Conservation Cover (Acre) 327

DEFINITION

Establishing and maintaining permanent vegetative cover.

PURPOSES

This practice may be applied to accomplish one or more of the following purposes:

- Reduce soil erosion and sedimentation.
- Improve water quality.
- Improve air quality.
- Improve soil quality.
- Enhance wildlife habitat.
- Enhance pollinator habitat.
- Manage plant pests.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on lands needing permanent vegetative cover, including those enrolled in reserve programs. This practice does not apply to plantings for forage production, biofuel production, or to critical area plantings.

CRITERIA

General Criteria Applicable to All Purposes

Species shall be adapted to soil, ecological sites, and climate conditions.

Plant species suited for the planned purpose and site conditions. Avoid use of invasive species. See the Invasive Species List published in Section II of the electronic Field Office Technical Guide (eFOTG).

Plant certified seed or source identified seed whenever possible.

Use seeding rates and methods adequate to accomplish the planned purpose.

Use recommended planting dates, methods, and care in handling the seed to ensure that seedlings have an acceptable rate of survival.

Use only viable, high quality and adapted seed or planting stock.

Inoculate legume seed with the proper Rhizobia bacteria before planting. Use two times the recommended rate of inoculants for a first time seeding of Birdsfoot Trefoil.

Use site preparation sufficient for establishment and growth of selected species.

Sow temporary vegetative cover or use other erosion control measures during the establishment period.

Set timing and use of equipment as appropriate for the site and soil conditions.

Manage vegetation, when necessary, by mechanical, biological, or chemical methods; by prescribed burning; or through a combination of the four. Include Prescribed Burning, practice code 338 in the Operation and Maintenance (O&M) Plan if burning is used alone or in combination with the other methods.

Apply all nutrients following the nutrient management requirements found in the eFOTG using criteria in the NRCS Michigan Nutrient Management Standard 590.

Additional Criteria to Reduce Soil Erosion and Sedimentation and Improve Water Quality

No-till seeding methods are preferred where there is potential for severe erosion to occur.

Apply temporary erosion control measures until permanent cover is established. If existing crop residue, sod, or other cover is greater than 40% ground cover (includes residue, strawy manure, or live plants), then a cover crop is not required.

Additional Criteria to Improve Air Quality

In perennial crop systems, such as orchards, vineyards, berries and nursery stock, establish full vegetative ground cover in the alleyway during mowing and harvest operations.

To sequester carbon, plant cover established will result in a positive CO_2.

See species in Table 3 that are deep rooted and fix high amounts of carbon based on a high carbon to nitrogen ratio. While existing stands of Reed Canarygrass do sequester carbon, do not sow new stands of Reed Canarygrass for this purpose as it is considered invasive.

Do not burn cool season grasses to prevent the release of carbon into the atmosphere.

Avoid tillage of grassland when brought back into production. Instead, use herbicides and no-till seeding to preserve the root carbon reserves without fueling the microbial fire that can reduce the long-term carbon pool in the soil (i.e., the stable old organic matter or carbon).

Additional Criteria to Enhance Wildlife Habitat

Plant grasses, forbs, and legumes in mixes to encourage maximum plant diversity.

Consider the benefits of warm season grasses, cool season grasses, and forbs to different species of wildlife when determining which seed mixtures to use (see Managing Michigan's Wildlife: A Landowner's Guide).

Seed Mixtures and Rates

- Use a seeding mixture beneficial for wildlife habitat from Table 4; or a mixture approved for a specific farm bill program, with wildlife considerations; or a mixture developed by wildlife professional that has a minimum of 10-20 grass seeds and 15-25 forb seeds per square foot. Table 5 provides specific examples of those mixes listed in Table 4, including a representative listing of forbs or use the 327 Seed Mixture Estimator found on the eFOTG under Technical tools.

Additional Criteria to Improve Soil Quality

Select plants that produce high volumes of organic material to maintain or improve soil organic matter. Determine the amount of biomass needed using the current soil condition index found in the RUSLE 2 Water Erosion Prediction model found in the NRCS Michigan eFOTG, Section I, Water Erosion Prediction.

Additional Criteria to Enhance Pollinator Habitat

For pollinators, consider mixtures which are dominated by forbs that provide nectar and pollen sources throughout the growing season. See Table 4 for a recommended mixture, and Table 5 for an example of a specific pollinator mix including forbs. Also see Michigan State University-Extension (MSU-E) Bulletin, E-2973, Attracting Beneficial Insects with Native Flowering Plants (2007) for preferred species.

In perennial crop systems such as orchards, vineyards, berries and nursery stock, permanent vegetative cover shall be established and managed according to MSU recommendations for the target species.

CONSIDERATIONS

This practice may be used to promote the conservation of wildlife species in general, including threatened and endangered species.

Where applicable this practice may be used to conserve and stabilize archeological and historic sites.

Consider rotating management and maintenance activities (e.g., mow only one-fourth or one-third of the area each year) throughout the managed area to maximize spatial and temporal diversity.

Where wildlife management is an objective, enhance the food and cover value of the planting by using a habitat evaluation procedure. See the Michigan Biology Tech Note on Wildlife Habitat Evaluation to aid in selecting plant species and providing or managing for other habitat requirements necessary to achieve the objective.

Use native species when available. Consider trying to re-establish the native plant community for the site. However, if a native cover (other than what was planted) becomes established naturally, and this cover meets the intended purpose and the landowner's objectives, the cover should be considered adequate.

PLANS AND SPECIFICATIONS

Prepare specifications for this practice for each site. They shall include, but are not limited to:

- Recommended species.
- Seeding rates and dates.
- Establishment procedures.
- Fertilizer and amendments.
- Pest control.
- Operation and maintenance.

Design seeding methods to protect the soil resource from erosion.

Record specifications using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable approved documentation.

ESTABLISHEMENT OF TEMPORARY COVER

Where planting is delayed because of seed scarcity or the normal planting period has passed, sow one of the following temporary cover crops:

1. Winter Wheat: 1 1/12 Bu/ac
2. Winter rye: 2 Bu/ac
3. Oats: 1 1/2 Bu/ac
4. Annual ryegrass: 10 lbs/ac

To prevent competition with the permanent seeding, mow, till, or spray cover crop to prevent production of seed heads.

Where triazine herbicide or other herbicide carryover is a concern, a bioassay test may be used to determine chemical carryover.

Sow one of the following temporary cover crops when herbicide carryover is present:

1. Forage sorghum: 15 lbs/ac
2. Sorghum-Sudan grass hybrid: 20 lbs/ac
3 Sudan grass: 15 lbs/ac.

For seeding specifications and recommended planting dates, see the NRCS-MI Cover Crop Standard (340) Table 1, Cover Crop Species.

Sorghum species need to be mowed in the early heading stage to prevent seed formation. Forage sorghums, Sudan grass and sorghum-Sudan grass may need multiple mowing to control biomass and seed production.

Residue may be fall tilled in preparation for temporary vegetative cover, leaving a minimum of 40% residue cover.

ESTABLISHMENT OF PERMANENT VEGETATIVE COVER

A. Seeding Dates Listed in Table 1

These are based on long-term averages and may be extended by 2 weeks based on favorable soil moisture and temperatures for seed germination and experience of the local NRCS Conservationist. For Wildflower species, consider planting forbs in the fall after grasses are established. See planting specifications.

B. Fertilizer and Lime Requirements

For cool season grasses and legumes, apply fertilizer according to a soil test taken within the last 3 years. The rate or fertilizer application will follow MSU-E fertilizer recommendations per the MSU Nutrient Management (MSUNM) Computer program or MSU-E soil test results per program code 99 or MSU-E Fertilizer Spreadsheet 6.0. The application rate shall be 100% of the recommended rate per acre of each nutrient for a 2-3 ton yield goal.

Nitrogen is not recommended for forage legumes. For cool season grass plantings, apply 50% of the nitrogen at planting and the remainder after the grass is well established. Apply the recommended rate of lime per acre to raise the soil pH to 6.8 for alfalfa or 6.0 for other legume species. Liming materials should have at least an 80% neutralizing value with 85% passing through an 8-mesh sieve and 25% passing through a 100-mesh sieve. Marl must have a calcium carbonate equivalent of 800 lbs per cubic yard. See MSU-E Bulletin E-471, Lime for Michigan Soils, for more information. For best results, liming materials for legume seedings should be applied 6 months to 1 year ahead of sowing.

Fertilizer and lime are usually not required for establishment of warm season grasses. However, if the soils test low in P (<38 lbs/ac), then apply 50 lbs of phosphorus (P205) per acre at seeding.

C. Seedbed Preparation and Seeding

Control noxious or competing weeds prior to seeding using mechanical or chemical control methods. Weed control is critical for successful establishment of warm season grasses. See the NRCS MI Agronomy Job sheet: Establishing Prairie Grass Buffer Strips for weed control options (eFOTG, Section IV).

For tilled seeding use the following steps. Till the seedbed to a 3-inch depth. Incorporate lime and fertilizer, if needed, during seedbed preparation. Prepare a smooth, friable and firm seedbed to ensure shallow coverage of the seed as well as contact with moist soil and nutrients. Drill grass and legume seed at 1/4-1/2 deep, or uniformly broadcast seed and roll into the seedbed. All broadcast-seeding methods on tilled soils require rolling or cult packing prior to and immediately after seeding. For warm season grasses, a firm seedbed is important. When broadcast seeding, increase the seeding rate by 50%.

For direct drilled seeding, use the following steps. Apply registered herbicides, if needed; according to label directions to control weed competition. Broadcast required fertilizer prior to sowing. A drill designed for no-till planting shall be used to plant seed at a depth of 1/4-1/2 inch. For warm season grasses, drill in a firm seedbed at a maximum depth of 1/4 inch.

When planting into existing stands for stand improvement, chemicals or mechanical equipment may be used to suppress the existing vegetation. Both methods used separately or in combination will provide different levels of control. To reduce competition in sods, use mowing, over grazing or prescribed burning to reduce vegetation that would interfere with chemical applications or planting.

Where tillage is used, adjust the equipment to leave 40-50% of the existing stand.

If chemicals are used, mow in mid-summer (Aug. 1-Aug. 15) and any new growth prior to applying herbicides. Late summer or early fall herbicide applications can provide adequate weed suppression.

Sow grasses and legumes in late summer or early fall by direct drilling or broadcasting and rolling after the dormant seed date. Spring seed at normal seeding dates if planned dormant seedings are not completed.

D. Seeding Rates and Species

Select varieties of grasses, forbs, and legumes based on purpose, soil, and resource concern to be addressed.

Approved seed mixtures and pure stand seeding rates are shown in Tables 1, 2, 4, and 5.

Use Pure Live Seed (PLS), where:

PLS = (% germination +% dormant seed) x % purity

When using a seed calculator, the total recommended seeding rate is between 21 and 55 PLS of grasses and forbs per square foot.

Several general seeding mixes are provided in Tables 1 and 2. General mixes targeted at improving wildlife habitat are provided in Table 4. Specific examples of those mixes, including a representative listing of forbs, are provided in Table 5.

If a legume is used, base selection on pH, soil type, and drainage. A pH of 6.5 or above favors alfalfa or sweet clover. Red, white, crimson, or ladino clover can tolerate a pH of 6.0 or above. Birdsfoot trefoil or alsike clover tolerates a pH of 5.5 or above. Legume species can be substituted based on soil test pH results or lime can be added to meet species need. Where more than 1 ton of lime is needed, delay seeding with legumes for 6 months or until the proper seeding date to improve stand survival. Native wildflowers tolerate a pH range of 5.5-6.5.

Select alfalfa varieties from the latest MSU-E alfalfa variety bulletin found at:

http://web1.msue.msu.edu/fis/

Use only varieties that are winter hardy enough to last 10 years or longer. These are varieties with winter survival index rating for winter-hardiness of 2 or less (on a 1-5 scale with 1 being the most hardy).

Inoculate all legume seed with an inoculant specific for that species. If the seed was pre-inoculated more than 60 days prior to seeding, inoculate again.

E. Seed Quality

Seed quality criteria are met when the seed mix conforms to the following Michigan acts and regulations:

- Act 623 - Field Seed Certification - includes standards for field crop seeds and tolerances for contaminants.
- Act 329 of 1965 - Michigan Seed Law - includes limit on percentages of weed seed.
- Regulation 715 - Seed Law Implementation - lists prohibited and restricted noxious weeds.

OPERATION AND MAINTENANCE

Maintenance practices and activities should not disturb cover during the primary nesting period for grassland species in Michigan. An exception to this restriction may be allowed for periodic burning or mowing but only when such action is necessary to maintain the health of the plant community.

To reduce competition from annual weeds, mowing is encouraged during the establishment period. Annual or spot mowing of the conservation cover stand for general weed control is recommended until it is established.

Control noxious weeds to prevent proliferation in the stand and spreading to adjacent fields.

Maintenance practices and activities shall not disturb cover during the reproductive period for grassland wildlife species as follows:

- First Year (establishment year) - Mow or use approved chemicals to control undesirable plants. Mow high (4-6 inches for cool-season grasses (CSG) and 8-10 inches for warm-season grasses (WSG) to control weeds but prevent damage to the permanent seeding. For CSG, mow between August 1 and August 15, if feasible. For WSG, mow between June 15 and July 15, if feasible. Otherwise mow as needed during the first summer to control weeds and promote growth of target species. Mow weeds that exceed 10 inches during the first year even if it is before the August 1 date.

- After the seeding year, spot mow or spot spray herbicides to control undesirable plants rather than mowing the entire field. When necessary to control weeds in CSG stands, spot mow before April 1 or between August 1 and August 15 to protect nesting and brood-rearing wildlife. If necessary to control weeds in WSG stands, spot mow between June 15 and July 15 to ensure establishment of the stand.

- Annual mowing is not recommended, since it greatly reduces residual wildlife cover through the winter and early spring.

Only those pesticides that are labeled for the specific use will be recommended. Refer to the MSU publications and specific label instructions for guidance on pesticide selection and use.

Use adequate maintenance measures to control noxious weeds and other invasive species. For a list of weeds prohibited by Act 359 of 1941 – Noxious Weeds – see the Michigan Department of Agriculture (MDA) website:

http://www.michigan.gov/mda

To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds shall be done on a "spot" basis to protect forbs and legumes that benefit native pollinators and other wildlife.

If the cover meets the intended purpose and the landowner's objectives, the cover should be considered adequate.

Use of any fertilizers, pesticides, and other chemicals shall not compromise the intended purpose.

Re-establish weak stands due to chemical drift, winter injury, sediment burial, or other injuries.

Treat concentrated flow areas by shaping and seeding if necessary.

Re-seed areas damaged by prolonged flooding during establishment.

Table 1. Seeding Recommendations Based on Proposed Use and Soil Groups

Proposed Use	Depth and Drainage Characteristics of Soils: Deep Well-Drained	Moderately Well Drained	Somewhat Poorly Drained	Organic Soils Poorly Drained
Conservation Buffers	See various conservation buffer standards for seeding information, mixtures and rates.			
Wildlife Habitat	See Table 4 for general wildlife mixes, Table 5 for specific wildlife mix examples, or follow Program requirements			
Erosion Control	3, 9, 10, 11 12, 13, 16, 17	1, 3, 5, 9, 10, 11 12, 13, 16, 17	3, 5, 6, 16, 17	16, 6

Table 1a. Seeding Dates

COOL SEASON GRASSES & LEGUMES - ***WARM SEASON GRASSES & LEGUMES***

Upper Peninsula*:*

- *May 1 - June 1 or July10 - August 1* — *May 15 - June 15*

North 1/2 of Lower Peninsula (N. of US10)

- *April 20 - June 1 or July 15 - August 1.* — *May 15 - June 15*

South 1/2 of Lower Peninsula (S. of US 10)

- *April 10 - May 20 or July 20 - August 15* — *May 5 - June 15*

DORMANT SEEDING DATES - **Statewide** After *November 1 or when soil temperature at a 2-inch depth is below 50 degrees Fahrenheit.*

Table 2. Grasses and Legumes Mixtures (lbs/ac)

Mixtures 1/	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Legumes																		
Alfalfa 2/	6								6	6	6	3	6		6			
Alsike Clover		4					4											
Birdsfoot Trefoil 3/						3												
Ladino Clover				1	2			1				3						
Red Clover			5	3										3				
Cool season grasses																		
Int. Wheatgrass															8			
Kentucky bluegrass						5		2				2.5	2					
Orchardgrass				3			4			3				3				
Red top	6	2												3				
Smooth Bromegrass	2		8		8				6				6					
Timothy								4			4	2.5		3				
Warm season grasses																		
Big bluestem																	3	2*
Indian grass																	3	2
Little bluestem																	2	2
Switchgrass 4/																5	2	2
Wildflowers/forbs																	0.5	0.5
Total lbs./ac/mixture	14	6	13	7	10	8	8	7	12	9	10	11	14	12	14	5	10**	8.5

1/ use long-term winter hardy varieties. 2/ Trefoil needs to be inoculated with rhizobia bacteria @ 2 times the normal rate. 3/ See Michigan DNR publication. *Substitute Switchgrass for Indian grass on hydric soils. **Any combination that adds up to a total of 10 (or lower) total pounds/ac.

Species for Tree Planting	19	20	21	22	23	24
Kentucky bluegrass	5		10			
Orchardgrass				8		
Red Fescue						12
Redtop	2	4				
Timothy					5	
Total lbs./ac/mixture	7	4	10	8	5	12

Table 3. Comparison of Grasses and Legumes for Carbon Sequestering *

Species	Above ground biomass weight lbs./ac	Weight of Roots lbs./ac**	Carbon to Nitrogen Ratio	
Cool Season Grasses			**C:N Ratio*** **	**% N** 1/, 5/
25 Reed Canary Grass 2/	5460-6600	8200-32178	H-M	1.35%
26 Field Bromegrass 1/		3,000-8,000	H-M	-
27 Ryegrass Annual 1/		2,000-8,000	H-M	0.71%
28 Ryegrass Perennial 2/	4000-4200	5039		1.67%
29 Bromegrass, Smooth 1/, 3/ 5/	4200-6600	4,186-6,700	H-M	1.87%
30 Tall Fescue 1/, 2/, 6/	4400-8000	6,500 -13,597	H-M	1.97%
31 Orchard Grass 1/, 2/, 3/	4700-5800	3,900 -10,501	H-M	1.47%
32 Bluegrass Ky 1/, 2/, 3/	3000-4600	3,832 -6126	H-M	2.05%
33 Timothy 1/, 2/, 3/	4400-6600	2,296 -13,449	H-M	1.71%
34 Redtop 1/, 3/		3,000 13,116	H-M	
Warm Season Grasses				
35 Big Bluestem	6000	High		
36 Little Bluestem		High		
37 Switchgrass	6000	High		
38 Indian Grass	6000	High		
Legumes				
39 Alfalfa 1/	5820-9400	4,100	M-L	2.34%
40 Clover Red 1/	3500-4200	2,400	M-L	2.24%
41 Clover Ladino 1/		2,000	L	2.41%
42 Birdsfoot trefoil 1/	4320-6600	2,000	L	2.39%
43 Clover, Sweet 1/	5820-9400	2,000	L	3.61%

* This list is intended for information about the Carbon Sequestering potential of the forage grasses currently found in Michigan.

** Weight of roots is quite variable depending upon age of stand, management of stand, and soil type.

*** H - High, M - Medium, L - Low

1/ MI SCS Ready Reference Pg. 27.

2/ Knoch, Germany. Roots measured to 11.8" deep.

3/ Gist and Smith, Virginia. Stands 3 years old, roots 18" deep.

References - "Forages", Hughes, Heath and Metcalfe, "Grass" 1948 Yearbook of Agriculture.

4/ MI NRCS Grazing Calculator Spreadsheet database 2002.

5/ NRCS AWMFH, 4/92, Table 6-6.

6/ Do not plant reed canary grass, because of its invasive tendencies. Do not plant endophyte infected tall fescue because it may be harmful to cattle and wildlife.

Table 4. General Mixtures for Wildlife Habitat

Mix	Recommended species	PLS lbs/ac
Short-grass Prairie Planting (mesic through dry sites)	Little bluestem	3.0
	Canada wild rye	1.75
	June grass (or appropriate substitute)	0.25
	Forbs (7-20 species)	≥1.0
	Total	6.0
Moderate-height Prairie Planting (wet mesic through dry sites)	Little bluestem	2.0
	Indian grass	1.5
	Big bluestem	0.5
	Canada wild rye	0.5
	Switchgrass	0.5
	Forbs (7-20 species)	≥1.0
	Total	6.0
Tall Grass Prairie Planting (wet mesic through dry sites)	Big bluestem	2.0
	Indian grass	2.0
	Switchgrass	0.5
	Canada wild rye	0.5
	Forbs (7-20 species)	≥1.0
	Total	6.0
Tall Grass Prairie Planting (wet mix)	Prairie cord grass	0.5
	Big bluestem	2.0
	Switchgrass	2.5
	Forbs (7-20 species)	1.0
	Total	6.0
Winter Cover (Not to exceed 10% of the grassland cover)	Switchgrass	5.0
	Total	5.0
Cool Season Grass Mixture	Orchardgrass	2.5
	Timothy	3.0
	Red top	0.5
	Red clover or alfalfa	3.0
	Ladino clover	1.5
	Total	10.0
Pollinating Insect Mixture	Native Grasses	3.0
	Forbs (15-30 species which will provide	2.0
	Total	3.5
Wildlife Biologist Mix * Grasses @ 11-25 seeds per square foot Forbs @ 10-30 seeds per square foot See 327 Seed Calculator	Grasses (2-8 species)	
	Forbs (7-20 species)	

* This Wildlife Biologist is to be determined on a case by case basis by a wildlife biologist or similarly trained individual. For this mix only, seeding rate is determined based on seeds per square foot instead of seeds per unit weight per acre. These mixes may be used for conservation programs. This mix is to be planted to fitted fields or crop stubble.

Table 5. Examples of General Mixtures for Wildlife Habitat

(These examples expand upon the information in Table 4 by including a representative list of specific forbs for each mix. Lists were prepared taking into consideration seed cost and availability as well as flowering time and forb height, and are meant to serve as an example, and not necessarily a recommendation.)

COMMON NAME	GENUS SPECIES NAME	OUNCES/ACRE	APPROXIMATE SEEDS/OUNCE
Short-grass Prairie Planting			
Little bluestem	*Andropogon scoparius*	48.0 (3.0 lbs PLS)	
Canada wild rye	*Elymus canadensis*	28.0 (1.75 lbs PLS)	
June grass	*Koeleria cristata*	4.0 (0.25 lbs PLS)	
Grass Subtotal		80.0 (5.0 lbs PLS)	
* Black-eyed Susan	*Rudbeckia hirta*	3.0	276,000
* Rough Blazing Star	*Liatrus aspera*	0.25	4,000
* Sand Tickseed	*Coreopsis lanceolata*	3.0	60,000
* Sweet Black-eyed Susan	*Rudbeckia submentosa*	0.25	10,750
* Stiff Goldenrod	*Solidago rigida*	1.0	41,600
* Showy Goldenrod	*Solidago speciosa*	0.25	10,750
* New England Aster	*Aster novae-anglia*	0.25	16,500
* Butterfly Milkweed	*Asclepias tuberosa*	0.25	1,075
* Smooth Aster	*Aster laevis*	0.25	13,750
* Purple Coneflower	*Echinacia purpurea*	3.0	19,800
Horsemint	*Monarda punctata*	0.25	22,500
Hoary Vervain	*Verbena stricta*	3.0	84,000
* Round Headed Bush Clover	*Lespedeza capitata*	0.25	2,500
Forb Subtotal		16.0 oz	
MIX TOTAL	TOTAL	96.0 oz (6.0 lbs)	

* Denotes Plateau tolerant species

COMMON NAME	GENUS SPECIES NAME	OUNCES/ACRE	APPROXIMATE SEEDS/OUNCE
Moderate-height Prairie Planting (Plateau Tolerant)			
Little bluestem	*Andropogon scoparius*	32.0 (2.0 lbs PLS)	
Indian grass	*Sorghastrum nutans*	24.0 (1.5 lbs PLS)	
Big bluestem	*Andropogon gerardii*	8.0 (0.5 lbs PLS)	
Canada wild rye	*Elymus canadensis*	8.0 (0.5 lbs PLS)	
Switchgrass (Southlow, Shelter, Forestburg varieties)	*Panicum virgatum*	8.0 (0.5 lbs PLS)	
Grass Subtotal		80.0 (5.0 lbs PLS)	
Pale Purple Coneflower	*Echinacea pallida*	1.0	5,200
Purple Coneflower	*Echinacea purpurea*	2.75	18,150
Gray Headed Coneflower	*Ratibida pinnata*	2.0	60,000
Tall Coreopsis	*Coreopsis tripteras*	.25	3,500
Partridge Pea	*Cassia fasiculata*	3.0	8,100
Round Headed Bush Clover	*Lespedeza capitata*	1.0	8,000
Butterfly Weed	*Asclepias tuberose*	0.5	2,150
Marsh Blazingstar	*Liatris spicata*	0.5	5,500
New England Aster	*Aster novae-anglia*	0.5	33,000
Showy Tick Trefoil	*Desmodium canadense*	1.5	7,250
Iron Weed	*Veronia fasiculata*	0.5	12,000
Stiff Goldenrod	*Solidago rigida*	1.0	41,000
Showy Goldenrod	*Solidago speciosa*	.25	23,750
Early Sunflower	*Heliopsis helianthoides*	1.0	6,300
Forb Subtotal		16.0	
MIX TOTAL		96.0 (6.0 LBS)	

COMMON NAME	GENUS SPECIES NAME	OUNCES/ACRE	APPROXIMATE SEEDS/OUNCE
Tall Grass Prairie Planting			
Big bluestem	*Andropogon gerardii*	32.0 (2.0 lbs PLS)	
Indian grass	*Sorghastrum nutans*	32.0 (2.0 lbs PLS)	
Switchgrass	*Panicum virgatum*	8.0 (0.5 lbs PLS)	
Canada wild rye	*Elymus canadensis*	8.0 (0.5 lbs PLS)	
Grass Subtotal		80.0 oz (5.0 lbs)	
* Evening Primrose	*Oenothera biennis*	1.5	135,000
Foxglove Beardstongue	*Penstemon digitalis*	0.5	65,000
* Greyheaded Coneflower	*Ratibida pinnata*	3.0	90,000
* Showy Tick Trefoil	*Desmodium canadense*	1.0	5,000
* Ironweed	*Vernonia fasciculata*	0.25	6,000
* New England Aster	*Aster novae angliae*	0.25	16,500
* Tall Sunflower	*Helianthus giganteus*	0.25	2,500
* Stiff Goldenrod	*Solidago rigida*	0.25	10,250
* Round Headed Bush Clover	*Lespedeza capitata*	0.5	4,000
* Brown-Eyed Susan	*Rudbeckia triloba*	3.0	102,000
* Sweet Black-Eyed Susan	*Rudbeckia submentosa*	1.0	43,000
* Tall Coreopsis	*Coreopsis tripteris*	.25	3,500
Bergamot	*Monarda fistulosa*	.25	17,500
* Purple Coneflower	*Echinacia purpurea*	3.0	19,800
Culver's Root	*Veronicastrum virginicum*	0.25	200,000
Rosinweed	*Silphium integrifolium*	0.25	300
Compass Plant	*Silphium laciniatum*	0.25	165
Forb Subtotal		16.0 oz	
MIX TOTAL			

* Denotes Plateau tolerant species

COMMON NAME	GENUS SPECIES NAME	OUNCES/ACRE	APPROXIMATE SEEDS/OUNCE
Tall Grass Prairie Planting (wet mix)			
Prairie cord grass	*Spartina pectinata*	8.0 (0.5 lbs PLS)	
Big bluestem	*Andropogon gerardii*	32.0 (2.0 lbs PLS)	
Switchgrass	*Panicum virgatum*	40.0 (2.5 lbs PLS)	
Grass Subtotal		80 (5.0 lbs PSL)	
Bergamot	*Monarda fistulosa*	0.5	35,000
* Tall Coreopsis	*Coreopsis tripteris*	0.25	3,500
* Brown Eyed Susan	*Rudbeckia triloba*	3.0	102,000
* Swamp Milkweed	*Asclepias incarnata*	1.0	4,800
* Swamp Aster	*Aster puniceus*	0.25	20,000
Sneeze Weed	*Helenium autumnale*	1.0	130,000
* Stiff Goldenrod	*Solidago rigida*	0.5	20,500
* Early Sunflower	*Heliopsis helianthoides*	2.0	12,600
* Marsh Blazingstar	*Liatris spicata*	0.5	5,500
Golden Alexander	*Zizia aurea*	2.0	22,000
Culver's Root	*Veronicastrum virginicum*	0.25	200,000
Boneset	*Eupatorium perfoliatum*	0.25	40,000
Blue Vervain	*Verbena hastata*	3.25	302,250
* New England Aster	*Aster novae angliae*	0.25	16,500
Great Blue Lobelia	*Lobelia siphilitica*	0.25	125,000
* Ironweed	*Veronia fasiculata*	0.25	6,000
Joe Pye Weed	*Eupatorium maculatum*	0.25	23,000
Cup Plant	*Silphium perfoliatum*	0.25	350
Forb Subtotal		16.0 oz	
TOTAL			

* Denotes Plateau tolerant species

COMMON NAME	GENUS SPECIES NAME	OUNCES/ACRE	APPROXIMATE SEEDS/OUNCE
Pollinating Insect Mixture			
Little bluestem	*Andropogon scoparius*	32 (2.0 lbs PLS)	
Grass Subtotal		32 (2.0 lbs PLS)	
* Whorled Milkweed	*Asclepias verticillata*	1.0	11,000
Thimbleweed	*Anemone cylindrica*	0.5	13,000
Sneezeweed	*Helenium autumnale*	1.0	130,000
Spiderwort	*Tradescantia ohiensis*	1.0	8,000
* Smooth Blue Aster	*Aster laevis*	0.5	25,000
* Showy Goldenrod	*Solidago speciosa*	0.5	42,500
* Stiff Goldenrod	*Solidago rigida*	.5	20,500
* Rough Blazing Star	*Liatrus aspera*	1.0	16,000
Round Leaf Ragwort	*Senecio obovatus*	0.5	35,000
* Early Goldenrod	*Solidago juncea*	0.25	72,500
* New England Aster	*Aster novae angliae*	0.5	33,000
Mountain Mint	*Pycnanthemum virginianum*	1.0	220,000
* Sand Tickseed	*Coreopsis lanceolata*	2.0	40,000
Hoary Vervain	*Verbena stricta*	0.5	14,000
* Gray Headed Coneflower	*Ratibida pinnata*	2.0	60,000
* Butterfly weed	*Asclepias tuberosa*	2.0	8,750
* Purple Coneflower	*Echinacia purpurea*	2.0	13,200
* Black-Eyed Susan	*Rudbeckia hirta*	2.0	184,000
* Sky Blue Aster	*Aster azureus*	1.0	55,000
Alum Root	*Heuchera americana*	0.25	175,000
Germander	*Teucrium canadense*	0.5	10,000
Golden Alexander	*Zizia aurea*	1.0	11,000
* Sweet Black-eyed Susan	*Rudbeckia submentosa*	1.0	5,000
Foxglove Beardstongue	*Penstemon digitalis*	1.0	130,000
* Round Headed Bush Clover	*Lespedeza capitata*	1.0	8,000
* Heath Aster	*Aster ericoides*	0.5	100,000
Forb Subtotal		24.0 oz	
MIX TOTAL		24.0 oz	

* Denotes Plateau tolerant species