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Establishing and Managing Nesting Cover for Wildlife



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Beginnings — the annual promise of new life. For pheasants, gray partridge, and upland nesting waterfowl and songbirds this promise is too often left unfulfilled. Safe nesting sites have all but disappeared. Join with other Minnesotans as our effort to restore nesting areas takes root.

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Introduction

AN IDEAL LANDSCAPE of protective woody cover, cattail marshes, grain fields, wild haylands, pastures, and grass legume covered retired croplands once existed across Minnesota. This habitat produced a spectacular abundance of wildlife that was as much a part of the agricultural community as grain elevators, livestock and family farms. Many Minnesotans still relish memories of “hundreds of pheasants flushing from a farm grove” or waterfowl flocks “darkening the skies”.

Unfortunately, intensive farming practices and major changes in federal farm policies during the 1960’s combined to dramatically alter the scene. Earlier mowing of alfalfa converted these prime nesting areas into death traps. Soil Bank, a multi-year land retirement and soil protection program, was replaced by annual crop set-asides. The lush grass and legume cover that provided millions of acres of undisturbed nesting cover disappeared.

These trends, fueled by expanding grain exports, gained momentum through the 1970’s. By the end of that decade, millions of acres of wildlife habitat had been converted to row crops. By the mid 1980’s these radical land use changes proved devastating to wildlife. Pheasant populations, for example, plummeted to only 15 percent of what they were in 1960. Many songbird and small mammal populations were similarly affected. Nesting success for upland nesting waterfowl, such as mallards, dropped sharply in many areas.

The demand for grain exports has lessened and the nation is focusing more attention on wise management of our soil, water and wildlife resources. Through programs like the Conservation Reserve and RIM-Reserve, excellent opportunities now exist to restore the habitat so beneficial to wildlife. This booklet is dedicated to the establishment of a vital component of that landscape — upland nesting cover.



Before World War II, Minnesota’s agricultural landscape provided an abundance of food and cover for wildlife.

Types of Upland Nesting Cover

UPLAND NESTING cover occurs in a variety of vegetation types, locations, and sizes. Although vegetation may include both grasses and broad leaf plants, it must provide total screening for both the hen and the nest to be effective.

Areas which provide cover at least 12 inches high are preferred by most wildlife species. Where cover is available mallards and pheasants begin nesting as early as mid-April. Renesting efforts by unsuccessful hens often continues into mid-summer. Adequate cover should be available throughout the nesting season.

In addition, properly managed upland nesting areas often provide brood rearing and roosting cover for upland game and songbirds, as well as prime locations for spring foraging and fawning by white-tailed deer.

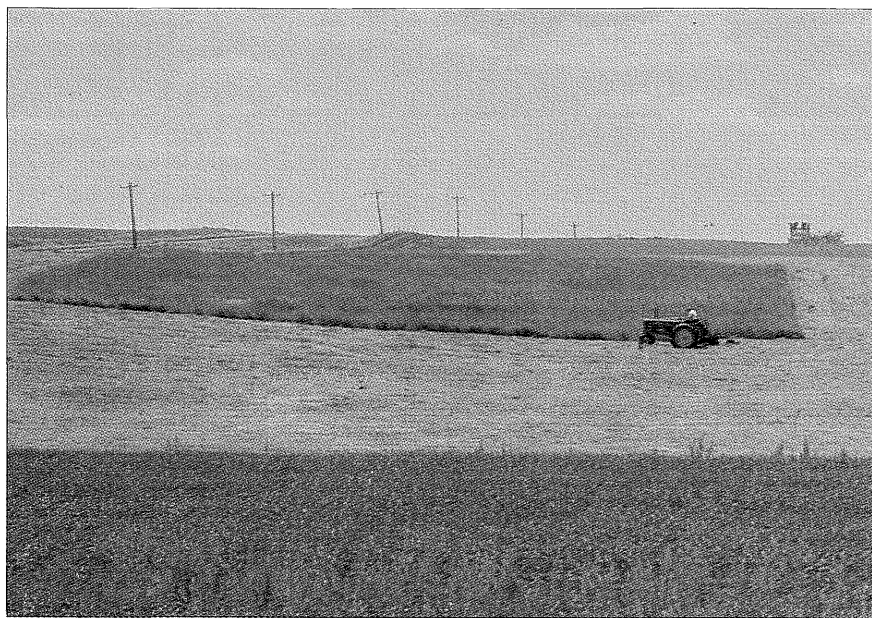
How nesting cover is established and managed depends on the vegetation type, location and size of the area. Following are four basic types of vegetation suitable for a variety of game and nongame wildlife.

Alfalfa

By mid-May, the dense leafy foliage of alfalfa is very attractive to upland nesting wildlife. Prior to the 1960's, farming practices provided ample time for most of these nests to hatch before the first cutting for hay.

Modern farming practices, however, encourage cutting the first crop as early as late May to maintain high protein values and maximum production. Very few hens now have time to bring off a brood before mowing eliminates the cover. In addition, commonly used high speed mowers often kill setting hens as well as exposing nests.

Delaying the first cutting for a few weeks can make a tremendous difference in nest success but also



Alfalfa is very attractive for nesting. Unfortunately May and June mowing makes this preferred cover a death trap to pheasants and waterfowl. Unlike this example, these losses can be reduced by mowing from the inside out.

reduces the quality of forage. Unless disturbance of this dense vegetation can be avoided during the nesting season, alfalfa is one of the most attractive, yet deadliest, types of cover used by nesting wildlife.

Cool Season Vegetation

Cool season grasses and forbs, as their name implies, achieve most of their growth during the relatively cool months of late spring and early fall. Easily established with standard farm equipment, cool season mixtures can provide dense, attractive nesting cover. Maintaining optimum quality, however, may require rejuvenation every 3 to 5 years. While this reduces the permanence of the cover, it allows effective rotation with other farm crops.

Brome grass forms the basis of many cool season mixtures. It is readily available, relatively inexpensive and easy to establish.

Typically mixed with alfalfa and sweet clover, its biggest disadvantage is that it is often flattened by heavy winter snows. Without erect residual cover, it offers little or no cover for early spring nesting.

Other cool season grasses include intermediate and tall wheatgrass. Intermediate wheatgrass develops tall, vigorous growth and a thick sod. It is adapted to a variety of upland soil types.

Tall wheatgrass is similar to intermediate, but grows in clumps rather than a continuous sod. Although it can be established where there is as little as 8 inches of annual precipitation, it does better on wet, poorly drained soils.

Success has not been consistent in developing dense, high quality stands of wheatgrasses throughout Minnesota. Be sure to check with local wildlife or Soil Conservation Service (SCS) personnel on their experiences before investing in major planting efforts.

Warm Season Grasses

The dominant native grasses of Minnesota's prairies were big bluestem, little bluestem, Indiangrass, porcupine grass, prairie dropseed, sideoats grama, switchgrass and prairie cordgrass. Mixed with numerous broadleaf plants, these grasses developed a thick sod with extensive root systems.

Unlike cool season grasses, most of these native prairie species achieve their greatest growth during the warmest months. Natural and manmade fires helped maintain the prairie by reducing competition with woody plants and converting excess plant litter to available nutrients.

A number of warm season native grasses can be established on previously cultivated land to produce dense nesting cover. Although slower than cool season mixtures to get started, they require less long-term maintenance to provide high quality stands. Specialized planting equipment aids establishment of warm season grasses.

Big bluestem, Indiangrass, and switchgrass are available in

commercial varieties that do well in Minnesota. These grasses produce tall, dense stands similar to the natural nesting cover of our native prairie.

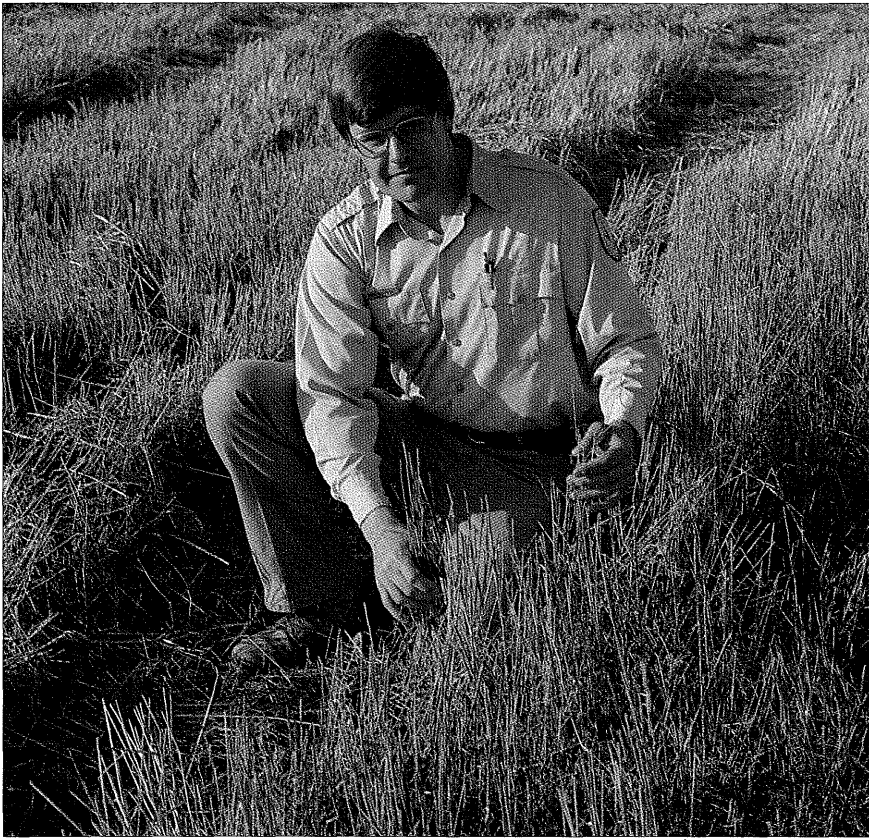
Growing as tall as 6 feet under ideal conditions, big bluestem develops deep root systems. Indiangrass is similar in form, but is somewhat shorter with shallower roots. Switchgrass grows well on most soil types although it does best on moist, deep, fertile soils. Tolerance to pre-emergence herbicides makes switchgrass particularly attractive for establishment on croplands.

All three of these warm season grasses are highly resistant to lodging by heavy snows. The erect residual plants provide vital cover for early spring nesting.

When selecting varieties of warm season grasses for planting, particular care should be taken to choose seed sources adapted to local climate and soil types. Recommendations are available from local wildlife agencies or Soil Conservation Service.

Wildlife Managers promote brome grass and alfalfa plantings on retired cropland because it is attractive nesting cover, easy to establish and provides good brood habitat for pheasant and gray partridge.





Small grain stubble that is not fall plowed and retained over winter provides soil erosion protection.

Small Grains

Small grain fields have probably always provided some sites for upland nesting. Until the introduction of no-till planting, however, fall plowing and spring cultivation eliminated the stubble that provided residual cover for early spring nesting.

The increasing use of this conservation tillage technique has dramatically improved small grain fields for ground-nesting birds. No-till farming also reduces soil erosion, saves fuel and labor, and can be readily incorporated into farm management programs.

Fall planted grains, such as winter wheat and rye, are the most beneficial in providing cover. No-till methods, however, will improve the attractiveness of any small grain. Although nesting densities on these croplands tend to be significantly less than previously discussed vegetation types, the success rate of these nests is quite high.



Native grasses are often established on wildlife, Conservation Reserve, and RIM Reserve lands because it requires less maintenance to retain its vigor and long term attractiveness for nesting cover.



Minimum tillage allows planting without disturbing the grain stubble that provides nesting cover.



Both photos were taken on June 24th in Martin County, Minnesota.

USDA annual cropland setaside programs pay farmers to retire croplands to control the over supply of major crops like corn. These lands could provide an enormous benefit to nesting wildlife if small grain cover crops that are required to control erosion were planted before May 15th (Photo A) and left undisturbed until August 1st. In 1986, 2.5 million acres of corn, oats, barley and wheat lands were setaside in Minnesota at a cost of over hundreds of millions of dollars. Most of the cover crops were planted late and disturbed before July 15th. (Photo B)

Getting Started



Residual cover often provides the only sites for early spring nesters like mallards. Fall mowing to a height less than 12 inches or burning eliminates residual cover.

THE FIRST STEP in providing upland nesting cover is to determine what is needed in your area. Take a close look at what currently exists. How many nesting areas are there? How large are they? How about the quality of cover? And their location?

How Many?

The number of nesting areas needed is difficult to answer. It depends on the size of the areas, the quality of the cover, and the type of wildlife to be benefitted. Waterfowl, for example, should have at least one acre of upland for each acre of wetland. Four acres of upland cover for each acre of wetland is considered ideal.

Pheasants should have at least 30 acres of safe, undisturbed nesting cover per square mile. Nesting areas within a mile of small grain fields provide ready access to these important feeding areas for broods.

How Good?

Effective nesting cover must be tall and dense enough to hide both nest and hen. A simple yardstick can be used to evaluate cover quality. The vegetation should totally block visibility to a height of at least 8 inches when viewed from a dozen feet away.

Remember that many ground nesting birds, particularly mallards and pintails, begin laying in early April. Residual cover from the previous year's growth is the primary source of available cover for these birds. That is why vegetation that is resistant to flattening by winter snows is so important.

Location

High quality nesting cover, wherever it is found, provides important wildlife benefits. However, upland cover near other use areas,

such as wetlands, tend to be the most attractive to ground-nesting wildlife.

Many upland birds, like pheasants, live out their lives in a relatively small area. The most beneficial cover will be within a mile of winter cover, food plots, and small grain fields that provide brood habitat.

Although strips of cover are usually not as effective as solid blocks, roadsides can play an extremely important role in providing nesting sites in intensively farmed areas. Although roadside cover makes up only 2 percent of the land base, its widespread distribution provides the primary source of available nesting cover throughout Minnesota's pheasant range.

Like other areas, the effectiveness of roadsides depends on the quality of cover. Good quality cover along heavily traveled highways is particularly effective because nest predators are less common.

Where There's A Need

ONCE EXISTING nesting conditions have been reviewed, one or more options can be selected to improve local habitat. Worthwhile projects may involve improving and maintaining the quality of existing vegetation or establishing new areas of premium cover.

Improving Existing Cover

The most important factor in improving existing nesting cover is reducing disturbance. Mowing, for example, often occurs on roadsides at the peak of the nesting season. Delaying mowing until after August 1 saves both nests and hens from the cutting bar. Mowing during August will still allow vegetation growth to provide residual cover for the next spring. Any mowing between September 1 and the next spring

should leave a minimum of 12 inches of erect residual cover.

Delayed mowing of alfalfa fields also provides a tremendous boost to ground-nesting birds. Unfortunately, the delay reduces the forage quality of the hay as well. Landowners normally cannot afford this loss on their own. Formulas have recently been developed to measure the loss of quality and convert it to a specific cash value. This provides an opportunity to establish cooperative agreements with willing landowners.

Another common disturbance factor is grazing. Under most conditions the removal of vegetative cover eliminates secure nesting sites. Although grazing can be used as a special management technique to encourage plant diversity and vigor; only when vegetation is allowed to recover to a height of at least 12 inches will nesting hens find the cover attractive.

The value of grassland cover for nesting can be improved by the timing and extent of mowing or other disturbances. Roadsides, for example, should not be mowed before August 1st and after September 1st, except the first eight feet next to the shoulder. If a roadside is mowed after September 1st, it should be clipped high to leave a minimum of 12 inches erect residual cover.





Periodic prescribed burning, once every 4 to 8 years, is an excellent tool to improve nesting cover. Warm season grasses should be burned in late April or early May, while cool season grasses require burning immediately after snow melt.

Like grazing, prescribed burning can be beneficial when used as part of an overall cover management plan. Widespread indiscriminate burning of ditch banks, roadsides and wetlands, however, can be disastrous for wildlife.

Established stands of cool season grasses and legumes often deteriorate in density 3 to 5 years after planting. This occurs as the vegetation becomes sodbound and excessive plant litter develops. Cover quality can be regenerated by several methods.

Burning in very early spring (immediately after snowmelt) or late summer eliminates plant litter and encourages new growth. Mechanical discing or spiking, followed by

harrowing, can restore plant vigor by reducing the effects of crowded root systems. Proper application of chemical fertilizers also encourages new growth.

Warm season grasses also require periodic rejuvenation but not nearly as often as cool season mixtures. Treatment of these stands should be limited to spring burning, short term intensive grazing, or removal of vegetation by haying. The intent is to eliminate excessive plant litter that has built up to the point of choking out live stems. Heavy applications of fertilizers, particularly nitrogen, often promotes the growth of undesirable weeds. The effects of proper treatment of warm season nesting cover should last for 4 to 8 years.

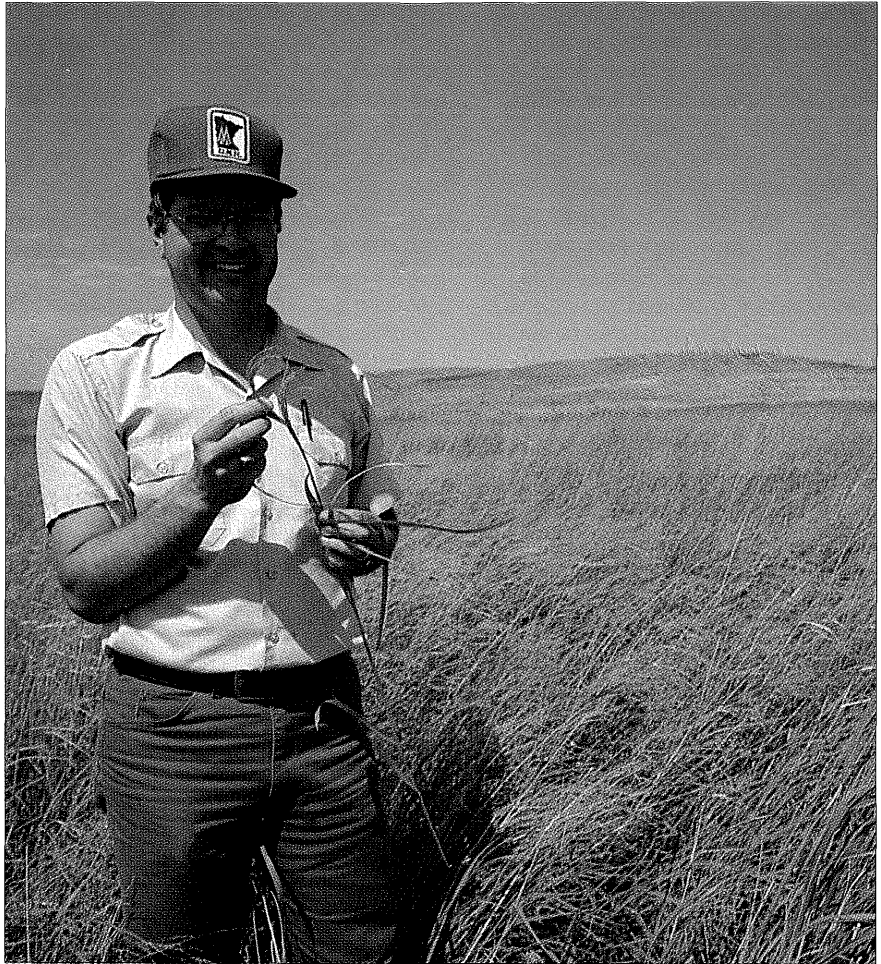
Establishing New Cover

Where no other option exists, new stands of nesting cover will have to be established. Contacts with local landowners and wildlife personnel may yield cooperative projects. Road construction projects, for example, are opportunities for developing high quality cover on areas scheduled for seeding.

Seeded grasslands are a crop just like corn, oats, or wheat. Proper planning and attention to details are necessary to establish good stands. Recently cropped areas are good sites because initial competition with weeds is reduced. Herbicide carryover can be a problem, however, in some situations. Legumes, for example, are particularly sensitive to residual atrazine which is often used on corn fields for weed control.

The choice between cool season mixtures of grasses and legumes or warm season mixtures of native grasses depends on available equipment and management goals. The relative ease of establishing cool season vegetation should be weighed against the reduced need for long-term maintenance of warm season grasses.

The ease of establishing cool season mixtures should be weighed carefully against the reduced maintenance cost of warm season grasses.



A well-tilled seedbed is preferred for planting cool season mixtures. Although not necessary as a nurse crop, a companion seeding of flax, oats, or barley can reduce erosion and help insure an even distribution of the much lighter grass seed through standard drills. If used as a nurse crop, the companion seeding should be at only 1/3 the normal rate. Ideally it should be mowed to a height of 15 inches just as it begins to form seed heads to reduce competition with the desired plants. The nurse crop may be harvested at maturity if the straw is removed as well. However, this may slow development of the permanent stand.

Cool season mixtures can also be

planted in existing sod by first mowing the vegetation as short as possible and then working the top few inches of soil with a disc or rotovator. A Brillion type seeder works best in this situation but others can be used if the site is rolled before and after seeding. Seeding depth should be 1/8 to 1/4 inch.

Cool season plantings benefit from proper applications of fertilizer. Mowing can be used the first year to control noxious weeds, although particularly troublesome areas may require spot control with herbicides.

A firm seedbed is critical in establishing warm season grasses. Relatively level sites can be planted to soybeans for one or two years prior to establishment to firm the soil

and reduce weeds. Warm season mixtures should be planted directly into the soybean stubble the following spring. A firm seedbed can also be provided by using a roller or cultipacker before and after seeding to assure good soil to seed contact.

Seeding most warm season grasses requires the use of special drills designed for handling the light, bearded, fluffy seeds. Examples include the Truax and Nesbit prairie grass drills. However, debearded seeds are becoming more common and do not require the use of these special drills.

Some success has also been achieved by broadcast seeding warm season grasses when a roller or cultipacker is used before and after



Grain drills can be used to seed most of the recommended cool season mixtures. Native grasses, except switch and de-bearded seed, require special drills.

seeding. Recommended seeding rates, however, must be increased by at least 1/3.

Some native grasses, including switchgrass, can be established in existing sod using special seeders such as the John Deere Power Till, Zip Seeder, Haybuster, or tie drills. When planting into existing sod the vegetation should be mowed as short as possible and treated with Roundup at least 7 days prior to planting.

A common mistake is planting the seeds too deep. For proper germination seeds should be within 1/8 to 1/4 inch of the surface.

Warm season stands should be periodically mowed to a height of 8 inches during the first year for weed control. Warm season grasses typically put most of their growth into root systems rather than stem height during this critical period. Straight switchgrass and big bluestem plantings will benefit from treatment with pre-emergence herbicides such as atrazine or simazine. If soil tests warrant the use of chemical fertilizers, appropriate amounts of potassium and phosphorous can be used. Avoid adding nitrogen. Its use tends to benefit weeds much more than the warm season grasses.

Sample seeding rates and planting information for both cool season and warm season mixtures are given in the appendix. All rates are given in terms of pure live seed (PLS). PLS is an expression derived by multiplying the purity of the seed times the germination rate. The label on each bag of seed should provide the needed information.

For example, the tag on a 50 lb. bag of bulk seed might read "80% pure seed, 75% germination". To determine the percentage of pure live seed, multiply the percentage of pure seed by the percentage of germination and divide by 100 ($80 \times 75 \div 100 = 60\%$ PLS). Multiplying the percent PLS times the total weight of the seed (50 lbs.) provides the actual weight of the viable seed available for germination (30 lbs.).

Remember that nesting cover is a crop and requires care not only in

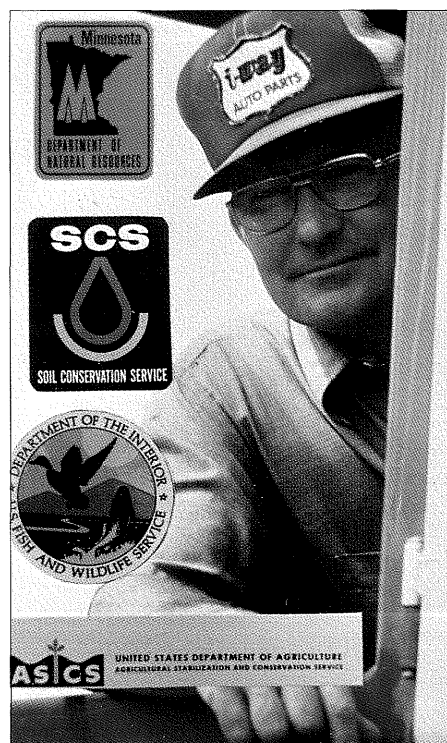
establishment but in long-term maintenance as well. Both cool season and warm season cover should be watched for signs of deterioration. Reductions in stand height and density, as well as in excessive build-up of dead vegetation, are signals that action is needed to restore cover quality.

Proper care and patience are necessary ingredients in providing high-quality nesting cover. The reward is knowing that a properly managed upland nesting area is one of the most important contributions you can make for wildlife in our state.

Need More Help?

For additional information on establishing or maintaining upland nesting cover, contact your local office of the Department of Natural Resources — Section of Wildlife, U.S. Fish and Wildlife Service, or Soil Conservation Service.

Besides additional technical assistance, these agencies often have information concerning cost sharing programs.



*Need more help?
Call your field representative
of the Soil Conservation Service,
Soil and Water Conservation
District or the Section of Wildlife,
Department of Natural Resources.*

Appendix

Note: These are technical standards for the establishment of grassland cover on croplands retired from production under the Conservation Reserve Program (CRP) and the RIM-Reserve Program. It was prepared by the Soil Conservation Service of the United States Department of Agriculture, Soil and Water Conservation Board of the Minnesota Department of Agriculture, Minnesota Department of Natural Resources, the University of Minnesota Extension Service, Minnesota Crop Improvement Association, and United States Fish and Wildlife Service.

Permanent Vegetative Cover for Long Term Land Retirement Programs

I. Definition

Establishment of perennial unharvested vegetative cover to conserve soil and water resources on land retired from crop production.

II. Purpose

To reduce soil erosion; to improve water quality; to create wildlife habitat; and to provide for multiple use.

III. Where Applicable

To all lands entered into long term land retirement programs where it is desirable to establish permanent vegetative cover on all or part of the enrolled acres. This may include areas where woody vegetation will also be planted.

IV. Planning Considerations

- A. Select plant species best adapted to the soils in the field being established to permanent vegetative cover.
- B. Consider the long term land use objectives in selection of vegetative cover species.
- C. Consider the needs of wildlife species.
- D. Consider existing wildlife habitat on land areas surrounding the field being established to permanent vegetative cover.

V. Specifications

All land will be established to permanent vegetative cover as soon as possible after enrollment in the program. Areas where adequate ground cover for erosion control fails to develop or be maintained shall be reseeded during the next seeding period.

A. Temporary Cover

- 1. Temporary cover is required for erosion control and weed suppression when:
 - a. Required seed is not available.
 - b. The normal planting period for the species has passed.

- c. Chemical residues will not allow establishment of cover.
 - d. Other situations approved by the technical agency are present.
2. On fields **without** potential atrazine carryover, seed one of the following small grain crops as soon as possible within the designated seeding period at the normal seeding rate. Minimum seeding rates are:

Crop	Rate	Date
Oats	2½ bu/acre	April 1-Sept. 1
Barley	1½ bu/acre	April 1-Sept. 1
Spring Wheat	1¼ bu/acre	April 1-Sept. 1
Winter Wheat	1¼ bu/acre	April 1-Sept. 15
Rye	1 bu/acre	April 1-Sept. 15

3. On fields **with or without** potential atrazine carryover, seed one of the following crops as soon as possible within the designated seeding period. If 2.0 or more pounds of atrazine (active ingredient) was applied the previous year, one of the following crops will be used.

Crop	Rate	Date
Millet	20 lbs./acre	May 15-Aug. 15
Sudangrass	20 lbs./acre	May 15-Aug. 15
Sorghum-Sudangrass Hybrid	20 lbs./acre	May 15-Aug. 15

4. Temporary cover crops shall be clipped in the boot stage unless otherwise directed in the seeding plan by the technical agency. Spring seeded winter wheat or rye will not require clipping to destroy a grain crop. Clipping may be needed for weed control.

B. Permanent Vegetative Cover

1. Lime and fertilizer — For introduced grasses and legumes, a soil test from the year of seeding or during the two proceeding calendar years is required to determine the need for commercial fertilizer and liming materials.
 - a. The rate of application for commercial fertilizer shall not be less than 75 percent of the recommended rate per acre of each nutrient for a 3-ton yield goal.
 - b. The recommended rate per acre of liming materials shall be used. Liming materials shall be applied and incorporated prior to seeding. Liming materials normally contain a sufficient amount of fines to permit application at seeding time and still obtain an adequate stand of legumes for this program.
 - c. Lime and fertilizer are usually not required for warm season grass species. However, if previous soil test history, current soil test results or the soils inherent fertility is low in phosphorus, apply 50 pounds P₂O₅ per acre prior to seeding.

2. Seeding Dates:

- a. Cool Season Grasses and Legumes:
 - South of I-94
 - April 1-June 1
 - Aug. 1-Sept. 1 (Mixtures 1 thru 4)
 - Aug. 1-Aug. 15 (Mixtures 5 thru 17)

North of I-94
April 1-June 15
Aug. 1-Aug. 20 (Mixtures 1 thru 4)
July 15-Aug. 10 (Mixtures 5 thru 17)

- b. Warm Season Grasses:
South of I-94 — May 15-June 15
North of I-94 — May 15-July 1
Statewide — Dormant seeding after Oct. 15

NOTE: Dormant seedings shall be made into residue from a temporary cover crop, into row crop residues providing at least 70 percent surface ground cover or into standing small grain stubble.

3. Seedbed Preparation

- a. Weed control shall be accomplished by using mechanical and/or chemical control methods. Severe infestations of noxious or any competing weeds will usually require application of an appropriate herbicide. Weed control is critical for successful establishment of warm season grasses.
- b. When seeding most grass and legume species, it is important to have a firm seedbed to provide good seed to soil contact and to insure a proper seeding depth of 1/4-1/2 inch.
- c. Conventional and mulch tillage — Prepare a fine firm seedbed to a depth of 3 to 4 inches. Incorporate lime and fertilizer during seedbed preparation. The seedbed should contain enough fine soil particles for uniform shallow coverage of the seed as well as contact with moisture.
- d. No-till — Apply herbicides according to label directions to kill or suppress existing vegetation and control weeds. Apply broadleaf herbicides at least two weeks prior to applying a contact herbicide and prior to seeding. Broadcast required fertilizer prior to seeding. Use a no-till drill adjusted to provide good seed to soil contact and a planting depth not to exceed 1/2 inch.

4. Seed Mixtures and Rates

- a. See attached Tables 1 and 2 for seeding mixtures and rates for Long Term Land Retirement Programs. All seeding rates are given in pounds Pure Live Seed (PLS) per acre.
- b. Inoculate legume seed before seeding with the appropriate inoculant for the species being seeded. Preinoculated seed may be used but shall be reinoculated if to be used beyond dates specified on the seed tag.
- c. Varieties shall be selected from those listed in the current University of Minnesota Varietal Trials Bulletin or in Tables 3 and 4. Tables 3 and 4 shall be updated annually. Seed used must be labeled in accordance with Minnesota Seed Law, 1983, Sections 21.80 to 21.92 and accompanying rules.
- d. Existing stands of legume or legume-grass mixtures shall be evaluated and a seeding plan developed based on the following guidelines:
 - 1) Alfalfa:
 - a) When existing alfalfa stand is 5 or more vigorous plants per square foot, the stand is acceptable provided weeds (excluding quackgrass) are not a significant component and erosion control is provided. Where weedy species are significant, reestablishment will be required.

- b) When existing alfalfa stand is less than 5 plants per square foot, more than 3 years old and the remaining vegetation is not introduced species, reestablish the stand.

NOTE: When reestablishment is necessary, seed mixtures that include alfalfa may be used if established alfalfa plants are less than 3 years old. When established alfalfa stand is 3 or more years old, use other legume species or a temporary cover for one year.

- 2) Red Clover: Evaluate the grass component. Where introduced grass species make up more than 60 percent of the stand the existing stand may be accepted. All other stands will require reestablishment. Test soil and apply needed lime and fertilizer for reestablishment.
- 3) Sweetclover: Stands will require reestablishment or interseeding with timothy at 5 lbs. per acre using proper interseeding techniques. Test soil and apply needed lime and fertilizer.
- 4) Birdsfoot Trefoil or Crownvetch: Evaluate existing stand for adequacy to control erosion. If stand is not adequate, interseed timothy at 5 lbs. per acre using proper interseeding techniques. Test soil and apply needed lime and fertilizer.

5. Companion Crop

- a. A companion crop shall be used for spring seeded "Introduced Grasses and Legumes" for erosion control and weed suppression. No companion crop is required for late summer seedings but it may be necessary for erosion control and to protect developing seedlings. Companion crop seeding rates shall be:

Oats — 3/4 to 1¹/₄ bu/acre

Barley — 1/2 to 1 bu/acre

Winter Wheat — 1/2 to 3/4 bu/acre (spring seeding only)

Rye — 1/2 bu/acre (spring seeding only)

- b. On highly erodible sites it may be desirable to seed a companion crop with native grasses unless no tilling into 70 percent residue cover or standing small grain stubble.
 - 1) On fields **where** atrazine was used the preceding year use a seeding of millet at 3-4 lbs./acre or sudangrass at 5-7 lbs./acre.
 - 2) On fields **without** atrazine carryover use a seeding of oats at 1/2 to 1 bu/acre or barley at 1/2 to 3/4 bu/acre.

- c. Companion crops shall be clipped after jointing but before heading unless otherwise directed by the technical agency. A second and subsequent clipping are necessary when regrowth provides competition. Clipping height should be above developing seedlings. Where excessive growth has accumulated, the vegetation should be chopped rather than swathed.

C. Vegetative Cover in Woody Plantings

- 1. Fields coming out of corn, soybeans or small grain crops without a grass-legume seeding may need an interim ground cover to control erosion. Suitable seeding mixtures for this purpose include perennial ryegrass (not cereal rye) at 8 lbs./acre or a companion crop as shown in 5.a. above with one of the following:

A) Timothy at 3 lbs./acre; B) Creeping red fescue at 5 lbs./acre; C) hard fescue at 5 lbs./acre; D) Smooth Bromegrass at 5 lbs./acre; E) Orchardgrass at 2 lbs./acre; F) Switchgrass (ND6-965-98) at 4 lbs./acre.

D. Cover Management for Stand Maintenance and Wildlife Benefits

1. The acreage shall not be harvested or grazed by domestic livestock.
2. Reseed areas where stands fail to provide adequate ground cover.
3. Weed Control
 - a. Hand rogue, clip or use approved chemicals to control noxious weeds during the seedling year. Clip high to prevent damage to the permanent seeding and to wildlife nests.
 - b. After the establishment year, spot mowing or spot chemical treatment to control noxious weeds will be used rather than mowing the entire field. Clip high to prevent damage to wildlife nests.
4. Maintenance Mowing
 - a. Complete field annual mowing will not be permitted unless recommended by a technical agency. Periodic mowing may be necessary to maintain stand vigor. Any planned mowing after the establishment year shall be completed during the period August 1-20 to protect nesting wildlife.
5. Control rodent infestations that adversely affect vegetation stands by trapping or accepted use of poison baits.
6. Other management measures that **may** be needed to maintain vegetation stands for erosion control include:
 - a. Top-dress grass stands with nitrogen at 40-50 pounds per acre. In mixed stands where the legume component is 30 + % apply only phosphorus (40 lbs./acre), potash (60 lbs./acre).
 - b. Disk lightly to recycle nutrients and stimulate vigor.
 - c. Prescribed burn on native grasses.

E. Use of Pesticides

Only those pesticides which are labeled for the specific use will be recommended. University of Minnesota current publications and specific label instructions will be used for guidance on herbicide selection and use.

University of Minnesota Publications:

AG-FO-0771 Weed Control in Small Grains
AG-FS-0923 Broadleaf Weed Control in Grass Pastures
AG-FS-No. 28 Weed Control in Grass Seed Fields

Table 1: Introduced Grasses and Legumes
(All Rates Listed in Pounds Pure Live Seed per Acre)

A. For sites with soils classified as moderately well, well or excessively drained:

1) Alfalfa	4 lbs.	2) Alfalfa	4 lbs.
Smooth Bromegrass	8 lbs.	Smooth Bromegrass	6 lbs.
Sweetclover	1 lb.	Orchardgrass	2 lbs.
		Sweetclover	1 lb.
3) Alfalfa	4 lbs.	4) Alfalfa	4 lbs.
Intermediate Wheatgrass	14 lbs.	Intermediate Wheatgrass	7 lbs.
Sweetclover	1 lb.	Tall Wheatgrass	7 lbs.
		Sweetclover	1 lb.
5) Birdsfoot Trefoil	5 lbs.	6) Birdsfoot Trefoil	5 lbs.
Alsike Clover	2 lbs.	Alsike Clover	2 lbs.
Timothy	3 lbs.	Smooth Bromegrass	6 lbs.

NOTE:

- Sweet clover in mixtures 1 through 4 may be deleted and the alfalfa increased by 2 lbs./acre.
- Use mixtures 3 and 4 only in areas where soil pH exceeds 7.0. This will usually be in MLRA's 56 and 102 and the western part of 57, 91 and 103. Where cooperators objective is pasture at the end of the contract period, delete the intermediate wheatgrass in mixture #4 and increase tall wheatgrass to 14 pounds.
- Mixtures 5 and 6 may be used only on areas where the soil pH is below 6.5 and the cost of liming materials is deemed to be excessive.
- In mixtures 1, 2, and 6, reed canarygrass at 5 lbs./acre may be substituted for smooth bromegrass. If smooth bromegrass is not available, substitute reed canarygrass at 5 lbs./acre or timothy at 4 lbs./acre.

B. For sites with soils classified as somewhat poorly or poorly drained or where soil pH is below 6.5 and the cost of liming materials is deemed to be excessive:

7) Birdsfoot Trefoil	5 lbs.	8) Birdsfoot Trefoil	5 lbs.
Timothy	3 lbs.	Alsike Clover	2 lbs.
Alsike Clover	2 lbs.	Reed Canarygrass	5 lbs.
9) Smooth Bromegrass	8 lbs.	10) Birdsfoot Trefoil	6 lbs.
Red Clover	4 lbs.	Smooth Bromegrass	8 lbs.
Alsike Clover	2 lbs.		

C. For sites with soils classified as poorly drained and very poorly drained:

11) Reed Canarygrass	5 lbs.	12) Garrison Creeping	
Birdsfoot Trefoil	5 lbs.	Foxtail	5 lbs.
Alsike Clover	2 lbs.	Birdsfoot Trefoil	5 lbs.
		Alsike Clover	2 lbs.
13) Timothy	5 lbs.	14) Reed Canarygrass	8 lbs.
Red Top	2 lbs.	Garrison Creeping	
Alsike Clover	3 lbs.	Foxtail	7 lbs.

NOTE: Use mixtures 10, 11 and 12 only on wet site conditions.

D. For sites where soil pH is below 5.5 and the cost of liming materials is deemed to be excessive:

15) Birdsfoot Trefoil	5 lbs.	16) Birdsfoot Trefoil	5 lbs.
Red Top	5 lbs.	Reed Canarygrass	5 lbs.
17) Timothy	3 lbs.		
Red Top	5 lbs.		
Alsike Clover	3 lbs.		

Table 2: Native Grasses
(All Rates Listed in Pounds Pure Live Seed per Acre)

A. For deep well drained, moderately well drained, and somewhat poorly drained soils:

1) Switchgrass	5 lbs.	2) Big Bluestem	10 lbs.
3) Switchgrass	2 lbs.	4) Locally harvested prairie mixes may	
Big Bluestem	5 lbs.	be used if tested for purity and	
Indiangrass	3 lbs.	germination. Seeding rates shall be	
		sufficient to seed 30-50 pure live	
		seeds per square foot. (See Table	
		5.)	

B. For shallow and/or excessively drained soils:

5) Big Bluestem or	
Sand Bluestem	2.0 lbs.
Sideoats Grama	2.5 lbs.
Indiangrass	1.5 lbs.
Switchgrass	1.0 lb.
Little Bluestem	1.5 lbs.

If seed is unavailable, up to three species may be substituted from the following list. These species may also be added to the above seed mix. Species added to the approved mixture should be at landowners expense.

6) Prairie Junegrass	1.0 lb.
Prairie Dropseed	1.0 lb.
Hairy Grama	1.0 lb.
Porcupine-grass	2.0 lbs.
Blue Grama	1.0 lbs.

C. Additional seeding mixtures for specific or special situations to develop wildlife habitat may be recommended by a technical wildlife agency. (See Table 5.)

NOTE: Slender wheatgrass and green needlegrass may be added to mixtures 3 at 2-4 lbs./acre each. Western wheatgrass at 2-4 lbs./acre may be added to mixture 3. These options will be applicable in areas where soil pH exceeds 7.0. This will usually be in MLRA's 56, 102, and western parts of 57, 91, and 103. This option will prevent use of atrazine during the seeding year and in subsequent years.

D. More complete prairie restoration, including planting of forbs is encouraged. This enhancement will be generally at the applicants expense. Recommendations should be developed with assistance from technical wildlife agencies. See Table 5 for approved species.

Table 3: Cool Season Grasses and Legumes

- A. Alfalfa — Varieties used shall be classified as Winter Hardy (WH) or Very Winter Hardy (VWH). Varieties may be selected from the 1986 University of Minnesota Varietal Trials Bulletin or the following table. Consideration should also be given to disease resistance. Varieties selected from those listed should exhibit Moderate Resistant (MR), Resistant (R) or Highly Resistant (HR) characteristics to Phytophthora root rot especially on soils that are moderately well drained.

1. Varieties Classified as WH or VWH for 1986

Maverick	Dekalb-Pfizer 120	Milkmaker
Spreader 2	Garst 629	Oneida VR
Agate	Admiral	Perry
Baker	Arrow	Phytor
Dawson	Big 10	Polar II
Garst 636	Blazer	Shield
Iroquois	Centurion	Sparta
Mohawk	Elevation	Surpass
Oneida	Endure	Thorobred
Vancor	Husky	Thunder
Vernal	Impact	Valor
Wrangler	Mercury	Garst 624
Algonquin (Canada)	Marathon	

2. Varieties and Blends Certified by Company as WH or VWH for 1986

Land O'Lakes 340	Keltgen Seed Co.-Salute
540	Lynks Seed Co.-Salute
Conservation Set-Aside Blend	Hoffer Seed Co.-Salute
Premium Seed Co. CRP 211	Cargill Seed Co.-Crown
Sokota Hybrid — Sokota 33	Mallard Seed Co. Super 60-60
Payco Seed Co. — Edge	Super 50-50
PA 600	Super 45-45
PA 500	Super 40-40
Honest John	Super Jade
Stauffer Seeds — Norshire	Seed Tec — Max 85
Cenex — Super 721	Max 87
Pioneer — 5000	9750
DBL	Jacques — Jx 90R
Top Farm Hybrids — TF50	Jx 60R
Pride Seed Co. — Hardy Leaf	Northrup King — 919

- B. Red Clover — Preferred varieties are Arlington, Florex, Prosper I or Lakeland.
 C. Birdsfoot Trefoil — Preferred varieties are Norcen, Empire, Leo or Carroll.
 D. Sweetclover — No designated variety.
 E. Alsike Clover — No designated variety.
 F. Smooth Bromegrass — All smooth bromegrass seed of good quality (purity and germination) are adapted in Minnesota and should be suitable for these programs. Most of the common seed is similar to the Lincoln variety.
 G. Orchardgrass — No designated variety.
 H. Timothy — No designated variety.
 I. Reed Canarygrass — Palaton and Venture are low alkaloid and thus preferred varieties. Flare, Rise, Vantage and Common are also suitable.
 J. Red Top — No designated variety.
 K. Creeping Foxtail — Garrison.
 L. Wheatgrass

1. Tall Wheatgrass — Alkar is preferred. Others may be used.
2. Intermediate Wheatgrass — Oahe is preferred. Others may be used.
3. Slender Wheatgrass — Revenue, Primar or North and South Dakota seed origin.
4. Western Wheatgrass — Rodan, Rosana or North and South Dakota seed origin.

Table 4: Native Grass Recommended Varieties

Species	Variety	MLRA
Switchgrass	'Forestburg' (PM-SD-149)	Statewide
	'Nebraska 28'	90, 91, 102A, 102B, 103, 104, 105
	NDG-965-98	56, 57, 88, 90, 91, 93
	'Summer'	102A, 102B, 103
	'Sunburst'	102A, 102B, 103
	'Pathfinder'	102A, 102B, 103, 104
	'Cave-In-Rock'	103, 104, 105
Big Bluestem	'Bonilla' (PM-SD-27)	Statewide
	NDG-4	56, 57, 88, 90, 91
	'Rountree'	102A, 102B, 103, 104, 105
	'Pawnee'	102A, 102B, 103, 104, 105
	'Champ'	90, 91, 102A, 102B, 103, 104, 105
Indiangrass	'Holt'	56, 57, 90, 91, 102A, 102B, 103, 104, 105
	'Nebraska 54'	102A, 102B, 103, 104, 105
	'Oto'	102A, 102B, 103, 104, 105
	'Rumsey'	102B, 103, 104, 105
	PM-ND-444	56, 57, 88, 90, 91, 102A, 102B
Sideoats Grama	'Pierre'	Statewide
	'Killdeer'	56, 57, 88, 90, 91
	'Trailway'	102A, 102B, 103, 104, 105
	'Butte'	90, 91, 102A, 102B, 103, 104, 105
Little Bluestem	'Camper'	90, 91, 102A, 102B, 103
	'Blaze'	90, 91, 102A, 102B, 103, 104, 105
		Well adapted sources not currently available for Minnesota.
Green Needlegrass	Lodorm, Green Stipa or ND, SD, and MN Common	Statewide
Buffalo Grass	ND or SD Common is preferred. Texoka may be used.	Statewide
Blue Grama	ND or SD Common is preferred.	Statewide

NOTE: Local seed sources of the above species may be used if it has been tested for germination and purity and if the seed origin is within 150 miles north or 200 miles south of your location.

Table 5: Native prairie species that may be approved by a technical agency for planting under the Conservation Reserve and RIM-Reserve Programs.

Grasses

Wet Prairies:

Blue-joint (*Calamagrostis canadensis*)

Mesic Prairies:

Slender wheatgrass (*Agropyron trachycaulum*)

Big bluestem (*Andropogon gerardii*)

Little bluestem (*Andropogon scoparius*)

Side oats grama (*Bouteloua curtipendula*)

Blue grama (*Bouteloua gracilis*)

Hairy grama (*Bouteloua hirsuta*)

Kalm's brome (*Bromus kalmii*)

Northern reedgrass (*Calamagrostis inexpansa*)

Canada wild rye (*Elymus canadensis*)

Sweet grass (*Hierochloe odorata*)

Prairie Junegrass (*Koeleria cristata*)

Stonyhills muhly (*Muhlenbergia cuspidata*)

Richardson's muhly (*Muhlenbergia richardsonis*)

Switchgrass (*Panicum virgatum*)

Indiangrass (*Sorghastrum nutans*)

Cordgrass (*Spartina pectinata*)

Prairie dropseed (*Sporobolus heterolepis*)

Porcupine-grass (*Stipa spartea*)

Green needlegrass (*Stipa viridula*)

Dry Prairies:

Prairie sandreed (*Calamovilfa longifolia*)

Forbs

Wet Prairies:

	NW	SW	SE
White ladyslipper (<i>Cypripedium candidum</i>)	X		
Gentian (<i>Gentiana</i> spp.)	X	X	X
Yellow star-grass (<i>Hypoxis hirsuta</i>)	X	X	X
Rattlesnake root (<i>Prenanthes racemosa</i>)	X	X	X

Mesic Prairies:

Prairie dandelion (<i>Agoseris glauca</i>)	X		
Leadplant (<i>Amorpha canescens</i>)		X	X
Thimbleweed (<i>Anemone cylindrica</i>)	X	X	X
Smooth aster (<i>Aster laevis</i>)	X	X	
Buffalo bean (<i>Astragalus caryocarpus</i>)	X	X	X
Wild indigo (<i>Baptisia</i> spp.)			X
Indian paintbrush (<i>Castilleja</i> spp.)	X	X	X
Tickseed (<i>Coreopsis palmata</i>)		X	X

	NW	SW	SE
Plains larkspur (<i>Delphinium virescens</i>)	X	X	
Rattlesnake master (<i>Eryngium yuccifolium</i>)			X
Prairie smoke (<i>Geum triflorum</i>)	X	X	X
American licorice (<i>Glycyrrhiza lepidota</i>)	X		
Maximilian sunflower (<i>Helianthus maximilianii</i>)	X	X	
Long-leaved bluets (<i>Houstonia longifolia</i>)		X	
False boneset (<i>Kuhnia eupatorioides</i>)		X	
Blazing star (<i>Liatris</i> spp.)	X	X	X
Prairie lily (<i>Lilium philadelphicum</i>)	X		X
Yellow flax (<i>Linum sulcatum</i>)	X	X	X
Puccoon (<i>Lithospermum</i> spp.)	X	X	X
Lobelia (<i>Lobelia</i> spp.)	X	X	X
False gromwell (<i>Onosmodium molle</i>)	X	X	X
Lousewort (<i>Pedicularis</i> spp.)	X	X	X
Beard-tongue (<i>Penstemon</i> spp.)	X	X	X
Prairie clover (<i>Petalostemum</i> spp.)	X	X	X
Prairie phlox (<i>Phlox pilosa</i>)	X	X	X
Tall cinquefoil (<i>Potentilla arguta</i>)	X	X	X
Indian breadroot (<i>Psoralea esculenta</i>)		X	
Mountain-mint (<i>Pycnanthemum virginianum</i>)	X		
Compass plant (<i>Silphium laciniatum</i>)			X
Bird's-foot violet (<i>Viola pedatifida</i>)	X	X	X
Alexander (<i>Zizia</i> spp.)	X	X	X
Death camas (<i>Zygadenus elegans</i>)	X	X	X

Dry Prairies:

Pasque flower (<i>Anemone patens</i>)	X	X	X
Silky aster (<i>Aster sericeus</i>)	X	X	X
Purple coneflower (<i>Echinacea angustifolia</i>)		X	
Loco-weed (<i>Oxytropis lambertii</i>)		X	
Silvery scurf-pea (<i>Psoralea argophylla</i>)	X	X	

