

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION GUIDE
EARLY SUCCESSIONAL HABITAT DEVELOPMENT/MANAGEMENT, CODE 647**

GENERAL SPECIFICATIONS

Plans and specifications for early successional habitat development and management shall be prepared for each site or management unit according to the USDA, NRCS-ME conservation practice standard *Early Successional Habitat Development/Management*, code 647. They shall be recorded on specification sheets or job sheets.

As required by law, chemicals to be applied under this standard will be only for uses listed on the container label and all label directions and precautions must be followed. Selection of a product shall be based on: (a) product effectiveness, (b) non-target species impacts, (c) toxicological risks, and (d) off-site movement of chemicals. Chemical use will follow requirements of NRCS practice standard *Pest Management*, code 595.

HABITAT TYPES

GRASS & FORB DOMINATED LANDSCAPES

Descriptions

Grassland can be either human created and maintained (such as hayfields and pastures), or a naturally occurring community occurring on droughty, low nutrient soils, or where regular disturbance and/or severe environmental conditions preclude plant succession to proceed to later seral stages. Grasslands are dominated by graminoids, but may contain various forbs.

Importance

Grasslands are an important habitat element for a variety of wildlife, including migratory songbirds, various species of waterfowl, raptors, large and small mammals, turtles, snakes, bees, butterflies and other species of insects.

Due to the reduction of grassland habitat in the northeast, grassland nesting bird species (such as eastern meadowlark, bobolink, grasshopper sparrow, vesper sparrow and upland sandpiper) are experiencing significant population declines.

Likewise pollinator populations, especially bees, are in decline due to use of pesticides, pests, and reduced habitat quality.

Areas to Target for Management:

A. Grassland Birds

1. Existing large grassland areas – Large blocks of grassland tend to be much more important for grassland birds species than many small parcels. Other large grassland areas of importance to grassland birds include locations such as existing or abandoned airports and military installations. Efforts to restore or enhance grassland habitat within these areas is encouraged; however, it may be prudent to exclude areas proximal to active runways to minimize the risk of plane - wildlife collisions.

2. Open landscapes – Focus on sites located within a ½ mile of other grassland habitats such as pastures, hay fields and wet meadows. Small, isolated parcels of grasslands in landscapes that are heavily wooded have limited potential to support grassland birds.

3. Recently abandoned sites - In general, do not try to reclaim grassland on sites that are >10 years post-abandonment. The cost can be prohibitive and the results may be less than satisfactory. Dry, gravelly sites with limited woody encroachment may be an exception.

B. Pollinator Habitat

1. Field borders, field corners in fields irrigated with center pivots, irrigation ditches, hedgerows, windrows, woodland, and other “idle areas” within or near cropland, hayland, pasture, etc.

2. Especially good are areas with poorer, infertile soils and good drainage are often best for ground nesting native bees.

3. Select areas that are isolated from areas where pesticides are applied and where prevailing winds are likely to cause pesticides to drift over the area.

4. Areas proximal to existing pollinator habitat.

Management Strategies

A. Grassland Bird Management Strategies

The objectives will be to target larger contiguous blocks of grassland and other open land to attract area sensitive birds and to enhance nesting and foraging habitat.

1. Grassland size - In order to support an array of grassland dependent bird species within an area, contiguous blocks of grassland at least 100 acres in size provide the greatest potential. Where 100 acre tracts or larger are unavailable, sites at least 20 acres in size should be targeted. On isolated patches smaller than 5

acres, manage for shrub habitat rather than grassland because shrub dependent wildlife species are generally not as area sensitive as grassland species. On sites from 5 to 20 acres in size, consider the surrounding landscape to determine if grassland habitat should be the focus.

2. Grassland shape - Consider ways to minimize the grassland edge to area ratio by favoring circular or square plots rather than long, linear plots (i.e., less than 600 feet wide) due to the increased rates of nest predation on narrow plots. Also, avoid establishing grasslands with very irregular borders as this also increases the edge to area ratio.

3. Consolidate grassland patches - Connected or unified grassland blocks provide increased habitat, reduce edge effects and can result in increased wildlife species diversity. Larger grassland blocks can be created by concentrating efforts near existing grasslands or open wetlands. Consideration should also be given to consolidation of adjacent grassland fields through the elimination of hedgerows or

tree lines in areas where open land occupies a considerable amount of the surrounding landscape.

4. Soften edges between habitats - Where grassland directly borders a forest edge, consider softening the hard edge by feathering shrub habitat at least 30 feet in width (see cutback border). "Hard" grassland/forest edges increase the rates of predation on wildlife in general and nest parasitism on grassland birds in particular.

5. Vegetation - Grasslands will be managed to achieve the proper mix of grass, forb and bare soil cover for the targeted wildlife species or community.

Bunch grasses rather than sod forming grasses should be the focus (dense stands of sodforming grasses can hinder bird movement in their search for food). While all grassland dependent birds rely on herbaceous cover for nesting or foraging, there are many differences in cover requirements among individual species (Table 1, Figures 1 and 2).

Table 1: Habitat Preferences of Grassland Dependent Birds						
Species	Preferred Grassland Growth Form			Avoids woody vegetation ¹	Min. Area acres if known	Other
	Short <12"	Medium <24"	Tall >24"			
American Kestrel	x					Open fields containing widely scattered trees (or utility poles) for perch sites, cavity nester
Bobolink		x		x	5-10	Prefer older fields with a mosaic of grasses, sedges, and scattered forbs
Eastern Meadowlark		x			15-20	Prefer areas w/ good grass and litter cover & scattered tall forbs/shrubs for perch sites
Grasshopper Sparrow	x			x	30	Prefer dry moderately open grasslands with patchy bare ground, minimal litter. Presently limited to southern Maine, (Kennebunk Plains, Wells Barrens, Sanford Airport)
Northern Bobwhite		x	x		20-40	Prefer a diversity of early successional habitats adjacent to one another (grasslands, hedgerows, open woodlands). Limited to extreme southern Maine
Northern Harrier			x	x	>100	Prefer marshy meadows, old fields, wet grasslands
Savanna Sparrow	x	x		x	20-40	Prefer dense ground vegetation and some litter; may favor damp soil grasslands
Short Eared Owl		x		x	>100	Nests in dense grass and forbs
Upland Sandpiper	x	x		x	150	Prefer short patchy grasses & areas of bare ground
Vesper sparrow	x				<10	Prefer dry sparse grasslands w/ scattered shrubs and bare patches

¹ Species that avoid areas with woody vegetation; but most can tolerate some woody vegetation where grassland is dominant.

Figure 1: Grassland bird species vegetation height and density preferences based on studies in Illinois and Missouri (Herkert et al 1993)

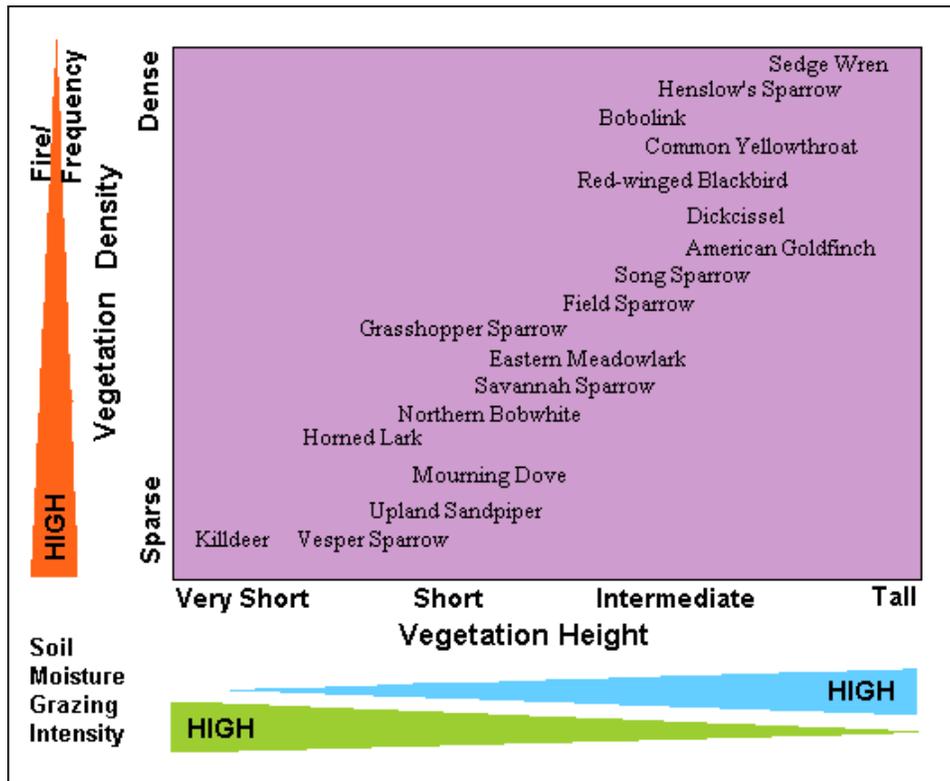
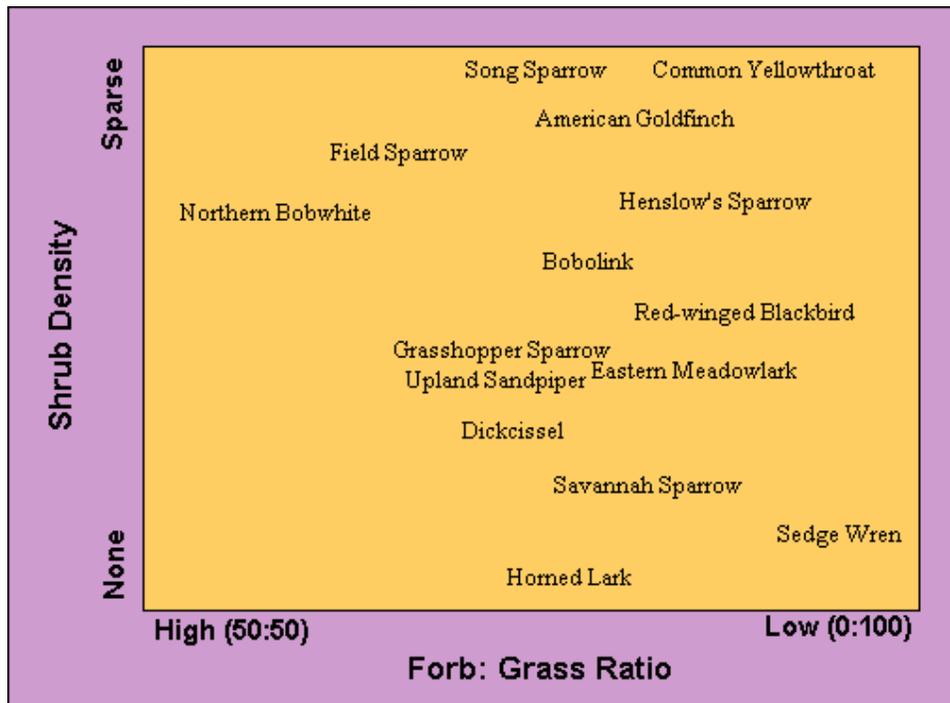


Figure 2: Grassland bird species forb abundance and low growing, less than 3 feet, woody stem density preferences based on studies in Illinois and Missouri (Herkert et al 1993)



B. Pollinator Habitat Strategies

The objective will be to provide nesting, pollen and nectar producing habitat proximal to each other. See Maine biology technical note [ME-03](#) for more information regarding pollinator conservation in New England.

1. Protect/Provide Diverse Forage Habitat -

Nectar and pollen production is enhanced if a diversity of flowers (grass, forbs, trees and shrubs) that bloom at different times during the entire growing season is available. Flower rich areas have 50 – 100 different flowering species, and pollinator diversity is correlated with flower diversity.

2. Protect/Provide Diverse Nesting Habitat -

Nesting habitat is provided by sparsely vegetated well-drained soils or sparsely vegetated mounds of spoil, hollow twigs of some shrubs, tree snags and large downed woody debris, and for bumblebees tree slash, native warm season grasses, and poorly maintained rock walls. Artificial nesting structures can be used as surrogates if nesting habitat is lacking.

3. Habitat Size – Habitat patches that are bigger and round are best. However linear strip habitats (e.g., roadsides, field borders, hedgerows) can also be protected or managed to enhance habitat for pollinators.

4. Habitat Orientation – Best locations will have good sun exposure for a good portion of the day. South facing exposures are good, but not necessary.

5. Habitat Location – Ideally forage (feeding/nectar) habitat should be proximal to nesting habitat. Small bee species may not fly more than 100 to 500 ft from nesting to foraging areas, whereas bumble bees may fly a mile.

Habitat Development/Management Activities

Herbaceous habitat may be developed and maintained by one or a combination of the following methods:

1. Chemicals - Herbicides may be used to manipulate plant succession, control brush, reduce plant competition, control exotic invasive plant species and improve habitat diversity. Careful planning and application are required when using chemicals to improve existing habitat. Product selection shall be based on: (a) product effectiveness, (b) non-target species impacts, (c) toxicological risks, and (d) off-site movement of chemicals.

2. Light disking - Dense sod or vegetation can be detrimental to feeding and movement of wildlife and can be improved by light disking. Light disking enhances habitat quality by

releasing sod-bound grasses, reducing residue, creating bare ground, stimulating the growth of annual forbs, which are prolific seed producers and can provide nectar or pollen while in bloom.

Do not perform light disking on sites where invasive or noxious plant species are present unless invasive species are controlled prior to disking. *Any disking of areas which have never been plowed is strongly discouraged.*

Where practicable, light strip can be implemented as a rest-rotation system where no more than 50% of the available area to be disked is disturbed in any one year.

(A) Frequency

Disking should be conducted every 2 to 3 years. An example rest rotation system would be to:

- Disk ½ to 1/3 of a field each year in a strip pattern. Strip disking creates a mosaic of plant communities from 1 to 3 years old, depending on the rotation.
- Divide the field into strips from 30 to 75 feet wide. In the first year disk every other strip or every 3rd strip (2-year and 3-year rotation, respectively). Disked strips will be separated from each other by an area of undisturbed vegetation either as wide or twice as wide as the disked strip (2-year and 3-year rotation, respectively).
- In the second year, disk a new strip of similar width in the adjacent undisked area, leaving the previously disked strips undisturbed.
- In the third year, the remaining undisked strips are done (3-year rotation) or the strips done in year one are done again (2-year rotation).

(B) Disking Intensity

In general, the more intensively the site is disked, the less residual perennial grass remains and the greater the annual plant component. Specifications for light strip disking are:

- Disks should run parallel, or nearly so, to the direction of travel and at a depth of only 2 to 4 inches;
- At least 50 % residue remains.

(C) Timing of Disking

- Disking can be done from fall through early spring. Do not disk during the primary nesting season of April 15 to August 1.
- Vegetative response and composition often varies based on the time of application; so consider varying application times to increase vegetative diversity.

(D) Erosion Control

- Strips should be planned across the slope or on the contour.
- Slopes greater than 5 percent should not be disked.

3. Mowing – Rotational mowing is a frequently used management tool. To prevent thatch buildup, residues should be thoroughly shredded or consider haying.

(A) Frequency

Where woody plant encroachment is not a problem, mow every three years or, on larger grasslands (i.e., > 50 acres), one can practice rotational mowing so that no more than 1/3 to 1/2 of a field is cut in any given year.

Annual mowing is discouraged, but not prohibited as it decreases structural plant diversity, reduces important cover for rodents which can also affect predators such as kestrel and northern harrier, and reduces residual cover available for the following nesting season.

(B) Time of Mowing

Maximum benefits will occur when mowing is deferred until after the primary nesting season which runs from April 15 to August 1.

Exceptions:

1. Mowing or disturbance during the primary nesting season is necessary to maintain plant community health to benefit target wildlife. For example, mowing is part of a strategy to help control/reduce the spread of bedstraw which may impede grassland bird use of a field.
2. On hayland an early harvest during May (no later than May 31st), with 65-days before the next haying (e.g., No haying from May 27th to Aug 1st) has been shown to be a successful model that balances forage production with grassland bird recruitment (Perlut et al. 2011).

Warm season grasses do not need to be mown as frequently as cool season grass fields to control shrub invasion; so a 3- to 4-year schedule may be adequate.

When possible, restrict mowing to October or early November. This allows grasses and forbs to seed out, reinforcing vegetative recruitment and enhancing food and nectar sources for a variety of wildlife and pollinator species. Late mowing may reduce the risk of injury or mortality to reptiles and amphibians that use terrestrial environments.

(C) Mow Height

Cool season grasses – Do not mow cool season grass lower than 2 inches. The matting of long cool season grass matting due to snow may inhibit wildlife movement, grass growth and nest initiation after snowmelt.

Warm season grass – Do not mow warm season grasses lower than 10 inches. If overwintering habitat is a concern, consider not mowing warm season grasses.

4. Prescribed grazing - Prescribed grazing may be utilized as a management tool to manipulate plant succession. The preferred grazing practice is to use a rotational system where paddocks are differentially grazed, and others are left idle as follows:

- A field should be managed so that 1/3 of the acreage is left idle (not grazed during the primary nesting season (April 15 to 1st of August), 1/3 is lightly grazed and 1/3 is moderately grazed.
- Ideally, an idle paddock will be located so that it is surrounded by other paddocks rather than trees or buildings.
- The lightly grazed paddock should be managed so that 50% or more of the vegetative cover is maintained at a minimum of 10 inches all summer with the remainder is grazed no shorter than 4 inches.
- The moderately grazed paddock should be managed so that 30% or more of the vegetative cover is maintained at a minimum of 10 inches all summer with the remainder is grazed no shorter than 4 inches.
- If native warm season grasses are grazed, do not graze below 6 inches.

Grazing should only be used as a management tool where the land user fully understands the principles and methodologies of a rotation system and has demonstrated a high level of management skill. An approved grazing plan is required.

5. Seeding of Herbaceous Plants - Seeding can be used to establish new stands or enhance existing stands. When establishing grass stands by seeding, the seed mix and rate shall be based on site conditions and habitat preferences of targeted species.

Select a mix of tall and short growing grasses to provide good nesting or forage habitat for diversity of species.

Planting of tall fescue (*Festuca arundinacea*), quackgrass (*Elytrigia repens*), and reed

canarygrass (*Phalaris arundinacea*) is prohibited.

Both cool season and warm season grasses provide wildlife habitat. Cool season stands are valued as wildlife cover because they are easy to establish and provide cover early in the season. The disadvantages are that they lose vigor over time and mat down under rain, snow and wind. Warm season grasses provide excellent wildlife habitat because they hold up better under the elements, thus providing winter cover.

Soil type and target wildlife species should determine what kinds of vegetation to plant. Table 2 provides some specific seeding mixes, Table 3 provides information on various grasses and legumes and Table 4 provides a list of flowering forbs for pollinators. Additional suitable grass and forb mixes are provided by biology technical notes [ME-01](#) and [ME-03](#).

The inclusion of forbs and legumes in grassland improves structural diversity of the stand and increases invertebrate abundance. The inclusion of forbs can also improve the stand for various pollinators such as butterflies, moths and bees.

Herbaceous plantings under this standard will:

- be suited to site conditions;
- have soils samples taken from the planned planting location according to sampling protocols of the Maine Soil Testing Service;
- have soil amendments applied according to soil sample test results, and NRCS conservation practice standard *Nutrient Management*, code 590, *unless native* warm season grass or flowering forb plantings are involved. Seek the assistance of a plant materials specialist for native warm season grass establishment.
- involve proper seedbed preparation for the species, and site conditions.
 - **Pollinator Planting Site Preparation:** To be successful on areas seeded to cool season grasses an entire growing season of site preparation is required. Proven techniques include: tillage every two weeks, tillage combined with herbicide treatments during alternating months, or vegetation can be smother by covering with UV-stable black plastic for a full year.
- if from a commercial source,
 - seed must be certified and properly labeled according to Maine (7 MRSA § 1046) and Federal Law (7 U.S.C. 1551-1611);

- seed will not contain primary noxious weeds, and secondary noxious weeds are within allowable state limits ([2011 Maine Noxious Weed List](#)).

Non-native, non-invasive plantings are allowed under the following conditions:

- native plant materials are too expensive to be practicable; and/or
- native plant establishment is likely to take too long to address the immediate resource concern (e.g., soil stabilization, invasive species control).

Areas planted with the *primary* objective to provide herbaceous forage and seed for wildlife consumption shall:

- include at least 3 perennial species for non-pollinator related plantings. See biology tech note [ME-01](#) for more information on grass and forb plantings.

Areas planted with the *primary objective* to provide pollen and nectar for pollinators shall:

- consist of at least 9 flowering species known to provide nectar and/or pollen for pollinators, and plantings shall include a mix of early-, mid- and late-blooming species. See biology tech note [ME-03](#) for more information regarding pollinator plantings.
- be no less than ½ acre and no more than 5 acres in size, unless authorized by the State Resource Conservationist.

Table 2: Seed Mixes for Grassland Bird Habitat		
Location	Species	Rates lbs/ac
Well drained site	Canada Wild Rye	4
	Timothy	2
	White Clover	6
Well drained site	Timothy	1
	Orchard Grass	1
	Alfalfa	5
Well to somewhat poorly drained site	Orchard Grass	4
	Timothy	2
	Red Clover	8
Well drained to somewhat poorly drained site	Deer Tongue	2
	Switchgrass	8
	Tick Trefoil	1
Well to poorly drained site	Orchard Grass	4
	Red Top	2
	White Clover	6
Well to poorly drained site	Virginia Wild Rye	3
	Orchard Grass	3
	White Clover	6
Dry to well drained site	Big Bluestem	2
	Little Bluestem	2
	Indian Grass	3
	Switchgrass	1

- be limited to one acre of supplemental perennial plantings per 25 acres of adjacent, managed land.
- be within or share a border with land suitable as wildlife/pollinator habitat (e.g., provides wildlife cover, nesting sites, native food sources).
- be located on existing open ground (e.g., fields, road edges, fields, log landings, etc).

6. Cut-back borders (a.k.a. feathered edges)

Cut-back borders are used to create a softer edge between field/forest edges. To create a cut-back border from an area having predominantly tall growing tree species, cut trees greater than 1 - 2 inches in diameter. Retain native fruit bearing shrubs, vines and small trees. The increased sunlight will produce a flush of new growth and many of the trees species will quickly sprout at the stump – forming a brush border in one to five years.

Cut-back borders will be a minimum of 50 feet in width and soil disturbance shall be minimized. If invasive plant species are present, they must be controlled because the increased sunlight to the area could dramatically increase their growth.

Re-apply the practice when trees in the woodland edge become large enough to shade more than 60 percent of the area. Cutting back a portion of the edge each year will provide increased structural diversity and allow for retention of some habitat.

Shrub/Tree Removal – When grassland bird habitat enhancement is the objective, woody vegetation can be removed to create open views. However, careful consideration should be given to other wildlife species which might be negatively impacted. For example, certain species of shrubs and trees along field edges, in hedgerows, windbreaks and brushpiles can provide nesting and foraging habitat for some native pollinators.

- Hedgerows dominated by woody species taller than 10 feet and wider than 15 feet can fragment grasslands, reducing the probability of attracting area-sensitive birds.
- Cut trees low enough so that the stumps will not be a mowing hazard. If trees are dense or >6 inches dbh, mowing immediately following restoration may not be realistic. In this case, alternatives in order of preference are: 1) transition the area to grassland by allowing a period of 2-10 years of regeneration. Stumps will partially decay during this time period which will then allow the use of a mulching mower; 2)

grind stumps in place to permit immediate mowing; 3) although typically not cost-effective, whole stumps including roots may be removed and the disturbed area seeded.

- Woody material cut during reclamation should be removed. If a brontosaurus, hydro-axe, feller buncher or mechanical is used to cut the woody material, the site may need to be raked or treated in some way so that the wood chips do not hinder herbaceous growth. Disk the area after treatment, as needed.

OLD FIELD/SHRUBLAND

Descriptions

Old field habitat is variable but typically has a mix of forbs, grasses, shrubs, along with some tree seedlings. It is usually a successional stage that occurs during the transition from field to forest.

Shrubland communities include, but are not limited to coastal scrub oak barrens, blueberry lichen barrens, beaver flowages, alder swales, and dwarf shrub communities at sub-alpine and alpine elevations. Some wet or sandy sites and ledge areas can support a relatively stable shrub cover.

Importance

Shrubland associated birds (such as chestnut-sided warbler, ruffed grouse, brown thrasher, eastern towhee, field sparrow, white-throated sparrow and American woodcock) are experiencing significant declines and have been identified as a suite of species that should receive a high degree of conservation attention in the northeastern United States. Shrub and thicket associated mammals, such as the Maine endangered New England cottontail, are also in decline.

Locations to Target for Management

1. Near similar habitat – Priority should be given to sites located proximal or within ¼ mile of other shrubland habitat. Because many of the shrubland dependent species will utilize other early successional woody habitats such as regenerating clear cuts and powerline right of ways, sites located proximal or within ¼ mile of these habitat types can facilitate population expansion. Sites supporting or proximal to known occupied habitat of priority species should receive extra consideration.

Oldfield/Shrubland Management Strategies

1. Patch size – Priority should be given to patches at least 5 acres in size; however smaller patches may also provide some habitat value.

- For the **New England cottontail** patch sizes of 12 acres or more should receive priority.

2. Management units and habitat treatments

– Preserve existing habitat that is near the end of its suitable lifespan until adjacent habitat is made suitable for occupancy by target species. Only then renovate the original habitat patch.

3. Timing of management – The primary nesting season for most species in Maine is from April 15 to August 1. Whenever possible, conduct restoration and management activities outside the primary nesting season.

4. Management frequency – To prevent succession to forest, shrubland habitat will typically require regular disturbance. To determine the disturbance interval, consider the habitat preferences of the targeted species (Table 4).

5. Forest edges – Early successional woody habitat can be developed along field/forest edges to create an important transition zone between different habitat types. Abrupt, or “hard” edges, often have negative effects on birds due to increased rates of nest predation and nest parasitism. These negative “edge effects” are greatest within 150 feet of a forest edge. Therefore, the shrubby transition zones should be as wide as possible (preferably > 150 feet), and never less than 50 feet.

Management Activities

Shrubland may be created or maintained by one or a combination of the following methods:

1. Mechanical: including brush hogging, mulching mowers, hand cutting, chainsaw, or other approved techniques.

- If the site is a mix of tall growing tree species and shrubs, avoid a total clearing operation in which all vegetation is cut down. Instead, clear tall growing tree species, leaving behind desirable shrub species that can act as seed sources for regeneration (Table 5). This method preserves the habitat as opposed to cutting all the woody vegetation. Repeat the process on a 3-10 year interval, or as needed to manage the site for the targeted species.

- If the site is known or likely to be occupied by a protected species (e.g., New England cottontail), avoid removing suitable habitat. If habitat needs to be reclaimed from invasive plants or rejuvenated because it is at the end of its useful lifespan suitable habitat, consider one of the following approaches.

- a) Create early successional habitat adjacent to the occupied habitat that is large

or larger than the occupied area to receive future treatment. Treatment of occupied habitat cannot occur until the adjacent area becomes suitable habitat for the species.

- b) If occupied habitat is large enough to support the species post treatment, treat in a rotation where no more 20% of available habitat is treated at any one time. The next block cannot receive treatment until the most recent treatment is suitable for species occupancy.

Always consult a species expert prior to manipulating habitat occupied by a Maine or Federally protected species to get approval of the treatment plan and to determine what permits shall be needed.

- Shrubby borders can be created along field-forest or woodland edges by developing cut-back borders (a.k.a. feathered edges). Refer to #6, page 7.

- Clusters of valuable native shrubs and small trees shall be marked for retention prior to any mechanical activities that could cause their removal.

- Woody material cut during reclamation shall be either: (a) chipped and spread no deeper than 4 inches across the site, (b) left where felled as long as regeneration is not inhibited, or (c) used to make brush piles or windrowed.

- Rejuvenation of shrub habitat (e.g., alder, willow) by cutting shall occur when shrubs have entered a period of winter senescence.

- If invasive plant species are present, they must be treated prior to removal of overstory, because the increased sunlight to the area could dramatically increase their growth.

2. Planting – Planting may be appropriate to enhance or expand existing shrubland habitat. Costs can be prohibitive, so it generally should not be used create shrubland where none currently exists.

For planting of tree and shrubs refer to NRCS conservation practice standard *Tree and Shrub Planting*, code 612 for specifications.

3. Direct Seeding – Table 6 provides a list of available shrub seed and recommended seeding rates. The following criteria must be met or done to us this technique:

- Direct seeding shall only be done where the threat of invasion by nuisance non-native plants is low, or the likelihood of control is high.

- Soil must be exposed prior to sowing seed to ensure good seed-to-soil contact. Depending

on site conditions, sown seed will be raked in, or pressed-in with a cultipacker or other suitable equipment.

- Most shrub seeds need cold stratification prior to germination, so seeding will occur after the growing season, but prior to snowfall.
- Sown seed shall be covered. Mulch can be leaves, straw, or other suitable and approved material.

4. Chemical - Herbicides may be used to control tall growing tree species and invasive plant species. When using chemicals to control tall growing tree species, focus on trees greater than 3-4 inches dbh or apply treatment when the tree coverage exceeds 5-10 percent.

Application techniques can include cut-stem treatments, basal bark application or stem-injection.

- If non-native invasive plant species are present in an area, they must be controlled. In general, if the site is easily traversed, it's better to treat the invasive species before a management cut occurs. If the vegetation is too dense to walk through, it is probably better to do the management cut and treat the invasive species re-sprouts at a later time.

Table 4: Habitat Preferences of Early-Successional Forest or Shrub/Thicket Dependent Wildlife	
Species	Habitat Preferences
American Woodcock	Require mix of habitat, including forest openings or clearings for singing; regenerating and second growth hardwoods for nesting and dense, moist shrubby areas for feeding.
Blue-winged Warbler	Dense vegetation in the herb and shrub layers and little vegetation above 9 feet
Broad-winged Hawk	Relatively young forest with openings such as regenerating clear cuts
Brown Thrasher	Thickets, open woodlands with brushy undergrowth, shrubby shelterbelts
Chestnut-sided Warbler	Slight to moderate herb density and low shrub density of short height
Common Yellowthroat	Slight to moderate herb density and dense shrub density
Eastern Towhee	Dense shrub, small tree cover near ground and well developed litter layer; Breeds in shrub habitats, often in dry environments and open ground
Field Sparrow	Relatively early stage of old field with scattered shrubs/trees – will not readily use a site shrubs become dense
New England Cottontail	Heavy shrub thickets or regenerating hardwood forest with high stem densities interspersed with other land uses.
Mourning Warbler	Thickets and semi-open areas with dense shrubs including regenerating clear cuts
Northern Bobwhite	Mix of open and brushy areas such as cropland, pasture and wide brushy hedgerows
Prairie Warbler	Brushy second growth, dry scrub areas
Ruffed Grouse	Sapling to pole stage hardwoods interspersed with mature forest
Whip-poor-will	Nests in dry woodlands with an open understory but forages in young brushy forests such as regenerating clear cuts
White-throated Sparrow	Coniferous and mixed forests with clearings of thick shrubby growth and other edge habitat
Willow Flycatcher	Breeds in moist shrubby areas, often with standing or running water nearby

Table 5: Example of plants to selectively favor when creating shrubland habitat

Common Name	Latin Name
Alder	<i>Alnus sp.</i>
Apple, Pear	<i>Pyrus sp.</i>
Arrow-wood, Nannyberry, etc	<i>Viburnum sp.</i>
Blackberry, raspberry, dewberry, etc.	<i>Rubus sp.</i>
Blueberry	<i>Vaccinium sp.</i>
Chokecherry	<i>Prunus sp.</i>
Dogwood	<i>Cornus sp.</i>
Elderberry	<i>Sambucus sp.</i>
Greenbrier	<i>Smilax sp.</i>
Hazelnut	<i>Corylus sp.</i>
Meadowsweet	<i>Spirea sp.</i>
Serviceberry	<i>Amelanchier sp.</i>
Sumac	<i>Sumac sp.</i>
Sweet pepper bush	<i>Clethra sp.</i>
Winterberry	<i>Ilex sp.</i>

Table 6. Shrub Mix for Direct Seeding

Common Name	Latin Name	Seeds/lb	Lbs/Acre
Elderberry	<i>Sambucus canadensis</i>	291,500	0.5
Gray Dogwood	<i>Cornus racemosa</i>	13,000	1.0
Silky Dogwood	<i>Cornus amomum</i>	12,220	1.0
Red-osier Dogwood	<i>Cornus serotina</i>	18,400	1.0
Common Blackberry	<i>Rubus spp.</i>	262,000	0.1
Arrowwood	<i>Viburnum dentatum</i>	57,000	1.0
Black Chokeberry	<i>Aronia melanocarpa</i>	256,000	1.0
Steeplebush	<i>Spirea tomentosa</i>	1,100,000	0.1
Nannyberry	<i>Viburnum lentago</i>	7,000	1.0

EARLY SUCCESSIONAL FOREST

Description

Early successional forest is dominated by regenerating seedling (< 4.5 feet tall) to sapling sized (> 4.5 feet tall and < 4 inch dbh) trees. They often occur near a field edge or in areas where disturbances such as wind storms, fire or timber harvests have removed trees.

Importance

Many of the declining shrubland dependent species described under *Old Field/Shrubland*

can also utilize early successional forest in addition to the shrubland habitats. *Habitat recommendations and specifications for American Woodcock start on page 13.*

Locations to Target for Management

1. Near similar habitat – Priority should be given to sites located within ½ mile of other early successional woody habitats, such as powerline right of ways, shrub wetlands, and regenerating clear cuts.

2. Poorly stocked stands - Focus early successional forest operations on sites:

- dominated by “pioneer” tree species such as aspen, paper/gray birch, ash and cherry;
- poorly stocked forest stands that are the result of having been high-graded (i.e., partial cutting of only the best or highest grade trees);
- sites that have low fertility or gravelly soils; and,
- sites with less than 6 percent slope.

3. Timber harvest sites – Even-aged silvicultural methods used to regenerate shade intolerant tree species (i.e., clearcut) provide optimum conditions for early successional forest regeneration. Although these sites may ultimately be managed for timber, the regenerating forest provides good early successional woody habitat for 10 to 20 years

Management Strategies

1. Size of cut – For many early successional forest birds, forest cuts should be a minimum of 5 acres in size. Small selection cuts do not provide the equivalent habitat for breeding birds that larger clear cuts do. If a cut less than 5 acres in size will be done, it should be located near existing early successional woody habitat or additional cuts must be done so that the total early successional woody habitat is at least 5 acres in size.

When managing to enhance habitat for conservation of at-risk and protected species, consider the extent and proximity of existing suitable habitat and invasive species when sizing and locating cuts. Ensure that enough suitable habitats remain to meet the needs of the species. *Note: The Maine Forest Practices Act limits the size and distribution of clearcuts. Consult with the Maine Forest Service, a Maine licensed forester before creating a clearcut greater than 5 acres.*

2. Timing of management – The primary nesting season for most species in Maine is from April 15 to August 1. Whenever possible,

conduct restoration and management activities outside the primary nesting season.

3. Re-vegetation - Early successional cuts shall be left to re-vegetate naturally; however, if non-native invasive species invade, they must be controlled.

4. Preserve sensitive areas - Early successional cuts will be conducted so as to protect sensitive areas such as vernal pools, riparian zones, other forest associated wetlands, cultural resources and structures.

5. Management frequency – To ensure that some portion of the forest is in early successional woody habitat, staggered cuts conducted on a rotational basis (e.g., every 5 - 15 years) should be considered. To determine the cutting frequency, consider the needs of the targeted species (Table 6).

Management Activities

Early successional woody habitat may be developed or maintained by one or a combination of the following methods:

1. Manual Harvesting – includes chainsaw and brushsaw

2. Mechanical - including brontosaurus, tree shear, feller-buncher, mechanical harvester or other approved techniques.

- Wildlife reserve trees will be marked or described for retention prior to harvest or management activities.
- In a forest, 75 to 90% of the overstory canopy should be cut to ensure that shading does not hinder regeneration of desired species. Do not high-grade the stand by removing only trees with higher stumpage value.
- Woody material cut during reclamation (slash) shall be used to create adequate amounts of coarse woody material when lacking. Lacking means less than five 10" dbh, 20 ft long logs per acre with some bark and limbs attached. The remainder shall be either: (a) chipped and spread no deeper than 3.5 inches across the site, (b) removed from the site, or (c) used for brush pile construction (see *Artificial Denning and Nesting Structures* below). Tops can be retained on site if placed in brush piles.

3. Chemical - Herbicides may be used to manipulate plant succession, control exotic invasive plant species and improve habitat diversity. If non-native invasive species are present in an area planned for an early successional cut, they must be controlled because the increased sunlight and soil

disturbance could dramatically increase the spread of the invasive species.

In general, if the site is easily traversed, it's better to treat the invasive species before a management cut occurs. If the vegetation is too dense to walk through, it is probably better to do the management cut and treat the invasive species re-sprouts.

4. Wildlife Tree and Structure Retention or Creation

(A) Tree Inclusions

To the extent practicable, retain deciduous inclusions within coniferous forests and coniferous inclusions within deciduous forest. These areas increase biodiversity, conifers provide thermal and persistent cover, and hardwoods provide a source for cavity and snag trees.

(B) Snag, Den and Nest Trees

Snags include standing dead, or partially dead trees which are at least 6-inches dbh, 20 feet tall and ½ covered by bark.

Cavity Trees are live or dead trees of any diameter containing a natural cavity or exfoliating bark used by wildlife for nesting, brood rearing, hibernating, roosting, daily or seasonal shelter and escape.

Nest Trees contain nests built by squirrels, crows and hawks that resemble a platform of sticks and leaves when viewed from the ground. These may be used by owls or re-used by hawks.

Natural stands of both deciduous and coniferous forest have relatively large amounts of dead, standing trees. Incorporate forest management and harvest strategies to ensure a supply of snag, cavity and nest trees of various size classes and diameter. Riparian forest buffers are good locations to manage for snag, cavity and nest trees.

The following management specifications are suggested under this standard.

- Retain or manage for a minimum of 4 snag or den trees per acre. Preferably, one in four should be > 24 in. dbh, with the other 3 > 14 in. dbh. At a minimum, two shall be > 10 in. dbh and 2 > 6 in. dbh,
- Manage uneven-age stands so at a minimum 3 – 5% of the stand consists of snags and den trees,
- In even-aged stands, leave at least a ¼ acre patch uncut for every 10 acres harvested with patches selected based on the presence of existing snags or cavity trees.

- Snags, cavity and nest trees may be distributed among a forested landscape or clumped.

(C) Downed Woody Material

Woody material consists of sound and rotting logs and stumps and other woody material greater than 3 inches in diameter on the forest floor. Maintaining coarse woody material is a critical element of managing for biodiversity and nutrient cycling.

The quantity and size of woody material needed in the forest is not well-defined. Current harvest techniques tend to create large amounts of logging slash. What tends to be lacking is a supply of large downed woody material.

At a minimum retain at least 3 logs per acre \geq 5 in. dbh, and > 20 feet long with some bark and limbs attached. Preferably, retain at least 5 logs > 10 inches dbh and > 20 feet long with some bark attached, over retention of smaller logs to meet large woody material retention goals.

Incorporate forest management and harvest strategies to ensure a supply of downed woody material, with special emphasis place on large material. For example, preserve existing downed woody material by having logging equipment avoid disturbing pre-existing large downed logs, stumps and uprooted stumps. If snags are cut for safety concerns prior to timber operations, leave the felled snag on-site.

When creating coarse woody material from cut material, use the following guidelines.

- Larger pieces of woody material are more valuable than smaller pieces – strive for logs that are a minimum of 6 inches diameter, at least 6 feet long and with bark on;
- “Bark on” is preferred to “bark off”;
- Dispersed woody material is preferred over large accumulations (although some piles are good and can be used by wildlife);
- Logs oriented along contours are more likely to be used.

Maine animals that use snag, cavity, or downed woody material are listed in Appendix C of Elliott (1999), and snag requirements of cavity excavators are provided in Appendix D.

(D) Apple Trees

Their renovation and release shall follow specifications developed by the University of Maine Cooperative Extension, Bulletin #2409.

(E) Mast Trees

Species producing nuts, berries and/or fruit shall be retained in large enough numbers to ensure a reliable annual food supply, and a supply of food through the growing season.

Table 7: Number of years after clear cutting an eastern deciduous forest that breeding, early successional birds first appear, become common, and then decline (from DeGraaf and Yamasaki, 2004)			
Bird Species	First Appear	Become Common	Decline
Ruffed Grouse	10	15	20
Northern flicker	1	1	7-10
Olive-sided flycatcher	1	1	3-4
Willow flycatcher	1	2	5-7
Tree swallow	1	1	7-10
Winter wren	1	4	7-10
Eastern bluebird	1	1	2
Veery	3	10	20
Swainson's thrush	2	4	15
Cedar waxwing	2	4	7-10
Chestnut-sided warbler	2	4	10
Black and white warbler	3	10	-*
Mourning warbler	2	5	10
Common yellowthroat	2	6	10
Canada warbler	5	15	-*
White-throated sparrow	1	2	-*
Rose-breasted grosbeak	3	15	-*

-* Present until next cutting cycle

Incorporate forest management and harvest strategies to ensure a continual supply of productive mast trees. This usually involves management for superior stock and thinning for canopy release of dominants, mast-tree regeneration, and development of a mast-bearing shrubs layer.

Important mast producing species in Maine are listed by Elliott (1999), in Appendix E.

(F) *Supplemental Cover*

- **Artificial Denning and Nesting Structures** - Follow construction, placement, density and maintenance recommendations provided in NRCS' Fish and Wildlife Habitat Management Leaflet, No. 20, [Artificial Nesting Structures](#), and by biology technical note [ME-02](#).

Brush Piles - Brush piles can provide enhanced protection from predators and weather where such cover is lacking.

To construct brush piles:

1. lay at least four 12 to 18 ft logs , 6 - 10 inches in diameter parallel to each other 8 – 12 inches apart,
2. lay an equal number of similarly sized logs on and perpendicular to the 1st base logs,
3. build up the pile by crossing several layers of 2" – 4 " limbs with loose branches and twigs on top to a minimum height of 4 feet. Interlaced conifer branches with needles can top-off the structure,
4. if desired, 4 feet section of 6 inch drainage tile or cinder blocks can be placed under the base to allow easier access,
5. piles should not exceed 3 piles per acre and should be arranged to connect uncut forest and riparian areas,
6. maintain brush piles by periodically adding new limbs and branches.

Note: Piles at least 6 feet high, circular brush piles 16 or more feet in diameter or rectangular piles 16 feet wide and at least 25 feet in length provide better cover.

(G) *Creation of Snag and Cavity Trees*

Artificially created snags usually last longer than natural snags.

If possible, favor un-merchantable (non-commercial) or poor quality trees (e.g., those with broken tops or branches).

Favor species known to be preferred by cavity nesting species when selecting potential snags (i.e., black oak, maple, beech, hemlock, basswood, box elder, and ash).

Snag Trees

If possible, favor un-merchantable (non-commercial) or poor quality trees. Better results will occur if non-clonal species are girdled.

(A) *Girdling*

1. During the growing season (e.g., July – August), use a sharp axe or chain saw to make two cuts circling the tree at less than breast height and about 4 inches apart. The cut depth should go through the cambium, but be less than 1 inch deep. ,

Remove the bark between the two cuts.

One can make shallow surface cuts into the sapwood.

(B) *Cut and Frill or Hatchet Injection*

- Apply appropriate chemical using a hypo-hatchet, or
- Make frills (outward hanging bark and sapwood) by overlapping downward ax-cuts around the base of the tree, and apply an appropriate chemical into the frill.

Cavity Trees

- Cavity and den starts can be started by cutting a small limb (4- to 6- inch diameter) 6 inches from the trunk, or
- Chop out a 6 x 6-inch section of bark at the base of a suitable tree.

Disease-causing pathogens will enter the wound and start the decay process to create cavities.

HABITAT MANAGEMENT for AMERICAN WOODCOCK

Woodcock best management practices for the northeast is described in Sepik et al. (1981), and NRCS' Wildlife Insight #89 (2010). In summary, the following minimum guidelines should be observed.

(A) *Courtship Clearings (singing grounds)*

- In forested stands with overstory trees > 25 feet tall, clearings shall be 0.5 acres in size.
- In forested stands with overstory trees < 25 feet tall, clearings can be 0.25 to 0.5 acres.
- Openings should have a south aspect, should be rectangular and located where four age classes of nesting and brood rearing cover co-join, or within 1 mile of diurnal foraging and nesting habitat.

- Stumps are not to be removed.
- Slash removal is recommended.
- Maintain by brush-hogging on a 1 to 3 year cycle.

(B) Nesting, Brood Rearing and foraging Cover (dense regenerating sapling size hardwoods)

- Below is an example stand cutting cycle, courtesy of the Wildlife Habitat Management Institute, to achieve both woodcock and forest management objectives, where the same numbered stand is cut in the same year. A five acre or larger clear-cutting sequence is recommended. Clearcutting should be on a cycle of 10-15 years for a 40 – 60 year rotation, respectively. The same numbered blocks are cut on a single clear-cutting cycle.

1	3	4	2
4	2	1	3

- For alders < 20 years old, strip cut on a 20 year cycle with adjacent strips cut every 5 years;

Example 20-year strip cut:

- Assuming a minimum 350 foot strip of alders is present, cut a 70 foot wide strip and leave 280 feet uncut.
- Cut an adjacent 70 foot strip every 5 years to achieve a 20-year cycle.

- For alders > 20 years-old, strip cut on a 10-year cycle. Once the 10-year cycle is completed, switch to a 20-year cycle with adjacent strips cut every 5 years;

Example 10-year strip cut:

- Assuming a minimum 350 foot strip of alders is present, cut a 70 foot wide strip and leave 280 feet uncut.
- Cut an adjacent 70 foot strip every 2 years.

- Feeding covers should be located within 0.5 miles of brood/nesting cover; slash removal is desirable.

(D) Night Roost Fields (regenerating forest approximately 2 to 5 years after a clearcut)

- Should be at least 5 acres in size, and 60 – 70 percent covered with regenerating shrubs and trees.
- Minimum density of 1 per 100 acres of habitat.
- Roost fields should be maintained by cutting every 2 to 5 years.
- Consider bordering nest fields with 100 feet of managed brood/nesting cover, or no further than 2 miles from suitable of other habitat components described above.

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