

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

**UPLAND WILDLIFE HABITAT MANAGEMENT**

(Acre)  
**Code 645**

**DEFINITION**

Creating, restoring, maintaining, or enhancing areas for food, cover, and water for upland wildlife and species which use upland habitat for a portion of their life cycle.

**PURPOSE**

Several conservation practices may be applied as part of a wildlife system to accomplish one or more of the following resource management objectives:

- Manage the wildlife habitat to achieve a viable wildlife population within the species home range;
- Arrange habitat elements in proper amounts and locations to benefit desired species;
- Provide the necessary variety of cover types (e.g., breeding, fawning, loafing, resting, escape, travel lanes, and thermal) for the desired kinds of wildlife species;
- Provide drinking or bathing water for the desired kinds of wildlife species; and
- Provide a variety of foods for the desired kinds of wildlife.

**CONDITIONS WHERE PRACTICE APPLIES**

On lands that are suitable for the kinds of wildlife habitats that are needed within the range of the desired species or the natural community under consideration.

**WILDLIFE HABITAT CRITERIA**

General Criteria Applicable to All Purposes

For the desired kinds of wildlife habitat, specify the type, amount, and distribution of vegetation required. In addition, specify the management condition of the vegetation necessary for survival and reproduction of viable populations of wildlife species indicative of the habitat type. Food and cover requirements for wildlife may be provided by habitat elements that are part of other existing or proposed management systems or land uses. The habitat elements fulfilling the food and cover requirements and their management must be identified in the conservation plan.

Development and management options to achieve the above will be based on a wildlife habitat appraisal or evaluation. The appraisal or evaluation procedure will be used to determine the habitat suitability for individual fields, home range areas, habitat types, or natural communities as well as to provide an overall evaluation for the entire property or operating unit.

The evaluation will result in a quality rating or habitat suitability index (HSI). This will consider the type, amount, quality, and distribution of habitat elements required. The quality rating or HSI will be compared to the quality criteria in Section III of the Field Office Technical Guide.

If the evaluation indicates a level below the acceptable quality, alternatives will be recommended that will result in the necessary changes in habitat elements or

their management to bring the rating up to the minimal acceptable level or above.

If the evaluation is at the minimum level or above, alternatives will be recommended that will result in the necessary management to preserve, maintain, or improve the existing habitat in its present state or toward optimum conditions.

The use of native plant materials shall be encouraged.

Vegetative manipulations to restore plant and/or animal diversity shall be accomplished by prescribed burning, mechanical, biological, or chemical methods, or a combination from among these four.

Where feasible, prescribed burning shall be utilized instead of mowing.

Livestock grazing or haying shall be conducted when necessary to maintain or improve vegetation structure and composition so as to improve the desired wildlife habitat.

Management measures shall be provided to control invasive vegetative species and noxious weeds.

To protect forbs and legumes that benefit native pollinators and other wildlife and provide insect food sources for grassland nesting birds, spraying or other control of noxious weeds shall be done on a "spot" basis. Chemical spraying should be avoided during the typical nesting season (i.e., April 1 through September 15).

The specific criteria for upland wildlife habitat management conservation practices and components are given for the following land use types in this practice standard:

1. 645-C: Cropland (pp. 2-5);
2. 645-G: Grassland (pp. 5-6);

3. 645-MF: Mixed Forest (pp. 6);
4. 645-CF: Conifer Forest (pp. 7); and
5. 645-OA: Odd Areas (e.g., powerline right-of-way) (pp. 7).

### CROPLAND

#### **Wildlife Field Borders :**

- A newly designed, planned, and planted wildlife field border for upland wildlife habitat management purposes cannot have tall fescue (*Festuca arundinacea*), bermuda grass (*Cynodon dactylon*), or bahiagrass (*Paspalum notatum*) in excess of 20% total plant composition in the final established vegetation.
- If tall fescue, bermuda grass, or bahiagrass is present in an area in which an upland wildlife field border is desired, it must be eradicated for any upland wildlife habitat management plan.
- A wildlife field border may be created either by planting desired native herbaceous (refer to Native Warm Season Grasses in the Grassland section of this Standard) and shrub plants, through abandonment of the field edge and using proper management techniques for the resulting natural vegetation (e.g., a proper disturbance regime), or through proper management of adjacent lands.
- No more than 50% of a wildlife field border shall be disturbed in any one year.
- During years of allowed disturbance, mowing, disking, or other major disturbance shall be between September 15 and April 1.

- Wildlife field borders designed for upland wildlife habitat shall be a minimum of 20 feet wide.
- As a minimum, a planted wildlife field border will consist of at least two grasses and one legume.

#### **Early Successional Habitat:**

- Techniques to enhance, maintain, or create early successional habitat include, but are not limited to, prescribed fire, disking, herbicide use, and mowing.

#### **Natural Vegetation:**

- Managing the succession of volunteer plant species and/or inducing the natural establishment of native vegetation is recommended and generally more cost effective for wildlife than is establishing wildlife plantings.
- Plantings should be considered only under the following conditions:
  - ♣ when natural succession cannot be expected to develop the recommended plant community within a reasonable amount of time (normally, within three years of the planting date);
  - ♣ when plants established for other purposes will not do the job required;
  - ♣ to establish choice food and cover vegetation in a particular place (e.g., near urban areas) for a particular species or group of species, especially songbirds; or

- ♣ if necessary to establish a cover crop to reduce erosion prior to natural vegetation establishment, a temporary, annual cover crop may be planted.

#### **Plant Diversity:**

- Aggressive and non-native species that tend to form monocultures should be avoided.

#### **Fescue Eradication:**

- The typical method of eradication involves a fall (September 15 - October 15) treatment of fescue with an appropriate herbicide (consult the North Carolina Agricultural Chemicals Manual or Cooperative Extension Service for advice on herbicide), a prescribed burn following brown-up caused by the herbicide, and an inspection of the fescue in late winter, following the fall spraying/burning.
- If the late winter inspection reveals incomplete eradication, an early spring herbicide treatment may be required.
- Upon eradication of fescue, the area may either be allowed to revegetate naturally or be planted to vegetation more conducive to wildlife population enhancement (see Appendix 1).

#### **Wildlife Riparian Forest Buffers:**

- For a list of potential plants that can be used in riparian buffers, see Appendix 1.
- For more information about riparian forest buffers, see Riparian Forest Buffer, NRCS Practice Standard 391.

**Wildlife Filter Strips :**

- When filter strips are planned for upland wildlife habitat management, the use of tall fescue is not permitted.
- A minimum of 2 grasses and 1 legume/forb shall be used in any wildlife filter strip (see Appendix 1).
- Upland wildlife habitat filter strips should be maintained by either prescribed burning, light disking, or mowing.
- If mowing or disking is the preferred management alternative, then the allowed disturbance dates are between September 15 and April 1.
- If prescribed fire is the preferred management alternative, then burning shall be completed between February 15 and June 1. Filter strips should not be burned in consecutive years. Contact the North Carolina Department of Forest Resources for assistance with preparing an appropriate burning plan.
- Regardless of the management alternative chosen for the wildlife filter strip, the established vegetation shall be maintained at an effective winter plant height of no less than 12 inches.
- For more information about filter strips, see Filter Strip, NRCS Practice Standard 393.

**Wildlife Strip Disking:**

- Strips should be between 30 and 50 feet wide and as long as possible, with 60 to 100 feet left undisked in between the disked strips.
- Strip disking for wildlife should be implemented as a rest-rotation system.

- Disked areas for wildlife should be allowed to grow for one to three years, so that, within any field, a mosaic of vegetation exists (i.e., a third of the area 0-1 years old, a third of the area 1-2 years old, and a third of the area 2-3 years old).
- No area should be allowed to remain undisked for more than 3 years.
- The following points should be taken into consideration when utilizing strip disking as an upland wildlife habitat management tool:
  - \* strip disking should be planned for the least erosive parts of fields where slopes are less than 7% and not in places where gully formation or excessive soil erosion can be a problem;
  - \* strip disking operations should be performed along field contours when possible;
  - \* strips should be lightly disked to leave a minimum of 30 percent residue remaining on the soil after disking operations are complete (e.g., run disk gangs parallel to the direction of travel and at a shallow depth (i.e., 2"-4")); and
  - \* strip disking should only be conducted during periods that will not interfere with ground nesting activities and will promote the growth of desirable annual plants. Disking should take place between September 15 and April 1.

**Unharvested Crops :**

- Unharvested crops can be left in cropland fields to provide winter food and cover for upland wildlife.
- When crops are left unharvested, they should be near cover, where they provide the most wildlife benefit.
- The strips should be left in close proximity to established escape cover or along the edges of fields (e.g., field borders).
- Unharvested crops should be left fallow or idle the following cropping season to enhance nesting cover.
- Areas of unharvested crops should be alternated in rotations from year to year, by leaving a strip along one field border one year and the opposite field border the next year.

**GRASSLAND****Wildlife Field Borders, Early Successional Habitat, Natural Vegetation, Plant Diversity, Fescue Eradication, Wildlife Riparian Buffers, and Wildlife Strip Disking:**

- Previously discussed under Criteria for other land uses.

**Native Warm Season Grasses:**

- Native warm season grasses should not be grazed or hayed as low to the ground as is commonly the practice with fescue (no lower than 9”).
- Livestock should be removed by mid-August, to allow regrowth before winter dormancy.

- Important steps in establishing a healthy and sustainable stand of native warm season grasses include attention to the following points: obtaining good seed; preparing a firm seedbed; planting the seed shallow; and controlling competing weeds, especially grassy weeds (Virginia Department of Game and Inland Fisheries, 1995).
- For upland wildlife habitat management utilizing native warm season grasses, seeding rates should be significantly lower than that used for forage stand production.
- For more information about grazing native warm season grasses, see Prescribed Grazing, NRCS Practice Standard 528A.

**Wildlife Prescribed Burning:**

- For more information about prescribed burning, refer to the NRCS Prescribed Burning Practice Standard, 338.

**Wildlife Firebreaks:**

- Firebreaks should be established to enhance upland wildlife and food diversity, as well as to serve their obvious safety function.
- Fescue and bermuda grass are unacceptable components of a firebreak.
- For more information about firebreaks, see Firebreak, NRCS Practice Standard 394.

**Wildlife Prescribed Grazing:**

- For more detailed information on prescribed grazing, refer to the NRCS Prescribed Grazing Practice Standard, 528A.

**Wildlife Mowing Management:**

- Mowing management is performed to control the growth of undesirable plants.
- When considering upland wildlife habitat management, mowing should be performed between September 15 and April 1.
- Mowing should always be completed in a manner that allows the vegetation to maintain at least 9-12 inches of vertical height.

**MIXED FOREST****Wildlife Thinning:**

- The valuable, soft and hard mast-producing component of the stand should be maintained during thinning operations.
- A balance between the white and red oak groups shall be maintained.
- Maintain maximum overstory and understory diversity.
- Some large diameter trees should be left on the site to produce natural cavities in the future.

**Wildlife Forest Openings:**

- Forest openings in mixed forest stands shall be 0.5 to 2.0 acres.
- These openings should be strategically located throughout an area to provide maximum diversity.
- Openings should not be developed adjacent to major roads or other public access routes.

- Where feasible, logging roads and skid trails can be opened up or widened to allow more daylight to reach the ground.
- Heavy thinning in a 100-foot zone adjacent to fields or wildlife forest openings provides a transition zone and increases the benefits of the opening for some wildlife species.
- Where appropriate, openings should be allowed to naturally revegetate.
- Consult Appendix 1 for beneficial wildlife plants that can be used for plantings in openings. If cowbirds are common or the surrounding landscape is fragmented or dominated by agricultural uses, avoid planting annual species in openings.

**Wildlife Use Exclusion:**

- All mixed forest wildlife acreage should be excluded from livestock usage.
- For more information, refer to the NRCS Use Exclusion Practice Standard, 472.

**Conserving Natural Areas :**

- Where forest interior songbird conservation is an objective:
  - \* minimize gaps in the overstory canopy;
  - \* manage openings for native vegetation; and
  - \* allow hardwood regeneration to provide foraging/nesting opportunities.

## CONIFER FOREST

### **Plant Diversity, Wildlife Firebreaks, Wildlife Forest Openings, Wildlife Strip Disking, and Conserving Natural Areas:**

- Previously discussed under Criteria for other land uses.

### **Wildlife Thinning:**

- The primary focus of conifer stand management for upland wildlife habitat should be directed toward increasing plant diversity by managing the basal area of the stand and disturbing the understory vegetation.
- Intermediate thinning of pine stands is recommended to open the overstory and encourage desirable understory vegetation.
- Thinnings should be sufficient to reduce tree density to approximately 300 trees or less per acre (12 x 12 spacing or lower), or, alternatively, thin to allow sunlight on approximately 60% of the ground at midday.

### **Wildlife Prescribed Burning in Southern Yellow Pine Forests:**

- The North Carolina Forest Service will be consulted any time a landowner plans to conduct prescribed burning.
- Initial burns in conifer stands should be made as early as possible, so long as unacceptable damage to the trees can be avoided.
- Burning rotations of 1 to 3 years, depending on the site, provide the maximum benefits to wildlife.

- Winter burns are often necessary to reduce fuels to acceptable levels so that summer burns may be conducted in the future.
- If fire has been excluded from a site for many years, one or more winter burns may be conducted followed by summer burns. Thereafter, burning in alternate years will provide a continuous supply of food and cover.
- For more information about prescribed burning, refer to the NRCS Prescribed Burning Practice Standard, 338.

## ODD AREAS

### **Wildlife Field Borders, Native Warm Season Grasses, Early Successional Habitat, Natural Vegetation, Plant Diversity, Fescue Eradication, Wildlife Riparian Buffers, Wildlife Prescribed Burning, Wildlife Firebreaks, Wildlife Strip Disking, and Wildlife Mowing Management:**

- Previously discussed under Criteria for other land uses.

### **Wildlife Hedgerows:**

- Hedgerows should be designed to provide concealed travelways across cropfields and pastures.
- Hedgerows shall be comprised of native woody plants.
- Hedgerows can be created by planting various shrub species (see Appendix 1) and encouraging natural revegetation.

### **Wildlife Fencerows:**

- Fencerow vegetation should be maintained in native plant materials by

periodic maintenance to provide an early successional plant community.

vegetative cover, such as rock outcrops and other geologic features should also be protected as wildlife use areas.

## CONSIDERATIONS

As indicated by the wildlife habitat evaluation or appraisal, certain habitat elements may be weak or missing. Management or development of habitat to provide for or strengthen weak or missing elements may be accomplished by applying a wide variety of conservation practices. The following points should be considered anytime a landowner exhibits interest in maintaining, enhancing, or creating upland wildlife habitat:

- All land has the potential to provide one or more of the basic wildlife habitat elements. Wildlife habitat management may involve a primary or secondary land use;
- Wildlife is not restricted by human conceived boundaries (property lines, political boundaries, etc.) and some wildlife species (e.g., neotropical migratory birds or grassland birds) are frequently limited by the extent of suitable habitat available. Thus, adjoining properties should also be considered, where possible, to provide all of the wildlife habitat elements if the landowner's property is smaller than the home range of the wildlife species of interest to the landowner.
- Wildlife species need food, cover, and water distributed throughout their home range. If any of these elements is lacking, the habitat is deficient for one or more wildlife species. Food must be present during all seasons of the year and in physical reach, especially during critical times of the year. Cover must be available for thermal protection, to enhance reproductive success, and to provide escape from predators. Non-

- Suitable cover near pools of drinking/bathing water is required for many species of wildlife.
- The quantity, quality, and distribution of vegetative elements largely determine the size of the home range and population levels of many wildlife species. A given factor will limit population growth within the home range. Identify and remove that limiting factor and the population will increase until another limiting factor is encountered. For example, quail nesting cover and brood habitat, not food, is usually the critical factor limiting quail populations throughout much of its range. Manipulate the quantity, quality, and distribution of vegetative elements to improve cover, food supply, and reproductive success.
- Numerous habitat types in small units provide a maximum amount of diversity of edge and may result in optimum habitat for some species. However, this may result in habitat fragmentation, adversely affecting other wildlife species. The amount of diversity providing food is generally correlated with higher populations of some wildlife species. However, larger blocks of habitat are more beneficial to some migratory songbirds and many other species of wildlife.
- Linking fragmented habitats or cover types with corridors may increase the use of an area by some wildlife species. Corridors may also cause detrimental effects (e.g., spreading of noxious weeds or wildfire). In general, the wider the corridor, the more wildlife species that will use it.

- Many wildlife species prosper at some early plant successional stage. Other wildlife species are dependent on older-aged communities. Knowledge of the local plant communities, plant successional stages, native versus nonnative status of plants, and the animals associated with each of these is essential for providing accurate wildlife management assistance.
- Manipulations of habitat may impact more than the desired kinds of wildlife. These possible effects shall be evaluated and taken into consideration during the planning process.
- This practice may be used to promote the conservation of declining species, including threatened and endangered species.
- Wildlife population control, which is the responsibility of state and federal wildlife agencies and the landowner, may be necessary to protect and maintain certain habitats. However, it is important to recognize that population control of one species may affect more than the target species (i.e., ecosystems are not simple systems operating as independent components).

The specific considerations for upland wildlife habitat management conservation practices and components are given for the following land use types in this practice standard:

1. 645-C: Cropland (pp. 9-11);
2. 645-G: Grassland (pp. 11-12);
3. 645-MF: Mixed Forest (pp. 12-13);
4. 645-CF: Conifer Forest (pp. 13); and
5. 645-OA: Odd Areas (e.g., powerline right-of-way) (pp. 13-14).

## **CROPLAND**

### **Wildlife Field Borders:**

- Wildlife field borders provide cover and may serve as wildlife travel corridors.
- Upland wildlife habitat can be further enhanced by planting shrubs within the grasses and legumes. Shrubs provide perching areas, food, winter cover, escape cover, and breeding cover that are the desired elements for a properly planned and managed wildlife field border. For examples of wildlife field border recipes, see Appendix 2.

### **Early Successional Habitat:**

- Early successional habitat is most compatible with cropland management systems because it causes minimal light and moisture competition with field crops and can be managed correctly with the capabilities of most farmers.
- Many upland wildlife species rely on one of the early successional habitats for many, if not all, of their needs for survival and reproduction.

### **Plant Diversity:**

- The number of species of organisms present in an area (species richness) is positively correlated with the structural complexity of the ecological community.
- Structurally simple habitats generally support fewer species of organisms than more structurally complex communities.
- In most terrestrial environments, plants provide the major components of the physical structure within which the activities of all other organisms are carried out.

- Structurally complex communities have a greater variety of microclimates, a greater variety of resources, a larger number of ways in which wildlife can exploit those resources, and more places in which to find shelter from predators and the physical environment.
- The positive correlation between bird species diversity and foliage height diversity has been tested on all continents and in many different vegetation types and has been found to be generally true.
- When vegetation considerations are part of any upland wildlife habitat management scheme, the more diverse the vegetative community, the better the community for diversity of all living organisms.
- A riparian buffer can provide upland wildlife habitat in cropland by establishing travel corridors, escape cover, and nesting cover, while reducing sediment, organic material, nutrients, and pesticides in surface runoff and shallow ground water flow.
- In general, the wider the buffer, the greater the value to wildlife.

#### **Wildlife Filter Strips:**

- A filter strip can be used to enhance wildlife cover around cropland by establishing travel corridors, escape cover, and nesting cover, while also reducing the delivery of sediment into waterways.

#### **Wildlife Strip Disking:**

#### **Fescue Eradication:**

- Tall fescue is an aggressive grass that typically forms a monoculture of dense, thick vegetation.
- Once it is established, it is of no use to wildlife.
- The eradication of fescue on a portion of its current North Carolina range would greatly benefit a wide variety of wildlife species.

- Strip disking releases grass-bound fields, reduces litter accumulation, creates bare ground, stimulates germination of desirable seed-producing plants, and increases insect populations by as much as four times.
- Strip disking can significantly alter plant succession and help control woody vegetation and noxious weeds.
- It is important to remember that strip disking for upland wildlife habitat management involves less intensive cultivation than disking for most cropland plantings.
- The purpose of strip disking for wildlife habitat is to maintain old-field conditions.
- If conducted correctly, strip disking for upland wildlife habitat results in far less soil disturbance than typical seedbed preparation.

#### **Wildlife Riparian Buffers:**

- Riparian buffers are areas of trees, woody shrubs, or other vegetation located adjacent to and up-gradient from water courses, wetlands, and impounded water bodies.

**Elimination of Fall Plowing:**

- Fall plowing creates a landscape devoid of vegetation, which allows for virtually no winter utilization by wildlife species.
- The elimination of fall plowing provides a great deal of seed for wildlife, left over from the harvesting of the field.
- The crop residues that provide winter food and cover for many wildlife species are also lost when fall plowing is implemented.

**GRASSLAND****Wildlife Field Borders, Early Successional Habitat, Plant Diversity, Fescue Eradication, Wildlife Riparian Buffers, and Wildlife Strip Disking:**

- Previously discussed under Considerations for other land uses.

**Native Warm Season Grasses:**

- The term “native warm season grasses” refers to a group of native grasses that once ranged widely across much of the Great Plains and Southeastern U.S., including North Carolina. Native warm season grasses have been systematically removed as a result of the plow, overgrazing, planting of nonnatives, and fire suppression.
- This group of grasses includes, but is not limited to, big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), indiagrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*), and broomsedge (*Andropogon virginicus*).

- Native warm season grasses are bunchgrasses, meaning that they grow upright with bare ground in between plants. This growth habit provides a variety of wildlife benefits including overhead protection, quality nest sites and material, allows free movement on the ground, provides abundant insects, and facilitates food-searching on the bare ground, in between the clumps, by ground feeding wildlife.
- Seeding at 50-80% of rates typically used for grazing situations will produce a stand of native warm season grasses attractive and beneficial to many wildlife species.

**Wildlife Prescribed Burning:**

- Prescribed fire is a practical and economical tool for upland wildlife habitat management, which can result in increased nesting cover, escape cover, and species diversity.
- Prescribed burning also improves palatability and nutrition of understory plants and releases nutrients that create lush herbaceous growth necessary for high insect production.
- Prescribed burns are recommended for areas of native grasses and southern yellow pine forests every 1-3 years. The burn will set back the existing condition and stimulate growth of desirable plants.

**Wildlife Firebreaks:**

- Upland wildlife food supplies can be protected and created with the proper planning and management of firebreaks.

**Wildlife Prescribed Grazing:**

- Prescribed grazing can be one of the easiest and least expensive management tools utilized in an effort to increase wildlife habitat.
- Prescribed grazing can, at the same time it is benefiting wildlife, allow for livestock production on hayland/pastureland.
- The purposes of utilizing a prescribed grazing management system include, but are not limited to, achieving a more uniform utilization of the plant material available in a pasture, improving the plant species composition by increasing the number of “desirable” plants present in the pasture, improving the vigor and health of the plants present, and improving wildlife habitat by allowing more cover and improved plant palatability and nutrition.
- The most important decisions when implementing a prescribed grazing management system, is timing, duration, and intensity of grazing.
- If too many animals are allowed access, the pasture will be overgrazed resulting in, among other things, a higher proportion of the pasture being inhabited by low nutritional value plants, the elimination of wildlife habitat, the elimination of ground cover, and the elimination of the soil conservation and water holding capabilities of the pasture.
- Likewise, if just a few animals are allowed access to a pasture for an extended period of time, this may also result in pasture overgrazing.

**Wildlife Mowing Management:**

- Mowing does not promote plant diversity to the same degree as prescribed burning and disking.
- Nevertheless, mowing management for upland wildlife habitat can provide benefits to a wide variety of wildlife species.
- Mowing management involves timing the mowing to allow wildlife the most beneficial use of the vegetative cover available before and after mowing has taken place.
- Mowing management also involves limiting the acreage to be mowed – spot mowing is preferred to mowing all acres.

**MIXED FOREST****Wildlife Thinning:**

- Mixed forest stands generally provide good wildlife habitat and are an important source of mast, fruit, and browse production for a variety of wildlife species.
- These stands should be thinned frequently to the lower limits of tree stocking in order to renew understory forage and hasten early mast production.

**Wildlife Forest Openings:**

- A wide variety of wildlife readily utilizes natural forest openings.
- These openings can compensate for yearly and seasonal fluctuations in food supplies, especially mast.
- Natural forest openings should be retained.

- Minimize human disturbance by restricting access to wildlife forest openings.

#### **Wildlife Use Exclusion:**

- Livestock exclusion is a practice that benefits upland wildlife by prohibiting free access to the area by domestic livestock.
- Grazing by livestock degrades understory vegetation, soil structure, species composition, and the duff layer.
- Livestock exclusion can provide for greater vegetative diversity, improved nesting cover, improved escape cover, and improved feeding areas for upland wildlife.

#### **CONIFER FOREST**

##### **Plant Diversity, Wildlife Firebreaks, Wildlife Forest Openings, and Wildlife Strip Disking:**

- Previously discussed under Considerations for other land uses.

##### **Wildlife Thinning:**

- The primary focus of conifer stand management for upland wildlife habitat should be directed toward increasing plant diversity.
- Intermediate thinning of pine stands is recommended to open the overstory and encourage desirable understory vegetation.

##### **Wildlife Prescribed Burning:**

- Prescribed fire is a practical and economical tool for upland wildlife habitat management, which can result in

increased food, nesting cover, escape cover, and species diversity.

- Prescribed burning in open pine stands, grasslands, or old fields benefits wildlife by increasing browse yields and improving palatability and nutrition of understory plants.
- Prescribed fire also releases nutrients that create lush herbaceous growth necessary for high insect production.
- The North Carolina Forest Service should be consulted anytime a landowner plans to conduct prescribed burning.

#### **ODD AREAS**

##### **Wildlife Field Borders, Native Warm Season Grasses, Early Successional Habitat, Natural Vegetation, Plant Diversity, Fescue Eradication, Wildlife Riparian Buffers, Wildlife Prescribed Burning, Wildlife Firebreaks, Wildlife Strip Disking, and Wildlife Mowing Management:**

- Previously discussed under Considerations for other land uses.

##### **Wildlife Hedgerows:**

- Hedgerows should be developed and maintained, not only for wildlife habitat benefits, but also to enhance water quality and reduce wind erosion.
- These areas are especially important for food, nesting cover, escape cover, and brood-rearing habitat for many wildlife species.

##### **Wildlife Fencerows:**

- Fencerows should be developed and maintained for wildlife habitat benefits.

- These areas are especially important for food, nesting cover, escape cover, and brood-rearing habitat for many wildlife species.

### **Food Plots:**

- Food plots are unnatural, man-made areas intended to attract and hold wildlife for some human-oriented benefit.
- Typically, food plots are established to attract and hold wild game for hunting or viewing purposes.
- Food plots have been thought to provide the resources necessary to increase a wide variety of wildlife species. The fact is, almost no wildlife is limited solely by the amount of food available in its habitat.
- Food plots are intended to meet only one wildlife requirement, food. Cover and water requirements are usually not met by food plots.
- Providing good quality vegetative cover is more likely to benefit the vast majority of wildlife species.
- Food plots can be an ecological trap if adjacent cover is inadequate.
- If songbird management is a focus and cowbirds are common, food plots should be avoided.
- Food plot establishment and maintenance does not meet this practice criteria and is likely to not improve the HSI in any significant manner.
- Habitat management that results in the creation, enhancement, and/or maintenance of good quality wildlife habitat, including improving food, cover

AND water availability, should be the goal of upland wildlife habitat management.

### **PLANNING CONSIDERATIONS**

**Water Quantity:** Many of the considerations listed above hold potential for a change in plant growth and transpiration because of changes in the volume of soil water.

**Water Quality:** The above listed criteria and considerations may have effects on erosion and the movement of sediment and soluble and sediment-attached substances that would be carried off by runoff. They may also effect the movement of dissolved substances below the root zone and to groundwater. Lastly, they may effect pesticide and nutrient use on surface and groundwater quality.

### **OPERATION AND MAINTENANCE**

The purpose of operation, maintenance, and management is to insure that the practice functions as intended over time.

A plan for operation and maintenance of upland wildlife habitat at a minimum shall include monitoring and management of structural and vegetative measures.

Timing of haying and livestock grazing will avoid periods when upland wildlife are nesting, fawning, etc., and will allow the establishment, development, and management of upland vegetation for the intended purpose.

Biological control of undesirable plant species and pests (e.g., using predator or

parasitic species) shall be implemented where available and feasible.

**REFERENCES**

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## Appendix 1

	<b>Native (N) Introduced (I)</b>	<b>Perennial (P) or Annual (A)</b>	<b>Adapted to: Coastal Plain (C), Piedmont (P), Mountains (M)</b>	<b>ONE Species (Lbs./acre)</b>	<b>TWO Species Mix (Lbs./acre)</b>	<b>THREE Species Mix (Lbs./acre)</b>	<b>FOUR Species Mix (Lbs./acre)</b>	<b>FIVE Species Mix (Lbs./acre)</b>
<b>FORBS</b>								
Buckwheat	I	A	C, P, M	50	25	16.7	12.5	10
Chufa	N	P	C, P, M	30	15	10	7.5	6
Sunflower, maxmillian	N	P	C, P, M	1	0.5	0.3	0.25	0.2
<b>GRASSES</b>								
Bahiagrass	I	P	C, P	15	7.5	5	3.75	3
Barley	I	A	C, P, M	90	45	30	22.5	18
Bluegrass, Kentucky	I	P	P, M	10	5	3.3	2.5	2
Bluestem, big	N	P	C, P, M	6	3	2	1.5	1.2
Bluestem, little	N	P	C, P, M	5	2.5	1.6	1.25	1
Dallisgrass	N	P	C, P	7	3.5	2.3	1.75	1.4
Deertongue, 'Tioga'	N	P	P, M	6	3	2	1.5	1.2
Eastern gamagrass	N	P	C, P, M	4	2	1.3	1	0.8
Egyptian Wheat	I	A	C, P	10	5	3.3	2.5	2
Flaccidgrass	I	P	C, P	2	1	0.7	0.5	0.4
Indiangrass	N	P	C, P, M	6	3	2	1.5	1.2
Lovegrass, weeping	I	P	C, P	2	1	0.7	0.5	0.4
Millet (any variety)	I	A	C, P, M	25	12.5	8.3	6.3	5
Oats	I	A	C, P, M	90	45	30	22.5	18
Orchardgrass	I	P	P, M	15	7.5	5	3.75	3
Panicgrass, 'Atlantic Coastal'	N	P	C, P	6	3	2	1.5	1.2
Rye, grain	I	A	C, P, M	90	45	30	22.5	18

## Appendix 1

	<b>Native (N) Introduced (I)</b>	<b>Perennial (P) or Annual (A)</b>	<b>Adapted to: Coastal Plain (C), Piedmont (P), Mountains (M)</b>	<b>ONE Species (Lbs./acre)</b>	<b>TWO Species Mix (Lbs./acre)</b>	<b>THREE Species Mix (Lbs./acre)</b>	<b>FOUR Species Mix (Lbs./acre)</b>	<b>FIVE Species Mix (Lbs./acre)</b>
Ryegrass, annual	I	A	C, P, M	20	10	6.7	5	4
Sorghum, grain	I	P	C, P, M	15	7.5	5	3.75	3
Switchgrass (any variety)	N	P	C, P, M	6	3	2	1.5	1.2
Wheat	I	A	C, P, M	90	45	30	22.5	18
Wildrye, Virginia	N	P	C, P, M	6	3	2	1.5	1.2
<b>LEGUMES</b>								
Alfalfa	I	P	C, P, M	15	7.5	5	3.75	3
Beggarweed (Tickclover)	N	A	C, P	8	4	2.6	2	1.6
Birdsfoot trefoil	I	P	C, P, M	4	2	1.3	1	0.8
Clover, red	I	P	C, P, M	12	6	4	3	2.5
Clover, white	I	P	C, P, M	2	1	0.7	0.5	0.4
Lathco flatpea	I	A	C, P, M	15	7.5	5	3.75	3
Lespedeza, bicolor	I	P	C, P, M	10	5	3.3	2.5	2
Lespedeza, common	I	A	C, P, M	15	7.5	5	3.75	3
Lespedeza, Kobe	I	A	C, P, M	15	7.5	5	3.75	3
Lespedeza, Korean	I	A	C, P, M	15	7.5	5	3.75	3
Lespedeza, 'VA-70', 'Amquail'	I	P	C, P, M	10	5	3.3	2.5	2
Partridge pea	N	A	C, P, M	6	3	2	1.5	1.2
Vetch, common	N	A	P, M	15	7.5	5	3.75	3
Vetch, hairy	N	A	P, M	15	7.5	5	3.75	3

## Appendix 1

	Native (N) Introduced (I)	Wetness Tolerance: High, Moderate, or Low	Height in Feet at Maturity	Noted for: Flowers, Berries, Fruit, Nuts, Cover, or Habitat
<b>SHRUBS/TREES</b>				
Alder	N	High	20	Seeds/Cover
American basswood	N	Moderate	60-100	Seeds
American beautyberry	N	Moderate-Low	3-5	Drupes
American hornbeam	N	High	30	Seeds
Apple	I/N	High-Moderate	30-40	Fruit
Atlantic White-cedar	N	High	50-90	Cover
Baldcypress	N	High	100-120	Seeds/Habitat
Beech	N	High-Moderate	60-80	Nuts/Cover
Bicolor lespedeza	I	Moderate	10	Seeds/Cover
Black walnut	N	Moderate	70-90	Nuts
Black willow	N	High-Moderate	60-100	Cover
Blackberry	N	Moderate	4-6	Berries/Cover
Blackgum	N	High-Moderate	50-100	Fruit/Cover
Blueberry	N	High-Moderate	4-6	Berries
Boxelder	N	High	30-60	Seeds
Buckeye	N	High	60-80	Seeds
Butternut	N	Moderate-Low	40-70	Nuts
Buttonbush	N	High	4-8	Seeds/Cover
Carolina buckthorn	N	Moderate-Low	10-15	Fruit
Carolina willow	N	High-Moderate	50-80	Cover
Cherry	N	Moderate	80	Fruit
Chestnut hybrids	N	Moderate	30-50	Nuts
Chinquapin	N	Low	40	Nuts
Chokeberry	N	High-Moderate	12-15	Fruit
Crabapple	N	High	30	Fruit
Dogwoods (many)	N	High-Low	25	Fruit
Eastern cottonwood	N	High-Moderate	100	Seeds/Habitat
Eastern hemlock	N	Moderate-Low	60-80	Seeds/Cover

## Appendix 1

	<b>Native (N) Introduced (I)</b>	<b>Wetness Tolerance: High, Moderate, or Low</b>	<b>Height in Feet at Maturity</b>	<b>Noted for: Flowers, Berries, Fruit, Nuts, Cover, or Habitat</b>
Eastern hornbeam	N	High-Moderate	20-50	Nuts
Elderberry	N	High-Moderate	10-15	Berries
Gallberry	N	High-Moderate	3-6	Drupes/Cover
Green ash	N	High-Moderate	60	Nuts
Hackberry	N	High-Moderate	50-90	Drupes
Hawthorn	N	High-Low	20-40	Fruit/Cover
Hazelnut	N	Moderate	10	Fruit/Cover
Hickory	N	High-Low	Species Dependent	Nuts
Holly, American	N	High-Moderate	40-70	Fruit/Cover
Honeylocust	I	High-Low	80	Fruit
Indian currant	N	Moderate-Low	4	Fruit/Cover
Maple (many)	N	High-Low	Species Dependent	Seeds
Oaks (many)	N	High-Low	Species Dependent	Nuts
Pawpaw	N	High-Moderate	30	Fruit
Pecan	N	Moderate	100	Nuts
Persimmon	N	Moderate-Low	20-70	Fruit
Pine, longleaf	N	Low-Moderate	80-100	Seeds
Pine, pond	N	High	40-70	Seeds
Pine, shortleaf	N	Moderate-Low	70-100	Seeds
Pine, white	N	Low	100	Seeds
Plum	N	High-Moderate	15-30	Fruit/Cover
Plum, American	N	Moderate	30	Fruit/Cover
Possum haw	N	High	15	Fruit
Red mulberry	N	Moderate	60	Fruit
Redbud	N	Moderate	40	Seeds
Redcedar	N	Moderate-Low	40-60	Fleshy Cones/Cover
River birch	N	High	40-80	Cover
Sassafras	N	Moderate	30-60	Fruit
Serviceberry	N	High-Moderate	40	Fruit

## Appendix 1

	<b>Native (N) Introduced (I)</b>	<b>Wetness Tolerance: High, Moderate, or Low</b>	<b>Height in Feet at Maturity</b>	<b>Noted for: Flowers, Berries, Fruit, Nuts, Cover, or Habitat</b>
Silky dogwood	N	Moderate	10-15	Fruit/Cover
Silky willow	N	High-Moderate	10-20	Cover
Sourwood	N	Moderate	50	Flowers/Habitat
Spicebush	N	High-Moderate	10	Fruit
Sugarberry	N	High-Moderate	80	Drupes
Sumacs	N	Moderate-Low	30	Fruit
Swamp rose	N	High-Moderate	6-8	Fruit
Sweetbay	N	High	20-60	Seeds/Habitat
Sweetgum	N	Moderate	60-100	Seeds
Thunbergii lespedeza	I	Moderate	15	Seeds/Cover
Viburnums	N	Moderate-Low	35-40	Fruit
Virginia willow	N	High	4-8	Seeds
Wild hydrangea	N	Moderate	6-8	Cover/Habitat
Winterberry	N	Moderate	30	Drupes
Witch-hazel	N	Moderate	20-30	Flowers
Yaupon holly	N	High-Moderate	20	Fruit/Cover
Yellowroot	N	High-Moderate	1-3	Seeds/Habitat

## Appendix 2

### Suggested Wildlife Field Border Mixtures

	PLANTING DATE	MIXTURE / RATE
1	January through April	10 lbs. Kobe, 5 lbs. partridge pea, 40 lbs. wheat or rye, 4 lbs. little bluestem
2	Late February through mid-April	3 lbs. reseeding soybeans, 5 lbs. Kobe / Korean lespedeza, 5 lbs. red clover, 5 lbs. partridge pea
3	April through June (for CRP-CP2)	15 lbs. browntop millet, 15 lbs. sudex, 5 lbs. Kobe lespedeza, 3 lbs. hulled shrub lespedeza., 3 lbs. 'Atlantic' Coastal panic grass, 3 lbs. switchgrass, 3 lbs. Eastern gamma grass, indian grass, or big bluestem
4	Spring / Fall	Small grain planting overseeded with Kobe or Korean lespedeza
5	May	5 lbs. switchgrass, 4 lbs. 'Atlantic' Coastal panic grass, 3 lbs. Kobe / Korean Lespedeza
6	May through August	5 lbs. browntop millet, 5 lbs. Kobe, 3 lbs. 'Atlantic' Coastal panic grass, 3 lbs. switchgrass, 3 lbs. little bluestem
7	Early Summer	Switchgrass - 7 lbs. drilled; 9 lbs. broadcast
8	Early Summer	'Atlantic' Coastal panic grass - 10 lbs. drilled or broadcast
9	Early Summer	Eastern gamma grass - 8 lbs. drilled only
10	September-through October	18 lbs. Shilo orchardgrass, 40 lbs. wheat or rye, 3 lbs. Ladino clover, 5 lbs. crimson clover
11	Sept.-Nov. (for CRP-CP2)	10 lbs. Kobe lespedeza, 40 lbs. wheat / rye / oats, 4 lbs. little bluestem, 3 lbs. innnocolated white clover, 3 lbs. unhulled shrub lespedeza, 2 lbs. orchardgrass, 5 lbs. switchgrass
12	Fall	Small grain planting allowed to develop into native vegetation
13	Fall	Small grain / switchgrass mix (40 lbs. wheat or rye, 5 lbs. switchgrass)
14	September through December	40 lbs. wheat or rye, 5 lbs. switchgrass, 2 lbs. Ladino clover
<p><b>Note:</b> If plantings are to be mowed, it should be done in September to avoid nests of quail, rabbits, turkeys, and other ground-nesting wildlife. Avoid winter mowing so that escape cover will be available. Mowing height should be no lower than 12 inches.</p>		

## Appendix 3

### Ecosystems and Examples of Associated Wildlife Species

<b>CROPLAND</b>	
American crow ( <i>Corvus brachyrhynchos</i> )	Mourning dove ( <i>Zenaida macroura</i> )
American woodcock ( <i>Scolopax minor</i> )	Northern bobwhite ( <i>Colinus virginianus</i> )
Common snipe ( <i>Gallinago gallinago</i> )	Opossum ( <i>Didelphis marsupialis</i> )
Crickets ( <i>Orthoptera spp.</i> )	Raccoon ( <i>Procyon lotor</i> )
Eastern cottontail ( <i>Sylvilagus floridanus</i> )	Red fox ( <i>Vulpes vulpes</i> )
Grasshoppers ( <i>Orthoptera spp.</i> )	Squirrels ( <i>Sciurus spp.</i> )
Gray fox ( <i>Urocyon cinereoargenteus</i> )	Striped Skunk ( <i>Mephitis mephitis</i> )
Horned lark ( <i>Eremophila alpestris</i> )	White-tailed deer ( <i>Odocoileus virginianus</i> )
Killdeer ( <i>Charadrius vociferus</i> )	Wild turkey ( <i>Melagris gallopavo</i> )
<b>GRASSLAND</b>	
Bachman's sparrow ( <i>Aimophila aestivalis</i> )	Least shrew ( <i>Cryptotis parva</i> )
Butterflies ( <i>Lepidoptera</i> )	Meadow vole ( <i>Microtus pennsylvanicus</i> )
Common yellowthroat ( <i>Geothlypis trichas</i> )	Northern bobwhite
Eastern cottontail ( <i>Sylvilagus floridanus</i> )	Opossum
Eastern harvest mouse ( <i>Reithrodontomys humulis</i> )	Owls
Eastern Meadowlark ( <i>Sturnella magna</i> )	Savannah sparrow ( <i>Passerculus sandwichensis</i> )
Field sparrow ( <i>Spizella pusilla</i> )	Vesper sparrow ( <i>Pooecetes gramineus</i> )
Grasshopper sparrow ( <i>Ammodramus savannarum</i> )	White-tailed deer
Grasshoppers	Wild turkey
<b>MIXED WOODLAND</b>	
Blue jay ( <i>Cyanocitta cristata</i> )	Red-shouldered hawk ( <i>B. lineatus</i> )
Bobcat ( <i>Lynx rufus</i> )	Red-tailed hawk ( <i>Buteo jamaicensis</i> )
Carolina chickadee ( <i>Parus carolinensis</i> )	Ruffed grouse ( <i>Bonasa umbellus</i> )
Chipping sparrow ( <i>Spizella passerina</i> )	Scarlet tanager ( <i>Piranga olivacea</i> )
Cooper's hawk ( <i>Accipiter cooperii</i> )	Sharp-shinned hawk ( <i>A. striatus</i> )
Downy woodpecker ( <i>Picoides pubescens</i> )	Squirrels
Eastern cottontail	Striped Skunk
Golden mouse ( <i>Peromyscus nuttalli</i> )	Summer tanager ( <i>Piranga rubra</i> )
Gray fox	Tufted titmouse ( <i>Parus bicolor</i> )
Opossum	White-footed mouse ( <i>Peromyscus leucopus</i> )
Owls	White-tailed deer
Raccoon	Wild turkey
<b>CONIFER WOODLAND</b>	
Brown headed nuthatch	Pine vole ( <i>Pitymys pinetorum</i> )
Carolina chickadee	Prairie warbler
Carolina wren	Red-shouldered hawk
Cooper's hawk	Red-tailed hawk
Downy woodpecker	Sharp-shinned hawk
Eastern cottontail	Striped skunk
Northern bobwhite	Summer tanager
Northern cardinal	White-tailed deer
Opossum	Wild turkey

<b>ODD AREAS</b>	
American woodcock	Mink ( <i>M. vison</i> )
Common yellowthroat	Northern bobwhite
Cooper's hawk	Opossum
Eastern bluebird ( <i>Sialia sialis</i> )	Owls
Eastern cottontail	Prairie warbler
Eastern harvest mouse	Red fox
Field sparrow ( <i>Spizella pusilla</i> )	Red-shouldered hawk
Grasshoppers	Red-tailed hawk
Gray fox	Sharp-shinned hawk
Indigo bunting ( <i>Passerina cyanea</i> )	Striped skunk
Longtail weasel ( <i>Mustela frenata</i> )	White-footed mouse
Meadow vole	White-tailed deer
	Wild turkey