

NATURAL RESOURCES CONSERVATION SERVICE
EARLY SUCCESSIONAL HABITAT DEVELOPMENT/MANAGEMENT
DESIGN PROCEDURES
(647DP)

Early Successional Habitat Development / Management shall be planned and applied in accordance with the 647 standard detailed in Section IV of the Field Office Technical Guide (FOTG). This document describes the definition, purpose, and conditions where Early Successional Habitat Development/Management applies, as well as criteria, considerations, and operation and maintenance for developing site-specific plans.



This design procedure provides information on alternatives to set-back plant succession within grasslands and other land uses to achieve the desired plant community for wildlife habitat.

1. Habitat Development for New Herbaceous Seedings

Design initial plantings of herbaceous cover to provide early successional habitat in order to prevent the need for management techniques to be used early following establishment. The following criteria apply:

- Seed mixtures should provide between 10 PLS/ft² and 15 PLS/ft² total seeding rate. Note: Erosive sites may require higher seeding rates up to 25 PLS/ft² in localized areas.
- Grasses should not exceed 50% of the total mixture based on seeds per square foot.
- Minimize the use of sod-forming grasses in the mixture (i.e. less than 25% of the mix).

Sites already established to a grass-dominated plant community can be temporarily converted to early successional habitat using techniques described under the “Management” section below. On sites dominated by aggressive sod-forming grasses such as smooth brome, reed canarygrass, or switchgrass, a combination of techniques may be required to completely suppress or eliminate the existing vegetation prior to seeding a more desirable herbaceous mixture.

Areas which have been recently seeded (<10 years old) and still provide a minimum level of both bare ground and annual broadleaf plants may not require early successional habitat management to be implemented until future years. At least 15% bare ground and 15% canopy cover of annual broadleaf plants is desired. Any combination of these two variables that meets or exceeds ‘25’ is acceptable to delay the implementation of this practice.

2. Habitat Development for Other Habitat Types (Woodlands and Wetlands)

- a. Woodland/Forest Habitats are suitable for early successional habitat as outlined under some provisions within the (666) Forest Stand Improvement standard and design procedures. Techniques involving selective thinning, “edge feathering”, or new understory plantings within the “Wildlife Considerations” of the design procedure can be used to develop or manage for early successional habitat.
- b. Wetland Habitats are suitable for early successional habitat as outlined under some provisions within the (644) Wetland Wildlife Habitat Management standard. Many temporary and seasonal wetlands in Nebraska are intended to provide early successional plant communities resulting from the varied hydroperiod during the growing season or wet cycles across several growing seasons.

3. Habitat Development for Cropland

It is possible to create early successional habitat on a temporary basis by management techniques used within the crop rotation and residue management system. The following are examples of this approach:

- Tall Wheat Stubble:
 1. Small grains including wheat, oats, barley, etc. are harvested in mid-summer and maximum stubble height is maintained at 15 inches or greater. Ideally, a “stripper header” is used to provide even greater stubble height. Tall stubble tends to favor broadleaf plants over grassy weeds which are often problematic in wheat rotations.
 2. No residue manipulation (tillage, baling, shredding, grazing) is conducted between harvest and the following spring (March 31st) which will maintain stubble height.
 3. Herbicide applications are not allowed until after September 1st to allow annual broadleaf plants to persist within the field. When possible, no herbicides should be used until the following spring.
 4. Subsequent to steps 1-3 above, an additional benefit can be gained in a wheat-fallow rotation by using only herbicide applications as “chemical fallow” until after July 15th of the following growing season to provide secure nesting cover.
- Oats and Sweet Clover:
 1. Oats, or other suitable spring-planted small grain, is planted in combination with sweet clover in early spring. The oats are harvested in mid-summer.
 2. Subsequent sweet clover growth is allowed to persist the remainder of that growing season through winter until March 31st to provide early successional habitat.
 3. Additional benefits are gained by allowing the sweet clover to continue to grow during the second growing season as a “green manure” crop. For no-till operations, the sweet clover could be cut for hay or silage after July 15th to protect most ground nesting birds and then herbicide applied to prepare for site for planting of crops.

4. Habitat Management on Existing Grass Stands

- a. Tillage – This technique generally involves the use of a disk to create bare soil within established plant communities. Other tillage implements including field cultivators, rototillers, etc. may produce suitable results depending upon the amount of residue present. In most instances, this technique will require multiple “passes” to be conducted across the treatment area. The following criteria must be used:
- A minimum of 30% bare ground should be exposed following the tillage operation.
 - On sites dominated by aggressive sod-forming grasses, a minimum of 50% bare ground is needed to adequately set-back plant succession and prolong practice benefits.
 - A minimum amount of residue cover of 30% must be maintained on slopes greater than 9% and within 100 feet of streams or permanent water bodies.
 - Apply this technique on the contour where slopes exceed 9% and use the following table to dictate the maximum width of tilled strips allowed separated by a 20 foot strip of undisturbed grassland cover.

Maximum Contour Strip Width Slope%

200 feet	9 to 11
150 feet	12 to 15
100 feet	16 to 20

- Avoid tillage in the following areas to prevent the noted negative effects:
 1. Within 20 feet of streams or permanent water bodies due to possible sedimentation
 2. Within areas of concentrated flow or waterways due to ephemeral erosion concerns
 3. On slopes >20% or sandy soils with an I factor >134 due to erosion potential
 4. Within 50 feet of property boundaries due to weedy growth and neighbor relations
 5. Within 50 feet of public roads due to visual obstruction caused by tall vegetation
 6. On areas with a high risk of colonization by noxious weeds such as musk thistle, Canada thistle, leafy spurge, etc.
 7. On high quality native prairies with significant diversity and few non-native plant species present
- b. Herbicide Application – This technique uses specific applications of herbicides to kill or suppress the established plant community. Any herbicide used must be labeled for this use and all label restrictions must be applied. Cooperators should consult with their local herbicide representative to obtain the exact specifications to be used including type of herbicide, timing, rate, etc.

- c. The table below was obtained from the 2010 Nebraska Weed Management Guide and provides general recommendations for the type of herbicide, timing of treatment, and applications rates for various forms of vegetation to achieve the associated level of control.

Herbicide	Treatment Time ¹	Rate/Acre	Alfalfa	Bluegrass	Red Clover	Smooth Brome	Sweet Clover	Tall Fescue	Warm Season Grasses	Wheatgrass
2,4-D + dicamba [♦]	Spring	1 qt + 0.5 pt	9	1	10	2	10	2	-	-
2,4-D + dicamba [♦]	Fall	1 qt + 0.5 pt	10	1	10	2	10	2	-	-
Gramoxone Inteon	Spring	2 pt	2	5	5	3	3	5	3	3
Gramoxone Inteon	Spring	4pt	3	6	6	4	4	7	4	4
Gramoxone Inteon	Fall	2 pt	3	6	6	4	4	6	-	-
Gramoxone Inteon	Fall	4 pt	5	6	6	5	4	7	5	5
Glyphosate [♦]	Spring	1 qt	5	8	5	4	5	5	4	4
Glyphosate [♦]	Spring	2 qt	6	9	7	6	7	7	7	6
Glyphosate [♦]	Fall	1 qt	6	9	7	6	7	7	7	6
Glyphosate [♦]	Fall	2 qt	7	10	9	8	9	9	9	8
Glyphosate [♦] + 2,4-D	Spring	1 qt + 1 pt	7	8	8	4	8	5	4	4
Glyphosate [♦] + 2,4-D	Spring	2 qt + 1 qt	8	9	9	6	9	7	7	6
Glyphosate [♦] + 2,4-D	Fall	1 qt + 1 pt	8	9	9	6	9	7	7	6
Glyphosate [♦] + 2,4-D	Fall	2 qt + 1 qt	9	10	10	8	10	8	9	8
Glyphosate [♦] + dicamba	Spring	1 qt + 0.5 pt	8	8	8	4	9	5	4	4
Glyphosate [♦] + dicamba	Spring	2 qt + 1 pt	9	9	10	6	10	7	7	6
Glyphosate [♦] + dicamba	Fall	1 qt + 0.5 pt	9	9	10	6	10	7	7	6
Glyphosate [♦] + dicamba	Fall	2 qt + 1 pt	10	10	10	8	10	9	9	8
Gramoxone Inteon + atrazine	Spring	2 pt + 2 lb	5	9	7	7	7	7	3	7

¹ Response ratings assume that old growth is removed before application and 6-12 inches of new growth is present. Soil moisture affects the response. Soil moisture is usually limiting in the fall in western Nebraska. Response ratings assume the addition of AMS and appropriate surfactant. Fall applications to warm-season grasses must be made prior to dormancy, usually before September 15 to October 5, depending on area of the state. Control of warm-season grasses will decrease after a light frost. Fall applications to cool-season grasses may be made through November 1.

Select one of the three following scenarios to address the objectives of this technique:

Control of Aggressive/Invasive Species – This scenario applies to situations where a high level of control is needed to target aggressive sod-forming grasses (i.e. smooth brome). The objective is to kill a significant portion (60% to 90%) of that target species and release any desirable species that may be present within the stand (i.e. native, warm-season grasses, legumes, forbs, etc.).

Suppression/Thinning of Desired Species – This scenario applies to situations where the existing grass species are desirable but need suppressed or thinned to allow for annual broadleaf plants and/or seeded legumes or forbs to establish. The objective is to suppress all existing grass species and kill approximately one third of the stand to allow beneficial annual plants to establish.

Chemical Mowing – This scenario applies to situations where very little control or kill is desired but the current year’s growth is suppressed to allow seeded species to establish and diversity the overall plant community. Some herbicides provide guidelines for “chemical mowing” on the label. This option is not suitable for aggressive sod-forming grasses, such as smooth brome, where control/kill is needed to set-back plant succession.

Recommendations for All Herbicide Applications

- Refer to the current **Guide for Weed Management** published by University of Nebraska. This document will provide general recommendations of the type of herbicide, treatment timing, and application rate for various vegetation types.
- The level of control will be dramatically reduced if appropriate growing conditions do not exist. Refer to the table below for factors that influence the effectiveness of herbicides. Ensure that 6 to 12 inches of new growth is present and that plants are actively growing. To increase efficacy, it is beneficial to harvest hay from or conduct a prescribed burn on the proposed treatment areas several weeks prior to the herbicide application to remove old residual growth and allow for uniform re-growth which will improve effectiveness.

Factors that Influence the Efficacy of Burn-down Herbicides*

Increased Level of Control/Kill	Reduced Level of Control/Kill
Plant is actively growing	Plant not actively growing or dormant
Low amount of residual cover	Excessive dead plant material present
Uniform level of growth	Uneven growth across stand
Moderate to high humidity	Low humidity
Moderate temperatures (70 to 85	Temperature extremes (cold or hot)
Good soil moisture	Dry or saturated soils
Plant trans-locating energy to roots (Fall)	Plant only initiating growth (early Spring)
Light textured soils with low organic	Heavy clay soils or with high organic
Full herbicide rate application	Reduced rate of herbicide application

* Refer to product label for additional information on herbicide use.

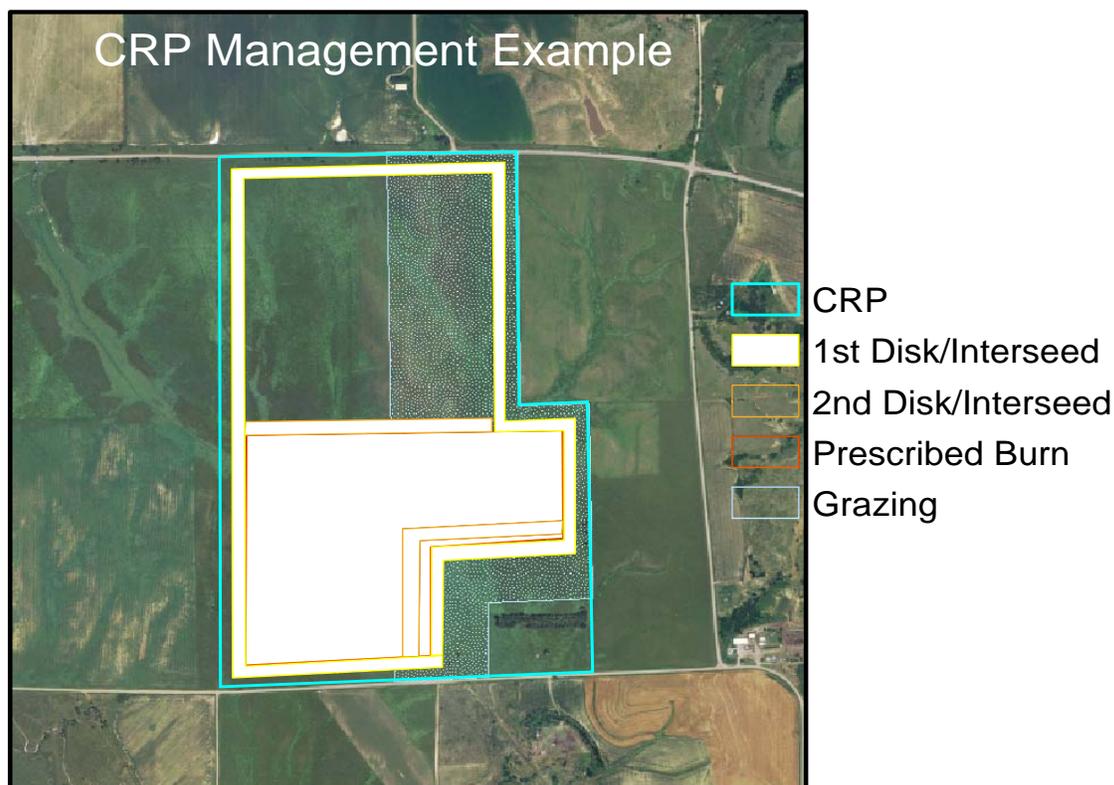
- The following criteria applies when a lower level of control is desired for a given site:
 1. The overall grass stand is weak or not well established due to being relatively young or occurs on soils with low productivity (sands, heavy clay, shallow soils, etc.).
 2. There is a high proportion of desired bunchgrass species (i.e. little bluestem) within the established grass stand providing open areas for new early successional plants to become established.
 3. The site is located in Vegetative Zone I or II where limited precipitation slows plant succession and prolongs benefits from the practice.
 4. The soils are prone to excessive erosion (i.e. >20% slope or I factor >134).
- The following criteria applies when a higher level of control is desired for a given site:
 1. The grass stand consists of a monoculture of aggressive sod-forming grasses (i.e. smooth brome, switchgrass, etc.) with little or no plant diversity or contains a combination of undesired grasses and other vegetation.

2. The site is located in Vegetative Zones III or IV and on highly productive soil types.
 3. The objective is to provide habitat for Northern bobwhite quail which require high levels of bare ground and broadleaf plant species.
- Avoid herbicide application or adjust the application in the following areas to prevent the noted negative effects:
 1. In areas with high forb/legume composition or pockets of native shrub thickets due to the desire to maintain these plant communities
 2. On high quality native prairies with significant diversity and few exotic plant species
 3. Over or near water features such as streams and wetlands due to toxicity to aquatic species, unless the herbicide is labeled for use in those areas
 4. Within 50 feet of property boundaries due to weedy growth and neighbor relations
 5. Within 50 feet of public roads due to visual obstruction caused by tall vegetation
 6. On areas with a high risk of colonization by noxious weeds such as musk thistle
- d. Prescribed Burning – This technique is addressed extensively in the (338) Prescribed Burning standard which should be referenced for details associated with planning and applying that practice. In addition to the information in that document, the following considerations apply:
- Target timing of burns in fall or winter (i.e. September through February) to reduce grass height and density the following growing season and increase forb composition.
 - Generally, burns conducted in late spring just prior to or during green-up, will favor grass species over forbs. However, late April burns, just before or shortly after green-up of warm season grasses and while cool season grasses are actively growing, are useful to target invading cool-season species such as smooth brome in warm-season stands.
 - Use of prescribed burning to remove old growth residue will improve the success of subsequent spring herbicide applications by allowing more uniform growth and earlier green-up of cool season grasses that are targeted for control.
 - Implementation of prescribed burning more frequently than once every three years is not beneficial to overall habitat quality and is only recommended for sites where specific objectives have been identified. Examples may include control of seedling/sapling tree species that re-sprout, seasonal removal of herbaceous cover in shallow, temporary wetland habitats, or providing nesting habitat for a target wildlife species such as mountain plover that requires minimal cover.
- e. Disturbance Grazing – This technique, also referred to as “mob” grazing, involves the use of livestock to conduct high-intensity, short-duration grazing events to the extent that plant succession is set-back by the creation of bare ground and the incorporation of plant litter. Substantial information is available in the (528) Prescribed Grazing standard and associated references and job sheets. In addition to the information available from those sources, the following criteria apply:
- Estimates of available forage production must be made in order to adequately develop recommended stocking rates and timing for the treatment area. These can be estimated using the data from the forage suitability groups or

- the ecological site descriptions. The collection of onsite data including clip and weigh method, species cover transects, etc. is not required but can be used as deemed appropriate.
- Once the production data has been assembled, stocking rates should be prescribed that are approximately two times (2X) the NRCS recommended stocking rate for a period not to exceed 30 days. Animal Unit Months (AUM) will be used to address rate and time.
 - Frequent monitoring of the treatment area to assess site conditions may be substituted for the steps noted above in order to determine when livestock should be removed provided that an adequate stocking rate is applied initially and grazing does not exceed 30 days.
 - The following criteria applies when a lower level of control is desired for a given site:
 1. The overall grass stand is weak or not well established due to being relatively young or occurs on soils with low productivity (sands, heavy clay, shallow soils, etc.).
 2. There is a high proportion of desired bunchgrass species (i.e. little bluestem) within the established grass stand providing open areas for new early successional plants to become established.
 3. The site is located in Vegetative Zone I or II where limited precipitation slows plant succession and prolongs benefits from the practice.
 4. The soils are prone to excessive erosion (i.e. >20% slope or I factor >134).
 - The following criteria applies when a higher level of control is desired for a given site:
 1. The grass stand consists of a monoculture of sod-forming grasses with little or no plant diversity or contains a combination of undesired grasses and other vegetation.
 2. The site is located in Vegetative Zones III or IV and on highly productive soil types.
 3. The objective is to provide habitat for Northern bobwhite quail which require high levels of bare ground and broadleaf plant species.
- f. Haying – This technique, when used alone, does not provide for early successional habitat. However, it can be one component of a larger habitat management project to make it more successful. Examples of where haying is appropriate are listed below:
- Remove excessive vegetation so that tillage operation results in more bare ground
 - Provide for uniform stand of vegetative re-growth to make herbicide more effective
 - Create mowed firebreaks on perimeter of areas where prescribed burning is applied
 - Facilitate seeding of introduced legumes into existing warm season grass stands in Vegetative Zone IV where higher precipitation makes establishment possible
- g. Combinations of Management Techniques
- Typically, the use of two or more habitat management techniques will provide a greater response of the treated plant community and is desired for sites dominated by aggressive, sod-forming grasses including smooth brome, reed canarygrass, etc.

- Example: A field dominated by smooth brome is treated with the following techniques:
- a. Hay harvested between July 15 and August 15 to protect ground nesting birds and provide adequate fall re-growth prior to herbicide application
 - b. Glyphosate herbicide applied with suitable weather to re-growth at applicable rate according to label directions between September 15 and October 1
 - c. Tillage operation (disking) performed in April to suppress any re-growth of smooth brome and create bare soil
 - d. Seed mixture of introduced legumes prior to May 10
- Using multiple combinations of techniques across a contiguous site will also provide added diversity in terms of both species composition and vegetative structure. An example of this approach being used on lands enrolled into the Conservation Reserve Program is shown below. This combination of management techniques should be “rotated” across the site in subsequent years for optimum results.
 - Patch-Burn Grazing is a technique which uses prescribed burning and grazing by livestock in combination. Refer to the (338) Prescribed Burning standard, the (528) Prescribed Grazing standard, and Nebraska Biology Technical Note #79 “Patch Burning: Integrating Fire & Grazing to Promote Heterogeneity” for more information.

Figure 1. The example below is a site enrolled into the Conservation Reserve Program (CRP) and is being managed with tillage and seeding, prescribed burning, and disturbance grazing. Following implementation of the management techniques, portions of the field are left intact without any management applied while others are treated with one or more different treatments. Each of these resulting “micro-habitats” provides unique habitat features to a wide array of wildlife species.



5. Beneficial Annual Plant Species

Following the implementation of management, annual plant species – commonly called weeds, will germinate and occupy the treatment area during subsequent growing seasons. These early successional plants provide the following benefits:

- Produce seeds and insect populations that are consumed by birds and small mammals
- Offer a dietary component with a higher protein content than grass for big game
- Provide an open understory with low stem density to allow movement of young wildlife
- Provide overhead cover that hides young wildlife, especially young upland game bird chicks, and protects them from aerial predators and hot summer temperatures

Table 1. Desirable Early Successional Plants and Preferred Sites

<u>GENUS NAME</u>	<u>COMMON NAME</u>	<u>PREFERRED SITE</u>
<i>Amaranthus</i>	Pigweeds	Uplands/Moist Sites
<i>Ambrosia</i>	Ragweeds	Uplands/Moist Sites
<i>Bidens</i>	Beggarticks	Wetlands
<i>Brassica/Sisymbrium</i>	Mustards	Uplands
<i>Cannabis</i>	Hemp	Uplands/Moist Areas
<i>Chenopodium</i>	Lambsquarters	Uplands
<i>Cleome</i>	Rocky Mt. Beeplant	Uplands
<i>Conyza</i>	Marestail	Uplands
<i>Croton</i>	Texas Croton	Uplands
<i>Digitaria</i>	Crabgrasses	Uplands
<i>Echinochloa</i>	Barnyardgrass	Wetlands/Moist Sites
<i>Galium</i>	Bedstraw	Moist Sites
<i>Helianthus</i>	Annual Sunflowers	Uplands
<i>Iva</i>	Marshelder	Uplands/Moist Sites
<i>Kochia</i>	Kochia	Uplands
<i>Lactuca</i>	Prickly Lettuce	Uplands
<i>Malva</i>	Common Mallow	Uplands
<i>Medicago</i>	Black Medic	Uplands
<i>Melilotus</i>	Sweetclover	Uplands
<i>Oxalis</i>	Yellow Woodsorrel	Uplands
<i>Panicum</i>	Witchgrass	Uplands
<i>Plantago</i>	Plantains	Uplands/Moist Sites
<i>Polygonum</i>	Smartweeds	Wetlands/Moist Sites
<i>Rumex</i>	Docks	Uplands
<i>Setaria</i>	Foxtails	Uplands
<i>Stellaria</i>	Chickweeds	Uplands
<i>Taraxacum</i>	Dandelion	Uplands
<i>Thlaspi</i>	Pennycress	Uplands
<i>Veronica</i>	Speedwells	Uplands

6. Enhancement Seeding with Legumes, Forbs, and/or Grasses

Some sites can be further enhanced following management by seeding legumes, native forbs or, in some cases, even grass species. This may provide for more enduring benefits due to the establishment of desired perennial species within the stand. Refer to (550DP) Herbaceous Vegetation Design Procedures for additional information related to seeding dates, equipment, and other related site preparation and planting factors.

The following criteria and considerations will be used to determine when and how the enhancement seeding option applies:

Requirements for Using the Enhancement Seeding Option

- a. Refer to guidance provided in the Herbaceous Vegetation Design Procedures (550DP) in relation to species/variety selection, seed requirements, seeding dates, equipment, and other factors.
- b. Seeding of legumes and/or forbs following management is required when the existing plant community contains less than 10%, by canopy cover, of desired broadleaf plants.
- c. Sites which receive “high impact” management techniques that either expose 50% or more bare ground or kill 60% or more of the existing vegetation will be seeded with legumes and/or forbs.
- d. Seeding two or more species as a mixture is required in order to provide added diversity and allow species to establish on different micro-habitats within the seeded area.
- e. Only introduced legumes/forbs or aggressive native forbs (i.e. Maximilian sunflower) will be seeded into managed stands of aggressive sod-forming grasses such as smooth brome due to their ability to adequately compete with the established grass.
- f. Introduced species will not be seeded into native prairies to protect the integrity of the site
- g. Seeding rates when seeding into established grass stands will range between 10 and 20 PLS/ft² total to provide best results unless seeding outside this range is justified based on considerations listed below. Use the NE-CPA-8 Job Sheet for Grass Seeding to document species used in the mix, seeding rates, and other relevant information.
- h. Broadcast seeding is only acceptable where the management technique used resulted in significant bare ground (>50%) to allow for adequate seed to soil contact. Recommended seeding rates must be doubled if the seed is broadcast.

Considerations for Using the Enhancement Seeding Option

- a. If the existing vegetation contains the desired plant species in sufficient quantities, seeding may not be necessary. Sites that contain 30% or more legumes or native forbs, by canopy cover, will often respond favorably to a management treatment without additional seeding, except when herbicide applications will eliminate desired forbs.
- b. Native forb species that readily germinate and persist are best suited for seeding into existing, managed stands of native grasses. Existing competition and poor seed bed preparation conditions do not favor native forbs which are difficult to establish. Table 2 below lists several native forbs that are most likely to establish despite unfavorable conditions.
- c. Seeding of grass species is generally not recommended for early successional habitat unless there is a key species or structural component missing from the existing grass stand. Examples might include adding a cool-season grass (i.e. Canada wildrye) to a warm season stand for added diversity or adding bunchgrass species (i.e. little bluestem) to a stand dominated by sod-forming species to create alternative structure.
- d. A greater diversity of seeded species, including diversity of bloom period, flower color and structure will provide additional benefits as pollinator habitat.
- e. In rare instances, seeding rates below 10 PLS/ft² (down to a minimum of 5 PLS/ft²) may be acceptable but will be difficult to implement due to drill calibration for low seeding rates. Likewise, seeding rates above 20 PLS/ft² may be necessary on some sites to accomplish the desired outcome. The following criteria should be used as guidance for determining the proper total seeding rate:
 - Lower seeding rates (at approximately 10 PLS/ft²) are acceptable where the existing cover is less competitive (i.e. warm season, bunchgrass)

communities); where sufficient suppression has been conducted on the existing stand resulting in suitable seed bed preparation; or where a predominance of weedy or volunteer species are desired to establish and occupy the site.

- Higher seeding rates (at approximately 20 PLS/ft²) are necessary where extensive competition from established cover exists; where poor seed bed conditions exist; or where the management technique killed most (i.e. ≥90%) of the existing stand.

Table 2. Legumes and Forbs Suitable for Seeding into Managed Grass Stands

<u>Species</u>	<u>Vegetative Zone</u> ¹	<u>Site Adaptability</u>	<u>Single Species Seeding Rate</u> ²
Alfalfa	Statewide	All Except Wet Sites	2.2 – 4.4
Sweet Clover	Statewide	Aggressive, Moderate Use	1.7 – 3.4
Red Clover	III, IV	Loamy, Fertile Soils	1.6 – 3.2
White Clover (Ladino)	II, III, IV	Avoid Dry, Sandy Soils	0.5 - 1.0
Alsike Clover	III, IV	Moist and Wet Soils	0.6 - 1.3
Birdsfoot Trefoil	IV	Adaptable to Many Sites	1.2 – 2.4
Cicer Milkvetch	I, II, III	High pH, Calcareous Soils	3.2 – 6.4
Sainfoin	I, II	Dry, Calcareous Soils	7.2 – 13.3 *
Small burnet	I	Hardy Perennial, ~Evergreen	3.7 – 7.4 *
Black-eyed Susan	Statewide	Widely Adapted, Short-lived	0.3 – 0.6
Blanketflower	Statewide	Establishes Easy, Short-lived	1.4 – 2.8 *
Coneflower, grayhead	III, IV	Adaptable to Many Sites	0.7 – 1.4
Coneflower, purple	Statewide	Avoid Dry, Sandy Soils	1.9 – 3.8 *
Coneflower, upright	Statewide	All Except Wet Sites	0.6 – 1.2
Coreopsis, plains	Statewide	Moist and Wet Soils	0.3 – 0.5
False sunflower	Statewide	Suitable for Dry Soils	3.6 – 7.3 *
Flax, blue (lewisii)	I, II	Prefers Light Soils	0.7 – 1.5 *
Illinois bundleflower	II, III, IV	Moist Sites (Esp. in VZ II)	3.6 – 7.3 *
Milkvetch, Canada	Statewide	Needs Moist Soils in West	0.9 – 1.7 *
Mint, lemon	Statewide	Annual, Readily Re-seeds	0.3 – 0.6
Prairieclover, purple	Statewide	Widely Adapted Except Sands	1.6 – 3.2
Prairieclover, white	Statewide	Use on Well Drained Soils	1.2 – 2.3
Rocky Mt. bee plant	I, II, III	Annual, Use on Sandy Soils	3.4 – 6.9 *
Showy partridge-pea	II, III, IV	Annual, Easy to Establish	4.3 – 8.7 *
Sunflower, Maximilian	Statewide	Aggressive in East	1.5 - 2.9 *
Western Yarrow	Statewide	Drought Tolerant, Rhizomes	0.2 – 0.4

¹ Refer to Nebraska Vegetative Zones map found in Section I, Nebraska Field Office Technical Guide.

² Rates provided are for pounds of pure live seed (PLS) per acre drilled as a single species. For most species, the range provided is for 10 – 20 pure live seeds per square foot (PLS/Ft²). Species noted with a “*” have a reduced seeding rate of 5 PLS/Ft² to 10 PLS/Ft² listed due to seed size/volume and/or total price making higher seeding rates impractical. Rates will be doubled if a broadcast seeding is used.

Reduce rates proportionately when using two or more species in a mixture

Frequency and Duration of Benefits

Duration of benefits will vary widely depending upon technique used, intensity of application, soil type, weather conditions, and other factors. Frequency of practice application will depend upon the desired objectives for the site and whether a continuous presence of early successional habitat is needed.

- Management techniques which are generally “low impact” include prescribed burning, disturbance grazing, and “chemical mowing” herbicide applications which will typically provide benefits ranging from 1 to 3 growing seasons.
- Management techniques which are generally “high impact” include tillage and herbicide applications designed to kill a significant portion of the existing vegetation which will typically provide benefits ranging from 3 to 5 growing seasons.
- Duration of benefits will be reduced in areas with higher precipitation and on soils with higher levels of organic matter. It will be lengthened in the drier climate of Western Nebraska (Vegetative Zones I and II) and on poor or more erosive soil types.
- Many upland game bird species, including ring-necked pheasant and Northern bobwhite quail, require a portion of their home range to be managed as early successional habitat in order to provide suitable brood-rearing cover.

8. Weed Control Considerations

Refer to Herbaceous Vegetation Design Procedures (550DP) for information on management and protection of plantings during establishment where the enhancement seeding option is used. In addition, consider that expansive weed control efforts including shredding, clipping, herbicide applications, and other methods will reduce or eliminate the effectiveness of this practice. Use the following recommendations to increase the potential for the desired objectives to be attained:

- Avoid implementing the management technique in areas known to have a history of noxious weed infestations. Use less aggressive, low impact management techniques (i.e. disturbance grazing) in these areas rather than high impact techniques such as tillage.
- Control only noxious or extremely invasive species, as identified by Nebraska Department of Agriculture, following the implementation of the management technique. Allow desired weedy species, listed in Table 1, to persist to the greatest extent possible.
- Implement spot treatment weed control in the most heavily infested areas and maintain undisturbed travel corridors wider than 100 feet between habitat areas in close proximity.
- Where possible based on phenology of the target weed species, weed control should be delayed until after July 15th to avoid impacts to ground-nesting bird species.

SUPPORT REFERENCES

NRCS Conservation Practice Standard, Prescribed Burning, Code 338:

<http://efotg.nrcs.usda.gov/references/public/NE/NE338.pdf>

NRCS Conservation Practice Standard, Prescribed Grazing, Code 528:

<http://efotg.nrcs.usda.gov/references/public/NE/NE528.pdf>

NRCS Conservation Practice Standard, Upland Wildlife Habitat Management, Code 645:

<http://efotg.nrcs.usda.gov/references/public/NE/NE645.pdf>

NRCS Nebraska Conservation Planning Form, Job Sheet For Grass Seeding, NE-CPA-8:

[http://efotg.nrcs.usda.gov/references/public/NE/NE-CPA-8\(grass_seeding_jobsheet\).pdf](http://efotg.nrcs.usda.gov/references/public/NE/NE-CPA-8(grass_seeding_jobsheet).pdf)

NRCS Nebraska Herbaceous Vegetation Design Procedures (550 DP):

<http://efotg.nrcs.usda.gov/references/public/NE/NE550DP.pdf>

NRCS Nebraska Forest Stand Improvement Standard (666):

NRCS Nebraska Forest Stand Improvement Design Procedures (666DP):

NRCS Nebraska Wetland Wildlife Habitat Management Standard (644):

NRCS Nebraska Forest Stand Improvement Standard (666):

Nebraska Guide for Weed Management:

NRCS Nebraska Vegetative Zones Map:

Nebraska Biology Technical Note #79 Patch Burning: Integrating Fire & Grazing to Promote Heterogeneity