate.edu

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.