

# NEBRASKA TECHNICAL NOTE

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## PROCEDURES USING TARGETED GRAZING – INVASIVE PLANT MANAGEMENT

### BACKGROUND:

Targeted grazing is the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals. For management of invasive or noxious plants, livestock are used to suppress unwanted plants and enhance desired ones. This practice is used in conjunction with an integrated pest management plan which is applied as part of a Resource Management System (RMS). Integrating elements of a prescribed grazing plan are also involved.



### ELEMENTS REQUIRED IN A TARGETED GRAZING PLAN:

A targeted grazing program for weed control requires planning and documentation that includes:

- a clear statement of the objective
- site inventory
- kind of animal
- a description of the timing of grazing
- rate of grazing necessary to suppress troublesome plants and maintain healthy landscapes
- monitoring plan to evaluate the effects of targeted grazing.

The targeted grazing prescription should:

- 1) cause significant damage to the target plant;
- 2) limit damage to the surrounding vegetation;
- 3) be integrated with other control methods as part of an overall landscape management strategy

### Forming the Resource Objective:

It is important that a clear objective be quantitatively or qualitatively defined when using targeted grazing practices to control an unwanted plant. The objective should be defined with the following minimum parameters:

- The degree or amount of control desired by the treatment
- The desired condition and/or trend of the plant community following treatment
- Anticipated timeframe to achieve the objective.

**Site Inventory**

A site inventory will include both a physical inventory and resource inventory of the area to be grazed. It will include the following information on either a map or in a narrative or combination of both:

- Boundary of the area to be treated
- Soil Mapping Units
- Ecological Site/Range Site
- List of plants targeted for defoliation
- List of desirable plants (key species) to maintain
- Excluded areas
- Water sources or facilities
- Presence of poisonous plants
- Topographic limitations

The inventory should yield a list of plants that will be grazed/browsed. Plants targeted for removal must be described and the presence of poisonous plants identified. Desirable plants, key plant species, or groups of plant types such as grasses in general, must also be identified and the limitations to their defoliation or damage described.

Some common poisonous plants in Nebraska are listed below. Poisonous plants are often a component in areas infested with other weedy species. The site inventory should identify these plants before animals are introduced and either removed, fenced or mitigated. Reactions to toxins in poisonous plants can vary between kinds, class and age of livestock, and amount of plant or plant part consumed.

Toxic Plant Species	Toxic compound	Animal Species
Arrowgrass	Hydrocyanic acid in leaves	All
Deathcamas	Toxic alkaloids throughout all plant parts	All
Dwarf milkweed	Glycosides and resinoids	Cattle & sheep
Lambert crazyweed	Locoine throughout all plant parts	All
Larkspurs	Toxic alkaloids throughout all plant parts	
Nebraska lupine	Toxic alkaloids, particularly fruit and seeds	Cattle and sheep
Poison hemlock	Alkaloids throughout all plant parts	All
Riddell groundsel	Alkaloids esp in young leaves	All, esp cattle & horses
Showy milkweed	Glycosides and resinoids	Cattle & sheep
Water hemlock	Cicutoxin, esp in roots and stalks	All
Chokecherry	Hydrocyanic acid	All

**Selecting the Appropriate Animal**

Select the livestock species that most readily consumes the plant targeted for control. Because of inherent dietary differences, herbivores are classified into three broad groups:

Herbivory Class	Livestock Kind	Preferred Diet Selection		
		Grasses (%)	Forbs (%)	Shrubs/Trees (%)
Grazers	Cattle	65-75	20-30	5-10
Browsers	Goats	20-30	10-30	40-60
Intermediate feeders	Sheep	45-55	30-40	10-20

Multi-species grazing uses two or more species to graze the same piece of ground, not necessarily at the same time. This practice may help restore balance to ecosystems by encouraging more even distribution of utilization over all forage species. Forage availability should be sufficient to balance livestock needs for each animal species

Animal age, sex, body condition, stage in production cycle, and tolerance to secondary plant compounds will all affect the foraging behavior. The maintenance of animal health and productivity when applying targeted grazing can be achieved when the following points are considered:

- Introduce animals to new plants gradually
- Do not starve animals to force them to eat a particular plant
- Provide supplements when appropriate
- Time grazing to maximize nutritional benefits and minimize toxicity
- Provide adequate water
- Manage stress in livestock movement and containment

There may be an opportunity for disease transmission to wild bighorn sheep populations when using domestic goats or sheep for vegetation control. Refer to recommendations provided in Nebraska Biology Technical Note 81 for guidance on how to avoid these potential conflicts.

### **Timing of Grazing Treatments**

Grazing treatments should be timed when the target weeds are most susceptible to damage by grazing and when they are most palatable to livestock. Plants are generally most susceptible to grazing when they have started flowering until they begin to form seeds. The basic goal of targeted grazing is to give the desired plants a competitive advantage over the target plant or plants.

Generally, forbs are most susceptible to grazing when they are initiating flower production or “bolting.” Native desirable forbs and grasses may also bolt or begin flowering at the same time as weeds, making them equally susceptible. Targeted grazing requires close observation and intensive management to reduce this effect. Altering the season of use in a comprehensive prescribed grazing plan so that desired species are not grazed year after year when they are most susceptible may reduce seed production by weeds and reduce long-term harm to desired species.

Woody plants are most susceptible when they are re-sprouting, or initiating new growth. Mechanical, chemical, or prescribed burn treatments on re-sprouting woody plants can precede or be followed by targeted grazing to suppress the new growth and further weaken the plant.

Perennial grasses are most susceptible to grazing while in the boot stage. Graze annual grasses to limit seed stalk production and help reduce the seed bank in the soil and decrease plant density in the plant community over time.

Table 1. Lists some grazing and browsing guidelines for the targeting grazing of some common invasive and/or noxious plants in Nebraska:

TABLE 1. Grazing and Browsing Guidelines for some Common Nebraska Invasive Plants							
Plant Classification	Plant Species	NWMA Status		Palatability by Animal Species			Growth Stage for Grazing Treatment
		Noxious	Watch List	Cattle	Sheep	Goats	
GRASSES	Phragmites			H	NP	NP	Graze from initial growth through boot stage. Remove 80-90% of top growth. Re-graze new sprouts, removing top growth to prevent flowering and seed set.
	Caucasian Bluestem		X	L	L	NP	
	Reed Canarygrass			H	NP	NP	
	Smoothbrome			H	M	L	
	Cheatgrass			H	H	H	
	Other exotic annuals			H	M	L	Flash graze to remove biomass, decrease plant density and prevent seed set. Graze before plants turn purple
FORBS	Leafy Spurge	X		NP	H	H	Graze before flowering and seed set. Remove 95% of top growth. Re-graze new sprouts.
	Amur Honeysuckle		X	NP	L	L	Graze initial spring growth to achieve 95% stem defoliation. Re-graze new sprouts.
	Whitetop		X	L	L	L	Graze before flowering. Palatability is low for all livestock classes.
	Dame's rocket		X	NP	L	L	Graze young growth early in season to reduce biomass and prevent flowering and seed production.
	Crown Vetch		X	M	H	H	
	Sericea Lespedeza		X		M	H	
	Poison Ivy			NP	L	H	
	Garlic Mustard		X	NP	M	M	
	Scotch Thistle		X	L	H	H	Graze when rosettes are green, through vegetative stage. Remove 80-90% of top growth. Re-graze new sprouts, removing top growth to prevent flowering and seed set.
	Musk Thistle	X		L	H	H	
	Canada Thistle	X		M	H	H	
	Plumeless Thistle	X		L	H	H	
	Knapweeds	X		M	M	H	Graze in rosette or bolted stage before seed set.
SHRUBS & TREES	Russian Olive			L	M	H	Graze when trees are young, (< 6' tall) or to girdle larger trees. Graze to remove biomass, young plants, and young stems. Winter grazing period may be preferred by goats on eastern red cedar.
	Eastern red cedar			NP	M	H	
	Autumn Olive		X	L	M	M	
	Honey Locust			NP	L	H	
	Salt Cedar	X		NP	M	H	
	European buckthorn		X	L	M	H	Graze initial spring growth to achieve 95% stem defoliation.
	Multiflora Rose		X	NP	M	H	
	Smooth Sumac			NP	M	H	

**Intensity and Frequency of Grazing Treatments**

Two or more grazing treatments during a grazing season are often needed to suppress undesirable plants. Rest previously grazed areas at least 4 weeks during the growing season to allow desired plants to re-grow leaf material and build up root mass. Reintroduce targeted grazing to the site when desirable plants have completed seed production and while the target species are still bolting and flowering in response to the earlier grazing treatment.

This can be achieved by concentrating or enclosing animals in relatively small areas until defoliation objectives are met. Stock densities are dependent upon palatability of species and season of use. Initial recommended stocking densities for various animal species are listed below. These recommendations will need to be adjusted timely to achieve the target plant objective. This may involve moving animals frequently in a day or a week, depending on the size of the enclosure, stock density, rate of defoliation of the target plant, and rate of utilization or damage to non-target vegetation.

Animal Species (mature)	Approx AUE	Recommended Initial Stock Density (AU's/ac)	Approx # animals/ac	EXAMPLE of TARGET PLANT
Cattle	1.0	5-8	5-8 cows	Phragmites
Sheep	.20	8-10 AU's/ac	40-50 sheep	Leafy spurge
Goats	.15		55-65 goats	Russian olive

The targeted grazing plan will include planned defoliation values of the target plant as well as planned defoliation limits for desirable plants. Selection of a desired key plant species can help in evaluating timing and movement of animals to new target areas.

A number of consecutive years of targeted grazing treatments are generally required for effective invasive plant control. A minimum of three years should be planned if targeted grazing is the only treatment method planned. If other treatment methods are integrated into the Pest Management Plan such as an herbicide, mechanical or prescribed burn treatment, then subsequent treatments using targeted grazing can be reduced.

**After Treatment Management**

After the target plant has been reduced to an acceptable level, grazing may be applied at a lower stocking rate (fewer animals) and/or less frequent schedule as part of a prescribed grazing plan. Grazing treatments alone are unlikely to achieve complete eradication of a target species. Annual scouting for the target plant, long-term monitoring of the site, integrating other pest management treatment practices as needed, and a solid conservation plan for managing grazing on lands for improved health and condition will all help achieve the objective of reducing or controlling invasive plants.

**Monitoring**

The treatment area will need to be monitored with an initial set of photo monitoring points as well as either a quantitative or qualitative estimate of target plant density (# plants or stems/acre), composition of the target plant in the community (%), canopy cover percentage, or other unit of measurement. Utilization should be observed frequently throughout the treatment and the end result documented with a photograph and the value recorded in the plan. Document the monitoring plan on *Grazing Lands Monitoring Plan and Key Area Documentation, NE-ECS-8* or an equivalent. Refer to Nebraska Range and Pasture Technical Note 16, *Minimum Standards for Nebraska NRCS Photo-Point Monitoring* for guidance on using photo points.

**REFERENCES**

*Targeted Grazing: A Natural Approach to Vegetation Management and Landscape Enhancement* American Sheep Industry Association, 2006.

<http://sheepindustrynews.com/Targeted-Grazing/>

*Nebraska Poisonous Range Plants*, EC-85-198, Reese and Moser, University of Nebraska Cooperative Extension Service

National Range and Pasture Handbook, USDA-NRCS, 2006:

<http://www.glti.nrcs.usda.gov/technical/publications/nrph.html>

*Biological Vegetation Control Using Goats*, Brann, DRAFT Agronomy Tech Note #27, USDA-NRCS, 2006

Noxious Weeds of Nebraska, the Nebraska Weed Control Association:

<http://www.neweed.org/noxiousweeds.htm>

Grazing Plans for Goats, USDA-NRCS, Oklahoma.

Prescribed Grazing Design Procedures, USDA-NRCS, Nebraska, 2006:

<http://efotg.nrcs.usda.gov/references/public/NE/NE528DP.pdf>

Brush Management Design Procedures, USDA-NRCS, NE-TG Notice 592, Section IV, Nebraska, 2007: <http://efotg.nrcs.usda.gov/references/public/NE/NE314DP.pdf>

Pest Management Standard, USDA-NRCS, NE-TG Notice 552, Section IV, Nebraska, September, 2004: <http://efotg.nrcs.usda.gov/references/public/NE/NE595.pdf>

Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems; Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford; USDA CARS Jornada Experimental Range, University of Arizona Press, Tucson, AZ, 2005

Monitoring Plan and Key Area Documentation, NE-ECS-8, USDA- NRCS, Nebraska, 2007: [http://efotg.nrcs.usda.gov/references/public/NE/NE-ECS-8\\_Grazing\\_Lands\\_Monitoring\\_Plan\\_&\\_Key\\_Area.pdf](http://efotg.nrcs.usda.gov/references/public/NE/NE-ECS-8_Grazing_Lands_Monitoring_Plan_&_Key_Area.pdf)

Minimum Standards for Nebraska NRCS Photo-Point Monitoring, Nebraska Range and Pasture Tech Note 16, 2006:

[http://efotg.nrcs.usda.gov/references/public/NE/NE\\_TECH\\_NOTE\\_16.pdf](http://efotg.nrcs.usda.gov/references/public/NE/NE_TECH_NOTE_16.pdf)

Pest Management Plan- Biological Control, Targeted Grazing, NE-CPA-39, USDA-NRCS, Nebraska, May, 2008: [http://efotg.nrcs.usda.gov/references/public/NE/NE-CPA-39\(pest\\_management\\_jobsheet\).pdf](http://efotg.nrcs.usda.gov/references/public/NE/NE-CPA-39(pest_management_jobsheet).pdf)

Weeds of Nebraska and the Great Plains, Stubbendieck et al Nebraska Department of Agriculture, 1994.

Davison, J. et. al. Livestock Grazing Guidelines for Controlling Noxious Weeds in the Western United States, EB-06-05, University of Nevada Cooperative Extension: <http://californiarangeland.ucdavis.edu/Publications%20pdf/CRCC/Livestock%20Grazing%20Guidelines%20for%20Noxious%20Weeds.pdf>