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# NATURAL RESOURCES MANAGEMENT AND THE BIRD AIRCRAFT STRIKE HAZARD AT WESTOVER AIR RESERVE BASE, MASSACHUSETTS

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**ABSTRACT:** Bird-Aircraft Strike Hazard (BASH) reduction strategies at Westover Air Reserve Base (ARB) conflict with recommended habitat management strategies for two State-listed grassland bird species that inhabit the Base—the upland sandpiper (*Bartramia longicauda*) and the grasshopper sparrow (*Ammodramus savannarum*). Westover ARB contains the largest contiguous grassland habitat in the New England region, comprising 1,600 acres that surround the airfield. Annual breeding surveys, emphasizing the Upland sandpiper and Grasshopper sparrow, began in 1986. Initial surveys revealed that the implementation of habitat management suggestions provided by the Massachusetts Division of Fisheries and Wildlife (MDFW) resulted in a rapid rise in specie population levels. More recent surveys suggest that population levels stabilized as the habitat reached carrying capacity. State habitat management guidelines recommend prohibition of pedestrian and vehicle movement through the breeding grounds from April 20 through August 1. These guidelines conflict with U.S. Air Force (USAF) BASH reduction guidelines, which require mowing to reduce the attractiveness of the airfield to the overall grassland bird population. Conflict resolution efforts involving the installation, the USAF BASH Team, the U.S. Department of Agriculture-Wildlife Services, and the MDFW have produced limited success. However, an airfield Vegetation Management Plan has been developed in conjunction with these agencies to reduce the attractiveness of the grassland habitat to species that pose the greatest threat to aircraft safety (e.g., wild turkey, white-tailed deer, and gulls). Westover ARB personnel continuously monitor and modify management practices to reduce the BASH threat and also to maintain suitable habitat for sensitive grassland bird species on the Base.

**KEY WORDS:** grasshopper sparrow, upland sandpiper, BASH, vegetation management, Massachusetts, *Bartramia longicauda*, *Ammodramus savannarum*

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## INTRODUCTION

In January 1991, a flock of herring gulls (*Larus argentatus*) loafing on the Westover Air Reserve Base (ARB) airfield took flight just as a C-5A Galaxy Cargo aircraft lifted off toward the Persian Gulf during Desert Storm. The ensuing bird strike took out two of the four massive engines on the aircraft causing an abortive take off. A 2.5-pound herring gull, struck by an aircraft traveling 290 miles per hour, has an impact of 34 tons. Damage to the aircraft was estimated at \$100,000 (WARB 1998).

Shortly after the bird strike, Westover ARB was visited by a U.S. Air Force (USAF) Bird Aircraft Strike Hazard (BASH) Team representative to assist in assessing the condition of the airfield. Initially, the BASH Team representative concluded that off-Base gull migrations between five local landfills that surround the Base contributed to a majority of the BASH threat in the vicinity of and on Westover ARB.

The bird strike also prompted Westover ARB to enter into a cooperative agreement with the U.S. Department of Agriculture-Wildlife Services (USDA-WS) to find ways to reduce the number of birds roosting in and around the base. Once USDA-WS made their recommendations for grassland management to reduce the attractiveness of the airfield, as well as to reduce the chance of another catastrophic bird strike, a conflict

arose with the recommendations for habitat management made a few years earlier by the Massachusetts Division of Fisheries and Wildlife (MDFW). MDFW's recommendations for grassland management at Westover ARB encouraged protection of two State-listed grassland bird species—the upland sandpiper (*Bartramia longicauda*) and the grasshopper sparrow (*Ammodramus savannarum*).

## LOCATION

Westover ARB is located in the Connecticut River Valley of western Massachusetts. Sixteen C-5A Galaxy aircraft are assigned to Westover ARB, representing 5% of United States' total airlift capability. The Base's on-the-ground training areas are heavily utilized by military and civilian organizations throughout the year. On average, over 100,000 personnel from National Guard units, USAF Reserve Medical units, US Marine Corps, and other Federal agencies used the Base annually for training. Westover ARB is unique in that it contains the largest contiguous grasslands in the six-state New England region. Downsized to half its original size in 1972, Westover ARB comprises 2,500 acres of which approximately 1,600 acres of grasslands are part of and surround the airfield. These grasslands are considered Northeast's premier breeding habitat for the upland sandpiper and the grasshopper sparrow.

## UPLAND SANDPIPER

The upland sandpiper, listed in Massachusetts as endangered, is a slender, moderate-sized shorebird with a small head; large, "shoe-button" eyes; short and thick dark brown bill; long, thin neck; long, yellowish legs; and a relatively long tail (Carter 1994). The upland sandpiper inhabits open expanses of grassy fields and hay fields. The upland sandpiper migrates from its wintering areas in South America during mid-April to early May to breed in Massachusetts. In Massachusetts, upland sandpipers nest at only nine locations, five of which are airports or military bases (MNHESP 1995). Optimum habitat for the upland sandpiper consists of separate areas of short and tall vegetation. Grassland areas utilized by the upland sandpiper are devoid of tall shrubs, dense ground litter, and uniform grasses and legumes (MNHESP 1995). Visually, this species prefers extensive open areas to detect approaching predators. Short grass regions usually containing bare soil areas are used for feeding (Terres 1980).

Tall grass regions are used by the upland sandpiper for nesting. Nests are built in sparse vegetation approximately 4 to 12 inches tall (MNHESP 1995). Nests are well-concealed, grass-lined depressions on the ground. Clutch size is four cinnamon- to pale-olive or greenish-white eggs spotted with brown coloring. Both sexes incubate the eggs for 21 to 28 days. Young birds reach full size, develop adult plumage, and are fledged 32 to 34 days after hatching. European settlement created extensive nesting habitat through the clearing of forests for agricultural and grazing purposes. The species has been State-listed in Massachusetts because of its rarity, declining population, and the continuing loss of open grassland habitat due to urban development and the natural succession of open lands to forests. The upland sandpiper is currently experiencing population decline over much of its range, particularly in the midwest and eastern United States (MNHESP 1995).

## GRASSHOPPER SPARROW

The grasshopper sparrow, listed in Massachusetts as threatened, is a small- to medium-sized grassland sparrow, with a narrow, short tail. Adult birds have an unstreaked or faintly streaked, buff-colored throat and breast; brown to reddish upper parts with intervening gray coloration; a pale, cream-colored strip flanked by lateral, dark brown strips on the head; and a yellowish area extending from the bill to below the eye. Grasshopper sparrows appear to be flat-headed with large bills (Rising 1996). This species inhabits sandplain grasslands, pastures, hayfields, and airfields. The grasshopper sparrow is one of the most widespread species of sparrows with populations in North, Central, and South America. The grasshopper sparrow has been listed as threatened in Massachusetts due to declining populations resulting from the loss of grassland habitat within the state (MNHESP 1995). Westover ARB contains one of the 20 remaining breeding populations within the state.

Typical grasshopper sparrow habitat consists of dry, upland sites, composed of short native grasses, bunch grasses, minimal litter cover, patches of bare ground,

scattered forbs, and short shrubs. Grasshopper sparrows select habitat areas with bare ground for insect foraging and escape routes for young and adults to seek cover and avoid predation. Grasshopper sparrows require at least 30 acres for breeding and prefer grassland areas up to 100 acres (MNHESP 1995). Fence posts and shrubs of selected habitats are used for perching and territorial singing. This species nests in loose colonies, each male defending approximately a 1 to 3 acre territory. Nests are constructed on the ground at the base of grass clumps or clover. Nests are placed in a slight depression in the ground concealed with a dome-shaped grass cover (Terres 1980).

MDFW has collected data intermittently over a 12-year period to assess Westover ARB's grassland bird populations. Data was collected annually from 1987 to 1989 and from 1993 and 1995. Since this time, the grassland bird population census survey has been conducted on a biannual basis. Table 1 presents the results from these surveys.

## CONFLICTING GUIDANCE

Prior to 1987, very little was done at Westover ARB concerning grassland birds or habitat management. Westover ARB's grassland management plan was outlined in a Performance Work Statement for Grounds Maintenance crews to follow while mowing the Base's airfield grasses. Semi-improved grounds were to be mowed to "a height of 5 inches ..., except for a 6-foot wide strip on each side of runway and taxiway lights that will be cut to a height of 3 inches." Lack of manpower resulted in some of the grassland areas growing longer than 5 inches before mowing. This approach limited the success of grassland bird breeding activities each season.

In 1987, a three-year cooperative agreement was entered into with the MDFW, the U.S. Fish and Wildlife Service, and Westover ARB "for the protection, development, and management of fish and wildlife resources ..." (Melvin 1989). The conservation and management of the upland sandpiper and the grasshopper sparrow, as well as their habitats, became the primary objective of the wildlife management program at Westover ARB (Melvin 1989).

MDFW recommendations for grassland bird habitat management on Westover ARB have included:

1. Refrain from mowing all areas of the airfield between 1 May and 31 July to minimize chances of "taking" State-listed species.
2. Maintain grass strips 50 feet wide at a height of 6 to 8 inches along edges of runways and taxiways to meet USAF safety requirements while also providing optimum quality foraging habitat for upland sandpiper chicks.
3. Avoid all unnecessary driving on grass areas between 1 May and 31 July.
4. Controlled burns of no more than 10 percent of the airfield should occur annually.
5. Increase Public Awareness and support for Westover ARB grassland bird management.

Subsequently, USDA-WS submitted a Wildlife Hazards to Aircraft Management Plan to Westover ARB in May

Table 1. Westover ARB Grassland Bird Species Census Data, 1987-1997

Species	1987	1988	1989	1993	1994	1995	1997
Upland Sandpiper	20-30	23	41	55	101	115	118
Grasshopper Sparrow	55	47	74	99	168	170	152

1993. The plan's initial recommendations, as well as those received as part of USDA-WS' annual progress summaries are summarized as follows:

1. From 01 May to 31 July, the airfield grasses should be kept at a height of 2 to 6 inches. Short grasses were encouraged to help to reduce small mammals and insects that attract raptors and swallows. However, short grass also provides ideal habitat for horned larks and loafing gulls. (This recommendation was changed to maintain the grass at a height of 7 to 14 inches after consultation with the USAF BASH Team in 1996.)
2. From 01 August to 30 April, the mowing of airfield grasses should be discontinued or not be mowed to a height shorter than 10 to 14 inches to discourage loafing birds. Grasses should also be monitored so that it does not go to seed. If this occurs, it should be mowed at the highest level possible within the 10 to 14 inch range.
3. If large numbers of raptors or swallows are attracted to the insects and rodents on the Base, the application of insecticides or rodenticides should be considered.

The USDA-WS Plan and subsequent annual progress reports did not mention upland sandpipers, grasshopper sparrows, the apparent conflict with the Massachusetts Endangered Species Act, or the violations that could have potentially occurred if the USDA-WS recommendations were implemented. Mowing grass from 01 May to 31 July could have resulted in egg destruction, as well as upland sandpiper and grasshopper sparrow chick and fledgling mortality. The Memorandum of Understanding between the Department of Defense and the USDA-WS clearly states, "planned animal damage control work ... will be compatible with the ... Natural Resources Management Plans." The USDA-WS recommendations were not compatible with the Base's natural resources management strategies and were, therefore, not fully implemented.

However, other USDA-WS efforts have been extremely successful, especially with respect to the implementation of gull control in the surrounding landfills. Commonwealth law in Massachusetts requires landfills to practice bird harassment activities. USDA-WS efforts to encourage these landfills to abide by this law have led to the minimization of the gull problem within the area over the last few years. In addition, USDA-WS staff have also been successful in reducing the number

and types of high-ranking hazardous wildlife (i.e., wild turkey, white-tailed deer, beaver) on Westover ARB.

#### MANAGEMENT APPROACH

Air Force Instruction 32-7064, Integrated Natural Resources Management, states that USAF installations should comply with state endangered species laws where possible. Furthermore, an opinion issued by a former Westover ARB Staff Judge Advocate stated that the Base had a moral obligation to adhere to the Massachusetts Endangered Species Act, but had no legal requirement to do so. Also, prior to 1995, the USAF BASH Team had concluded that managing for these sensitive grassland bird species on Westover ARB did not constitute a BASH conflict. In addition, Westover ARB was named as a Special Focus Area as part of the establishment of the Silvio O. Conte National Fish and Wildlife Refuge. The Refuge encompasses the entire Connecticut River watershed. The Base was included as part of the Refuge due to the high priority established for rare species, and its contiguous and unique grassland habitat type. Under some of the alternatives evaluated in the Environmental Impact Statement for the establishment of the Refuge, State-listed threatened and endangered species would receive the benefit of protection from the U.S. Fish and Wildlife Service. The EIS states that "[f]ederal actions, which include projects involving federal funds, may not adversely impact listed species."

As a result, a grassland management plan that adhered to most of the MDFW recommendations was implemented during 1993 growing season. Grass heights are maintained between 10 to 14 inches 300 to 500 feet from the active runways, in agreement with USAF BASH Team recommendations. Fifty-foot strips adjacent to runways and taxiways are maintained at 7 inches. Strips of grass are also mowed within the on-Base Drop Zone away from the runways in early spring to promote alternative foraging habitat for the grassland birds. Maintaining the short grass heights in the Drop Zone also deters nesting in this area, which is used heavily for training. Late summer mowing maintains grass heights at a 10 inch minimum for the fall months to discourage gulls from loafing on the airfield. The remaining grassland acreage on the Base is mowed every other year for brush control to maintain grassland habitat. The success of this plan is evidenced by the initial increase and subsequent stabilization of grassland bird populations on Westover ARB (see Table 1). During this same

time period, there were no recorded upland sandpiper or grasshopper sparrow strikes at Westover ARB.

#### ADDITIONAL SAFETY CONCERNS

A Headquarters Air Force Reserve Command performed a safety review of Westover ARB, which revealed that the forested areas surrounding the airfield were in violation of several USAF and Federal Aviation Administration rules and regulations that require the maintenance of navigable airspace free of obstructions. The forested areas in proximity to the runways and within the runway Clear Zones have been slated for removal to increase the margin of safety for both aircraft and the public. The forested areas will be converted to grasslands, thereby increasing the habitat available to the sensitive grassland bird species on the Base. In order to facilitate the removal of trees and tall vegetation that pose a safety threat and to guide the successful conversion of these vegetative communities to grasslands, a Vegetation Management Plan was developed for Westover ARB.

Numerous meetings were conducted in order to build a consensus among the various groups that had previously provided conflicting management guidance to the Base. A compromised approach was reached to present vegetation management options including physical, chemical, and biological methods that are applicable to managing the transitional vegetation communities on Westover ARB while promoting the reduction of the BASH threat and protecting sensitive state-listed bird species occupying the grassland areas on Base to the maximum extent possible.

In essence, the Vegetation Management Plan expanded the existing airfield mowing regime to include the new grassland areas. However, it also provided detailed guidance on the removal of woody debris and the control of woody vegetation growth. A unique blend of warm season grasses was selected for planting in the cleared areas. The seed mix consists of 30 percent Kentucky 31 tall fescue, 26 percent Niagara big bluestem, 20 percent annual ryegrass, 14 percent camper little bluestem, and 10 percent red top has been selected for planting within cleared areas (pounds per acre recommendations are shown below). This seed mix was selected to deter high-ranking hazardous wildlife while, at the same time, providing mitigating habitat for upland sandpipers and grasshopper sparrows.

In order to decrease foraging habitat for high-ranking hazardous wildlife such as deer, turkey, geese, and flocking bird species, tall fescue infected with an endophyte fungus (*Neotyphodium coenophialum*), which reduces the palatability of the grass and which may also affect reproduction success of rodent species, has been incorporated into the seeding mix. Kentucky 31 tall fescue (*Festuca arundinacea*) is a deep-rooted bunch grass that produces an effective ground cover the first year. Annual ryegrass (*Lolium multiflorum*) has been included within the seed mix as a "nurse crop." Traditional cereal grain nurse crops are not recommended with these seedings due to the potential to attract granivorous bird species. Nurse crops are essential in providing shade necessary to foster growth of the desired seed crop. Annual ryegrass is a short-lived grass that usually germinates in 4 to 7 days creating a very effective soil

erosion control. Red top (*Agrostis alba*) is a fast-starting, sod-forming grass produces effective ground cover within the first year. The leaves are narrow and the stems are fine. Because it is fast starting and tolerates cold temperatures and poorly drained soils, it is widely used as a component in mixtures planted in the Northeast (WARB 1999).

Big and little bluestem are native, warm season bunch grasses. These warm season grasses will seed late in the season allowing for mowing in August after the breeding and nesting season (May-July) of the targeted grassland bird species. Niagara big bluestem (*Andropogon gerardii*) is a long-lived erosion control plant that is slow to germinate and establish the first year; however, Niagara big bluestem will produce fair to good cover by the end of the second year. Camper little bluestem (*Andropogon scoparius*) is a dense, high producing variety of grass that reaches 2 to 3 feet in height. Camper little bluestem is a persistent, low maintenance, warm-season, bunch perennial grass that is drought tolerant and adapts to a wide variety of soil types (WARB 1999).

#### CONCLUSION

Reduction of the BASH threat on Westover ARB can be directly attributed to numerous organizations with contrasting missions and responsibilities working together to form a consensus management approach. Presently, the upland sandpiper and grasshopper sparrow, as well as other grassland bird species, coexist with Westover ARB's peacetime mission to organize, recruit, and train USAF Reservists. The management of natural resources on Westover ARB impacts the many ecosystems within the Connecticut River Valley. Westover ARB has enhanced its grassland resources to what currently appears to be a stable, balanced system. Partnering with other Federal agencies and working with local and regional groups has led to a tentative airfield management compromise. As stewards of the Northeast's premier neotropical grassland bird habitat, the goal of the Westover ARB natural resources program is to protect the State-listed grassland bird species inhabiting the Base without impacting the safety and efficiency of the flying mission.

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