

## APPENDIX 1: Breeding Biology, Habitat Selection, and Management Options for Selected Grassland Birds

	GRASSHOPPER SPARROW	VESPER SPARROW	UPLAND SANDPIPER
<b>Breeding Facts</b>			
<i>Breeding dates</i>	May 20–July 30	April 15–August 30	May 30–July 30
<i>Wintering status</i>	Usually migrates to southern US and islands	Occasionally seen in winter; most migrate south to southern US and Mexico	Migrates to South America
<i>Egg dates</i>	May 25–July 15	April 15–August 11	May 30–June 30
<i># of broods/year</i>	2	1–2	1
<i>Type of nest</i>	Cup nest in depression on ground under clump of overhanging litter and grasses or at base of shrub; mostly domed	Cup nest in depression on ground concealed by sparse vegetation at base of forb or thin clump of grass	Shallow depression on dry habitat, concealed with grass
<i>Territory size (acres)</i>	2–4	1–4	20–30
<b>Habitat Requirements</b>			
<i>Grassland type</i>	Upland meadow/pasture, old field, sandplain grassland (e.g., cultivated grasslands, old fields, coastal heathlands, blueberry barrens, reclaimed grasslands, capped landfills)	Upland meadow/pasture, old field, sandplain grassland (e.g., crop fields, weedy edges of potato fields, pastures, pine barrens, blueberry barrens, gravel pits, forest clearings)	Upland meadow/pasture, old field, sandplain grassland (e.g., pastures, old hayfields, dry meadows, airfields, blueberry barrens, extensive mixed agricultural areas)
<i>Minimum grassland size (acres)</i>	30	30	150
<i>Vegetation structure</i>	Short bunch grasses (ht.: 4–12") with minimal litter and grass cover, patches of bare ground, scattered tall forbs (ht.: 8–25") and short shrubs (ht.: 1–8") for song perches; favors well-drained upland sites; absent from fields with >35% shrubs	Open, sparse, short grass (ht.: 1–8") on dry upland sites with low grass and forb density, and scattered shrubs or small trees (ht.: <12") for singing perches	Mixture of short and tall (ht.: 24") grass interspersed with patches of bare ground and some tall singing perches; avoids fields with uniform grass and legumes and dense litter layer
<i>Diet</i>	Adult: Mostly grasshoppers, and also caterpillars, ants, bugs, and some grass and weed seeds Nestling: Caterpillars	Adult: Primarily beetles, grasshoppers, caterpillars, bugs and ants, and also grass and weed seeds	Adult: Mostly insects (grasshoppers, crickets, weevils, etc.) and occasionally weed, grass, and grain seeds

## Management Suggestions

### *Mowing/Haying*

Mow fields annually outside breeding season (May 1–August 5)

Favors frequently mowed areas for foraging; leave nesting areas unmowed during breeding season (April 15–August 30)

Provide mixture of short grass (feeding) and tall grass (breeding); mow nesting areas after mid-July, every 1-3 years (provide 6-8" grass in nesting area for spring arrival)

### *Grazing*

Light to moderate grazing to maintain short and sparse bunched vegetation

Moderate grazing to maintain 20-40% of vegetation at 10" tall

Moderate grazing (grass ht.: 8-12") with some scattering of forbs; restrict cattle May 1–July 15 in nesting areas

### *Prescribed burning*

Nests in burned and unburned areas, increases for 4-5 years following burn until litter cover increases; burn every 5-7 years but leave sufficient unburned breeding habitat each year

Responds positively to short sparse vegetation created by burning, burn early spring or late fall; for grasslands >60 acres, burn 20-30% yearly; for smaller grasslands, do not burn >50-60% of area in given year

Nests in recently burned fields (prefers second year after burn) with short new growth and no litter; burn only a portion of large areas in a year to provide unburned habitat in spring; burn every 5-10 years after September 1 or before May 1

### *Restoration*

Plant native warm-season bunch grasses rather than sod-forming grasses on well-drained or sandy soils with mixture of scattered forbs and shrubs

Plant native warm-season grasses in well-drained fields with lighter soils (sand and gravel), avoid heavy clays; provide undisturbed sparse vegetation and song perches along borders of crop fields

Plant native warm-season bunch grasses in large fields or combine existing fallow fields to provide mosaic of habitat types for feeding and breeding areas

### *Comments*

In crop fields, nests confined to field edges; will forage in nearby brush and woods

Often nests near airfields but cause little threat to aircraft because of low and direct flights; nest territories often grouped and feeding areas shared

## APPENDIX 1 (continued)

	BOBOLINK	EASTERN MEADOWLARK	SAVANNAH SPARROW
<b>Breeding Facts</b>			
<i>Breeding dates</i>	May 25–July 15	April 21–August 15	May 21–July 31
<i>Wintering status</i>	Migrates to South America	Southern Massachusetts, in salt marshes/moorlands, and south through eastern US	Some winter along Massachusetts coast; most winter along southern states to Mexico
<i>Egg dates</i>	June 1–8	April 21–July 28	May 21–June 29
<i># of broods/year</i>	1	2	1–2
<i>Type of nest</i>	Cup nest in depression on ground at base of dense cover of forbs in mat of dead grass <4" tall	Well-concealed domed cup nest, often with a runway, in depression on ground in dense cover with vegetation 10-20" tall	Cup nest in shallow depression on ground, formed in grass clumps or at base of low woody shrub
<i>Territory size (acres)</i>	1–6	6–8	1–2
<b>Habitat Requirements</b>			
<i>Grassland type</i>	Upland meadow/pasture, wet meadow, old field (e.g., old hayfields, reclaimed grasslands, capped landfills)	Upland meadow/pasture, old field, (e.g., hayfields, croplands, reclaimed grasslands and capped landfills, airports, shrub-by overgrown fields)	Upland meadow/pasture, old field, sandplain grassland, salt meadow (e.g., cultivated fields, hayfields, pastures, successional fields, blueberry barrens, coastal grasslands, airports)
<i>Minimum grassland size (acres)</i>	5–10	15–20	20–40
<i>Vegetation structure</i>	Mixed grass (ht.: 8-12") old hayfields >8 years old with relatively sparse ground cover, usually in lowlands with moist soil; prefer mosaic of grasses, sedges, and scattered broad-leaved forbs with <25% shrub cover; use shrubs, posts, small trees as song perches	Sparse to dense grass-dominated cover (ht.: 10-20"), preferably in low-lying areas with damp soils, thick layer of dead grass, scattered shrubs (ht.: 1-8"), and tall forbs (ht.: 1-15") for song perches; prefer mixed grass fields to alfalfa	Dense ground vegetation with mixture of short and tall grasses (ht.: 1-25") in moist habitat with thick layer of dead grass, scattered saplings, shrubs, and forbs (ht.: 1-10"); use fields of all ages from alfalfa to grass
<i>Diet</i>	Adult: Insects (caterpillars, grasshoppers, beetles, ants, etc.), grain and weed seeds Nestling: Caterpillars, grasshoppers	Adult: Mostly insects (crickets, grasshoppers) and some seeds Nestling: Caterpillars, cutworms	Adult: Mostly insects (beetles, caterpillars, grasshoppers, ants, etc.) and some grass seeds, weed seeds, and fruit Nestling: Caterpillars and fruit

## Management Suggestions

<i>Mowing/Haying</i>	Mow hayfields every 1-3 years after mid-July or in August to prevent nest destruction; remove hay to prevent thatch build-up	Mow every 1-3 years in August to avoid nest destruction	Mow yearly after mid-August to maintain short grasses
<i>Grazing</i>	Light grazing (grass ht.: 8-12"); will not use heavily grazed pastures	Fields ungrazed for 2 years or lightly grazed pasture (grass ht.: >5") with scattered forbs; rotate grazing to maintain variety of grass height and density during breeding season	Light grazing with approximately 40% vegetation cover (grass ht.: 10")
<i>Prescribed burning</i>	Nests in a field 1 growing season following burn; avoids recently burned areas that remove all litter; burn patches every 2-5 years but not all of an area in one year	Nests 2-4 years following burn as shrubs regrow; avoids areas with thick litter layer	Increases 2-4 years following burn and then decreases because of greater litter cover, short grasses, and not enough short shrubs
<i>Restoration</i>	Plant late-maturing hay species (warm - season native grasses) rather than legumes; can restore habitat on erodible, marginal farmland; use no-tillage method for reseeding	Restrict surface tilling for weed control or seeding during breeding season; plant mixed-grass hayfields (warm-season native grasses) in moist areas	Plant fields with mixture of tall and short grasses and forbs
<i>Comments</i>	Attempts renesting if nest destroyed before June 20; high site fidelity when breeding is successful; greatest nest success far from forest edge	Attempts renesting if nest destroyed early in season; sensitive to human disturbance while breeding	