NATURAL RESOURCES CONSERVATION SERVICE

RESTORATION AND MANAGEMENT OF RARE OR DECLINING HABITATS WOODLAND/FOREST DESIGN PROCEDURES

(643DPb)

INTRODUCTION

Restoration and Management of Rare or Declining Habitats shall be planned and applied in accordance with the 643 standard detailed in Section IV of the Nebraska NRCS Field Office Technical Guide (FOTG). This document describes the definition, purpose, and conditions where Restoration and Management of Rare or Declining Habitats in Woodland/ Forests applies, as well as criteria, considerations, and operation and maintenance for developing site-specific plans for this practice. Refer to Tree/Shrub Planting Procedures Guide (380 TPP) located in the Nebraska NRCS FOTG, Section IV, A. Conservation Practices.

Contents of Restoration and Management of Rare or Declining Habitats Woodland/Forest Design Procedures include:

Section	Subject Area
1	Determining the Required Extent of Restoration
2	Determining the Appropriate Plant Community
3	Species Selection
4	Planting Stock Considerations
5	Planting Densities and Arrangement
6	Species Diversity Requirements
7	Vegetative Cover Between Trees/Shrubs
8	Plans and Specifications
9	Management and Protection During Establishment
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1. DETERMINING THE REQUIRED EXTENT OF RESTORATION

a. Restoration is used where site conditions require that a majority of desired plant species must be seeded or planted. This typically occurs where the existing land use is cropland or on other land uses where the native plant community has been replaced by undesirable and/or non-native plants. All non-native plants must be eradicated prior to seeding/planting appropriate native species.

b. Renovation, by contrast, is used on sites where many of the desired native plant species still exist. In this case, specific techniques will be used to suppress the undesired and/or non-native species while maintaining the native plant species.

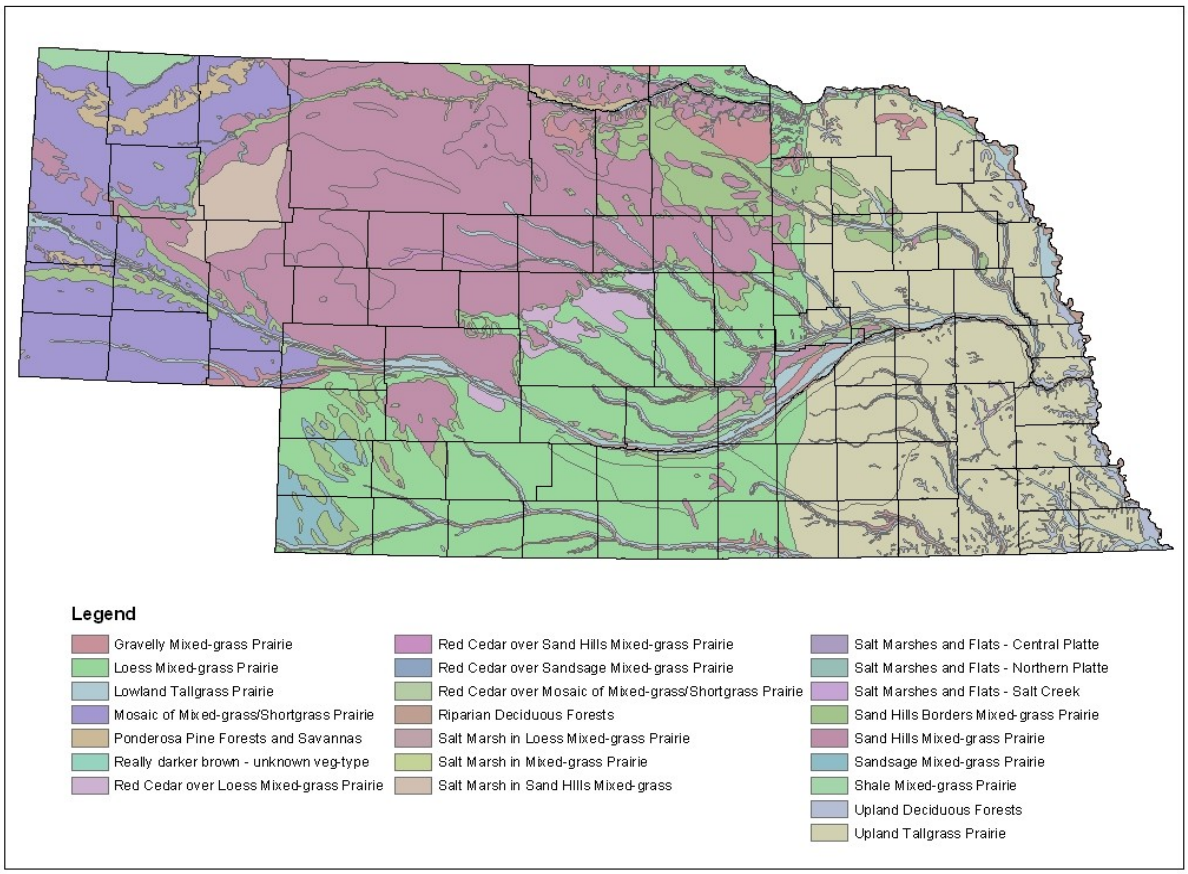
c. Management may be the only action necessary for native plant communities which are largely intact and functioning near desired levels.

2. Determining the Appropriate Plant Community

Information related to the native plant communities for Nebraska is found in the following sources:

a. The map shown in Figure 1 is a variation of Native Vegetation of Nebraska by Robert B. Kaul and Steven B. Rolfsmeier, published by University of Nebraska – Lincoln, Conservation and Survey Division (June 1993). The original source contains text descriptions of each plant community, including dominant species, within the key.

Figure 1 – Native Vegetation Map of Nebraska



b. The publication, Terrestrial Natural Communities of Nebraska – Version III, written by Gerry Steinauer and Steve Rolfsmeier (NE Biology Technical Note #65) contains details about the range and site (environmental description) for each natural community.

c. Intact native plant communities in close proximity (less than 10 miles) to the restoration/renovation site that have similar soils, slope, aspect, etc.

d. Historic soil surveys often contain references to plant species or vegetative communities which occupy certain soil types, range sites and condition classes.

Savanna habitats are an open stand of mature, fire-tolerant trees creating zones of sun and shade to support a diverse array of understory shrub and prairie communities. The two primary types of savanna in Nebraska are bur oak and ponderosa pine. Each of these occur within relatively close proximity to their respective woodland or forest type but are often present on sites with less slope or south-facing aspects that were historically influenced by a greater fire frequency than the adjacent woodland or forest would have experienced.

3. SPECIES SELECTION

Individual tree, shrub, and vine species (where applicable) used to the planting must be adapted to the site being restored or renovated and be representative of the historic plant community being restored. Sources of information noted below can be used to supplement data related to the appropriate composition of a planting plan.

a. Terrestrial Natural Communities of Nebraska – Version III, June 30, 2003 by Gerry Steinauer and Steve Rolfsmeier (Biology Technical Note # 65), contains a "vegetation description" for each community, including abundant and noteworthy species. The species listed under the heading "Most Abundant Species" should dominate the trees and shrubs selected for the planting plan. Any species with a scientific name in ALL CAPITAL LETTERS, used to identify an invasive species, should not be used.

b. The Flora of Nebraska by Robert B. Kaul, David Sutherland, and Steven Rolfsmeier, published by School of Natural Resources, University of Nebraska – Lincoln in 2006, contains a distribution map of plant species by county.

c. Conservation Tree/Shrub Groups (Tables 1-11) found in Section II of the NE NRCS FOTG, contains information on soils limitations and attributes by species for a wide range of tree and shrub species, including native status by vegetative zone.

Note: Use of green ash in restoration plantings is acceptable but should be limited to 15% of the total composition due to potential impacts of emerald ash borer in future years.

4. PLANTING STOCK CONSIDERATIONS

a. Direct Seeding: The "Direct Tree/Shrub Seeding" option noted in Section X of the Tree/Shrub Planting Procedures Guide (380 TPP) can be used for the establishment of appropriate species and may be desirable to accommodate local ecotype plant materials. For tree and shrub species that cannot be established in this manner, it may be necessary to supplement this type of planting with seedlings within two years of the direct seeding to meet species diversity expectations. Use NE-CPA-15B job sheet for direct seeding tree and shrub establishment planning.

b. Savanna Plantings: Larger planting stock is desired for this purpose to increase the success of establishment for a limited number of individual trees. Bur oak should be greater than ½ inch caliper and grown in air root pruned containers to improve survivability. Ponderosa pine should be three year old seedlings (2-1 stock) or potted (2 gallon or larger). Note: Use of weed barrier fabric mats to conserve soil moisture and reduce competition with herbaceous vegetation and the use of wire cages to prevent damage from rabbits and deer will likely be necessary until the trees are well established and no longer susceptible to these factors.

5. PLANTING DENSITIES AND ARRANGEMENT

A range of planting densities for small shrubs, large shrubs/small trees, and large trees is shown in the Tree/Shrub Planting Design Procedures (612 DP), Table 1 and should be used to determine the total number of seedlings to plant per acre.

Different species and growth forms should be interspersed throughout the planting to mimic natural conditions for the plant community being restored. Planting individual species in rows does not accomplish this objective. Likewise, a completely random design is often not appropriate. Individual tree

and shrub species typically occupy blocks or patches based on microclimate conditions, such as soil types, slope aspect and other topographic features.

a. Woodland Plantings

i) Minimum densities from Table 1 of (612 DP) are used for woodland plant communities where a more open stand is desired.

ii) This method typically applies to upland sites, areas of poor soils, zones with lower precipitation, or plantings with weed barrier fabric where seedling mortality is expected to be minimal.

b. Forest Plantings

iii) Maximum densities from Table 1 of (612 DP) apply to forest plant communities with a denser stand than woodlands.

iv) This method typically applies to lowland sites, areas of deep, fertile soils, zones with higher precipitation, or plantings without weed barrier fabric where higher seedling mortality is expected.

c. Savanna Plantings

v) Planting densities for a savanna should target an average of 25 trees per 'planted acre' at a spacing no less than 30 feet. A range of 10% to 50% of the field or site should be occupied by these blocks or clusters of trees.

vi) Areas within the field that have a north or east aspect as well as draws and ravines should support a more dense stand of trees while other areas should be more open and intermixed with prairie.

vii) Shrub species must be planted within or near the edges of the tree blocks or clusters. (The remaining areas not planted to trees or shrubs should be planted to the applicable prairie community for the site.)

6. SPECIES DIVERSITY REQUIREMENTS

Different species diversity thresholds have been established for the different woodland and forest plant communities and are outlined in Table 1 below. Native shrubs, suited to the plant community and site conditions, must comprise at least 25% of the total seedlings planted. See Table 2, Woodland/Forest Restoration Examples, for ratios of each of these plant communities.

Table 1 – Minimum Species Diversity of Trees and Shrubs by Plant Community Type

Type of Plant Community	Division	# of Tree Species	# of Shrub Species
Riparian (or Wetland) Woodland/Forest	Frequently Flooded [1/]	3	2
Riparian (or Wetland) Woodland/Forest	Infrequently Flooded	4	3
Upland Deciduous Woodland/Forest	MLRA 107 and six noted Southeast Nebraska counties [2/]	6	4
Upland Deciduous Woodland/Forest	MLRA 63B, 66, 71, 73, 75, 102C, and remainder of 106	4	3
Coniferous Woodland/Forest	All Suitable Sites	1	2
Savanna – Bur Oak or Ponderosa Pine	All Suitable Sites	1	2

[1/] Frequently flooded sites are noted as "frequently flooded" in the map unit name on floodplain landforms.
[2/] Six Southeast Nebraska counties refer to Cass, Otoe, Johnson, Nemaha, Pawnee, and Richardson counties.

8. VEGETATIVE COVER BETWEEN TREES/SHRUBS

Low maintenance grass and forb mixtures installed in areas planted to trees and shrubs must be native and adapted to the site in order to meet the intent of this practice. The use of non-native grasses, forbs, and legumes is not permitted. Example mixtures are provided in Tables 1 and 2 of the Tree/Shrub Planting Procedures Guide (380 TPP). Native forbs must comprise a minimum of 10% of the seeding mixture based on pure live seeds per square foot. Native forbs are not required on sites where maintenance practices implemented on tree and shrub plantings (i.e. herbicide use) will eliminate forbs.

Table 2 – Woodland / Forest Restoration Examples

These woodland, forest, and savanna restoration ratios are provided as **examples** of species diversity and percent composition. Adaptation of these examples is encouraged and will often be necessary to accommodate considerations such as site conditions, project objectives, species availability, etc. Other appropriate trees and shrub species can be added or substituted for those listed below and the percent composition adjusted accordingly. Refer to Item 4, Species Selection, for information on suitable tree and shrub species.

Tree/Shrub Species	% of Mix
RIPARIAN (OR WETLAND) WOODLAND/FOREST – Frequently Flooded	
Eastern cottonwood	25
Peachleaf willow	15
Green ash	15
Silver maple	10
Elderberry	10
Red-osier dogwood	10
Sandbar willow	10
False indigo	5
RIPARIAN (OR WETLAND) WOODLAND/FOREST – Infrequently Flooded	
Bur oak	20
Green ash	15
Black walnut	10
Hackberry	10
Red elm	10
American Hazelnut	10
Chokecherry	10
Rough-leaf dogwood	10
Missouri gooseberry	5
UPLAND DECIDUOUS WOODLAND/FOREST – Missouri River/Southeast Nebraska	
Bur oak	30
Basswood	10
Black walnut	5
Chinkapin oak	5
Hackberry	5
Red oak	5
Shagbark hickory	5
American hazelnut	10
Chokecherry	10
Coralberry	5
Missouri gooseberry	5
Rough-leaf dogwood	5

UPLAND DECIDUOUS WOODLAND/FOREST – Central Nebraska	
Bur oak	30
Green ash	10
Hackberry	10
Red elm	10
Honeylocust	5
American plum	10
Buffalo currant	10
Chokecherry	10
Western snowberry	5
CONIFEROUS WOODLAND/FOREST	
Ponderosa pine	50
Quaking aspen (or Green ash)	15
Chokecherry	20
Skunkbush sumac	10
Serviceberry	5
BUR OAK SAVANNA	
Bur oak	*
American plum	*
Chokecherry	*
PONDEROSA PINE SAVANNA	
Ponderosa pine	*
Skunkbush sumac	*
Chokecherry	*
* Refer to Item 6, Planting Densities and Arrangement, for savanna information.	

9. PLANS AND SPECIFICATIONS

a. Use NE-CPA-15 Job Sheet for Tree/Shrub Planting Plan or NE-CPA-15b Job Sheet for Direct Seeding Tree and Shrub Establishment to document practice designs, certification, and other requirements.

b. Renovations are often complex and variable due to multiple factors impacting the current condition and the numerous techniques which may be used to enhance the site. Consultation with an experienced resource professional is necessary to develop the renovation plan.

10. MANAGEMENT AND PROTECTION DURING ESTABLISHMENT

a. Undesirable volunteer trees or shrubs that become established and encroach within planted woodlands and forests must be removed. Clipping/cutting by mechanical means or applying herbicide to individual trees or shrubs may be necessary for complete control. Volunteer trees, shrubs, or vines which are well suited to the desired plant community should be allowed to persist, to a reasonable extent, in order to increase the diversity of the planting.

b. Weed control methods must be selective to avoid impacts to desired plants. Not all forbs are undesirable; nor should all forbs be eliminated. Seeded forbs and volunteer weeds can provide important habitat components to many species of wildlife as restored woodlands and forests become established. Spot treatment of target weeds is necessary to preserve the integrity of the restoration.

11. ESTABLISHED STAND MANAGEMENT

a. Management of woodlands and forests is complex due to the longevity of these types of plant communities. As a result, guidance should be provided by an experienced forester to develop management prescriptions.

b. Prescribed burning and livestock grazing may be appropriate for some sites, especially savanna habitats described above. Refer to Prescribed Grazing (528) and Prescribed Burning (338) for additional information.

c. Mechanical manipulations, such as pruning, selective thinning, timber harvest and similar practices, while unnatural, may provide opportunities to influence woodland/forest density, species composition, and stand characteristics such as age class. They may also be used to create micro-habitats such as small forest openings, brush piles, and snags (standing dead trees) within or adjacent to the stand. Refer to Tree Pruning Design Procedures (660DP) and Forest Stand Improvement Design Procedures (666DP) for additional information.

12. SUPPORTING REFERENCES

Robert B. Kaul, David Sutherland, and Steven Rolfsmeier. 2006. The Flora of Nebraska. Published by the University of Nebraska, School of Natural Resources, Lincoln, NE.

Gerry Steinauer and Steven Rolfsmeier. 2003. Terrestrial Natural Communities of Nebraska – Version III (NE Biology Technical Note # 65).

Tree and Shrub Planting Job Sheet, NE-CPA-15

Direct Seeding Tree Establishment Job Sheet, NE-CPA-15b

Windbreak/Shelterbelt Establishment-Tree Planting Procedures (380TPP)

Tree/Shrub Establishment Design Procedures (612DP)

Conservation Tree/Shrub Groups, Tables 1-11

Prescribed Grazing (528)

Prescribed Burning (338)

Tree/Shrub Pruning Design Procedures (660DP)

Forest Stand Improvement Design Procedures (666DP)