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Effect of Vegetation Management on Bird Habitat in Riparian Buffer Zones

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For information on this publication, contact Dr. Deanna Osmond, Department of Soil Science, North Carolina State University, Campus Box 7619, Raleigh, NC 27695-7619. (919) 515-7303. deanna_osmond@ncsu.edu; Christopher E. Moorman, Department of Forestry and Environmental Resources, North Carolina State University, Campus Box 7646, Raleigh, NC 27695-7646. (919) 515-5578. chris_moorman@ncsu.edu; Tim Smith, Department of Crop Science, North Carolina State University, 207 Research Station Road, Plymouth, NC 27962. (252) 793-4428. tasmith4@ncsu.edu.

Cover photo: Three-zone riparian buffer. Photo by Tim Smith.

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Introduction

Riparian buffers, vegetated areas adjacent to streams or ditches, are an agricultural best management practice (BMP) used to protect water quality. Buffers also provide habitat for wildlife residing in the riparian zone. Wildlife use buffers for nesting habitat, den locations, escape cover, and bedding areas in landscapes frequently disturbed by farming machinery. Buffers also provide wildlife food such as plant seeds, vegetative material, and insects. Finally, buffers serve as travel corridors for wildlife between fragmented habitats.

Some riparian buffers are composed of hardwood trees, while others are maintained with only herbaceous vegetation. Riparian areas that were once cleared may have been revegetated either by planting or natural recolonization. Composition and density of the plant community following revegetation greatly influences the wildlife community.

Improvements in farming machinery, weed control, and harvest methods led to clean farming techniques that limited the survivability of non-crop plant species during crop production. As a result, many riparian buffers were cleared, thus converting the entire landscape to cropland.

Many United States Department of Agriculture (USDA) incentive programs such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), and Wildlife Habitat Incentives Program (WHIP), provide cost-share assistance to private landowners to install buffers. Buffers used in USDA programs require the use of Natural Resources Conservation Service (NRCS) Conservation Practice Standards (CPS). Establishing a healthy, uniform stand of the plant species required to be established in the CPS may necessitate intensive non-target plant species management and replanting in subsequent years. Natural revegetation may be more cost-effective, but it is unclear how these buffers compare to planted buffers as wildlife habitat. The objective of the project was to determine whether planted buffers affected bird habitat differently than buffers allowed to revegetate naturally.

Study

Three riparian buffers were evaluated and all sites were located in the Middle Coastal Plain of North Carolina, a flat area comprised of sandy or sandy loam soils. The three types of buffers evaluated for bird use in the project were:

- A three-zone riparian forest buffer (CPS 391), allowed to recolonize, with an adjacent field in production as either pasture or grain crops (corn, wheat, or soybeans). Vegetation on each side of the stream consisted of:
  - An approximately 13-foot-wide grass and forb outer zone.
  - A 66-foot-wide shrub middle zone fenced in 1999 to exclude cattle.
  - A 20-foot-wide inner zone closely resembling the shrub zone but also containing taller woody vegetation directly adjacent to the stream.

  Management was limited to annual spring mowing in the outer zone. The total length of buffer was approximately 820 feet long (fig 1).
- A field border (CPS 386) with the adjacent agricultural fields in a rotation of tobacco, corn, and soybeans. Within fields were agricultural ditches

Figure 1 Planted buffer located in Mount Olive, NC

Photo by Tim Smith, NCSU

for drainage bordered by buffers. These buffers established naturally in 1993 but have been managed using a tractor-mounted weed wipe herbicide applicator to prevent vegetative succession to woody species. The buffer was 30 feet wide and 853 feet long and present on only one side of the drainage ditch. Crops were on the opposite side of the drainage ditch. Vegetative buffers also occurred along ditches and trees not far from the cropped fields (fig 2).

- A planted riparian forest buffer (CPS 391) consisted of American sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), bald cypress (*Taxodium distichum*), and red maple (*Acer rubrum*). The trees were planted by NRCS in 1994 in an attempt to increase nutrient uptake and sediment retention by the streamside zone. The planted buffer was 524 feet long by 82 feet wide and present on one side of the stream. The adjacent field was a Bermudagrass (*Cynodon dactylon*) pasture and periodically cut for hay.

Natural streams were present along the three-zone riparian forest buffer and the planted riparian forest buffer, whereas drainage ditches were adjacent to the field border.

Vegetation

Vegetation sampling encompassing 5 percent of the total buffer area occurred at each site. The percent cover of each plant species was estimated in each sample plot. Vertical structure was characterized using estimates of frequency for different vegetation classes (grass, forb, woody), vegetation density, and vegetation height. In the three-zone buffer, percent cover and vertical structure were determined for the middle and inner zones combined due to the similarity of vegetation in the two areas. Taller, woody vegetation was measured in the three-zone buffer and at the planted buffer site.

High variability in percent cover of dominant vegetation among study sites was observed. Giant cane (*Arundinaria gigantea*), goldenrod (*Solidago* spp.), Canadian horseweed (*Conyza canadensis*), blackberry (*Rubus* spp.) and dogfennel (*Eupatorium capillifolium*), were observed in all three buffers. Species richness values for the planted riparian forest buffer and the field border were 19 and 20 species, respectively for each. Combined species richness for the three-zone riparian forest buffer was 23 species.

Compared with the field border and planted riparian forest buffers, the three-zone riparian forest buffer supported all three vegetation classes while woody frequency at the field border and grass frequency at the planted riparian forest buffer was low (table 1).

Few of the plant species found within the buffer zones provided seeds eaten by northern bobwhite (*Colinus viginianus*). Twenty-four of the 30 most common plant species observed had importance values (a number based on food preference by northern bobwhite with higher numbers associated with staple food, versus number associated with less preferred foods (Landers and Johnson 1976)), of 1 to 4 (low value) on a 16-point importance value scale. None of the major species had importance values higher than 12 (medium-high value). Only Japanese honeysuckle (*Lonicera japonica*), a non-native species, in the planted riparian forest buffer, sweetgum (*Liquidambar styraciflua*) in the three-zone riparian forest buffer, and pine (*Pinus*

Figure 2 Naturally revegetated shrub buffer, Kinston, NC

Photo by Wesley Childres, NCSU

Table 1 Frequency of vegetation at the three buffer locations

	Three-zone Riparian Forest Buffer		Field Border	Planted Riparian Forest Buffer
Vegetation Class	Outer	Middle/ Inner		
	%			
Woody	1	47	9	53
Forb	69	91	92	82
Grass	35	24	21	4

spp.) in the field border had scores of 9 to 12 (medium-high value). On the other hand, plants with high value as escape and nesting cover (e.g., blackberry and dogfennel) were common in all three. Bare ground was most frequent, 88 percent, in the outer zone of the three-zone riparian forest buffer. Bare ground also covered 48 percent and 4 percent of the plots at the field border and planted riparian forest buffers, respectively.

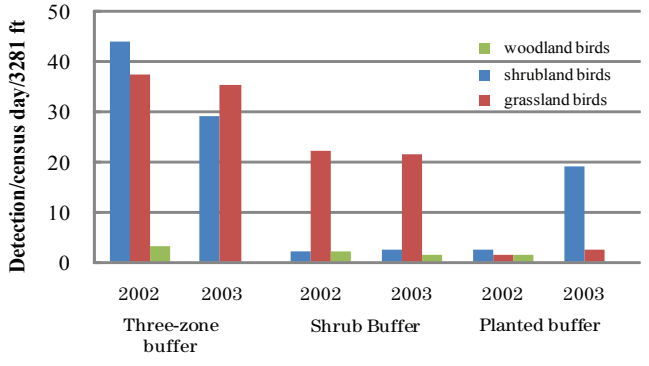
Birds

Breeding birds were surveyed between May 1 and June 30 for 2 years. Eight early-morning surveys were conducted between 7:00 and 9:30 am at each site. All singing males seen or heard were recorded on site maps. If two or more birds of the same species were heard simultaneously, this was noted to prevent recording the same individual more than once. Detections were averaged for all eight visits and results were standardized using length rather than area to illustrate differences in management techniques related to the type of buffer maintained.

The structure of the plant community within each buffer site dictated the composition of the bird community found there. Of all three buffers, the three-zone riparian forest buffer had the highest detections of grassland (3.2), shrub/scrub (37.4), and woodland (43.8) species as well as the highest species richness (29 species) (fig 3). Shrubland bird species dominated the detections in the field border, while the planted riparian forest buffer contained primarily woodland birds.

Northern cardinal (*Cardinalis cardinalis*) and indigo bunting (*Passerina cyanea*) were the only species recorded in all three buffers. Indigo bunting was the most frequently detected species in the three-zone forest riparian buffer, while northern cardinal and red-winged blackbird (*Agelaius phoeniceus*) were the most frequently detected species in the planted forest riparian buffer and field border, respectively. Areas as small as 1 acre can be used, although 5-acre units are better from a management perspective.

Figure 3 Bird sampling at three riparian buffer sites in the Coastal Plain of North Carolina



The type of vegetation present at each site played a major role in determining the bird community detected within each type buffer. Vegetation composition at the three-zone forest riparian buffer incorporated characteristics of three different habitat types (grassland, shrubland, and woodland) into a single streamside area. As a result, bird species ranging from grassland to shrubland and woodland birds occupied the area. Although the restoration simply involved leaving the area fallow, management did have an effect on the composition of the wildlife community:

- Spring mowing in the outer zone of the three-zone forest riparian buffer once a year maintained habitat suitable for grassland birds such as eastern bluebird (*Sialia sialis*) and eastern meadowlark (*Sturnella magna*).
- The 4- to 5-year early-successional zone created by leaving the area undisturbed after buffer widening created habitat suitable for shrubland birds such as indigo bunting and blue grosbeak (*Passerina caerulea*).
- The large trees along the stream bank, although sparse, were effective in supporting woodland species such as Carolina wren (*Thryothorus ludovicianus*) and blue-gray gnatcatcher (*Polioptila caerulea*).

Differences in land management and surrounding landscape resulted in differences in bird abundance and richness among the three type buffers. The farmland adjacent to the three-zone forest riparian buffer and the field border was used for crop production of corn, wheat, and soybeans, which most likely affected food availability to birds within these areas. The planted riparian forest buffer was surrounded by land in pasture grass that was periodically cut for hay, but crops (e.g., corn or soybeans) were sparse and likely contributed little in the form of bird forage during both years of observation. The three-zone riparian forest buffer and planted riparian forest buffers both connected larger adjacent woodland areas, while the field border was more isolated from significant woodland habitat. Therefore, more woodland birds may have occupied

territories within the three-zone riparian forest buffer and planted riparian forest buffers because of their proximity to other suitable woodland habitats. Although the riparian vegetation at the three sites produced seeds ranking from low to medium as northern bobwhite food sources, most quail were observed at the three-zone riparian forest buffer and field border sites. Northern bobwhite may have chosen these two type buffers for their cover protection and nesting habitat while foraging for food outside the buffer. On the other hand, they may have found suitable food within both types of buffers. Although seed production within the riparian forest buffer was less than ideal with respect to quail forage, the vegetative structure at these two sites supplied essential cover and indirect food sources for northern bobwhite residents. In addition, bare ground was also available for efficient foraging and movement throughout the buffer zones. The inability of the three types of buffers to produce highly desirable seed for northern bobwhite did not prevent these birds from occupying the area.

Conclusion

This study suggests:

- Restoration of riparian zones by allowing vegetation to recolonize is equally beneficial to birds as is restoration by planting specific grass, shrub, and tree species.
- Restoration by natural establishment is more affordable and less labor intensive than planting vegetation for food and cover.
- Although governmental support is available to landowners for buffer implementation, rarely does the payment cover the total expense required for successful restoration using planted species. The less expensive restoration by natural revegetation could entice more landowners to become involved with programs like CRP, WHIP and EQIP. When offering natural revegetation caution must be used to insure that invasive species are controlled.

References

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