

# Supporting Habitat Management for Bird Conservation Planning on Fort Belvoir, Virginia<sup>1</sup>

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## Abstract

The U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC), Environmental Laboratory has conducted seasonal avian surveys (winter, spring, summer, fall) from Spring 1998 through Summer 2002 at approximately 127 permanent point-count locations on Fort Belvoir, VA. This work has resulted in a data-rich baseline understanding of the distribution and abundance of birds, as well as the relative importance of different habitats on the installation. Our investigation identified opportunities to enhance or create improved early-successional habitat on Fort Belvoir for Partners in Flight (PIF) priority birds within the Mid-Atlantic Coastal Plain physiographic area (MACP). This document describes the development of a site-specific plan, in support of the MACP Bird Conservation Plan (BCP), for improving habitats of early-successional bird species at Fort Belvoir, VA.

*Key words:* Partners in Flight, early-successional habitat, Mid-Atlantic Coastal Plain, priority species, Fort Belvoir.

## Introduction

The Department of Defense (DoD) manages approximately 10 million ha of land on over 400 military installations in the United States. In addition, the U.S. Army Corps of Engineers administers approximately 5 million ha of project lands on over 450 man-made lakes and an additional 38,600 km of inland navigation

streams in the continental United States (Fischer and Hamilton 2001). DoD lands represent a wide diversity of habitats, from mountain forests and meadows to coastal beaches and cliffs, and abundant lake, river, and stream riparian ecosystems throughout the nation. These ecosystems often occur as oases of habitat in the midst of fragmented and developed landscapes. Throughout the Americas, habitats that host high priority and federally listed species are becoming increasingly threatened by development. However, much of the land administered by DoD is relatively undeveloped, providing large habitat blocks for numerous threatened, endangered, and Partners in Flight (PIF) High Priority species (Boice 2000).

In 1991, DoD joined the PIF initiative through each of the military service branches. By participating in this partnership, DoD actively has pursued a sound conservation ethic in managing its public lands for the benefit of bird species throughout the Americas. The Sikes Act (P.L. 106-580) requires military installations to develop and implement Integrated Natural Resources Management Plans (INRMP) addressing fish and wildlife conservation. The DoD PIF program offers a coordinated framework for incorporating bird habitat management into an installation's INRMP, consistent with the military mission. The goals of the PIF effort within DoD must support the military mission, both overall for DoD and at each installation. For installations with an active (and sometimes destructive) training mission, maintaining lands in a condition that permits ongoing training activities is imperative. If lands degrade beyond the point where troops can train, the lands are lost for training activities.

Following the intent of the national PIF bird conservation strategy, known as the Flight Plan (Pashley et al. 2000), as well as regional approaches to migratory bird conservation, DoD's strategy focuses on inventory, on-the-ground management practices, education, and long-term monitoring to determine changes in populations of birds on DoD installations. In addition, the DoD PIF program focuses on protecting biodiversity using the best available science, working at a landscape level, and using partnerships to maximize the effectiveness of management efforts. The goals and objectives of the Flight Plan many times can provide the necessary guidance to support the military training mission, while

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at the same time providing a benefit to bird habitat conservation.

### **Importance of Early-Successional Habitats in the Mid-Atlantic Coastal Plain**

The Mid-Atlantic Coastal Plain (MACP) occupies approximately 56,451 square km covering all of Delaware, eastern Virginia and Maryland, southeastern Pennsylvania, and southern New Jersey. Within this area are approximately 1,000 perennial rivers and streams and nearly 1 million ha of wetlands (primarily forested wetlands and salt marsh). Vegetation within the region is closely associated with the Southeastern Coastal Plain. The avifauna within the MACP is comprised of both northeastern and southeastern species, which contributes to high species richness (> 180 species that regularly breed) (Watts 1999). Although populations of most species of breeding birds within the region appear to be secure, 30 species (16.7 percent) have declined significantly (Watts 1999).

Early successional grasslands/shrublands are designated as priority habitats within the PIF Bird Conservation Plan for the MACP (Watts 1999). Early-successional habitats are represented by a range of habitat characteristics, varying from open grasslands with little or no woody vegetation, to areas having varying densities of woody shrubs and small trees (i.e., “oldfields”). Grassland and oldfield habitats support a large number of PIF priority species, including five species of high continental priority - Henslow's Sparrow (*Ammodramus henslowii*), Bachman's Sparrow (*Aimophila aestivalis*), Prairie Warbler (*Dendroica discolor*), Blue-winged Warbler (*Vermivora pinus*), and Field Sparrow (*Spizella pusilla*); and eight species of high regional priority (Northern Bobwhite (*Colinus virginianus*), Brown Thrasher (*Toxostoma rufum*), Eastern Towhee (*Pipilo erythrophthalmus*), Grasshopper Sparrow (*Ammodramus savannarum*), Gray Catbird (*Dumetella carolinensis*), Upland Sandpiper (*Bartramia longicauda*), Yellow-breasted Chat (*Icteria virens*), and White-eyed Vireo (*Vireo griseus*).

Since the mid-1900s, agricultural practices in the MACP have greatly diminished the availability of idle lands for grassland-obligate and shrubland species. The introduction and widespread use of cool-season grasses such as tall fescue (*Festuca arundinacea*) and other herbaceous plant species (e.g., sericea lespedeza [*Lespedeza cuneata*]) have greatly reduced habitat quality for many grassland species. Although early-successional shrubland bird communities have not been as affected, the quantity and quality of shrubland habitats within the region are lacking. More than 50 percent of bird species within the MACP with a declining trend are associated with early successional grassland/shrubland habitats (Watts 1999). In the eastern United

States, native grassland bird species populations have declined by almost 90 percent (Vickery et al. 1999).

According to Watts (1999), military installations provide some of the most significant forested and early successional habitats within the MACP. As such, it is important that these lands be identified, inventoried, and integrated into conservation planning processes to maximize their contribution to regional habitat and population goals. Natural resource managers charged with decision-making on these lands must be well informed of the priority habitats that they control and how appropriate management strategies can assist with meeting regional conservation objectives (Watts 1999).

The Fort Belvoir, Virginia, Environmental and Natural Resources Division is proactive in its approach to incorporating PIF objectives into their natural resources management strategy. The installation began its involvement with PIF in the mid-1990s by supporting the Monitoring Avian Productivity and Survivorship (MAPS) Program. A MAPS station has been operated on the installation every year since 1995. In 1998, Fort Belvoir initiated an installation-wide multi-year, multi-season bird survey to develop a comprehensive inventory of bird species, and evaluate habitat conditions and develop recommendations for habitat conservation and improvement. Fort Belvoir incorporated the preliminary results of this survey work, together with information gained through other survey efforts including Christmas Bird Counts, Breeding Bird Surveys and Jackson Miles Abbott's Fort Belvoir bird surveys, into their INRMP (U.S. Army Garrison, Fort Belvoir, 2001). Fort Belvoir expressed the installation's commitment to the PIF regional conservation objectives by including management actions for long-term monitoring and habitat conservation and enhancement, along with regional coordination of the PIF Program in their INRMP. Fort Belvoir used PIF Mid-Atlantic priority bird species and their associated habitats to designate sensitive wildlife habitat areas and identify potential areas for habitat improvement. For the latter, Fort Belvoir selected several PIF MACP priority bird species that 1) could reasonably be expected to maintain a viable population at Fort Belvoir, and 2) have habitat needs compatible with the habitat needs of other wildlife species of management interest on Fort Belvoir.

In 2000, the authors developed and hosted a Mid-Atlantic PIF conference at Fort Belvoir. Key attendees included representatives from PIF, other bird management programs (e.g., North American Waterfowl Management Program), regional land managers, and federal and state wildlife biologists. As a result of this conference, and using the conservation objectives expressed in Fort Belvoir's INRMP, we initiated development of the Fort Belvoir Bird Conservation Plan. In developing

this plan we synthesized data from several sources, including the PIF MACP Bird Conservation Plan (BCP) (Watts 1999), the Fort Belvoir INRMP (U.S. Army Garrison Fort Belvoir 2001), Fort Belvoir’s multi-season bird survey data, MAPS data, Christmas Bird Count data and other inventory data and management plans. The objective of this paper is to describe the development of an implementation plan for managing PIF priority habitats on an eastern military installation to promote regional habitat and bird conservation planning goals.

## Methods

### Study Area

Fort Belvoir is located in southeastern Fairfax County, Virginia, approximately 32 km southwest of Washington, DC. The installation, which occupies 3,434 ha, is located within the MACP physiographic area identified by PIF (fig. 1). Fort Belvoir supports a diversity of habitats important to a wide variety of birds, including bottomland hardwood and upland mixed forests, freshwater and brackish emergent wetlands, riparian areas, and early-successional shrublands.

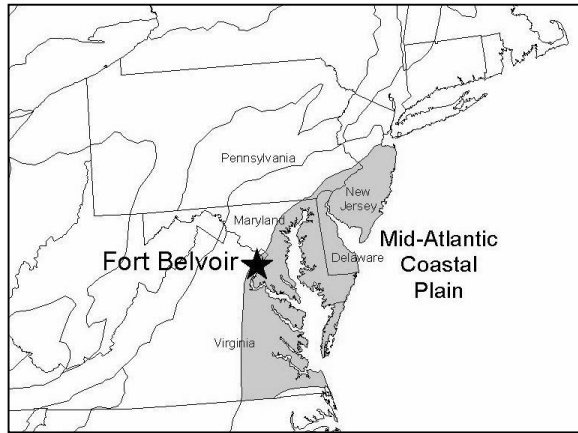


Figure 1— Location of Fort Belvoir, VA, in the Mid-Atlantic Coastal Plain.

### Avian Sampling

From April 1998 to June 2002, we established and sampled 127 permanent sampling points in representative forested and non-forested habitats. We used standardized, unlimited distance point-count surveys to census birds during all seasons. Observers counted birds for 10 minutes during Spring and Fall migration, and 5 minutes during Summer and Winter; all species and individuals detected by sight and sound were recorded. Observers began recording data when they reached a point that was <50 m from the point-count station, which enabled the recording of individuals that were initially present but stopped vocalizing or flushed

upon approach by the observer. The methodology used in this investigation is a standardized protocol for censusing breeding birds in the Southeast (Hamel et al. 1996).

## Results and Discussion

During the monitoring period, early-successional habitats consistently had the highest mean bird species richness and abundance during the spring migration and summer breeding seasons (figs. 2, 3). Numerous PIF priority species breed in early-successional habitats and the presence of these species in Fort Belvoir oldfield habitats confirms the importance of this habitat type on post. Such species include the Prairie Warbler, White-eyed Vireo, Field Sparrow and Yellow-breasted Chat. Based on our investigation, although early-successional habitat represents only a small percentage of the total available habitat on the installation, it is one of the most important breeding habitats for PIF Priority species. Therefore, we suggest that management to increase the quantity and quality of early-successional habitat on Fort Belvoir should be a conservation priority. Our goal is to develop a plan for converting low-quality open areas on Fort Belvoir to higher-quality shrubland and grassland communities. Our intention is to use a combination of management techniques to achieve habitat enhancement, including (1) selected tree harvests to improve the quality of existing shrublands and early-successional habitats, and (2) manipulations of soil conditions and enhancement of vegetation cover to improve plant species composition and structural diversity of these stands.

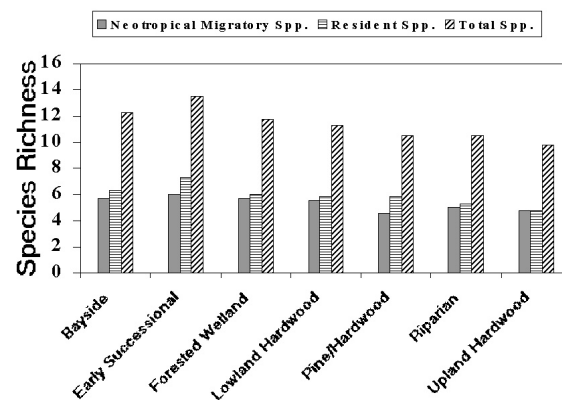
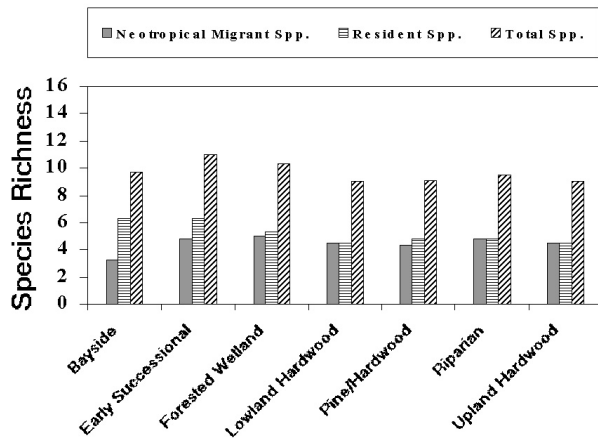


Figure 2— Mean species richness by habitat type during spring migration on Fort Belvoir, VA. May 1998-2002.

### Decision-Support for Habitat Management

Grassland-obligate bird species within the MACP reach their highest density and probability of occurrence within patches >10 ha in size (Watts 1999). Open

lands <10 ha that are managed as “grasslands” are often considered suboptimal because they are not large enough for “area-sensitive” grassland birds and do not have adequate woody vegetation for shrubland bird species. Watts (1999) reported that the most abundant and widespread patches of open land within the MACP are <10 ha in size, meaning that a significant amount of open land within the region would be suboptimal as grassland. Therefore, instead of managing these small-sized areas as grasslands, greater conservation benefit would be realized through the conversion and subsequent management of these patches as shrublands.



**Figure 3**— Mean species richness by habitat type during the breeding season on Fort Belvoir, VA, June 1998-2002.

All early-successional patch sizes on Fort Belvoir under consideration for bird habitat management fall below the 10-ha threshold. Moreover, the results of our intensive seasonal bird surveys indicated that these areas support a variety of early-successional habitats with a range of vegetation composition and habitat quality, each comprised of varying densities of several priority early-successional shrubland bird species. For example, scattered shrubland communities on the installation contained a mixture of grasses, herbaceous plants, and small trees that provide significant habitat for several priority species (e.g., Prairie Warbler, Field Sparrow, White-eyed Vireo). Thus, shifting the management focus of small early-successional patches on Fort Belvoir to shrublands would increase the availability of habitat for shrub-dependent birds on the installation as well as contribute to the overall goals of the MACP plan.

We identified three potential options for management of open areas on Fort Belvoir that had potential for providing habitat for PIF priority bird species: (1) enlarge existing open areas to rise above the 10-ha threshold and attempt to convert them to warm-season grasslands, (2) manage and maintain open areas as shrublands for early-successional bird species, or (3)

allow habitat patches that are either too small for shrubland management, or would assist in closing up gaps and reduce forest fragmentation, to undergo succession into mature forest.

### Option 1

An initial assessment identified two potential sites, a closed landfill and a former impact area, that could be connected via tree clearing, to create a 24 ha patch that could be managed for grassland birds. However, given logistical and political constraints associated with this conversion, we suggested that Fort Belvoir continue to manage the landfill as a grassland, and attempt to convert the vegetation cover from lespedeza to vegetation with better wildlife habitat value. Although the site is < 25 ac in size, some habitat benefits may be created for breeding Eastern Meadowlarks (*Sturnella magna*) and, possibly, Grasshopper Sparrows. The site also likely would provide suitable wintering habitat for numerous species (very few species currently use the site during any season).

### Option 2

Open areas too small for grassland management but large enough for shrubland management were identified for potential habitat manipulations. We recommend maintaining a mixture of early- and late-successional stages of oldfield succession. All priority shrubland bird species within the MACP show a positive response to the density of shrub cover within oldfields, but differ somewhat in their preference for various levels of woody intrusion (Watts et al. 1997). For example, Prairie Warblers and Field Sparrows use a range of relatively young oldfields, from those having scattered shrubs and trees to older fields with moderate shrub cover. Neither of these species will readily use later successional stages where shrub and sapling cover becomes very dense (Watts 1999). Field sparrows generally decline in numbers as woody vegetation cover becomes continuous (Carey et al. 1994). Conversely, Yellow-breasted Chats prefer later successional stages of oldfields having moderate to dense shrub cover (Eckerle and Thompson 2001); other shrubland species like Brown Thrasher, Eastern Towhee, and White-eyed Vireo also prefer later successional oldfields having dense thickets of shrubs and saplings (Watts 1999).

Many open areas on Fort Belvoir are deficient in either vegetation composition or structure, and contain several highly invasive non-native tree and herbaceous species. For example, sericea lespedeza and tall fescue currently dominate nearly all open areas on the installation, significantly reducing habitat quality and quantity. In areas suitable for shrubland management, we are investigating the potential for conversion or enhancement of vegetation from low-quality plants to a

mixture of native warm-season grasses and other herbaceous and woody species beneficial to shrubland birds in the eastern U.S. (i.e., plant species that provide food and cover during all seasons). We plan to attempt various management techniques (e.g., tree removal; soil fertilization and amendment; application of herbicides followed by plantings of native grass, herb, and shrub species) to maintain or enhance these early-successional habitats in support of regional PIF goals. In the absence of regular maintenance (e.g., fire, mowing, tree harvest) to maintain early succession, open fields will progress through successional stages from a mixed stand of grasses and forbs with little woody vegetation to a shrubland dominated by woody shrubs and saplings, and eventually to forest. This is occurring rapidly at several open shrubby areas on the installation. Most early-successional bird species, while initially present, will eventually cease to use these areas.

Because of safety concerns, prescribed fire as a management tool is not a feasible option on Fort Belvoir for assisting the conversion and maintenance of early-successional habitats. However, the recent release of several highly effective herbicides has revolutionized the eradication of cool-season grasses and other invasive or non-native herbaceous and woody species, and enhanced success for the subsequent establishment of native warm-season grasses (e.g., Washburn et al. 1999, Washburn and Barnes 2000). Either a rigorous mowing regime or prudent application of herbicides followed by reseeding and replanting techniques offers the best hope for converting vegetation cover. At Fort Belvoir, such conversion is complicated by poor soil conditions. All of the open areas addressed in this study have little to no topsoil, most of which is of poor quality. These poor soil conditions have promoted establishment of opportunistic species such as sericea lespedeza. Soil conditions will need to be amended before attempting vegetation conversions.

Most shrubland bird species would benefit from the establishment of native warm-season grasses (e.g., big bluestem [*Andropogon gerardii*], little bluestem [*Schizachrium scoparium*], and indiagrass [*Sorghastrum nutans*]), shrubs (e.g., blackberry and raspberry [*Rubus* spp.], hawthorn [*Crataegus* spp.], sumac [*Rhus* spp.]), and trees (e.g., American holly [*Ilex opaca*], black cherry [*Prunus serotina*], hackberry [*Celtis occidentalis*], flowering dogwood [*Cornus florida*], red mulberry [*Morus rubra*], and oak [*Quercus* spp.]). Recommendations and guidelines for the conversion of 10 ha and smaller patches to shrublands have not been developed for the region (Watts 1999), thus the Fort Belvoir effort can assist in providing recommendations for other sites within the MACP.

### Option 3

Allow small habitat blocks to succeed to forest habitat. These include areas deemed too small for effective habitat conversion, or those areas identified as habitat patches that, if allowed to succeed into forest, would increase patch size of forest blocks. None of the open areas assessed at Fort Belvoir were determined to benefit from conversion to forest habitat. Moreover the areas we evaluated all have operational requirements to be maintained in some type of open condition (e.g., landfill closure requirements prohibit establishment of woody vegetation).

As with most habitat management programs, there are some factors that hinder plan formulation and development. Funding tends to be the largest limiting factor; as budgets get tighter, funding for elective activities such as bird conservation becomes more difficult. Fort Belvoir has a contract workforce, and requires funds to hire contract staff and equipment to perform field projects for installation-wide surveys of birds, plant communities, invasive/exotic vegetation, and other taxonomic species groups, to manage data (e.g., GIS specialists), and to execute the habitat enhancement projects in the field. Second, resistance from the hunting community can be a problem, especially when they view any efforts toward “non-game species” management as in direct conflict with “game species” management. However, the proposed habitat enhancements will likely also benefit game species like white-tailed deer (*Odocoileus virginianus*) and eastern wild turkey (*Meleagris gallapavo*), allaying some of these concerns. Third, unprecedented development pressure is contributing to habitat loss and degradation on the installation. Because there are no regulatory requirements for the conservation of most PIF priority bird species, it can be difficult to convince the development community to consider them when making decisions on designing and siting new facilities. Finally, the largest grasslands on Fort Belvoir occur on closed landfills and at the installation airfield. Any habitat manipulation must make landfill closure and airfield operation requirements a priority.

The success of bird conservation and the DoD PIF program on military lands, like the larger natural resources management framework, is due largely to two key factors: dedicated professionals and successful partnerships. Natural resources professionals at Fort Belvoir and throughout DoD embody the thinking of Aldo Leopold (1949): “A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.” Balancing the needs of the military mission with those of protecting biodiversity requires the institutional memory, expertise, and dedication exhibited by these civilian employees. The research and recommendations

presented in this paper were completed over the course of several years with the close cooperation of the Fort Belvoir staff. Successful implementation and monitoring will require institutional dedication over many years.

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