Native grasses: Contributors to historical landscapes and grassland-bird habitat in the Northeast

By Bruce Peterjohn, Brian Eick, and Betsie Blumberg

As many national parks in the Northeast pursue their missions of re-creating open landscapes where important historical events took place, managers are using native grasses to replace forests that grew up on these sites in the 20th century and to restore open spaces now occupied by nonnative, cool-season grasses. This initiative reflects National Park Service (NPS) policy to restore native species and has ramifications for wildlife, particularly grassland birds.

By the mid-1800s, the once-dominant forests that covered much of the eastern United States had been converted to agriculture. Farming practices, particularly in the southern states, quickly depleted the land of nutrients. These worn-out fields were left fallow or used as pasture as new land was opened for farming. By the 1860s in the eastern United States, the landscape was typically a mosaic of crops, pasture, orchards, woodlots, and abandoned fields. The abandoned fields began the slow succession to forest, often being first colonized by native, warm-season grasses such as broomsedge (*Andropogon virginicus*), purpletop (*Tridens flavus* var. *flavus*), Indiangrass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium* var. *scoparium*), and big bluestem (*Andropogon gerardii*). These types of grasses grow in clumps or bunches, never forming a blanket of turf, and put down long taproots, penetrating at least 6 feet (1.8 m) into the subsoil. The long roots reach needed nutrients and water, making the grasses drought tolerant and helping rebuild the soil. Many species of grassland birds thrived in this landscape of small farming fields and abundant fallow ground.

Changes in agriculture following World War II, such as the introduction of large-scale crop production, and use of turf-producing, nonnative, cool-season grasses, particularly cultivars of fescue such as Kentucky-31, began altering the agricultural landscape. Habitat conversion and intensification of agricultural practices probably led to the decline of many grassland birds (Trocki and Paton 2005). Use of fescue for hay and pastures also greatly reduced wildlife habitat. These changes also took place in many historical park units where agriculture has been used as a land management tool. In many parks, the agricultural lands no longer reflected the mosaic landscape of the 1800s.

Re-creating native grassland habitat

At Appomattox Court House National Historical Park in Virginia, Natural Resource Manager Brian Eick has been converting 70 acres (28ha) of fescue fields into native, warm-season grasses. Worn-out tobacco fields

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dotted the scene in Virginia in the 1860s, and although planting warm-season grasses does not fully re-create this particular landscape, it creates an ecologically viable habitat for wildlife that suggests the historical scene.

The experiment entails learning how to successfully plant and sustain native grasses and then working with local farmers to maintain the fields through the park's agricultural leasing program. Like many historical parks in the Northeast, Appomattox Court House has been using agricultural leasing since the 1940s as a tool to maintain a historical, rural character of the landscape. This program also enables local farmers to cultivate park land in exchange for services or payment. Over time, however, local farmers stopped planting the fields in crops that were grown historically, such as corn and wheat. Instead, to compete in the modern agricultural market, they increased the use of nonnative, cool-season grasses for beef production. As a result, the cultural landscape of the park began to resemble modern agricultural land.

Park staff has tried several techniques to establish and manage native, warm-season grasses. They started by treating existing turf with herbicide (fig. 1). Because the native grass seed is "bearded" and will not slide through standard equipment, staff borrowed a special seed drill from the Virginia Department of Game and Inland Fisheries to plant the seed (fig. 2). They found that the germination rate improved if existing thatch was removed, promoting good contact between seed and soil. Park staff employed disking before planting and found that it yielded good results (fig. 3a, page 64). Establishing these grasses takes a few years (figs. 3b and 3c, pages 64–65), so staff used mechanical and chemical means to control broadleaf weeds, vines, woody plants, and invasive, nonnative plants. These grasses are harvested only once a year, in early August, rather than twice, in late May and late September, as are cool-season grasses (fig. 3d, page 65). The late-summer timing of the hay harvest allows nesting birds to fledge their young. In the historic village area, park staff created a mosaic of fields, some in warm-season grasses, and others in fescues. Because of the different harvest time periods, the park is able to re-create a partial impression of the smaller fields of the past. The park is working to create a volunteer bird monitoring program to compare the two field types in terms of providing bird nesting and wintering habitat.

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At Valley Forge National Historical Park in Pennsylvania, no agricultural leasing program has been implemented; however, starting in the 1990s, park staff converted 925 acres (374 ha) of lawn to native grasses. Here, monthly mowing was simply stopped and the native seed in the soil germinated and grew. About 35% of the vegetation in the meadows is nonnative. Park Ecologist Margaret Carfioli reports that the meadows are mowed once a year to keep them from reverting to forest, and the emerging woody saplings are controlled to some extent by deer browsing. Burning the meadows periodically would also keep them open, but this can not be done at Valley Forge, which is situated in a densely developed area.

Figure 1. Resource managers at Appomattox Courthouse National Historical Park, Virginia, have converted approximately 70 acres (28 ha) of nonnative grasses to native, warm-season species. The process began by treating the nonnative grasses with herbicide in preparation for planting native species. NPS/BRIAN EICK

Figure 2. In order to plant the "bearded," native, warm-season grasses, park staff at Appomattox Court House used a special seed drill from the Virginia Department of Game and Inland Fisheries, which allowed the seeds to slide through. Seeds of this type get caught in standard equipment. NPS/BRIAN EICK

At Petersburg National Battlefield in Virginia, Resource Management Specialist Dave Schockley found native, warm-season grasses to be a poor choice to replace trees removed from fortifications. The old trees that had covered the earthworks since the Civil War were falling over and damaging the historic ruins as their roots lifted out of the earth. Covering the bare slopes quickly when the trees were gone was necessary to protect the earthworks from erosion. Park staff planted six test plots in native grasses but found that their slow rate of establishment and spotty coverage did not provide adequate erosion control. Instead they planted a blend of fescues.

Native grasses for grassland birds

An important benefit of meadows and fields of native, warm-season grasses is that they provide habitat for ground-nesting birds. The status of grassland birds has become an increasingly important conservation issue because they are suffering the most consistent population declines of any group of North American birds (Peterjohn and Sauer 1999). The conversion of grasslands into other habitats is largely responsible for these declines, but other factors may include habitat fragmentation and unfavorable mowing regimes (Vickery et al. 1999). The plight of grassland birds has heightened awareness of the need for concerted conservation actions to reverse these seriously declining population trends.

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In 2005 the National Park Service partnered with the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center to initiate a project exploring the potential of cultural parks to support significant breeding communities of grassland birds. This required inventorying grassland habitats to determine the composition and abundance of the grassland bird communities. The objective was not to examine the effects of specific management actions on grassland birds in these parks, but rather to provide recommendations to the parks on how they could modify their management practices to the benefit of grassland birds. The best management for birds would reduce the value of agricultural leases for farmers, which would also mean reduced income to the parks. But when opportunities arise for the parks to provide better management for grassland birds, the park staff now has better information to allow them to make informed decisions.

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This project involved four parks in the Northeast that have extensive grasslands: Antietam and Monocacy national battlefields in Maryland, Gettysburg National Military Park in Pennsylvania, and Manassas National Battlefield Park in Virginia. Each of these parks maintains grasslands for interpretation of historic events. The grasslands within the parks vary in size from nearly 2,000 acres (810 ha) at Gettysburg to less than 100 acres (40 ha) at Monocacy.

Findings and discussion

The four test parks support differing compositions of grassland bird communities. Antietam supports the greatest densities of grassland birds. Gettysburg hosts a sizable population of bobolinks (*Dolichonyx oryzivorus*), a World Conservation Union threatened species (fig. 4). A breeding pair of Henslow's sparrows (*Ammodramus henslowii*)

Figure 3a (facing page, left). At Appomattox Court House, after disking the field, park staff sowed native, warm-season grasses. This practice improved germination by removing a cover of thatch. In spring of the first year (fig. 3b, facing page, right), the native grasses had germinated and begun to grow. In fall of the first year (fig. 3c, above left), the grasses had gone to seed. After two growing seasons (fig. 3d, above right) the grasses are well enough established to be cut the following year. Mowing is now delayed under the new management regime until mid-July or later, allowing nesting birds to finish brooding. NPS/BRIAN EICK (4)

Figure 4. Gettysburg National Military Park in Pennsylvania hosts a sizable population of bobolink, a grassland bird species listed as threatened by the World Conservation Union. Four national parks involved in grassland bird habitat enhancement support differing compositions of grassland-bird communities, with Antietam National Battlefield in Maryland hosting the greatest densities of grassland birds. USFWS/S. MASLOWSKI

inhabits a warm-season grassland at Manassas—a big surprise to USGS investigators. These sparrows prefer mature grasslands with dense vegetative cover and thick litter layers. Very few Henslow's sparrows have been documented in the greater Washington, D.C., area in recent years. Breeding population estimates developed for grassland birds in each park serve as a baseline useful for establishing goals for restoration efforts (table 1).

Table 1. Estimated populations of territorial male grassland birds in four northeastern cultural national park units

Species	Antietam	Gettysburg	Manassas	Monocacy
Vesper sparrow	8			
Savannah sparrow	9			1
Grasshopper sparrow	28	29	29	11
Henslow's sparrow	1			
Bobolink	74			1
Eastern meadowlark	14	48	33	

Several interesting patterns of occurrence were evident during these grassland bird surveys. In Gettysburg where mowing is delayed until July, grassland birds were largely restricted to NPS-managed fields that support more diverse grassland communities. Leased hayfields were composed of dense monocultures and supported few grassland birds. In the other parks where mowing began in late May, grassland birds generally abandoned fields after they were mowed. Evidence of successful reproduction was evident only in fields that remained unmowed through June. As expected, breeding grassland birds preferred the largest contiguous habitats in every park, avoiding smaller fields less than 24 acres (10 ha) in size.

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Preliminary results indicate that grassland management practices can be adapted to benefit breeding bird communities in these habitats. Regulating mowing and haying activities until after July 15 will allow for improved reproductive success resulting in population increases. Grassland birds avoid dense monocultures (areas where only one species grows) of grasses (Norment et al. 1999), so replacing these homogenous areas with mixed-grasses will increase the amount of suitable habitat. In addition, proactive grassland management through the use of prescribed burns, regular mowing, and/or periodic disking to create young and mature, mixed-species grasslands will support a more diverse grassland-bird community. Increasing the size of contiguous grassland habitats would also benefit breeding grassland birds.

With proper management of native grasses, cultural parks in the Northeast can cultivate an environment reminiscent of the past landscapes common in this region in the 18th and 19th centuries, while providing habitat with the potential to support source populations for most grassland birds. These efforts could contribute to the recovery of regional populations that flourished here during that era.

Acknowledgements

Talks with many people contributed to this article, including Kris Allen (resource management specialist, Richmond National Battlefield Park); Zach Bolitho (resource management specialist, Gettysburg National Military Park / Eisenhower National Historic Site); Margaret Carfioli (ecologist, Valley Forge National Historical Park); Jim Comiskey (coordinator, Mid-Atlantic Network); Larry Hilaire (wildlife biologist, Delaware Water Gap National Recreation Area); John Karish (chief scientist, Northeast Region); Chuck Rafkind (former natural resource manager, Colonial National Historical Park); and Dave Schockley (resource management specialist, Petersburg National Battlefield).

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