

TALLGRASS PRAIRIE RESTORATION

CONSERVATION MANAGEMENT SHEET - Biology Series

643



Natural Resources Conservation Service

Michigan



WHAT IS A TALLGRASS PRAIRIE RESTORATION?

Historically, tallgrass prairies were scattered throughout Michigan, with the highest concentrations in the southern portions of the Lower Peninsula. Tallgrass prairies are dominated by tall grasses mixed with forbs or wildflowers. In Michigan, the grasses include Big Bluestem, Indiangrass, Switchgrass, and Little Bluestem.

Tallgrass prairies provide important habitat for a wide range of wildlife species including grassland songbirds, butterflies, moths, and small mammals.

ESTABLISHING TALLGRASS PRAIRIES

Tallgrass prairies may be re-established by planting a mixture of native grasses and wildflowers. The soil and site conditions must be appropriate for tallgrass prairies.

Soils include loamy sand to loam, and moisture regimes range from well drained to somewhat poorly drained soils.

Criteria for Tallgrass Prairie Establishment

1. Native prairie plant communities will be established utilizing seed harvested from existing regional native prairies, or utilizing seed mixes comprised of regional ecotype grasses, legumes, and forbs, developed to reflect 'native prairie' communities as determined suitable for specific site conditions.
2. All seed must be tested for purity and germination.
3. Seed mixes will consist of at least 12 native species. The mixture will be comprised of a minimum 4 grasses and a minimum 8 forbs. At least one forb shall be a legume.

4. The mixture will result in a minimum total of 12 Pure Live Seed (PLS) per square foot.
5. Minimum seeding rates: Constructed mixtures may be developed using Table 2. Minimum grass seeding rate will be 4.0 PLS lb/ac. Minimum forb seeding rate will be 8.0 PLS oz/ac.
6. Species shall be selected from the following sources:
 - An origin within a 200-mile radius of the restoration site.
 - Yellow tag “source identified” plant materials from the nearest available source to the project are preferred. However, Michigan adapted cultivars and ecotypes obtained through commercial seed vendors are acceptable. The use of cultivars should be avoided adjacent to existing native prairie or other sensitive areas. Refer to Table 1 for a listing of allowable native cultivars and ecotypes.
7. Companion crops can be used to reduce the amount of erosion on critical sites by including Canada Wildrye in the mixtures at rates specified in Table 2.
8. Temporary cover crops shall be spring seeded small grains, sudangrass, or millet. Seeding rates are as follows:

SPECIES	RATE	DATE
Oats	1.5 bu/ac	4/1 - 6/1
Barley	1.5 bu/ac	4/1 - 6/1
Sudangrass/Millet	25 lbs/ac	5/15 - 6/10
Annual Ryegrass	25 lbs/ac	8/1 - 9/1

TABLE 1: Recommended Native Cultivars and Ecotypes for Prairie Restoration		
Warm Season Species	Variety	Geographic Zone (see standard 327)
Switchgrass	Forestburg	Statewide
	Shelter	Statewide
	Trailblazer	Statewide
	Southlow	Southern MI
Indiangrass	Tomahawk	Statewide
	Rumsey	Statewide
	Southlow	Southern MI
Little Bluestem	Blaze	Southern MI
	Aldous	Statewide
	Southlow	Southern MI
Big Bluestem	Roundtree	Southern MI
	Bonilla	Statewide
	Bison	Statewide
	Niagra	Statewide
	Southlow	Southern MI

9. Seeding Dates: Spring seeding will favor warm season grasses over forbs, unless forbs have already been cold-stratified. It is important to mow or use herbicides for weed control during the first summer, especially on silt loam or heavier soils.
 - Spring Seeding Dates - Found in Table 1 of Michigan Conservation Cover (327) Standard.
 - Fall Dormant Seeding - Offers an excellent opportunity to establish a diverse stand. Fall seeding tends to favor forbs and there is less competition with other planting activities. Dormant seeding shall be completed after November 1 or when soil temperature at a 2-inch depth is below 50° Fahrenheit to ensure seed will not germinate.

10. Seedbed Preparation and Seeding:

Conventional Tillage - Prepare a fine firm seedbed to a minimum of 3 inches. The seedbed should contain enough fine soil particles for uniform shallow coverage of the seed, as well as contact with moisture and nutrients. If possible, use specialized native grass drills with depth bands designed to handle a wide variety of seed. For conventional drills, as a minimum, cultipack twice before seeding. Cultipack after seeding.

Do not use heavy drills on conventionally prepared seedbeds, as heavy drills tend to sink in the soil and depth control is difficult.

Plant seed between 1/4 and 1/2 inch deep. Some seed may be seen on the surface of the ground after seeding. Tillage should only be used on flatter slopes or in conjunction with erosion control measures.

No-Till - No-till drilling reduces the exposure of the newly seeded site to erosion. A no-till drill must be used to seed these sites. A drill should be selected that can handle a wide variety of seed (fluffy, smooth, large, and small) and low seeding rates. Plant seed to a depth of 1/4 inch.

Use of a herbicide is essential in order to kill existing vegetation. Land that has been in grass for many years usually has a thick residue layer on the soil surface. To allow for the best no-till seedbed, this residue must be removed. Three options are: (1) grazing, (2) mowing with residue removed, and (3) prescribed burn. In the fall, a burndown herbicide can be applied to prepare for a spring no-till seeding. An additional spring herbicide application may be required, depending on plant growth.

11. Weed Control: During the establishment year, use a recommended herbicide or mow weeds after they have reached 12 inches in height. Mow 2 to 3 times, generally on 30 day intervals from the date of seeding. Mow to a 6-8 inch height. Use a rotary mower or remove the clippings so as not to smother the seedlings. This will slow the weeds but won't harm the prairie plants.

The second year, evaluate the stand to determine if weed control is necessary. If it is, use a recommended herbicide or spot mow weeds at a height of 6 inches. If there is enough material for a prescribed burn, this may be an effective method to control weeds.

12. Maintenance: Prairie communities are best managed by the use of prescribed fire. Other management techniques include mowing/haying and prescribed grazing. Periodic management will normally be required to maintain stand vigor and persistence of desired plant species. Management and maintenance activities will generally be restricted to the period defined in the Grassland Activity Dates in the Ecological Specifications of the FOTG.

Do not burn during the growing season within the first 5 years to allow establishment of the forb component. Burning will normally be required every 2-5 years thereafter.

Fall burns and early spring burns tend to favor forbs. Late spring burns provide maximum stimulus to warm season plants and work well to control cool season grasses. Burn when cool season grasses are growing and warm season plants are just beginning to grow.

Woody vegetation control becomes critical in maintaining areas in prairie. Undesirable woody vegetation may be controlled by early spring or fall burning, or cutting/girdling with spot chemical treatment to remove the plant or prevent sprouting.

13. Chemicals used in performing this practice must be federally, state, and locally registered and must be applied in accordance with label directions.

MANAGING EXISTING PRAIRIE STANDS OR REMNANTS

Today, many of our existing tallgrass prairies are degraded or in need of management to restore and maintain the area as a prairie. Following are some management guidelines for restoring and managing existing prairies.

Criteria for Managing Existing Prairies

1. A plan should be developed with specific goals for the prairie and each community in the prairie. Divide the prairie into biological communities. This plan should take into account management needs, problems, alien species, threatened and endangered species, availability of help, and adjacent land use.
2. Treat only small portions of the prairie (fire, mowing, grazing) at any one time. Avoid single universal treatment of a prairie tract so as to avoid extirpation of species and to minimize negative effects on susceptible species. Treatment options include fire, mowing, grazing, chemical treatment, manual removal, and biological control agents.
3. Diversify the treatments which are to be used to maintain or manage each

community in the prairie. Consider the treatment techniques, as well as the time of application for diversification.

4. Maintain control over unwanted woody vegetation and alien species by manual removal, mowing, grazing, chemical treatment, or burning.
5. Reintroduce only native species into the prairie which are adapted to the soils and site conditions.
6. Adjacent lands should be managed to reduce potential negative impacts to the prairie when possible. Maintain a buffer adjacent to the prairie. Control alien invasive species which might spread into the prairie.

CONSIDERATIONS

The management of prairies is based upon the use of natural mechanisms such as fire and grazing that have allowed prairies to develop and survive for thousands of years. Prairies are natural systems which are ever-changing and adapting to changes. It is important to use a combination of mechanisms to maintain a healthy prairie.

Consider the promotion of wildflowers or forbs which are beneficial for nectar-dependent insects such as bees and butterflies.

For other considerations, refer to the 643 Standard, "Restoration and Management of Declining Habitats."

OPERATION AND MAINTENANCE

Control competing vegetation before and after planting. Methods include mechanical weed control, chemical weed control, and mulch weed control. Weed control will be needed a minimum of 3 years after planting.

Control invasive and noxious weeds as needed to ensure a healthy and productive prairie.

In many cases, threatened and endangered species or species of concern will benefit from conservation of declining habitats. Consider the impacts upon both state and federally listed threatened and endangered species. Use the Natural Features Database as the first level of review. Any potential impacts to threatened and endangered species will need to be reviewed with the appropriate federal or state agency.

A restoration project may require many years to achieve the biological diversity that approximates a native habitat. Proper management of the restored area is essential for the restoration to achieve and maintain the full potential of the site for the desired habitat type. As vegetation matures and goes through successional stages, changes in management practices including introduction of new species may be required to maintain and enhance the desired habitat type.

Any use of fertilizers, pesticides, and other chemicals shall not compromise the intended purpose of this practice.

Follow-up habitat assessments shall be performed on a regular basis to assess progress of planned activities.

REFERENCES

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TABLE 2: Recommended Seeding Mixtures for Native Prairie Restoration

Seeding rates are listed in pounds pure live seed (PLS) per acre. All seeds shall be tested by a qualified laboratory and labeled for sale in Michigan as prescribed by the Michigan Department of Agriculture. Additional recommendations may be developed with assistance from a NRCS biologist or other technical organization.

Grasses:

Species	% of Mix	Seeds per Square Ft. (lb/ac)	pH Minimum	Wet Soils <u>1/</u>	Drought Tolerance <u>2/</u>	Flood Tolerance
Big Bluestem	10-50	3.8	>5.5	Yes	Moderate	Good
Indiangrass	10-50	4.0	>5.5	No	Moderate	Moderate
Little Bluestem	10-30	6.0	>5.5	No	Good	Poor
Prairie Sandreed	0-30	6.6	>5.5	No	Excellent	Poor
Canada Wildrye	5-20	2.6	>5.5	Yes	Moderate	Moderate
Switchgrass	0-5	9.0	>5.5	Yes	Poor	Good
Canada Bluejoint	0-5	9.0	>5.5	Yes	Poor	Excellent
Prairie Cordgrass	0-5	3.8	>5.5	Yes	Fair	Excellent

1/ Wet soils are those classified as somewhat poorly drained to very poorly drained.

2/ Droughty soils are those classified as excessively drained.

EXAMPLE: NATIVE GRASS AND FORB MIXTURE

SPECIES	% OF MIXTURE	FULL SEEDING RATE (PLS LB/AC)	TOTAL RATE/ACRE	TOTAL SEEDS/Sq. Ft
<i>Big Bluestem</i>	.30 x	6.0	= 1.8 lb	6.8
Indiangrass	.25 x	6.0	= 1.5 lb	6.0
Switchgrass	.05 x	3.0	= 0.2 lb	1.8
Canada Wildrye	.20 x	8.0	= 1.6 lb	4.2
Little Bluestem	.20 x	6.0	= 1.2 lb	7.2
			6.3 lb	26.0
			PLS OZ/AC	
Maximillian Sunflower			1.0 oz	1.0
Wild Bergamot			0.5 oz	0.6
Purple Prairie Clover			1.0 oz	1.0
Black Eyed Susan			0.5 oz	1.25
Yellow Coneflower			1.5 oz	0.9
Tall Blazingstar			1.0 oz	0.3
Stiff Goldenrod			1.0 oz	1.0
Yarrow			1.0 oz	1.0
Smooth Aster			1.0 oz	1.0
Silky Aster			1.0 oz	0.6
			9.5 oz	8.65

FORBS AND LEGUMES

The following list identifies native forbs and wildflowers beneficial to upland wildlife and native habitat restoration. The list is not inclusive, and identifies those species which are readily available through private vendor seed supplies. Additional recommendations may be developed with assistance from a NRCS biologist or other technical organization.

Species		Value to Wildlife ^{1/}	Seeding Rate PLS Oz/Acre	Seeds Per Square Ft ^{2/}
DRY				
Dotted Blazingstar	<i>(Liatris punctata)</i>	EX	1.0	0.3
Silky Aster	<i>(Aster sericeus)</i>	EX	1.0	0.6
Purple Coneflower	<i>(Echinacea angustifolia)</i>	EX	2.0	0.25
Showy Penstemon	<i>(Penstemon grandifloris)</i>	G	1.0	0.25
Bush Clover	<i>(Lespedeza capitata)</i>	G	1.0	0.25
DRY to MESIC				
Leadplant	<i>(Amorpha canescens)</i>	EX	1.0	0.4
Butterfly Weed	<i>(Asclepias tuberosa)</i>	EX	2.0	0.2
Smooth Aster	<i>(Aster laevis)</i>	EX	1.0	1.0
Heath Aster	<i>(Aster ericoides)</i>	EX	1.0	1.0
Stiff Tickseed	<i>(Coreopsis palmata)</i>	EX	1.0	0.3
Showy Goldenrod	<i>(Solidago speciosa)</i>	G	1.0	1.2
Rough Blazingstar	<i>(Liatris aspera)</i>	EX	1.0	0.3
Compass Plant	<i>(Silphum laciniatum)</i>	G	2.0	0.1
Hoary Vervain	<i>(Verbena stricta)</i>	G	1.0	7.5
Prairie Smoke	<i>(Geum triflorum)</i>	G	1.0	1.0
MESIC to WET				
Rattlesnake Master	<i>(Eryngium yuccifolium)</i>	EX	2.0	0.4
Giant Sunflower	<i>(Helianthus giganteus)</i>	EX	1.0	0.3
Common Ox-eye	<i>(Heliopsis helianthoides)</i>	EX	2.0	0.4
Tall Blazingstar	<i>(Liatris pycnostachya)</i>	EX	1.0	0.3
Yellow Coneflower	<i>(Ratibida pinnata)</i>	EX	1.5	0.9
Golden Alexanders	<i>(Zizia aurea)</i>	G	1.0	0.3
Canada Tick Trefoil	<i>(Desmodium canadense)</i>	G	3.0	0.3
Wild Bergamot	<i>(Monarda fistulosa)</i>	EX	1.0	1.25
WET				
Swamp Milkweed	<i>(Asclepias incarnata)</i>	EX	2.0	0.2
Paniced Aster	<i>(Aster lanceolatus)</i>	EX	1.0	0.75
Boneset	<i>(Eupatorium perfoliatum)</i>	EX	1.0	N/A
New England Aster	<i>(Aster novae-angliae)</i>	G	1.0	1.3
Joe-pye Weed	<i>(Eupatorium maculatum)</i>	G	1.0	2.0
Blue Vervain	<i>(Verbena hastata)</i>	G	1.0	1.0
DRY to WET				
Yarrow	<i>(Achillea millefolium)</i>	EX	1.0	1.0
Maximillian Sunflower	<i>(Helianthus maximiliani)</i>	EX	1.0	1.0
Black-eyed Susan	<i>(Rudbeckia hirta)</i>	EX	1.0	2.5
Stiff Goldenrod	<i>(Solidago rigida)</i>	EX	1.0	1.0
Purple Prairie Clover	<i>(Dalea purpurea)</i>	EX	1.0	1.0

^{1/} EX = Excellent; G = Good

^{2/} Seeds per square foot based on recommended seeding rate.