

NATURAL RESOURCES CONSERVATION SERVICE
SPECIFICATION GUIDELINES

**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-MA Conservation Practice Standard No 647, Criteria, Considerations, and Operation and Maintenance. They shall be recorded on specification sheets or job sheets.

HABITAT TYPES

GRASSLAND

Description

Grassland can be either human created and maintained (such as hayfields and pastures), or a naturally occurring community occurring on droughty, low nutrient soils, typically near the ocean (such as sandplain grassland). 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, butterflies and other species of insects. Due to the reduction of grassland habitat in the northeast, grassland nesting bird species (such as Eastern Meadowlark, Grasshopper Sparrow, Vesper Sparrow and Upland Sandpiper) are experiencing significant population declines.

Locations to Target

1. **Existing large grassland areas** - Results from surveys conducted by Massachusetts Audubon Society indicated that areas with important concentrations of grassland habitat and abundance of grassland birds include the Connecticut River valley and northeastern

Massachusetts. Other large grassland areas of importance to grassland birds include locations such as airports and military installations. Efforts to restore or enhance grassland habitat within these areas is encouraged.

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.

Restoration/Management Strategies

1. **Grassland size** – Grassland blocks at least 100 acres in size provide the greatest potential to support grassland dependent bird species. Where 100 acre tracts are unavailable, prioritization should be given to sites at least 20 acres in size. 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

creating shrub habitat at least 30 feet in width (see *cut back borders* section of document). “Hard” grassland/forest edges increase the rates of predation and nest parasitism on grassland birds.

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 sod forming 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 (see Table 1).

Table 1: Habitat Preferences of Grassland Dependent Birds

Species	Preferred Grassland Growth Form			Avoids woody veg 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
Barn Owl			x			Dense grasslands with substantial levels of plant litter, cavity nester – will utilize nest boxes/outbuildings
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
Henslow's sparrow		x	x	x	>10	Prefer damp areas in tall grass fields, likes thatch
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 while species marked “*avoids woody vegetation*”, most can tolerate some woody vegetation within areas dominated by grassland.

Restoration/Management Activities –

Grassland habitat may be developed or 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 is detrimental to wildlife feeding and movement 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 annuals (*annuals are prolific seed producers that provide seed-eating birds and mammals with abundant food resources*) and increasing insect populations.

Do not perform light disking on sites where invasive plant species are present unless invasive species are controlled prior to disking. In addition, light disking in areas which have never been plowed is strongly discouraged.

(A) Frequency

- Disking should be conducted on a 2 to 3 year rotation, meaning ½ to 1/3 of the field is disked each year in a strip pattern. Strip disking creates a mosaic of plant communities from 1 to 3 years old, depending on the rotation.

(B) Disking Intensity

- The disking should be 2 to 4 inches deep and leave 50 percent plant residue remaining on the ground surface. Disking intensity can be altered by adjusting the depth of the disk and/or the number of passes.
- To reduce soil erosion, strips should be planned across the slope or on the contour. Slopes greater than 5 percent should not be disked.

(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.
- 3. Liming** - Grasses grow best at a soil pH of 5.5, legumes prefer a soil pH of 6.0. To maintain the health and vigor of the grassland, periodic applications of lime may be applied according to soil test recommendations. If a soil test is not feasible, lime can be applied at the rates specified below.

Soil Texture	Tons Lime/Acre
Clay, clay loam, and highly organic soil	3
Sandy loam, loam and silt loam	2
Loamy sand, sand	1

When surface applying lime, apply no more than 1 ton per acre per application and no more than 2 tons per acre per year. In situations where soil pH is extremely low and a large amount of lime is recommended, apply the lime over 2 to 3 years with annual applications. If seeding is proposed and the soil is extremely acid, apply part of the lime at least 6 months before seeding.

- 4. Mowing** - Mow cool season grasses no shorter than 5 inches and warm season grasses no shorter than 7 inches. Mowing should not be done during the primary nesting season of April 15 to August 1. Exceptions may be allowed when necessary to maintain the health of the plant community. When possible, restrict mowing to early November through mid-March. This allows the grasses and forbs to seed out, reinforcing the seeding and providing a food and nectar source to a variety of wildlife species and pollinators. Late mowing can also reduce the risk of injury or mortality to turtles that utilize terrestrial environments.

Annual mowing is discouraged because it decreases structural plant diversity and reduces residual cover available for the following nesting season. Where woody plant encroachment is not a problem, mow every three years or, on larger grasslands (i.e., >50 acres), practice rotational mowing so that no more than 1/3 to 1/2 of the field is cut in any given year. Warm season grasses do not need to be mown as frequently as cool season grass fields to control shrub invasion; therefore a three to four year schedule is probably adequate. To prevent thatch buildup, residues should be thoroughly shredded or haying can be done.

- 5. Prescribed burning** - Burning can be used to manage the plant community and reduce vegetative litter which can hinder movement of small animals and birds. Prescribed burning is especially effective at maintaining warm season grass stands.

Conduct prescribed burns on grasslands managed for breeding bird habitat in early spring (March to early April) or late fall. A spring burn is preferred as it retains the grasses over winter, thus providing winter cover. When possible, burn large grasslands in a rotation of 20 to 30 percent annually in order to provide more structural diversity and potentially attract more diverse bird species.

Prescribed burning shall be conducted by certified individuals following an approved burn plan. Practice standard Prescribed Burning (338) must be followed.

- 6. Prescribed grazing** - Prescribed grazing may be utilized as a management tool to manipulate plant succession. Graze the site at a light rate, allowing at least 50% or more of the vegetation cover to be maintained at an average height of 10 inches all summer, with the remaining vegetative cover grazed no shorter than 4 inches. This could provide habitat for grassland bird species preferring intermediate vegetation height and density requirements.

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.

- 7. Seeding** - Seeding can be used to establish new stands or enhance existing stands. Select a mix of tall and short growing grasses to provide enough density for good nesting habitat. Plantings shall include at least three species and should consist predominantly of bunch grasses. Seeding should be done in accordance with practice standard Conservation Cover (327). Tall fescue and reed canary grass shall not be planted.

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. Although they can take 3 or more years to establish, warm season grasses are better adapted to drought conditions and low fertility soils than cool season grasses and generally retain the stand diversity longer than cool season grasses.

Soil type and target wildlife species should determine what kinds of grasses to plant. Table 2 provides some specific seeding mixes while Table 3 provides information on various grasses and legumes that can be used for grassland plantings.

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

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

8. Cut-back borders – Cut-back borders can be 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 2 inches 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 two years. Cut-back borders should be a minimum of 30 feet in width.

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. If invasive plant species are present, they must be controlled because the increased sunlight to the area could dramatically increase their growth.

9. Shrub/Tree Removal - Hedgerows dominated by woody species taller than 10 feet and wider than 15 feet can fragment grasslands, reducing the probability of attracting area-sensitive species. Hedgerow removal can create a larger grassland, however, careful consideration should be given to other wildlife species which might be negatively impacted.

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 from site. If a brontosaurus, hydro-axe or similar equipment is used to cut the woody material, the site may need to be burned, raked or treated in some way so that the wood chips do not hinder herbaceous growth. Disk the area after treatment, as needed.

Table 3: Grass and Forb Species for Grassland Habitat

Species	Scientific Name	Native	Warm/ Cool	Ht. Avg.	Characteristics
Alfalfa	<i>Medicago sativa</i>	No	Cool	1-2'	Well drained, fertile soils
Bluestem, Big	<i>Andropogon gerardii</i>	Yes	Warm	5-7'	Dry, medium to low fertility soils; sun
Bluestem, Little	<i>Schizachyrium scoparium</i>	Yes	Warm	2-3'	Dry, medium to low fertility soils; sun
Broom-Sedge	<i>Andropogon virginicus</i>	Yes	Warm	2-5'	Dry, sterile soils; sun
Bushclover, Hairy	<i>Lespedeza hirta</i>	Yes	Warm	2-4'	Open, sterile, sandy sites
Bushclover, Roundhead	<i>Lespedeza capitata</i>	Yes	Warm	2-4'	Dry, sandy soils
Clover, Red	<i>Trifolium pratense</i>	No	Cool	3-4'	Well drained soils
Clover, White	<i>Trifolium repens</i>	No	Cool	10"	Moist soils, sun-part sun
Deertongue Grass	<i>Dicanthelium clandestinum</i>	Yes	Warm	3'	Low fertility sites, dry to moist, sun to partial shade
Indian grass	<i>Sorghastrum nutans</i>	Yes	Warm	3-5'	Dry to moist soils; sun
Orchardgrass	<i>Dactylis glomerata</i>	No	Cool	2-3'	Dry to moist soils; sun
Red Top	<i>Agrostis alba</i>	No	Cool	3'	Dry to wet soils; sun
Rye, Canada Wild	<i>Elymus canadensis</i>	Yes	Cool	3-6'	Dry to moist soils; sun to partial shade
Rye, Riverbank	<i>Elymus riparius</i>	Yes	Cool	3-5'	Moist to wet sites, partial shade
Rye, Virginia Wild	<i>Elymus virginicus</i>	Yes	Cool	4-5'	Suited to wet sites, can tolerate shade
Partridge Pea	<i>Chamaecrista fasciculata</i>	Yes	Warm	3'	Dry to moist soils, open sites, reseeding annual
Switchgrass	<i>Panicum virgatum</i>	Yes	Warm	3-5'	Dry to moist soils; sun or partial sun
Timothy	<i>Phleum pratense</i>	No	Cool	2-3'	Dry to wet soils; sun
Trefoil, Showy-Tick	<i>Desmodium canadense</i>	Yes	Cool	2-4'	Dry, open sites

OLD FIELD/SHRUBLAND

Description

Old field/shrubland habitat is variable but typically has a mix of forbs and shrubs along with some tree seedlings. Grasses, if present, are not dominant. It is usually a successional stage that occurs during the transition from field to forest. Some sites such as wetlands, sandy sites and ledge areas can support a relatively stable shrub cover; however, most shrub communities in the northeast are successional.

Importance

Shrubland associated birds (such as 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 associated mammals (e.g., New England cottontail, bobcat) have also declined; New England cottontail to such low numbers that it is currently a candidate for federal listing on the endangered species list.

Locations to Target

- 1. Near similar habitat** – Priority should be given to sites located adjacent or in close proximity to 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 within ½ mile of these habitat types should also be given priority.
- 2. 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 (by animals such as cats, skunks and raccoons) and nest parasitism (by cowbirds). These negative “edge effects” are greatest within 150 feet of the forest edge. To provide adequate habitat for shrubland associated birds, early successional woody habitat along field/forest edges should be a minimum of 150 feet wide.

Restoration/Management Strategies

1. Shrubland size – Priority should be given to shrubland patches at least 5 acres in

size; however smaller patches may also provide some habitat value.

2. Limit management activities during the breeding season – The primary reproductive season for most wildlife species in Massachusetts is from April 15 to August 1. Whenever possible, conduct restoration and management activities outside this reproductive season.

3. Management frequency – To prevent succession to forest, shrubland habitat will typically require regular disturbance at 5 to 15 year intervals. To determine the disturbance interval, consider the habitat preferences of the targeted species (see Table 4).

Table 4: Habitat Preferences of Shrubland Dependent Wildlife	
Species	Habitat Preferences
American Woodcock	Foraging: dense closed canopy shrubland (i.e., alder thickets). Nesting: ~25% shrub cover, can be low cover (e.g., lowbush blueberry).
Blue-winged Warbler	50-80% shrub cover. Herbaceous openings good as well as a few emergent saplings (they nest at base of saplings).
Brown Thrasher	40-80% shrub cover w/ interstitial herbaceous openings.
Chestnut-sided warbler	30-60% shrub cover with dense interstitial herbaceous species (e.g., goldenrod and blackberry patches ideal).
Common yellowthroat	30-80% shrub cover with dense interstitial herbaceous species (e.g., goldenrod).
Eastern Towhee	60-100% shrub cover. Open woodland (<50% canopy cover) with dense understory (i.e., post harvest conditions)
Field Sparrow	25-60% shrub cover w/ interstitial grassy areas or bare ground. Prefers dry sites.
Golden-winged warbler	Typically use patches of herbs, shrubs (50% of territory) and scattered trees, plus a forested edge
Mourning Warbler	75-100% shrub cover near forest edge (1 ac. patch cuts)
New England cottontail	Very dense shrub cover or regenerating young forest.
Prairie Warbler	50-80% shrub cover w/ interstitial herbaceous growth.
Ruffed Grouse	Sapling to pole stage hardwoods interspersed with mature forest
Whip-poor-whil	Nests in dry woodlands with an open understory but forages in young brushy forests such as regenerating clear cuts
White-throated Sparrow	50-100% shrub cover. Cut over areas and shrub swamps.
Willow Flycatcher	50-100% shrub cover in wet meadows and shrub swamps. Nests n willows.
Yellow-breasted Chat	Later stages of old field with moderate to dense shrub cover

Restoration/Management Activities - Shrubland may be developed 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, selectively 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.

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 3 inches across the site, (b) removed from site, or (c) used to make brush piles. No slash shall be placed within 50 feet of any drainage course or wetland.

2. Planting - Planting may be appropriate to enhance existing shrubland habitat; however, because it is typically not cost-effective, it should generally not be used to create shrubland where none currently exists. Select plant species that are native and favor berry producing shrubs. Practice standard Tree/Shrub Establishment (612) must be followed.

3. Prescribed Burning - Burning may be used to manage the plant community but should be restricted to sites that are dominated by fire tolerant vegetation such as scrub oak. Prescribed burning shall be conducted by certified individuals following an approved burn plan. Practice standard Prescribed Burning (338) must be followed.

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 treatment, 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.

Careful planning and application are required when using chemicals to improve existing habitat. 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. As required by federal law, chemicals are to be applied only for uses listed on the container label and all label directions and precautions must be followed.

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

Common Name	Latin Name
Alder	<i>Alnus sp.</i>
Apple, Pear	<i>Malus, 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>Rhus sp.</i>
Sweet pepper bush	<i>Clethra sp.</i>
Winterberry	<i>Ilex sp.</i>

EARLY SUCCESSIONAL FOREST

Description

Early successional forests are dominated by regenerating seedling to sapling sized trees. They often occur near a field edge or in areas where disturbances such as wind storms, fire or timber harvests have removed trees. Presently, Massachusetts' forests are predominately even aged, 50 to 100 years old, and are lacking adequate seedling and sapling forest.

Importance

Many of the declining shrubland dependent species listed under *Old Field/Shrubland* can also utilize early successional forest.

Locations to Target

- 1. Near similar habitat** – Priority should be given to sites located adjacent or in close proximity to 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 pin cherry; on 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, leaving poor quality trees behind that eventually dominate the site); or sites that have low fertility or gravelly soils.
- 3. Timber harvest sites** – Several even-aged silvicultural methods that are used to regenerate shade intolerant tree species (e.g., *seed-tree*, and *silvicultural clearcut*) provide optimum conditions for early successional forest regeneration. Although these sites will ultimately be managed for timber, the regenerating forest provides good early successional woody habitat for a period of about 10 years.

Definitions

Seed-tree – All of the trees are removed at one time except for a few residual seed trees (e.g. 4 groups of three large diameter trees)

retained in multiple clusters scattered evenly across the stand which will provide the source of the new seedlings.

Clearcut – Removal of all the trees in a stand. Regeneration will come from a seed source located nearby or from root/stump sprouts.

Restoration/Management Strategies

- 1. Size of cut** - Early successional forest cuts should be a minimum of 5.0 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 must be located adjacent to existing early successional woody habitat or additional cuts must be done so that the total early successional woody habitat patch is at least 5 acres in size.
- 2. Limit management activities during the breeding season** – The primary reproductive season for most wildlife in Massachusetts is from April 15 through August 1. Whenever possible, conduct restoration and management activities outside the primary reproductive season.
- 3. Retain deadwood** – Coarse woody debris consists of sound and rotting logs and stumps and other woody material greater than 3 inches in diameter, on the forest floor. Coarse woody debris is important for nutrient cycling,; as habitat for insects, small animals and amphibians; and as a seed bed for various bacteria, fungi, lichens and mosses. It also reduces erosion, stores moisture and affects soil development. Maintaining coarse woody debris is a critical element of managing for biodiversity. Although the quantity of coarse woody debris needed in the forest is not well known, a minimum of 2 cords (256 cubic feet) per acre should be maintained.

To preserve existing coarse woody debris, avoid having equipment disturb pre-existing large downed logs, stumps and uprooted stumps. When creating coarse woody debris, use the following guidelines: (a) large pieces are more valuable than smaller pieces (strive for

logs that are a minimum of 6 inches diameter and at least 6 feet long, (b) “bark on” is preferred to “bark off”, and (c) dispersed coarse woody debris is preferred over large accumulations.

4. **Retain wildlife reserve trees** - Wildlife reserve trees should be retained when possible, but they should not impair the regeneration of the early successional forest due to shading. Reserve trees can be left scattered throughout the cut or left in clumps or islands, and can greatly enhance the aesthetics of an early successional cut. Wildlife reserve trees located in clumps are generally more wind-firm and the micro-habitat created by the clump of trees can provide habitat for remnant populations of amphibians. The clumps can be centered around wetland inclusions, mast trees, cavity trees and sensitive sites.

In general, when selecting wildlife reserve trees, choose larger, wind-firm specimens and leave 6 trees standing per acre. Shallow-rooted tree species are most susceptible to windthrow when exposed after cutting (most conifers are shallow rooted with the exception of white pine). To ensure future coarse woody debris inputs, consider leaving snags (both dead and live) which will become coarse woody debris in the short and long term.

Definitions

Snag - Includes standing dead, or partially dead trees which are at least 6-inches dbh and 20 feet tall (“stub” if shorter)

Den Tree - A live or dead tree 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.

Mast Tree - Species which provide nuts and/or fruit.

Nest Tree - Trees containing large nests (2-3 feet diameter) built by crows and hawks that resemble a platform of sticks when viewed from the ground. These may be used by owls or re-used by hawks.

5. **Revegetation** - Early successional cuts shall be left to re-vegetate naturally; however, if non-native invasive species invade, they must be controlled.
6. **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.
7. **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 10 years) should be considered. To determine the cutting frequency, consider the needs of the targeted species (Table 6). For example, Ruffed grouse and Woodcock prefer an older stage of succession than other early successional dependent species.

Table 6: 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
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
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

Restoration/Management Activities – Early successional woody habitat may be developed or maintained by one or a combination of the following methods:

- 1. Mechanical: including brontosaurus, chainsaw, tree shear or other approved techniques**
 - Whenever possible, management should occur outside the primary breeding season of April 15 – August 1.
 - Wildlife reserve trees will be marked for retention prior to activities that could cause their removal. In a forested environment, 75 to 90% of the overstory canopy should be cut to ensure that shading does not hinder regeneration of desired species.
 - Woody material cut during reclamation (slash) shall be used to create adequate amounts of coarse woody debris when necessary. The remainder shall be either: (a) chipped and spread no deeper than 3 inches across the site, (b) removed from site, (c) windrowed, or (d) stacked in piles and burned. If desired, woody material can be used to create brush piles. No slash shall be placed within 50 feet of any drainage course or wetland.
- 2. Prescribed Burning** - Prescribed burning shall be conducted by certified individuals following an approved burn plan. Practice standard Prescribed Burning (338) must be followed.
- 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 to the area could dramatically increase the growth 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 at a later time.

Careful planning and application are required when using chemicals to improve existing habitat. 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. As required by federal law, chemicals are to be applied only for uses listed on the container label and all label directions and precautions must be followed.

Applicable Laws and Regulations

The Massachusetts Forest Cutting Practices Act sets forth regulations on the cutting of timber in Massachusetts. Filing requirements under the Act are based on volume, cutting area and the use of the timber products. All landowners must comply with this Act. <http://www.mass.gov/dcr/stewardship/forestry/service/lawsnforms.htm>

Under the Massachusetts Wetlands Protection Act, work in and near jurisdictional resource areas including wetlands and perennial streams may require a permit from the local Conservation Commission and Department of Environmental Protection.

Under the Massachusetts Endangered Species Act, work in Priority and Estimated Habitat for Rare Species will require review by the Natural Heritage and Endangered Species Program for impacts to State Listed Rare Species.

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