



# Minnesota Practice Implementation Guide Biological Herbaceous Weed Control 528

Natural Resources Conservation Service (NRCS)  
Minnesota

Practice Code 528  
May 2016

## **Definition**

Biological Herbaceous Weed Control is the reduction or removal of broadleaf plants including those that are invasive, prohibited and noxious, accomplished primarily by ruminant species browsing and trampling. For Biological removal of woody plants see Biological Brush Management.

## **Purposes**

The practice is used to manage unacceptable levels of invasive, prohibited, or noxious broadleaf plants in farmsteads, pastures, and rangeland to promote desirable plant growth and plant communities. In addition the practice may facilitate management of pastures and rangeland, provide forage for livestock, reduce erosion, increase water infiltration, and improve wildlife habitat. The practice can be used to manage unacceptable concentrations of invasive species such as garlic mustard, spotted knapweed or other plants listed in the Minnesota DNR invasive plants list.

## **Conditions Where Practice Applies**

On native and naturalized pastures, rangeland, wildlife lands, and other lands where herbaceous broadleaf plants need to be removed to restore or create the desired plant community. Sheep and goats prefer browsing herbaceous species over other kinds of forages making them well suited to Biological Herbaceous Weed Management. Other species with some capacity to browse weeds are cattle and bison.

## **Criteria for Herbaceous Weed Management with Sheep**

### **Estimating Herbaceous Weed Canopy**

Herbaceous weed canopy estimates will be obtained by using the Line Transect Method and other methods in The NRCS National Range and Pasture Handbook, Chapter 4. Identify target species for control and management and estimate concentration and location. Use clipping and other methods to determine standing biomass for use with forage balance sheets.

### **Beginning threshold:**

The canopy of herbaceous species will exceed 25%, averaged throughout the targeted area. Localized infestations that could negatively impact sensitive features such as unique native plant communities also constitute a threshold. If brush canopy exceeds 25% use the Biological Brush Management Jobsheet for guidance.

### **Minimum Defoliation:**

For control: all target species will have at least 80% leaf removal.

### **Method/Implementation**

Use weed canopy estimates to develop defoliation strategy. Identify concentrations of herbaceous weeds on an aerial photo. Develop a forage balance sheet to determine carrying capacity.

### **Recommended Method Table for Weed Control**

<b>%Forbs</b>	<b>%Grass</b>	<b>%Brush</b>	<b>Species</b>
>25		>25	Use Brush Management Methods
	>75		Use Prescribed Grazing
>25		10-25	Goats and Sheep
25-40	60-75	0-10	Cattle, Sheep, Goats

### **Weed Reduction Strategies**

#### **General Guidelines**

Start grazing early in the growing season to defoliate the target species multiple times. Don't allow target species to develop seed heads. Combine with other control methods (fire, mowing, herbicides) if needed. Concentrate livestock to maximize impact and regraze target species when new leaves develop to weaken the plants. Hair sheep consume more herbaceous weeds than wool sheep. Nursing ewes, nannies, and growing lambs and goats may need supplemental feed and their body condition will be monitored to detect loss or gain of body condition.

#### **Localized Infestations**

Where the target species tend to be concentrated into smaller areas within a larger management unit, identify the area with the largest species concentration of the target species and apply the most grazing pressure there using portable fence. Defoliate to remove a minimum 80% of leaves. **Estimate size of paddocks initially by stocking one mature sheep or goat per acre for each percent of herbaceous weed cover. Use forage balance sheet from Prescribed Grazing to determine stocking rates for other species.** Adjust paddock sizes up or down by noting days it takes to achieve full defoliation. Move animals to the next paddock and repeat. **When the initial paddock leafs out again, regardless of where the animals are in the rotation, bring them back to the initial paddock to defoliate again. Change stocking rates up or down to adjust for conditions.** Continue this until all paddocks have weeds killed or suppressed to 80% defoliation. Killing weeds will require repeated browsing. Maintenance should be applied in future years as needed.

#### **Example:**

*Determine the recommended method to use on a pasture that has a 30% infestation of garlic mustard with 5% brush. From the Recommended Method Table above cattle, sheep and/or goats may be used. The initial stocking rate for sheep and goats, sheep alone or goats alone is 30 mature sheep per acre with an assumed average weight of 150 pounds.*

## **Target Species Evenly Distributed**

Where the target species is distributed evenly across the control area a two paddock switchback system can be used. Start when leaves first emerge. Stock with enough goats or sheep to achieve at least 65% defoliation in 30 days. Move goats to the second paddock and defoliate to at least 65%. Repeat process until both paddocks have been defoliated to a minimum of 65%. ***Use same starting stocking density as for localized concentrations of target species, one goat or sheep per acre per each percent of weed cover. Add cattle based on projected forage balance sheet.*** Adjust stock density up or down as needed to achieve defoliation goals.

## **Herbaceous Weed Management Strategies**

Where the goal is to maintain herbaceous weeds as part of a grazing system, use the Prescribed Grazing Standard 528.

## **Considerations**

### **Undesirable or potentially poisonous to all species:**

Horse nettle (poisonous), perilla mint, wooly croton, buffalo burr, Switchgrass (may cause photosensitivity), alsike clover (may cause liver damage) Garden Iris, Holly, Morning Glory, Wild Cherry, Yew, Oaks, and Mountain Laurel.

### **Fence:**

Use the Minnesota Conservation Practice Standard Fence (382) for construction specifications for goat and sheep boundary fencing options when permanent fences are desired. Perimeter fences need to be 6 or more wire high tensile electrified fence. Woven wire fences with an electric offset wire may also be used. Woven wire alone or high tensile fence with a minimum of three electrified wires are used for permanent interior fence. Voltages between 4000 and 7000 volts are recommended for electric fence to contain goats. Portable electric net fences can substitute for permanent fences and are commonly used, especially for contract grazing.

### **Watering:**

Goats, sheep and cattle eating dry forages will need approximately 2 gallons of water per day per hundred pounds of body weight. Cattle will require this amount of water or more. Goats may need no supplemental water when fresh forage is abundant, as is the case early in the growing season in the first day that goats are placed in a paddock that is managed to be defoliated within 4 days. Water intake will increase as lush vegetation availability decreases. Lactating does and ewes will consume more water than other classes. Cattle and sheep will have higher water requirements than goats. Plan to supply 2 gallons per hundred pounds body weight per day.

### **Supplemental Feed**

If goats and sheep are browsing intermediate preference species they may need supplemental energy or protein, particularly if they are young, growing animals or lactating. Mature dry nannies or mature

wethers may be able to cope short-term with intermediate preference browse without supplementation. The herder needs to monitor the body condition of the animals frequently (no less than once per week).

## **Multi-species Grazing**

Where the invasive plants are a mix of woody and forb species, a combination of goats and hair sheep, with the percentage of each livestock species by daily DMI being reflective of the percent cover of each type of invasive, can be successfully managed together, or in leader-follower browsing. Likewise, if the invasive community is a mix of invasive herbaceous weeds and grass, goats with hair sheep, or goats with cattle, or goats with horses would be an ideal mix for controlling the invasive plants. Sheep are susceptible to accumulated copper toxicity, thus treatment of sheep with Molybdenum following exposure to high-copper mineral designed for goats or cattle is recommended.

### **Guard Animals or Protection:**

Goat and sheep need protection from predators such as bears, wolves, coyotes and domestic dogs. The extent of protection depends on the concentration of predators. Means of protection include multi-strand, high tensile electrified fence with sufficient wires located near the potential point of intrusion and a minimum charge of 5000 volts. Dogs, Llamas, and donkeys may be used to guard sheep and goats. A tightly enclosed predator proof area to place sheep and goats overnight may be required depending on location and predator concentration

## **Biological Herbaceous Weed Management Plan**

Client:	Date:	Planner:
County:	Location:	Contract #:

### **Plan Objectives**

Determine whether the goal is to alter the plant community or eradicate invasive species. Identify the desired species composition.

### **List Target Herbaceous Weed Species:**

#### Herbaceous Weed Control Plan Details

Management Unit Name	Pasture/Management Goal	Acres	Target Species	Percent Herbaceous Weed Cover	Stocking Density
Example	Weed Eradication	1.75	Garlic Mustard	30	20 sheep and 10 goats/acre

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Attach aerial photo labeled to show named management units. Management units will be defined by similar weed cover and concentration. On aerial photo show existing and planned fences, pipeline, watering facilities, and environmentally sensitive features (if applicable). Locate concentrations of invasive species. Identify desirable species. List target species and identify whether the goal is species eradication or changing the plant community.



### Livestock Inventory

Example

Kind/Class Animal	Number	Average Weight	Total Weight Group
Ewes	20	150	3000
Lambs	30	50	1500

### Planned Livestock

Kind/Class Animal	Number	Average Weight	Total Weight Group

## Livestock Watering Plan

Estimate daily water use by animals and describe how water will be delivered. Formula for estimated daily water use is 2 gallon per hundred pounds of body weight.

### Example

Kind/Class	Number	Ave. Body Wt.	Group Wt.	Est. Water Need
Ewes	20	150	3000	60
Lambs	30	50	1500	30

Kind/Class	Number	Ave. Body Wt.	Group Wt.	Est. Water Need

## Sensitive Features Plan

Describe the sensitive features (riparian areas, sinkholes, threatened and endangered species, steep areas, droughty soils, etc.) Locate them on the plan map and describe how they will be managed.

Management Unit	Sensitive Feature Type	Management Recommendations

## Management Considerations

When weather is colder than 40F and rain is predicted, goats need shelter. Describe in the plan how goats will be protected from cold, rainy conditions. Dry goats can handle up to -30F without wind or rain, but need shelter if temperatures are below 20F with wind. Goats cannot be outwintered with simple windbreaks like beef cattle or wool sheep. Describe in plan how goats and other livestock will be wintered on site if applicable. Describe how and where supplemental feed will be provided if applicable.

## Monitoring Plan

Describe how the animal impact will be monitored and list criteria to move animals.

Management Unit	Management Objective	Action	Monitoring Frequency
Example	Remove 80% of leaves on all garlic mustard.	Remove animals once objective has been reached	Daily

## Monitoring Report

The monitoring report describes the results of observations and measures progress implementing the plan. Monitor herbaceous weed grazing daily. Observations will include the estimated percent of weed defoliation by species, any resource concerns in sensitive features, and any health issues in the grazing animals. The monitoring report will include data on species composition before the animals are turned out and when they are removed each year. See sample monitoring report below.

Date	Management Unit	Observations	Action
6/15	P1	Animals have removed around 50% of the garlic mustard leaves from the concentrated area.	Keep animals in 1D until 80% of garlic mustard leaves have been removed.

Submit monitoring reports each year with monitoring results and a final monitoring report that describes the species composition and percent defoliation of each management unit.

## Practice Specifications Approval and Completion Certification

***NRCS Review Only***

**DESIGN INSTALLATION AND LAYOUT APPROVAL:**

Designed By:	Date:	Job Approval Authority (JAA):
Checked By:	Date:	Job Approval Authority (JAA):
Approved By:	Date:	Job Approval Authority (JAA):

**LANDOWNER/OPERATOR ACKNOWLEDGES:**

- a. They have received a copy of the specifications and understand the contents including the scope and location of the practice.
- b. They have obtained all necessary permits and/or rights in advance of practice application, and will comply with all ordinances and laws pertaining to the application of this practice.
- c. No changes will be made in the installation of the job without prior concurrence of the NRCS.
- d. Maintenance of the installed work is necessary for proper performance during the life of the practice. The practice life is \_\_\_\_\_.

**I have reviewed all specifications and agree to install as specified:**

Landowner/operator name  (type or print):		
Landowner/operator Signature:		Date:



**RECORD OF COMPLETION AND CHECK OUT CERTIFICATION:**

Treated Acres:	Date Completed by Client:	Date Certified:	Approver's Initials:

**CERTIFICATION STATEMENT:**

I certify that implementation of this conservation practice is complete, meets criteria for the stated purpose(s), and meets the NRCS conservation practice standard and specifications.

NRCS Signature:	Date:	Job Approval Authority (JAA):
Notes:		

**References**

National Range and Pasture Handbook: NRCS, Grazing Lands Technology Institute, 2003

Using Goats to Control Invasive Species ; Nolden, Cherrie; University of Wisconsin, Madison

Targeted Grazing Handbook; University of Idaho;

Prescribed Grazing with Goats; NRCS; Conservation Practice Information Sheet; IS-mo528-  
gg;2005