

## Appendix B. Mannington Meadows Important Bird Area Grassland Breeding Bird Objectives

### Introduction

The Mannington Meadows Important Bird Area (MMIBA) contains patches of the most ecologically significant areas for grassland restoration in New Jersey, as identified by the New Jersey Habitat Incentive Team's (NJHIT) grassland priority model. This model identifies, ranks, and maps the largest and most significant patches of grassland habitat in New Jersey (Figure 1). By identifying priority parcels for grassland restoration, habitat protection and restoration efforts can be focused in key areas around the state. The grassland model prioritizes grassland patches utilizing the NJ Department of Environmental Protection's (NJDEP) Landscape Project and these variables:

1. Grasslands greater than or equal to 500 acres
2. Grasslands within a ½ mile of open space
3. Grasslands within a ¼ mile of preserved farmland
4. Grasslands coded with a state or federal listed species

The highest ranking patches (containing all four variables) are assumed to have the highest likelihood of attracting grassland breeding birds. Because high ranking patches are located within the MMIBA, grassland restoration projects within this area should be prioritized. To facilitate restoration efforts, we identified grassland bird management targets and developed population and habitat goals.

### Methodology

To guide implementation of the Mannington Meadows Important Bird Area (MMIBA) Conservation Plan, NJAS has developed population and habitat goals needed to support the target species of grassland breeding birds in the MMIBA. We followed the methodology developed by the Raritan Piedmont Wildlife Habitat Partnership utilized in the Grassland Conservation Plan. Methodology is summarized below; however, for more details and a complete literature review, please view the Grassland Conservation Plan available at:

[http://www.njaudubon.org/conservation/PDF/FinalRPWHPPlan\\_20060915.pdf](http://www.njaudubon.org/conservation/PDF/FinalRPWHPPlan_20060915.pdf)

### Target Species

The species of grassland breeding birds that will serve as management targets for restoration activities are listed in Table 1. Target species were identified as priority within the NJDEP Wildlife Action Plan (WAP). Because the WAP incorporates the priorities of all national plans (see p. 48 of the NJ WAP) it is the most comprehensive source for clearly defining species priorities for any part of New Jersey. As such, the WAP provides a comprehensive list of all Federal and State-endangered and -threatened species as well as others of State and Regional Conservation Concern. The WAP is the State's blueprint for the future conservation of NJ's species of greatest

conservation need because it identifies goals and conservation actions to mitigate threats to declining species. The WAP is divided into regional landscape conservation zones. The MMIBA is located within the Southern Piedmont Plains Conservation Zone.

Goals and conservation actions for the Southern Piedmont Plains include (from the WAP):

- Identify, protect, maintain, enhance, and/or restore important grassland (areas with >75 % herbaceous and <25% woody vegetation)
- Maintain viable populations of area-sensitive grassland species
- Increase the number of acres with an established mosaic of meadow, hay and row crops within open field habitats.
- Encourage landowners to delay mowing through public education and incentive programs to allow grassland-dependent species to successfully breed.
- Increase the number of acres converted from existing hay and/or row crops to warm season grass fields, where appropriate, using landowner incentive programs.
- Where appropriate, create large grasslands areas by eliminating hedgerows, fences, or tree lines in areas where open land occupies a considerable amount of the surrounding landscape and grassland management is a reasonable management alternative.

Implementation of the MMIBA Conservation Plan, particularly of the Grassland Breeding Bird Objectives, is direct implementation of the WAP. The complete plan for the Southern Piedmont Plains zone is available at:

<http://www.state.nj.us/dep/fgw/ensp/wap/pdf/15.pdf>

### *Population and Habitat Goals*

Population goals and the corresponding habitat goals to support grassland breeding bird populations were developed for each of the priority species. We started with current population estimates for the state of NJ that have been stepped-down from continental estimates (see RPWHP plan for details). Table 1 lists current population estimates for the MMIBA management targets. From there, we estimated what the population goals are for NJ. Because our management targets are species of conservation concern, population goals are an increase over current estimates. To determine the MMIBA's contribution to achieving the statewide population goal for each species, we determined the percentage of grassland habitat available within the IBA. Of the Landscape Project patches modeled as grassland habitat, approximately 2.4% occur within the IBA. Hence, 2.4% of the statewide population goals can be attributed to the MMIBA. This is true for all target species except for the upland sandpiper and vesper sparrow (Table 1). Because 2.4% of the statewide goal for these species is less than the minimum viable population size, we increase the MMIBA population goal above 2.4% to a number assumed to support a minimum viable population.

## Interpreting Project Acreage Goals

With specific habitat goals established for all target species, it is essential to make sure these goals are interpretable into real numbers that can be understood by land managers and partners. It is important to recall that we have made every attempt to be conservative with these goals; therefore achievement of the project's habitat acreage goals should accommodate the population objectives for the target species. Also, habitat for each species need not be managed independently from other species. In many cases habitat for one species can accommodate the needs of other species (see Table 2). For more information about grassland breeding birds within the Southern Piedmont Region of the WAP, refer to the Summary of Grassland Bird Traits at the end of this document.

### *Upland Sandpiper*

MMIBA Population Goal: 3 pair.

MMIBA Habitat Goal: 30 hectare

A target of 30 hectares of habitat in contiguous patches for nesting Upland Sandpiper that can support an IBA population goal of 3 breeding pairs was set. Upland Sandpiper should be a primary stewardship target on the largest parcels of land available for acquisition and/or stewardship because it requires larger habitat patches than any of the other primary target species. To improve patches identified as high priority for Upland Sandpiper, all trees and wooded hedgerows within fields, separating adjacent fields, and extending into the interior of the fields must be removed. Where possible and feasible, small, narrow woodlots should be removed to increase the amount of core nesting habitat available for this and all target species.

Some form of disturbance must be employed to maintain the habitat in optimal condition. For Upland Sandpiper, this is more difficult, because Upland Sandpiper require three distinctive vegetation conditions to fulfill three ecological needs: nesting cover, brood habitat, and foraging habitat. These can be addressed through a rotational disturbance regime.

Upland Sandpiper sites should represent the largest tracts that can be assembled within the MMIBA boundaries. The grassland can be composed of cool season or warm season grasses, however warm season plantings should be dominated by little blue stem to address the proclivity of Upland Sandpiper to avoid tall vegetation for nesting. Active disturbance is a necessity and can include conservation-grazing, burning or mowing. Moderate grazing can be employed but should be delayed until after mid-June. Burning should occur from March – April or October – November. Mowing should be delayed as long as possible, but if necessary to create a crop, should be conducted no earlier than mid-July. Mowing should be done at a height of 15 – 30 cm.

Placement of Eastern Bluebird and Tree Swallow nest boxes should be encouraged throughout Upland Sandpiper sites, but they should not extend above the surrounding

vegetation. These boxes would help address the Upland Sandpiper's preference of perches scattered throughout the habitat.

#### *American Kestrel*

MMIBA Population Goal – 29 pair.

MMIBA Habitat Goal – Not calculated. Size requirements for this species are highly variable.

A population goal of 29 pair was set for American Kestrel in the MMIBA. To achieve this goal, American Kestrel nest boxes should be placed throughout the entire region, expanding upon the DEP's nest box program. Boxes could be placed on telephone poles or on poles erected at the edges of suitable habitat that includes open agricultural fields, hayfields, and even large manicured lawns (e.g. schoolyards or golf courses). The normal occupancy rate of nest boxes by kestrels should be determined and the number of boxes needed to achieve the goal distributed. Monitoring of boxes is essential to prevent colonization by European Starlings. Volunteers could be utilized to monitor and maintain boxes.

#### *Grasshopper Sparrow*

MMIBA Population Goal – 58 pair.

MMIBA Habitat Goal – 116 hectares

A population goal of 58 pair supported within a core habitat of 116 hectares in patches no smaller than 30 hectares was set for Grasshopper Sparrow within the MMIBA. Grasshopper Sparrows occupy grasslands at an early successional stage, reaching peak abundance in the years immediately following a disturbance. Woody vegetation should be eliminated from grasslands managed for this species. 20 – 30% of large patches should be treated with disturbance annually with mowing, burning, and light grazing all acceptable. On smaller patches, 50-60% should be disturbed at a time.

#### *Savannah Sparrow*

MMIBA Population Goals – 10 pair.

MMIBA Habitat Goals – 5 hectares

A population goal of 10 pair supported within a core habitat of 5 ha was set for the MMIBA. Savannah Sparrows reach peak abundance 1 – 5 years after a management burn. Trees and shrubs should be removed from the nesting habitat. Mowing, light grazing, or burning should be applied on a 3-year rotation, within sites > 50 ha having 30 % of their total area disturbed and smaller sites having 50% treated at a time.



*Eastern Meadowlark*

MMIBA Population Goals – 31 pair  
MMIBA Habitat Goals - 71 hectares

A total of 71 hectares of habitat should be managed for Eastern Meadowlark within the MMIBA to support a population of 31 pair on patches no smaller than 5-10 ha, with larger patches preferred. This species requires grasslands at a later successional stage, but absent of woody vegetation, and habitat should be burned on a 3-5 year interval. Patches exceeding 80 ha should have 20-30% of the habitat disturbed annually. Smaller patches should have 50-60% of habitat burned at a time.

*Bobolink*

MMIBA Population Goals – 37 pair  
MMIBA Habitat Goals – 56 hectares

A total of 56 hectares of grassland habitat should be managed to sustain 37 pair of Bobolink in patches > 10 ha within the MMIBA, with larger patches preferred. Burning is the preferred habitat management method for this species but light grazing and mowing can also be used on a 2-3 year rotation.

For more information about grassland breeding birds within the Southern Piedmont Region of the WAP, refer to the Summary of Grassland Bird Traits at the end of this document.

**Table 1.** Management targets, population goals and habitat goals for the Mannington Meadows IBA.

Grassland Breeding Birds of Conservation Concern	NJ Pop. Estimate (present # of pairs)	Statewide Goal (target # of pairs)	*MMIBA pop. goal (pairs)	Avg. Territory size (ha)	MMIBA habitat goal (ha)
American kestrel ( <i>Falco sparverius</i> )	963	1445	29	NA	NA
Bobolink ( <i>Dolichonyx oryzivorus</i> )	1227	1840	37	1.5	56
Eastern Meadowlark ( <i>Sturnella magna</i> )	767	1535	31	2.3	71
Grasshopper sparrow ( <i>Ammodramus savannarum</i> )	1441	2882	58	2	116
Savannah sparrow ( <i>Passerculus sandwichensis</i> )	71	143	10	0.5	5
Upland sandpiper ( <i>Bartramia longicauda</i> )	NA	NA	3	10	30
Vesper sparrow ( <i>Poocetes gramineus</i> )	58	117	10	1.65	17
				<sup>1</sup> Total: 295 ha [708 ac]	

\*Mannington Meadows IBA = 2.4% of available grassland patch in NJ.

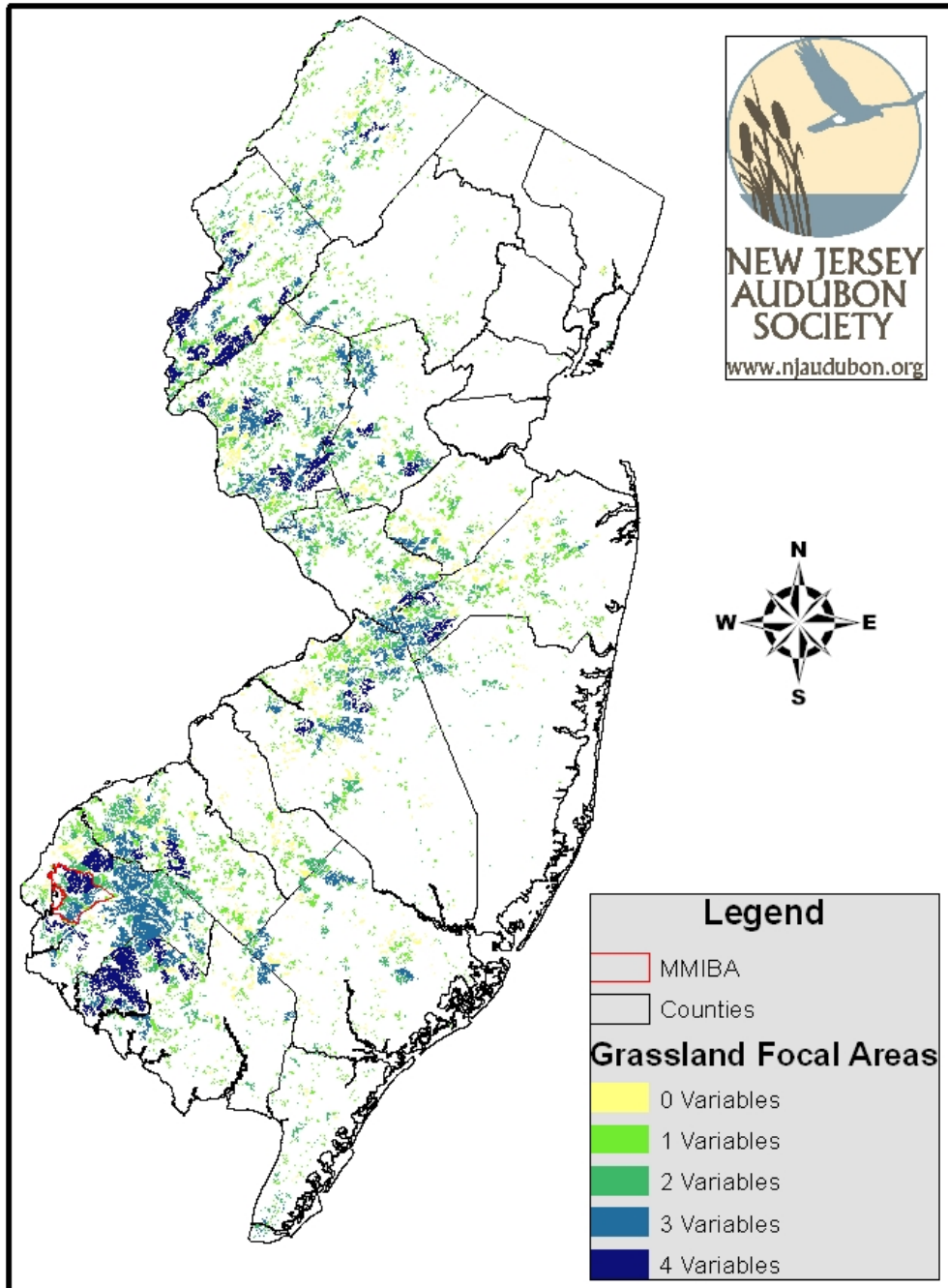
<sup>1</sup> Habitat goal is approximately 4% of the IBA.

**Table 2.** Grassland Bird Habitat Preference Gradient



**Figure 1.** Overview of the NJ Habitat Incentive Team Grassland Prioritization Model

### NJ Habitat Incentive Team Grassland Model





## **Summary of Grassland Bird Ecological Traits**

## **BOBOLINK (BOBL)**

**Breeding dates:** May 25 – July 15; 1 brood per year.

### **Keys to Management**

BOBL require large areas of suitable habitat (native and domestic grasslands of moderate height and density, with adequate litter), controlling succession, and protecting nesting habitat from disturbance during breeding season.

### **Habitat Description**

BOBL are found in both native and domestic grasslands with intermediate to tall vegetation height and moderate to dense vegetation density. BOBL habitat is often grass dominated, with forbs intermixed and an established litter layer. The strongest predictors of BOBL occurrence throughout its range are decreasing presence of bare ground and woody cover and increasing litter layer and vegetation density. Optimal habitat patches for BOBL exhibit a low perimeter to area ratio (less edge, more interior nesting habitat).

In the Northeast, BOBL have shown some preference for cool season grasses over native grasslands. Although optimal height varies, short grass is unsuitable as nesting habitat. BOBL will nest in row crops in low densities, but show a preference for no-till cropland. They also occur in light to moderately grazed pastures, wet meadows and planted clover and alfalfa fields.

### **Territory Size:**

0.45 – 2.5 ha (1.2 – 6.2 acres).

### **Area Requirements**

10 - 30 ha (25-75 acres). The incidence of occurrence on tracts  $\geq$  50 ha (125 acres) is 50%. This species is rarely encountered on tracts  $\leq$  10 ha. BOBL are associated with larger grassland tracts with minimal edge (interiors that are large relative to tract boundaries).

### **Habitat Maintenance and Management**

Some form of disturbance is necessary to maintain nesting habitat for BOBL, as densities have been shown to decline substantially when management of fields (mowing or burning) ceases. Use of an unmanaged field can be completely halted as soon as 3-5 years after a mow or burn. The preferred method for management is rotational burning. Burning reduces use and productivity during the year of the burn, but densities and productivity peak 1-2 years post-burn. Properly timed mowing or light grazing can also be utilized to maintain BOBL habitat. Disturbance during nesting season should be avoided.

### **Management Recommendations**

Create large habitat patches of at least 30 ha with minimal contact with woody edges. Rotational disturbance treatments should be used to maintain habitat. Preferably, burn or mow patches every

2-3 years, in early spring or late summer/early autumn. Mowing should be delayed at least until late June.

Burning is preferred over mowing. Either should be conducted every 2-3 years, but the entire area of a field should never be burned in a single season. For larger sites ( $\geq 80$  acres) burn or mow in units of approximately 20-30% of total area annually. For smaller more isolated sites, burn or mow  $< 50$ -60% per year.

Light grazing is another management alternative. Grazing should be moderate, leaving an average vegetation height of 20-30 cm, but should never be grazed  $< 25$  cm during the breeding season.

### Reference

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, A. L. Zimmerman, and B. R. Euliss. 2003. Effects of management practices on grassland birds: Bobolink. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/bobl/bobl.htm> (Version 12DEC2003).

## SAVANNAH SPARROW (SAVS)

**Breeding Dates** May 21 – July 31; 1 – 2 broods per year<sup>7</sup>

### Keys to Management

Effective management for SAVS requires the provision of large areas of suitable grassland (grasslands of intermediate height and density, with well-developed litter), controlling succession, and protecting nesting habitat from disturbance during the nesting season.

### Habitat Description

SAVS inhabit short to intermediate vegetation height and moderately dense habitat with well-developed litter layer. SAVS prefers grass dominated sites with limited forb cover and avoids areas with dense, tall vegetation. SAVS will nest in tallgrass or mixed-grass prairie, shortgrass, and domestic grasses, meadow edges of wetlands, hayfields (timothy, brome, clover, and alfalfa), retired cropland, and wheat fields. SAVP can also be found in cropland at low densities, where they prefer no-till practices. Strongest relevant predictors of occurrence are increased grass cover and litter depth and decreased visual obstruction. Will nest in shrubby areas but densities are higher and reproductive success greater in areas with sparse or no shrubs. Lack of disturbance enhances reproductive success. Fields of both native and non-native grasses are equally used, but some preference to domestic fields has been detected in northern portion of range. Nesting occurs preferentially toward the center of fields.

### Territory Size

0.05 – 1.25 ha (0.2 – 3.1 acres); average breeding densities 7.7 pair/ha (2.5 acres) in ungrazed fields versus 0.3 pair/ha in grazed ones.

### Area Requirements

Minimum area requirement 10 ha (25 acres) with 50% incidence at  $\geq 10$  ha. Nests are more abundant in the interior of tracts.

### Habitat Management

To attract or maintain SVAS, increase amount and size of contiguous grassland and minimize perimeter-to-area ratio of tract. Avoid disturbance during nesting season. Remove woody vegetation within grassland and along edge. Overall, maintain a habitat that is structurally diverse and reduce edge. Productivity greatly declines in absence of management. Burning appears to be optimal management technique. Populations peak 1-5 years post-burn, but may abandon a site by the third year post-burn. Mowing and light grazing are also effective habitat maintenance strategies.

### Habitat Recommendations

Burn or mow every 3 years, but never treat an entire site in the same year. Where possible, burn 25-30% of all sites  $\geq 50$  ha annually or, alternatively, mow on the same rotating regime. Burning should occur from March – April or October through December. Mowing should be delayed until



August 1. Light grazing (leaving at least 40% vegetation cover that is 25 cm tall [10 inches] or greater) can be used to create intermediate vegetation height used by SASP.

**Reference**

Swanson, D. A.. 2003. Effects of management practices on grassland birds: Savannah Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/svas/svas.htm> (Version 12AUG2004).

## **EASTERN MEADOWLARK (EAME)**

**Breeding Dates** April 21 – July 28; 2 broods per year.

### **Keys to Management**

Provide large areas of contiguous grassland of intermediate height with significant grass cover and moderate forb density.

### **Habitat Description**

Nesting habitat for the EAME comprises moderately tall grasslands with abundant litter cover, high proportion of grass, moderate to high forb density, and little woody vegetation. EAME utilize a variety of habitat types including tallgrass prairie, planted cover like CRP, pastures, and haylands. The HSI for EAME indicates optimal habitat occurs within dense grasses of intermediate height (12.5 – 35 cm [5 – 14 inches]), low (< 5%) shrub cover, low forbs, and adequate perches. Optimal herbaceous cover was > 90% and optimal grass cover was >80%; < 20% herbaceous or grass cover was inadequate for nesting. Ideal vegetation heights for nesting are 25 – 50 cm (10-20 inches); ideal heights for loafing and foraging are 10 – 30 cm (4-12 inches). Some perches are required. Eastern Meadowlarks will nest in both native and non-native grasses.

### **Territory Size**

2.3 ha (6 acres) with a range of 1.2 – 6 ha (3 – 15 acres).

### **Area Requirements**

The EAME is not a highly area sensitive species; but it does prefer large grasslands over smaller ones for nesting. 45% incidence on tracts < 20 ha (50 acres). Will use tracts as low as 5 ha.

### **Habitat Management**

If not disturbed every 3 -5 years, habitat quality will decline. Response to fire varies throughout the species' range. Mowing of CRP fields or other areas removed from management improves nesting habitat. EAME respond positively to moderate grazing.

### **Management Recommendations**

Encourage forbs to promote diversity within grassland. Limit woody vegetation encroachment. Maintain a complex of burned/unburned or mowed/unmowed habitats. Burn grassland patches > 80 ha on rotation, with 20 – 30% treated annually. Small, isolated patches should have 50 – 60% burned at a time. Burn or mow during last weeks of August and rake to reduce litter. Burning is preferred over haying, due to quicker recovery of vegetation. If grazing possible, create mosaic of grazed, burned and unburned areas. Burn every 3-5 years and mow at intervals > 3 years. Burning is recommended where grazing is not available. Do not graze WSG < 25 cm tall during growing season.



**Reference**

Hull, S. D. 2003. Effects of management practices on grassland birds: Eastern Meadowlark. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/eame/eame.htm> (Version 12DEC2003).

## GRASSHOPPER SPARROW (GRSP)

**Breeding Dates** April 1 – August 15; 2-3 broods per year.

### Keys to Management

Provide large areas of contiguous grassland of intermediate height with moderately deep litter cover and low shrub density.

### Habitat Description

The Grasshopper Sparrow is found in grasslands of intermediate height and moderate litter where clumped grass is interspersed with patches of bare ground and woody vegetation is sparse. GRSP nest in both native and domestic grasslands and more rarely croplands in much lower densities.

Nesting density decreases with increasing vegetation height and woody cover. Nesting density positively correlates with percent grass cover but negatively correlates with mean grass height. Requires areas free of dense living vegetation and litter with up to 24% bare ground. Dense vegetation and litter preclude effective foraging. Territories more sparsely vegetated than non-territories.

### Territory Size

Less than 2 ha (5 acres).

### Area Requirements

10 – 30 ha (25-75 acres) minimum size with  $\geq 30$  ha (75 acres) needed to support breeding population. There is 50% species incidence at 30 ha. Low perimeter to area ratio preferred, as GRSP tends to nest away from edges.

### Habitat Management

GRSP avoid spring-burned areas during burn year, but can reach greatest abundance 1-4 years post-burn. In addition, abundance often highest in areas under a constant, repeated burn regime. Mowing immediately prior to arrival in spring may be preferable to burning. Densities oftentimes increase one year after haying. In areas of dense, tall grass moderate grazing benefits GRSP by thinning vegetation and creating patchy areas with decreased vegetation height.

### Management Recommendations

Target managed areas at least 30 ha (75 acres) with low perimeter to area ratio. Although yearly mowing is preferable, mow at a 1 – 3 year interval. Alternatively, burn on a 2-4 year rotation prior to or following breeding season. Treat grassland patches  $> 80$  ha (200 acres) on rotation, with 20 – 30% treated annually. Small, isolated patches should have 50 – 60% burned (or mowed or grazed) at a time. Grass cover must predominate and shrubs and other woody vegetation should be kept to a minimum. Retain grass-dominated patches resembling old hayfields ( $> 8 - 10$  years since establishment). Plant bunch grasses on disturbed sites as these create openings that facilitate foraging. Graze areas of dense vegetation using various regimes (early season deferred [after July 15] and continuous grazing).



**Reference**

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, and B. R. Euliss. 2003. Effects of management practices on grassland birds: Grasshopper Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/grsp/grsp.htm> (Version 12AUG2004).

## UPLAND SANDPIPER (UPSA)

**Breeding Dates** April 15 – July 15; 1 brood per year.

### Keys to Management

Provide grasslands of various heights with few shrubs. Upland Sandpipers require short vegetation for foraging (30 cm), taller vegetation (10 – 64 cm) for nesting, and short-to-medium vegetation (< 15 cm) for brood cover.

### Habitat Description

In general, Upland Sandpipers inhabit wet meadows, hayfields, pastures, planted cover, native grasslands, and grassy areas of airports. A characterization of typical Upland Sandpiper habitat is complex, involving three distinct vegetation conditions to satisfy three ecological stages: nesting, brood rearing, and foraging. Territories are not actively defended by individual males; rather UPSA pair form loose aggregations or small colonies in which loafing and foraging sites are shared. One trait remains consistent throughout all habitat conditions utilized by UPSA: they are one of the most sensitive grassland birds to habitat fragmentation and are typically found only in the largest, most contiguous habitat patches.

For nesting, UPSA utilize areas with low to moderate forb cover, low woody cover, moderate grass cover, moderate to high litter cover, and little bare ground. Display perches, such as fence posts or other scattered, elevated substrates may be important components. Vegetation height within nesting habitat ranges between 50 – 70 cm; however nest initiation may be avoided in areas with vegetation > 40 cm at beginning of nesting cycle. Native or domestic grasslands may be used, or no consistent preference for either is evident. In some areas, preferentially select areas seeded to grass and being invaded by forbs.

Foraging habitat for UPSA consists of much shorter, sparser vegetation than nesting habitat. Foraging habitat includes overgrazed pasture (vegetation < 10 cm), plowed and/or seeded fields (in early spring), meadows with vegetation < 30 cm, and fields mowed during growing season (vegetation 2.5 – 15 cm), lightly grazed pastures (vegetation 17 – 23 cm) and small grain fields (vegetation < 27 cm).

Brood habitat also consists of shorter, less dense vegetation than that used for nesting. However, it offers more cover to the precocious young than found in foraging habitat. Heavily grazed pastures (vegetation height < 10 cm) are commonly used but not agricultural fields. Moderately grazed pastures are also used but lightly grazed are not. Can also be found in wheat stubble, and recently hayed fields including alfalfa and small grain fields. Brood habitat commonly contains vegetation ≤ 27 cm tall.

### Territory Size

8 – 12 ha (4 – 30 acres).

### Area Requirements

UPSA is highly sensitive to habitat fragmentation with abundance strongly correlated field or patch size. Minimum patch sizes range between 30 – 75 ha (75-190 acres) with 50% incidence in some areas (Upper Midwest) at 50 – 61 ha (125-153 acres). An extremely low perimeter to area ratio of 0.008 is preferred by UPSA.

### Habitat Management

Large, contiguous habitat creation and preservation is essential. Increase the amount and size of contiguous grassland to greater than 100 ha and minimize perimeter-to-area ratio of tract habitat. Avoid disturbance during nesting season. This can be accomplished by mowing late in summer after the birds have departed. Although burning can be detrimental to nesting during year of burn, it can be essential in maintaining the habitat heterogeneity required by UPSA. In many areas, populations recovered rapidly and reached peak densities 1-3 years post-burn for nesting. Annually burned areas can be important areas for foraging. Mowing can also improve habitat year after cutting. Grazing can also be extremely using in creating foraging and brood habitat but nesting density is lower in fields actively grazed throughout nesting season. Homogeneous fields rarely selected for nesting. Cultivation may negatively impact UPSA, eliminating brood habitat and forcing young to occupy edges.

### Management Recommendations

Maintain > 100 ha (250 acres) tracts of grassland within 1.6 km of one another connected by other grassy habitats (such as domestic haycrops) to reduce edge. Maximize habitat heterogeneity with active disturbance regime of burning, mowing and/or grazing. Leave some blocks undisturbed to serve as nesting habitat. Mowing of brood habitat should not occur until after July 1. Annually burn/mow/graze 20 – 30% of habitat to maintain mosaic on grasslands > 80 ha. Small fragments should have < 50% of their area burned at a time. If small fragments are adjacent to one another, they should be managed as a single unit, with managing rotating amongst them from year to year. Burned patches should be created adjacent to unburned patches to facilitate movement between nest and brood habitat. Burns should occur from March – April or October – November. Grazing should occur at moderate levels to provide diverse grass heights and densities. A rotational grazing system should be used to increase grass heights and densities. Continuous grazing should be avoided. Delay grazing until mid-to-late June. Maintain heterogeneous fields of domestic grasses 10 – 12 years old. Rotary mow domestic grasses to height of 15 – 30 cm (6-12 inches) on a 3-yr rotation or burn on same rotation. Moderate grazing came also be beneficial in domestic pastures.

### Reference

Dechant, J. A., M. F. Dinkins, D. H. Johnson, L. D. Igl, C. M. Goldade, B. D. Parkin, and B. R. Euliss. 2003. Effects of management practices on grassland birds: Upland Sandpiper. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwr.usgs.gov/resource/literatr/grasbird/upsa/upsa.htm> (Version 12DEC2003).

## NORTHERN HARRIER (NOHA)

**Breeding Dates** Late March – end of July; 1 brood per year.

### Habitat Description

NOHA prefer large undisturbed relatively open grassland or wetlands (>100 ha [250 acres]) but will tolerate smaller areas if grassland/wetland tracts are contiguous. Nesting sites are in tall (>30 cm [12 inches]), dense vegetation with abundant litter (>40%). Territory size depends on the abundance of available prey, preferably voles and other small rodents.

### Territory Size

NOHA territory size is 27.7 – 1570 ha (70 – 3900 acres) for males and 27.7 – 113 ha (70 – 280 acres) for females. Territory is very likely determined by prey availability. Nesting territories are smaller.

### Area Requirements

Area requirements for nesting at a minimum are fragments ranging from 8 – 120 ha (20 – 300 acres). The nest area must be proximate to tracts that support sufficient territory for prey.

### Habitat Maintenance and Management

For NOHA, maintain a large mosaic of contiguous grasslands and wetlands (>100 ha [250 acres]). Periodic mowing, burning, or grazing (every 3-5 years) is necessary to maintain habitat for small rodents that serve as prey for NOHA. Establish a treatment plan so that a large percentage of habitat is undisturbed each year. Convert cropland or fallow fields to warm season grasses and legumes. Restore wetlands if possible. Do not disturb nesting areas during the breeding season.

### Reference

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, and B. R. Euliss. 2003. Effects of management practices on grassland birds: Northern Harrier. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/noha/noha.htm> (Version 12AUG2004).

## SHORT-EARED OWL (SEOW)

**Breeding Dates** Early April to late August; 1 brood per year.

### Keys to Management

Provide large, open grasslands or the wet meadow zones of wetlands such as grasslands, retired cropland, hayfields, pastures or small grain stubble. If one tract is not large ( $\geq 100$ ha [250 acres]), contiguous tracts may make up the needed territory. SEOW occurrence depends on vole and other small mammal populations, so these must also be in sufficient supply in SEOW habitat.

### Habitat Description

SEOW are most commonly found in grassland areas. They may also be found in croplands, haylands, mixed-grass habitats, pastures, non-native grasslands, or wetlands. If an individual area is small, it will be contiguous with larger blocks of suitable grassland. A key characteristic of all is the presence of suitable amounts of prey – voles and other rodents, small mammals and birds. SEOW generally nest on the ground in dry uplands, but nests have also been found in peat bogs and wetlands.

### Territory Size

In a report from Manitoba, the mean size of 5 territories of short-eared Owls was 73.9 ha (185 acres) with one territory being 121.4 ha (300 acres). In Montana 32 nests were found in 164 ha (average territory of 5.125 ha [13 acres] per nest). Both prey availability and overall area available for hunting likely determine territory size.

### Area Requirements

In one study the Short-eared Owl was seldom observed in habitat blocks less than 100 ha (250 acres). The habitat, however, does not have to be contiguous. Nests have been found in blocks of managed grassland as small as 28 ha (70 acres).

### Habitat Maintenance and Management

For SEOW, maintain a large, open, contiguous grasslands and wetlands (>100 ha [250 acres]). Periodic mowing, burning or grazing (every 3-5 years) is necessary to maintain habitat for the small rodents that serve as prey for SEOW. Grass height and vegetation should be maintained at  $\leq 30$ -40 cm (12-16 inches). Establish a treatment plan so that a large percentage of habitat is undisturbed each year. Convert cropland or fallow fields to warm season grass and legumes. Restore wetlands if possible. Do not disturb nesting areas during the breeding season.

### Reference

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, and B. R. Euliss. 2003. Effects of management practices on grassland birds: Short-eared Owl. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/seow/seow.htm> (Version 12DEC2003).

## AMERICAN KESTREL (AMKE)

**Breeding Dates** March 15 – late August; 1 – 2 broods per year

### Keys to Management

AMKE require large, open grassland areas that can be contiguous tracts rather than one large expanse. Stands of trees may be interspersed. The species also needs dead trees with cavities for nesting. In the absence of natural nesting cavities, AMKE will accept nest boxes placed 15 to 30 feet above ground. Other elevated perches – power lines, trees, utility poles, shrubs, etc. – are essential for AMKE hunting activities.

### Habitat Description

AMKE are widely distributed across the United States and Canada and Central and South America. In the Northeast, AMKE habitat consists of open grassy fields with scattered dead trees for nesting and other elevated perches. Nest boxes may substitute for dead trees. Alternatively the kestrel may be found at woodland edges, highway and power line rights-of-way, pastures, and farmlands, especially fields where crops have been harvested. All habitats must provide a sufficient availability of insects, small mammals, reptiles and birds for food. Given a sufficient food supply, AMKE will remain year-round.

### Territory Size

AMKE nest at least one-half mile apart and generally in an area where they are surrounded by at least one acre of open space. Territory size is determined by the availability of prey. The breeding home range is 1.75 to 2 square miles. Overall territory size is approximately 269 to 321 acres (110 – 130 acres).

### Area Requirements

AMKE require an open expanse that may be grassland, hay fields, pastures, power line right-of-way, or newly cropped fields. The tracts that make up the expanse may be contiguous rather than one large tract. Wooded stands may be interspersed. Overall the area should be approximately 300 acres. Additionally, the area must include trees with large cavities for nesting and/or artificial nest boxes. Perches like trees, power lines, shrubs, etc. are also needed for effective hunting.

### Habitat Maintenance and Management

AMKE hunt by sight, so vegetation height in their territory needs to be low or moderate. Practices used to maintain habitat for grassland birds will also favor AMKE. In addition, if sufficient natural nesting cavities are not available, nest boxes should be provided and maintained. The availability of perches should be evaluated and supplemented if not enough are present. The use of pesticides in AMKE territory should be avoided. Insects, especially in summer, are primary food sources for AMKE.



**Reference**

Annon. 1999. American kestrel (*Falco sparverius*). NRCS – Wildlife Habitat Management Institute. 12 pages. [ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/pdf/kestrel\(1\).pdf](ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/pdf/kestrel(1).pdf)

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