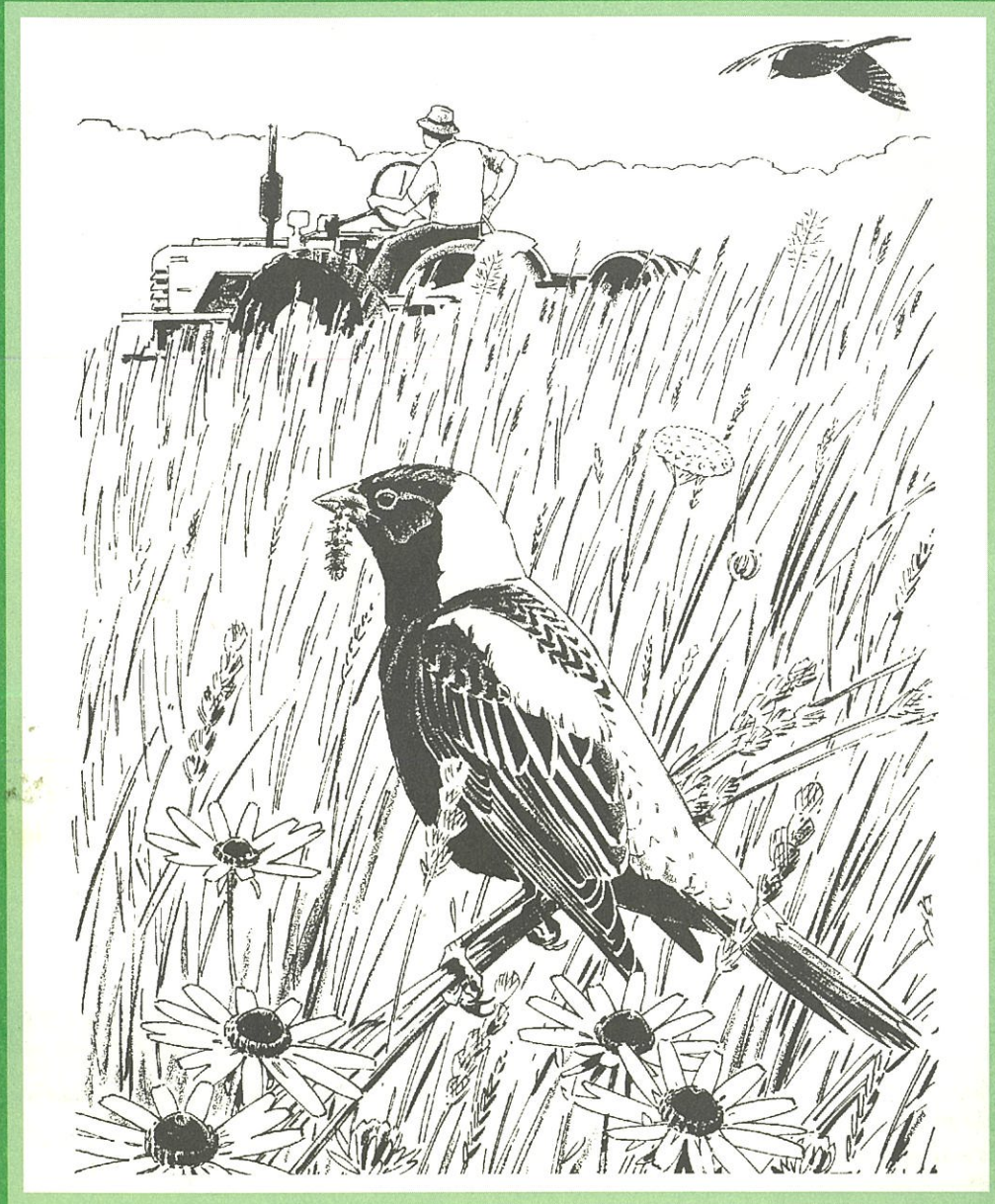


CONSERVING GRASSLAND BIRDS



MANAGING AGRICULTURAL LANDS
INCLUDING HAYFIELDS, CROP FIELDS,
AND PASTURES FOR GRASSLAND BIRDS

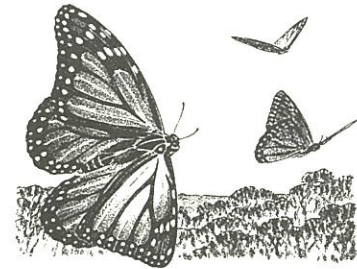
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GLOSSARY

Old field - An area that was formerly cultivated or grazed and where woody vegetation has begun to invade. If left undisturbed, it will eventually succeed into a forest. Many old fields occur at sites marginally suitable for crop production or pasturing. Old fields are highly variable in the Northeast, depending on soil, land use history, and management.

Upland meadow/pasture - Pastures are areas maintained in grass for livestock grazing; meadows are areas grown for hay production. Meadows may occur naturally in tidal marshes and inland flooded river valleys or, more frequently, at upland sites, through clearing of vegetation and planting of grasses. Meadows will revert to old field and eventually forest if they are not mowed, grazed, or burned. Grasses are usually similar in managed meadows and pastures, but herbs are often different in pastures because of selective grazing.

Wet meadow - Meadows located in moist low-lying areas, most often dominated by large colonies of reed canary grass. They are often created by collapsed beaver dams and exposed old pond bottoms. Salt-marsh meadows are subject to daily coastal tides.

Sandplain grassland - Dry grasslands that have resisted succession due to fire, wind, grazing, mowing, and salt spray. They are characterized by thin, acidic, nutrient-poor soils over deep sand deposits.

Sandplains occur primarily coastally and on the islands off of Massachusetts, as well as inland where sands have been deposited by glaciers and river sedimentation.

Restoration - Involves taking a degraded grassland and re-establishing habitat for native plants and animals. Restoration usually involves the planting of native grasses and forbs, and may include shrub removal and prescribed burning.

Native plant - A plant that has grown in the region since the last glaciation and occurred before European settlement.

Exotic - A species not native to the place where it is found.

Forb - A flowering plant, excluding grasses, sedges, and rushes, that does not have a woody stem and dies back to the ground at the end of the growing season.

Warm-season grass - Native prairie grass that puts on the most growth during summer when cool-season grasses are dormant.

Cool-season grass - Introduced grass for crop and pastureland that grows in spring and fall and is dormant during hot summer months.

Mesic soil - Sandy to clay loams, contain moisture-retentive organic matter, well drained (no standing water).

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Eastern Meadowlark and young on nest

INTRODUCTION

Agricultural lands have provided home and sanctuary to grassland birds for many hundreds of years in the Northeast. In hayfields and pastures, birds such as bobolinks and eastern meadowlarks have raised their young, hunted for food, and returned each spring to continue this cycle. Many species of wildlife, including birds, mammals, and butterflies, adapted and expanded their populations throughout the Northeast in the 1800s as land was cleared for farming.

Value of Farms to Birds

Most grassland birds use hayfields, meadows, and pastures for breeding while many other birds nest nearby and use crop fields and open areas for hunting and foraging. Some species nest along weedy borders and shrubby edges of fields and rely on open fields for feeding on seeds and insects. Songbirds, such as bobolinks and eastern meadowlarks, build nests on the ground, raise young, and forage exclusively within hayfields, meadows, and pastures during the summer. In the fall, fields provide food for migrating sparrows, larks, and warblers. Some songbirds that breed farther north, such as snow buntings, visit farm fields in search of food during the winter months. Many hawks and owls, such as American kestrels, northern harriers, and short-eared owls, rely on grasslands of all sizes for hunting small mammals. Waterfowl and shorebirds frequently feed in flooded portions of crop fields during migration.

Value of Birds to Farms

Many birds that live in or near agricultural areas rely on farm fields, particularly for feeding. In many cases, they hunt the pests that can destroy or invade crops. For instance, American kestrels (small falcons) that are seen hovering over fields are searching for insects as well as small mammals. Red-tailed hawks, large common birds of prey seen perching atop trees in open country, hunt mostly for rodents as well as some birds and insects. Songbirds, such as swallows, forage aerially for insects; large flocks are often seen following a plow as it churns up insects. Grassland birds also rely on insects such as caterpillars and grasshoppers found in the grasses to feed their young. They have all adapted to, and are an important component of, a grassland ecosystem.

Decline of Grassland Birds

In the past 100 years, there has been a decline in the quantity and quality of grasslands for wildlife. In the Northeast, hayfields that were traditionally harvested late in the season provided ideal breeding habitat for birds. Today, most hayfields are mowed earlier and more frequently in the growing season or are planted in large single-crop fields. Changes in agricultural technology, movement of farms to the west, and an increase in human population in the Northeast have resulted in a decline of habitat for grassland birds. Because farmland has become fragmented, most remaining grasslands have become smaller and isolated and are no longer suitable for many species requiring large tracts of grassland.

Historically, the large grasslands in the Northeast provided habitat for many grassland birds, particularly the grasshopper

sparrow, savannah sparrow, vesper sparrow, upland sandpiper, eastern meadowlark, and bobolink. However, as grassland habitat has become fragmented into small fields and pastures, only those birds that are adapted to living in smaller fields will persist at these sites. Bobolinks, eastern meadowlarks, and savannah sparrows are reliant on the remaining hayfields and pastures for their survival.

MANAGEMENT OF HAYFIELDS FOR GRASSLAND BIRDS

Mowing

Mowing is central to many farming operations as well as the conservation of grassland habitats. The following suggestions can be used on hayfields to improve wildlife habitat while minimizing a reduction in the quality or quantity of hay harvests.

Options

Keep alert for grassland birds nesting in fields. Mowing around areas where birds are frequently seen or leaving small patches unmowed can easily protect many nesting birds. Small unmowed patches will provide cover and feeding areas for birds for the remainder of the summer.

Rotating sizable fields (greater than ten acres) that are mowed early with those that are mowed late (hay used for bedding straw, etc.) each season can provide some fields for nesting birds while minimizing an impact on high-quality hay.



Crop field in winter

If possible, defer mowing until near the end of the grassland bird breeding season (i.e., after July 15) on fields not used for intensive hay production. This includes areas such as fallow fields, edge habitats, marginal farmlands, and weedy areas.

Flushing bars can be used on haying equipment to move birds hiding in grass.

Avoiding nighttime mowing will reduce the risks of injuring roosting birds.

Raising mower blades to six inches or more may avoid crushing some nests and young.

Local bird clubs or conservation organizations can help determine where and what birds are nesting in hayfields. Careful observations can determine the approximate nest locations and when birds have successfully raised their young. (See Appendix 4 for a list of local Audubon/conservation societies to contact.)

Burning

Burning improves agricultural land by releasing nutrients into the soil. Burning, particularly useful in large grasslands, enhances native grass-species composition and eliminates the buildup of ground litter. Burning removes old grass stems, standing dead vegetation, and ground litter; controls plant diseases; and helps control the spread of exotic plants and woody vegetation. It encourages growth of native warm-season grasses and forbs (if already present in the soil) and improves forage plant quality and quantity. In addition,

COMMON GRASSLAND BIRDS

BOBOLINK

Bobolinks, common in many hayfields throughout the Northeast, are known for their noisy bubbling songs and striking black and white plumage. Male birds are conspicuous as they fly while hovering over hayfields or perching atop a shrub or fence post to defend their territories and attract females. These farm birds were abundant at the turn of the century throughout the Northeast when hayfields and pastures dominated the landscape. Bobolinks are still distributed throughout the Northeast, but their numbers have declined notably in the past 30 years.

Life History

Bobolinks build their nests in late May and early June on the ground in a dense cover of grasses and wildflowers in hayfields, pastures, old fields, and wet meadows. Breeding dates typically range from May 25 to July 5. Therefore, mowing before mid-July can harm nesting birds and young. By late July, large groups of birds can be seen perched together on stalks of wildflowers, as they prepare for their journey south.

Bobolinks undertake one of the longest migrations of any land bird in North America. In the fall, these small birds make an extraordinary flight of approximately 6,000 miles to spend the winter in central South America (Argentina, Brazil, and Paraguay). The following spring, they return North, often to the same field they left the previous year.

Unlike many other grassland birds that require large grassland tracts, bobolinks will breed in grasslands as small as five acres. Quality and management of a hayfield are important for breeding bobolinks. Timing of hay mowing is usually the most important factor that affects breeding success.

Reasons for Decline

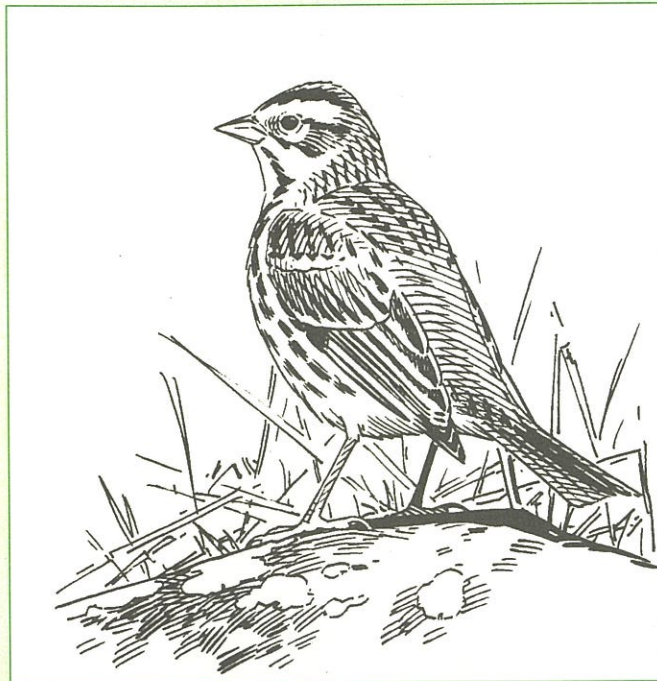
Reduction in field diversity. Bobolinks usually do not nest in pure legume/alfalfa fields; they prefer a mixture of grasses and wildflowers.



Male and Female Bobolink

More frequent field rotation. Bobolinks prefer hayfields more than eight years old, where vegetation is sparser and dominated by grass and there is a greater litter cover and a mixture of forbs and small shrubs.

Introduction of cool-season grasses. Fields, once grown in native warm-season grasses, are now planted with cool-season varieties that allow earlier and more frequent mowing. Hay is cut up to three times per year, which does not give bobolinks enough time to raise young.



BARRY VAN OUSEN

SAVANNAH SPARROW

This small brown sparrow, heard singing its buzzy insect-like song more than it is seen, has been the subject of a great deal of research in North America. This bird is known to return to its same natal or breeding site each year following migration to wintering grounds in the

southern United States, the Caribbean, and Central America. There are 17 different races based on geographic variation and separation.

Life History

A grassland generalist, the savannah sparrow is found in a variety of grassland habitats in the Northeast, ranging from heathland to farmland. This species is associated with hayfields and pastures as well as coastal grasslands and blueberry barrens. Unlike many grassland birds, savannah sparrows use fields of all ages. They tolerate successional growth, breeding in areas with scattered saplings, shrubs, and forbs.

Because savannah sparrows often have two broods per year, mowing before mid-July can harm nesting birds and young. Although each pair has a small territory size of one to two acres, they require relatively large areas of open space, 20 to 40 acres, for breeding habitat.

Reasons for Decline

Urbanization and reversion of farm fields to forest. Many successional fields that are suitable breeding habitat are often the first areas to be developed or to return to forest.

Early mowing. Mowing before mid-July results in a high percentage of nest failures.

burning benefits most grassland bird populations within one or two years following a burn.

Options

Burning in early spring (before arrival of birds in mid-May) is most beneficial to vegetation and nesting birds. Although some ground-nesting birds will not nest immediately following a burn, they will increase one or two years after a burn.

With large grasslands (greater than 100 acres), rotate portions burned over several years on a two- to six-year rotation, leaving some patches unburned each year (ideally burn 20 to 40 percent annually) to provide wildlife habitat and create a mosaic of vegetation.

Careful planning is necessary before burning. Most grassland burns occur between mid-March and the end of April, before greening and bird nesting. Timing of a burn must consider relative humidity, wind condition and direction, air temperature, and fuel conditions. Burn designs must incorporate existing firebreaks (roads, lakes, and streams), or fire breaks must be created. Adjacent landowners should be noti-

fied prior to burning. There may be state and local regulations governing controlled burns. Contact your local fire department for guidance and permits before burning.

MANAGEMENT OF CROP FIELDS FOR GRASSLAND BIRDS

Options

Field edge conservation: Uncultivated shrubby or grassy and weedy edges, particularly along wetlands and streams, protect soils, control erosion, improve water quality, and provide wildlife habitat for a variety of birds, such as eastern towhees and song sparrows, nesting along edge habitats, as well as for foxes and other mammals. These areas are important to birds, butterflies, and mammals for feeding, cover, and/or nesting. The Natural Resource Conservation Service's Wetlands Reserve Program may be able to pay for these areas to be protected (*see page 8*).

Brush row removal: Field borders, particularly those divid-

EASTERN MEADOWLARK

During the summer, meadowlarks may be seen along farm roads displaying their bold yellow chests from a nearby fence post, telephone pole, or tree, where their rich melodic song can be heard. Meadowlarks nest in a variety of grassland types, including hay and alfalfa fields, shrubby overgrown fields, and pastures. Once common on farmlands, meadowlarks are mostly confined to larger hayfields, conservation lands, and airports.

Life History

Meadowlarks usually require at least 15 to 20 acres of grassland. Meadowlarks prefer grass-dominated fields with a thick layer of dead grass for cover and nesting material and scattered shrubs and forbs for song perches. Mature fields with a variety of grass heights and densities are preferred.

Because meadowlarks can have two broods per season, the breeding period extends into mid-August. Therefore, early summer mowing of hayfields is detrimental to meadowlark nests and young.

Reasons for Decline

Farmland fragmentation. Meadowlarks only use medium to large hayfields (greater than 15 acres). Many remaining hayfields are too small to be suitable breeding habitat.

ing fields, that are not needed for wind or erosion control, or to protect wetlands, can be removed to control invasive woody plants. This results in the creation of larger grassland habitats that are attractive to more species of grassland birds. Removal of woody vegetation can be achieved by a variety of means: mechanically, with herbicides, or by burning. Removal should be avoided during the nesting season to minimize wildlife disturbance. Areas where brush has been removed should be monitored for resprouting and regrowth. Repeat applications and spot treatment may be necessary for some resilient woody plants. Herbicides are applied directly to the newly cut shrub stem.

Cover cropping: Planting a cover of grasses, grains, or legumes in unused fields decreases soil erosion, increases organic matter and soil fertility, and provides cover and feeding areas for wildlife throughout the year.

Strip cropping: In large fields, alternating strips of grass or close-growing crops with cultivated crops, particularly on the edge of a field or along a drainage area, provides cover and



BARRY VAN OUSEN

Eastern Meadowlark

More frequent field rotation. Meadowlarks prefer old, mature hayfields that contain a dense ground cover and diversity of grasses and forbs.

Reduction in field diversity. Meadowlarks prefer mixed fields over fields of pure alfalfa. Alfalfa lacks sufficient ground cover.

nesting habitat for birds and other wildlife. Leaving these areas unmowed and ungrazed during the breeding season helps prevent runoff and erosion while providing areas for birds to successfully raise young.

Wetlands protection: Wetlands adjacent to crop fields are especially important for wildlife habitat, and surrounding buffers of natural vegetation aid in the breakdown of pollutants from agricultural runoff. Pollutants in runoff include nutrients in fertilizers and harmful bacteria and viruses in manure. The wider the buffer, the greater the reduction of pollutants. In fields that are in agricultural use, and where cultivation already occurs close to a wetland, a buffer zone of 20 feet will provide some water quality benefits. However, a buffer of 60 feet or more will make a greater contribution to controlling pollutants and should be the minimum wherever possible. For maintaining good wildlife habitat in a wetland, as well as controlling pollutants, a buffer of 300 feet is preferable. Decisions on the buffer will depend on the type of pollution, slope, soil type, vegetation, and value of the wetland as wildlife habitat.

Conservation tillage: Frequent tillage destroys nests and decreases shelter and food for wildlife. In addition, tillage buries roughly 75 percent of crop residues, including waste grains and weed seeds that provide food in the fall for migrating and grassland birds and waterfowl. Conservation tillage is defined as a tillage or planting system that maintains at least 30 percent of the soil covered by plants or plant residue. Decreasing tillage reduces soil erosion, saves fuel and time, conserves soil moisture, and improves wildlife habitat, but is associated with more frequent herbicide use.

Crop rotation: Rotating crops grown in each field helps maintain or improve soil productivity and fertility. This can reduce soil erosion from wind and water, helps control weeds, manages plant pests by breaking the pest cycle, and improves or maintains the condition of the soil. Crops planted in recurring sequence may include cover crops that provide habitat for wildlife.

MANAGEMENT OF PASTURES FOR GRASSLAND BIRDS

Planting fields in warm-season grasses, in addition to the

WARM-SEASON VS. COOL-SEASON GRASSES



Bobolinks

Warm-season grasses: These are native grasses of the prairies and the Northeast. They grow in the summer, benefiting from groundwater when cool-season grasses are inactive. Because warm-season grasses are inactive in the winter and spring, they are susceptible to invasion by other grasses and weeds if stubble is removed. Warm-season grasses are drought resistant, winter hardy, and adapted to sandy, infertile soils. These grasses contain more nutrients than cool-season grasses and are equal or superior for livestock digestibility and yield. Because native grasses are mowed and grazed later in the season than cool-season forage crops, they provide nutritious feed for livestock for a greater portion of the year. In addition, they provide suitable breeding habitat for ground-nesting birds.

Common warm-season grasses used for range and pasture in the Northeast: big bluestem, little bluestem, Indian grass, and switchgrass (planted in mixtures are better for bird habitat; pure switchgrass stands can create poor bird habitat). (See Appendix 3 for a list of seed sources.)

Cool-season grasses: Cool-season grasses are primarily non-native species that have been introduced for crop and pastureland because the moist, cool spring and fall weather in the Northeast provides ideal growing conditions. They grow in the spring and fall but are dormant during the summer. Cool-season grasses do not grow well in dry and/or nutrient-poor soils. They can be grazed closer to the ground than warm-season grasses without reducing vigor in summer and winter. These grasses form a dense cover that provides less suitable nesting habitat for some ground-nesting birds.

Typical cool-season grasses planted in the Northeast: timothy grass, Kentucky bluegrass, and orchard grass (tall fescue and reed canary grass are sometimes planted but are invasive, provide no diversity in vegetative structure, and create thick, dense stands that prevent use by nesting grassland birds).

more commonly planted cool-season grasses, can benefit both the farmer and wildlife. The differences between the two grass types are described on page 6.

Grazing

Cattle, sheep, and horses have different food preferences; their grazing has effects on the different vegetation structures of pastures. Many grassland birds in the Northeast tolerate and benefit from light grazing because it creates a mosaic of grass heights and structures, removes ground litter, and benefits bunch grasses. Light grazing also allows the development of wildflowers and scattered shrubs. However, intensive grazing leads to a loss of plant diversity and cover for wildlife.

Options

Livestock rotation: Rotating livestock between forage fields planted in warm- and cool-season grasses prevents overgrazing and provides high-quality nutritious grass for a greater portion of the year. Manipulating the intensity, frequency, and duration of grazing in fields preserves upland or wetland vegetation, protects stream banks from erosion, minimizes soil compaction, and benefits nesting grassland birds.

Spring burning: Burning pastures, particularly on poor soil, releases nutrients into the soil and encourages growth of nutritious, palatable grasses for livestock (see previous section for permit requirements).

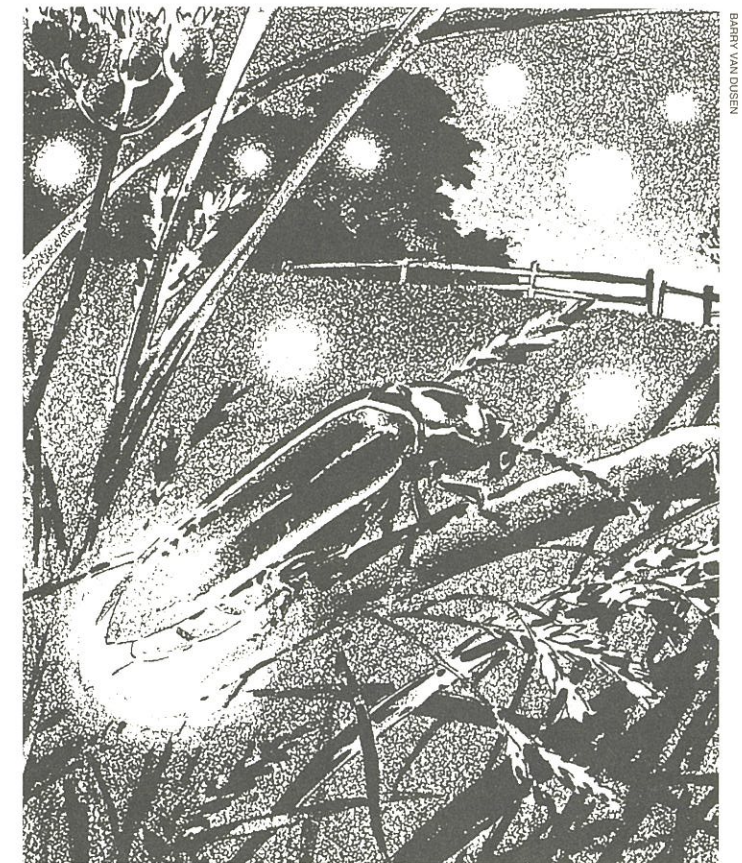
Creating a mosaic: Leaving some areas ungrazed and unburned each season and allowing grass to grow (8 to 12 inches) creates ideal habitat for growth of wildflowers, butterflies, and breeding areas for grassland birds. Maintaining adequate vegetation cover prevents soil erosion from wind and water.

Long-term agricultural benefits, including reduced soil erosion, decreased pollution of fresh water, decreased energy costs from fewer tillage operations, and increased soil fertility also provide farmland where grassland birds can thrive.

RESTORATION FOR WILDLIFE

Restoring portions of inactive farmland into grasslands can be beneficial to the land as well as wildlife. Planting an area in grasses prevents soil erosion and runoff and increases the fertility of the soil. It is particularly beneficial in fallow fields or idle croplands that have been depleted of nutrients.

What to plant. Native grasses are recommended when possible to provide habitat for a diversity of wildlife. Grass species should be determined based on the following criteria: amount of rainfall, length of growing season, temperature



Fireflies

extremes, and United States Department of Agriculture Plant Hardiness Zones, in addition to soil conditions such as pH, water-holding capacity, aspect, fertility, drainage, salinity, and alkalinity. Soil maps, available from local Natural Resource Conservation Service (NRCS) offices, will help determine what types of native grasses are most suitable on your land. (See Appendixes 2 and 3 for a list of grass species and a variety of nurseries that specialize in native grasses.)

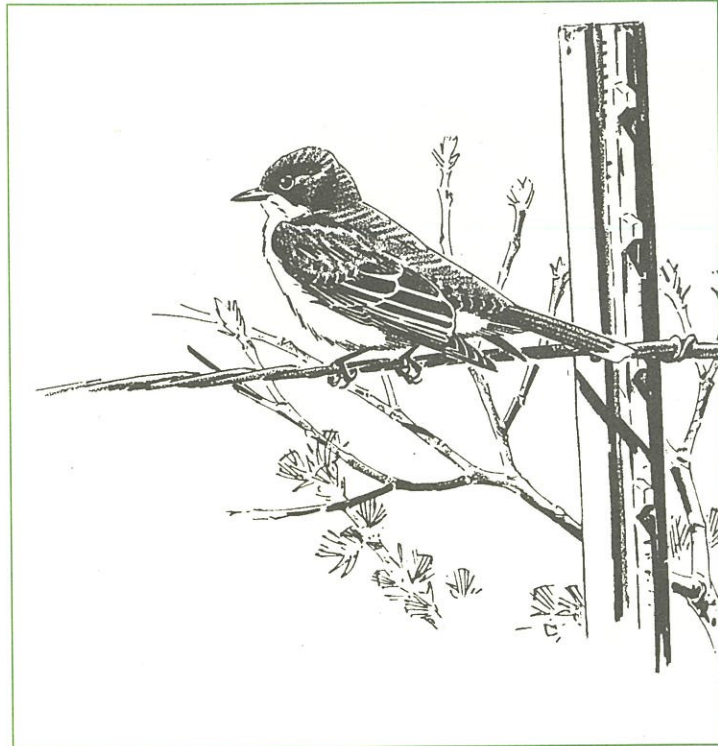
Prior to planting, provide a firm, weed-free seed bed and uniform soil moisture to ensure that plants will not dry. Follow seeding specifications, such as planting depths, soil types, seeding rates, and fertilizer needs, set by the seed supplier or an agency such as NRCS.

Planting a mixture of grasses provides greater diversity for wildlife habitat. However, be sure grass species are compatible in the rate of establishment, maturity, and growth habits to ensure survival of all species planted and to create a uniform stand.

Where and how much to restore. Restoring areas of grasslands of 100 or more acres is ideal for wildlife habitat but not always practical. If possible, choosing an area to restore that is adjacent to other hayfields or meadows will create the effect of a larger continuous grassland system for wildlife. By restoring a large tract of grassland, or a small area surrounded by other grassland habitats, the amount and diversity of

wildlife using the habitat throughout the year increases. Predation of grassland birds usually decreases as the size or amount of edge habitat of a grassland increases. Therefore, minimize edge habitat where possible (circular or square fields are preferable to rectangular fields).

Restored areas of less than five acres that are not adjacent to other fields or open habitats may benefit wildflowers and butterflies, but such parcels will not likely be used by grassland birds. Bobolinks, having the smallest acreage requirements of any grassland bird, are not found nesting in fields smaller than five acres.



Eastern Kingbird

SUSTAINABLE AGRICULTURE

Sustainable agriculture is a widely used method of farming that protects agricultural lands in a way that is beneficial to soil, water, and wildlife. Sustainable practices include the following.

Increased crop rotation on fields helps fields “rest” from crops that deplete the soil of nutrients and replaces fields with cover crops such as grains or grasses to prevent erosion and protect soil. This can provide habitat for wildlife.

Decreased use of pesticides protects water sources and associated aquatic wildlife from pollution and sustains greater insect populations in fields. Integrated Pest Management (IPM) is a program throughout the US that seeks to suppress pest populations to avoid economic losses while tolerating pest levels below economically damaging levels. This system uses pesticides in smaller, localized dosages based on pest

population monitoring, crop rotation to alleviate pests, and other methods such as 1) cultivating mechanically, 2) mulching, 3) planting pest-resistant crops, and 4) sanitizing fields. The release of beneficial organisms as pest controls is also considered part of IPM. Contact your state Department of Agriculture office for further information (see Appendix 4).

Conservation tillage protects ground insects and soil nutrients, and provides food and cover for wildlife (see page 6 for more information).

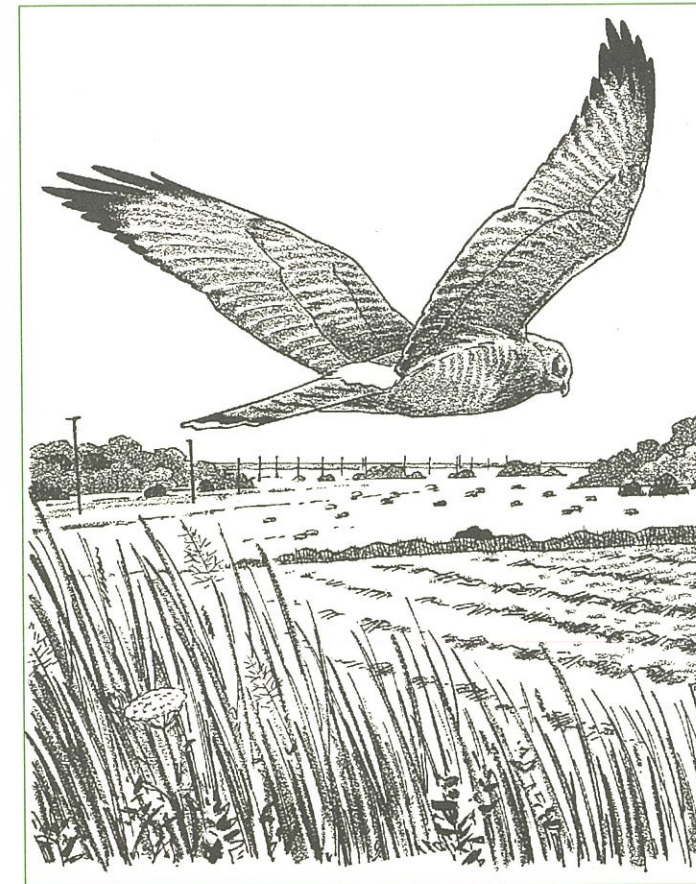
PRESERVATION OF FARMLAND

In order to protect existing farmland and grassland habitat from development and to provide future habitat for farmland wildlife, there are several options to protect land, including the following.

The Agricultural Preservation Restriction Program (APR) has been instituted in most New England states to protect agricultural land from development. In this voluntary program, farmers apply to the state to sell development rights to their land. Farmers are compensated by up to 90 percent of the value of the land. In return, the state acquires the deed restrictions on the land, stating that the land must remain in some form of agriculture. This allows other farmers to buy farmland at affordable prices but restricts any purchases of the land for development. Contact your state Department of Agriculture office for information on this program (see Appendix 4).

The Conservation Reserve Program (CRP) was instituted in 1985 by the US Department of Agriculture (USDA). The purpose of this program has been to reduce crop surplus, protect soil from erosion, and increase wildlife habitat. As a result, habitat has been created and enhanced for waterfowl and many grassland birds. Under this plan, landowners were paid to plant perennial vegetation (grasses, legumes, or trees) on eroding or highly erodible fields. This land could not be grazed or harvested for a ten-year period. Over 34 million acres have been put into CRP since 1985. Although this program is not widely used in the Northeast, the establishment of a similar program could provide incentives to conserve agricultural habitat in the region in the future.

The Wetlands Reserve Program (WRP), started in 1991, is a voluntary USDA program to help farmers and other landowners take agricultural lands out of production and restore them as wetlands. Eligible lands include wetlands farmed under natural conditions, farmed wetlands, formerly converted cropland, commenced converted wetlands, farmed wetlands pasture, stream corridors, or land substantially altered by flooding. Technical and financial assistance is pro-



Northern Harrier

vided by the NRCS. Landowners could receive up to 100 percent of the value of the property and up to 100 percent of the restoration costs. In some cases, farmers may sell a permanent or long-term easement to the federal government. In other cases, wetlands may be restored through a simple agreement. Under this program, conservation easements are purchased from landowners to restore, enhance, or create wetland areas. Ownership, control of access, and some compatible uses remain with the landowner. Information about restoring wetlands is available from NRCS at the local Soil and Water Conservation District offices.

The Partners for Wildlife Program (PFW) was created by the US Fish and Wildlife Service (USFWS) in 1992 to assist private landowners, including farmers, corporations, and private organizations, with habitat restoration projects. Under this program, the USFWS helps landowners with habitat restoration projects such as reseeding areas in native vegetation and restoring wetlands. For more information, contact:

Partners for Wildlife Coordinator
USFWS Northeast Regional Office
300 Westgate Center Drive
Hadley, MA 01035
Phone: (413) 253-8200

The Wildlife Habitat Improvement Program (WHIP) is a new program administered by the NRCS in each state through the 1996 Farm Bill. The purpose of WHIP is to help landowners develop habitat for upland wildlife, wetland wildlife, threatened and endangered species, and fish. In the New England states, grassland restoration has been listed as a priority to improve wildlife habitat through practices such as brush control, mowing, burning, native vegetation planting, and fencing. The NRCS will provide money through a 75 percent cost share. For more information on the WHIP program in your state, contact your local district conservationist at your state NRCS office (see Appendix 4).

The American Farmland Trust (AFT) is a national organization working to protect productive farmland while encouraging farmers to improve the stewardship of their land by suggesting conservation options available to farm owners. The AFT helps officials at the local, state, and national levels to create public policies that protect farmland and offer voluntary incentives for improving land stewardship. One such method is a conservation easement, a restriction that landowners can voluntarily place on their property to protect natural resources such as topsoil, water quality, and wildlife habitat, or to protect the land for farming into the future. An agricultural conservation easement is a voluntary, legally recorded agreement between the landowner and the AFT (or another qualified conservation organization) that prohibits or limits development that would damage the agricultural value or productivity of the farmland. Under this easement, a landowner may be eligible for tax benefits. For more information about agricultural conservation easements or other programs, contact:

AFT Northeast Office
Herrick Mill, 1 Short Street
Northampton, MA 01060
Phone: (413) 586-9330

MASSACHUSETTS AUDUBON SOCIETY AND AGRICULTURE

Massachusetts Audubon has consistently supported agriculture as a land use that is necessary for the production of food for human consumption. The Society recognizes that farms provide habitat for wildlife, and has supported federal and state laws and programs aimed at maintaining land in agricultural production and avoiding conversion of farmland to development. Massachusetts Audubon acknowledges the valid role of agriculture within the state's economy, its historic place as land use consistent with maintaining rural character, and its value in maintaining open space. This booklet is aimed at providing recommendations for managing open space for wildlife when appropriate, and is not intended to influence changes in agricultural production.

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

	GRASSHOPPER SPARROW	VESPER SPARROW	UPLAND SANDPIPER
Breeding Facts			
<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
Habitat Requirements			
<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			
<i>Mowing/Haying</i>	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)
<i>Grazing</i>	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
<i>Prescribed burning</i>	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
<i>Restoration</i>	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
<i>Comments</i>		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

	BOBOLINK	EASTERN MEADOWLARK	SAVANNAH SPARROW
Breeding Facts			
<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
Habitat Requirements			
<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 reseedling	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 re-nesting if nest destroyed before June 20; high site fidelity when breeding is successful; greatest nest success far from forest edge	Attempts re-nesting if nest destroyed early in season; sensitive to human disturbance while breeding	

APPENDIX 2: Native Grasses/Sedges Recommended for Grassland Bird Habitat

COMMON NAME/ SCIENTIFIC NAME	WARM/COOL SEASON	HEIGHT (feet)	CHARACTERISTICS	HABITAT
Little bluestem <i>Schizachyrium scoparium</i> (<i>Andropogon scoparius</i>)	Warm	1.5-4	Bunch grass in dry or moist soils; drought tolerant; flowers July-October	Sandy fields and disturbed areas in sun; common invader of old fields in Northeast
Poverty grass <i>Danthonia spicata</i>	Warm	.5-2	Bunch grass; flowers June-July	Abundant in sandy disturbed sites; typical grass along East coast
Pennsylvania sedge <i>Carex pennsylvanica</i>	Cool	.5-1	Flowers in early spring to July	Sun to part shade; common ground layer in dry oak woods
Big bluestem <i>Andropogon gerardii</i>	Warm	3-8	Bunch grass; very drought tolerant, adaptable; flowers August-October	Dry sunny open places along roadsides and shores, moist to dry fields
Broom-sedge <i>Andropogon virginicus</i>	Warm	1-4	Bunch grass; slow spreading, tolerates seasonal saturation; flowers August-October	Dry sunny fields, pastures (invades overgrazed ranges); valuable winter seed source for birds
Switchgrass <i>Panicum virgatum</i>	Warm	2-7	Bunch grass; slow spreading, drought tolerant, prolific; flowers late July-September	Sunny areas in dry soils along sandy roadsides and upland edges of salt marshes; valuable fall and winter food and cover for birds
Red fescue <i>Festuca rubra</i>	Cool	1-3	Moderately drought resistant	Sunny fields and meadows
Kentucky bluegrass <i>Poa pratensis</i>	Cool	1-2	Sod-forming; shallow root system, cannot withstand drought; flowers mainly in spring	Very common in fields, roadsides, lawns, shores; native to northern North America; good seed for birds
Indian grass <i>Sorghastrum nutans</i>	Warm	2-9	Drought tolerant; flowers August-September	Dry sunny fields; in East found sporadically along dry roadsides and fields
Side-oats gramma (Tall gramma grass) <i>Bouteloua curtipedula</i>	Warm	1-3.5	Bunch grass; drought tolerant; flowers July-September	Sunny areas in dry woods and prairies

SOIL TYPE	PLANTING INSTRUCTIONS	AGRICULTURAL USES	NURSERIES (See Appendix 3)
Dry to moist, light, textured soil; average fertility; does not grow well in rich soils	Seed late summer to early fall or early spring	Stabilization, range reseeding, landscaping, forage; does not grow well with close mowing/grazing	1, 2, 4, 5, 6
Dry, poor soil	Plant in spring or mid-to late summer		
Dry to moist, mesic, well-drained soil; acidic; average fertility	Plant or seed in fall or early spring	Pasture, forage, hay	1, 2, 5, 6
Poor to well-drained soil; coarse sand to clay	Seed in spring or summer when soil is warm; blooms first year if sown early	Poor forage grass; good cover crop (sometimes becomes too dense for some birds)	1, 2, 4, 5, 6
Tolerates dry to moist soil, prefers fertile well-drained soil	Plant in spring when soil is warm		1, 4
Tolerates many soils but grows best on fertile and moist sandy soil; tolerates moderate salinity	Seed or plant late summer/early fall or early spring; blooms first year if planted early; takes 1-2 years to become totally established	Pasture, forage, erosion control	1, 2, 4, 5, 6, 9
Moist to dry or rocky soil; tolerates salt, low fertility		Used as lawn grass in shady areas	1
Prefers limestone (neutral) porous soils; needs reliable moisture	(See nursery)	Widely used lawn, pasture, and turf grass; grows best after grazing	1
Mesic and dry to moist soil; poor to average fertility	(See nursery)	Pasture and range; nutritious for livestock.	1, 2, 4, 5, 6, 9
Dry to moist soils; grows best in well-drained rocky/shallow areas	Bloom first year planted	Pasture, range, erosion control	1, 5, 6

APPENDIX 3: Nurseries Specializing In Native Grasses and/or Wildflowers

NAME	ADDRESS	PHONE	FAX/e-mail
1. Ernst Conservation Seeds	9006 Mercer Pike Meadville, PA 16335	1-800-873-3321	(814) 425-2228 cernst@gremlan.org
2. Native Gardens	5737 Fisher Lane Greenback, TN 37742	(615) 856-0220	
3. Native Seeds, Inc.*	14590 Tridelphia Mill Road Dayton, MD 21036	(301) 596-9818	
4. Pinelands Nursery	323 Island Road Columbus, NJ 08022	(609) 291-9486	(609) 298-8939
5. Praire Ridge Nursery	9738 Overland Road Mt. Horeb, WI 53572-2832	(608) 437-5245	(608) 437-8982
6. Prairie Nursery	P.O. Box 306 Westfield, WI 53964	(608) 296-3679	(608) 296-2741
7. Putney Nursery, Inc.*	Route 5 Putney, VT 05346	(802) 387-5577	(802) 387-4491
8. Thompson & Morgan, Inc.*	P.O. Box 1308 Jackson, NJ 08527-0308	1-800-274-7333	(888) 466-4769
9. Wild Earth Native Plant Nursery	49 Mead Avenue Freehold, NJ 07728	(908) 308-9777	

*specializes in native wildflowers only

APPENDIX 4: Agencies and Organizations Specializing in Agricultural Land Management Issues

	NATURAL RESOURCES CONSERVATION SERVICE	DEPARTMENT OF AGRICULTURE	AUDUBON/CONSERVATION SOCIETIES	
MASSACHUSETTS	UMASS Cooperative Ext. System Dept. of Forestry and Wildlife Management Holdsworth Natural Resources Ctr. Amherst, MA 01003 Phone: (413) 545-2665	Massachusetts State Office 451 West Street Amherst, MA 01002-2995 Phone: (413) 253-4350	Massachusetts Department of Agriculture State Office Building 100 Cambridge Street Boston, MA 02202 Phone: (617) 727-3000 Email: unknown@state.ma.us Information Specialist: (617) 727-3018 ext 170	Massachusetts Audubon Society 208 South Great Road Lincoln, MA 01773 Phone: (617) 259-9500
CONNECTICUT	UCONN Cooperative Ext. System College of Agriculture and Natural Resources Box U-66, 1376 Storrs Road Storrs, CT 06269-4066 Phone: (203) 486-2917	Connecticut State Office 16 Professional Park Road Storrs, CT 06268-1299 Phone: (860) 487-4011	Connecticut Department of Agriculture State Office Building 165 Capitol Avenue Hartford, CT 06106 Phone: (860) 566-4667 E-mail: ctdeptag@po.state.ct.us Information Specialist: (860) 566-6094	Connecticut Audubon Society, Inc. 118 Oak Street Hartford, CT 06106 Phone: (860) 527-8737
RHODE ISLAND	URI Cooperative Ext. Services Kingston, RI 02881 Phone: (401) 874-2599	Rhode Island State Office 60 Quaker Lane, 2 nd Floor Warwick, RI 02886 Phone: (401) 828-1300	Rhode Island Division of Agriculture and Marketing DEM - 83 Park Street, 6th Floor Providence, RI 02903-1037 Phone: (401) 277-2781 Information Specialist: (401) 277-2781 ext 4501	Audubon Society of Rhode Island 12 Sanderson Road Smithfield, RI 02917-2600 Phone: (401) 949-5454
VERMONT	UVM Extension System 601 Main Street Burlington, VT 05401-3439 Phone: (802) 656-2990	Vermont State Office 69 Union Street Winooski, VT 05404 Phone: (802) 951-6795	Vermont Department of Agriculture 116 State Street, Drawer 20 Montpelier, VT 05620-2901 Phone: (802) 828-2430 E-mail: unknown@agr.state.vt.us Information Specialist: (802) 828-2361	Vermont Audubon Council Phone: (802) 388-4082 Vermont Institute of Natural Science RR2, Box 532 Woodstock, VT 05091 Phone: (802) 457-2779
NEW HAMPSHIRE	UNH Cooperative Extension 59 College Road, Taylor Hall Durham, NH 03824-2618 Phone: (603) 862-1520	New Hampshire State Office 2 Madbury Road Durham, NH 03824-1499 Phone: (603) 868-7581	New Hampshire Department of Agriculture Caller Box 2042 Concord, NH 03302-2042 Phone: (603) 271-3551 E-mail: 103423.365@com-puserve.com Information Specialist: (603) 271-3551	Audubon Society of New Hampshire 3 Silk Farm Road Concord, NH 03301-8299 Phone: (603) 224-9909
MAINE	UMAINE Cooperative Extension 5741 Libby Hall Orono, ME 04469-5741 Phone: (207) 581-3240	Maine State Office 5 Godfrey Drive Orono, ME 04473 Phone: (207) 866-7241	Maine Department of Agriculture Augusta Mental Health Institute 28 State House Station Augusta, ME 04333-0001 Phone: (207) 287-3871 E-mail: agcommst@state.me.us Information Specialist: (207) 287-752	Maine Audubon Society Gilsland Farm 118 U.S. Rt. 1 P.O. Box 6009 Falmouth, ME 04105 Phone: (207) 781-2330



Prepared by Andrea L. Jones and Peter D. Vickery, Grassland Conservation Program, Center for Biological Conservation, Massachusetts Audubon Society, Lincoln, MA, in collaboration with Silvio O. Conte National Fish and Wildlife Refuge and the USFWS North American Waterfowl Management Program. Additional financial support provided by the:

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