

## Information on Applied Herbivory (with a focus on using goats)

**Applied Herbivory** = strategic application of livestock forage consumption to achieve specific vegetation management objectives

- Also known as: controlled grazing; prescribed grazing; targeted grazing
- ◆ Domesticated livestock can be used to mimic natural disturbance regimes as a substitute for the role of historical wild herbivores
- ◆ A useful option when conventional methods aren't suited or are cost-prohibitive
- ◆ Herbivory application uses: high elevation grassy bald maintenance; agroforestry; fire fuel reduction; wetland restoration; non-native plant management; pasture reclamation

### **Selecting Appropriate Livestock**

- ◆ Management objectives best determine most suitable choice of livestock
- ◆ Grazers will only consume grass and forbs whereas browsers will also consume woody-stemmed vegetation
  - Grazers: Cattle, Sheep, Horses
  - Browsers: Goats, Deer
- ◆ Highly domesticated livestock breeds are typically easier to manage but may not perform as well

### **Pros to Applying Cattle:**

- Don't mind walking in water and heavily hydrated soils so can be effectively applied within very wet areas
- In addition to consuming forage, cattle also break up rhizome mats

### **Cons to Applying Cattle:**

- Avoid dense shrubs
- Heavy body size of cattle (avg. 300 – 1800 lbs.) can result in erosion and soil compaction even during short-duration applications
- Can degrade water quality through bank erosion and comparatively high level of nutrient loading from manure

### **Benefits of using Goat Herbivory Applications**

- Goats will browse above eye level
- Goats have a dietary preference for woody-stemmed vegetation
- Goats are undeterred by thorns & dense shrub layers
- Dexterity and small body size of goats is advantageous to vegetation management on steep slopes
- Goats are less likely to pollute natural water sources than other livestock due to aversion to walking in water
- Goats can climb
- Goats have a light footprint on the land (Average adult domestic goat body weight: 45 – 150 lbs.; Average lifespan 10 – 15 years)
- Goats aerate and fertilize the soil
- ◆ As multi-functional livestock capable of producing milk, fiber, and meat in addition to providing a simple solution for weed regulation in a variety of communities including sensitive ecosystems, domestic goats present an advantageous option to land and livestock managers with diverse objectives.

◆ Employing domestic goats as a mechanism to control invasive vegetation decreases the spread of nuisance species as well as heavy herbicide applications while increasing the use of existing grazing resources

### **Types of Herbivory Applications**

- ◆ Intensive application: Short duration ( $\leq 1$  month); Moderate to high stocking density
  - Appropriately used on sites with disproportionately high percent cover of target vegetation
- ◆ Sustained application: Duration of 30+ days; Low to moderate stocking density
  - Best for maintaining vegetative community structure

### **Suggested Livestock Stocking Density per Acre**

◆ Site-specific stocking density prescriptions are crucial to achieving mgmt. goals and to avoiding unintended consequences of the application

◆ General ballpark for intensive applications:

- Cattle: 1.5 - 2.25 per acre
- Goats/Sheep: 10 - 15 per acre

◆ Appropriate stocking density is highly dependent on:

- the structure and composition of the vegetation community
- the site dynamics such as hydrology and topography
- the extent to which each individual animal's body weight differs from the LU standard

{Livestock Unit (LU): common unit of measurement based on a proportional relationship between metabolic body size of domesticated herbivore and forage consumption requirements}

◆ Typical goal of intensive application: to eradicate target plants in 2 - 4 years through multiple applications of herbivory using applications approximately 14 - 30 days in duration

### **Applied Herbivory and Effectual Non-native Invasive Plant Management**

◆ Requires overgrazing of target vegetation, where continuous, repetitive defoliation that depletes the stored energy reserves in the root systems, coupled with stem damage, occurs for the duration of the project

### **Strategic Planning and Monitoring are Keys to Successful Goat Herbivory Applications**

◆ Applications of domestic goat herbivory can be systemized to avoid significant impact to the native plant community through:

- frequent progress monitoring during the application period
- the initiative to remove the goats from the site immediately following successful defoliation of the target plants

◆ Potential negative impacts of herbivory applications (namely excessive nutrient input and water quality degradation) can be mitigated by using low stocking densities and/or short-duration applications

◆ Record keeping provides a measure of progress toward meeting objectives as well as a trend analysis

**Factors Influencing Cost:** Personnel/labor expenses, required equipment, duration of application, complexity of project objectives, site topography and access, abundance of target vegetation, vegetation community dynamics, number of goats applied, availability of resources

◆ Total cost is dependent on contributing expenses and is often a factor of the magnitude of the overhead associated with the project

◆ Applied herbivory is typically more economical than chemical treatments overall due to the heightened labor expenses associated with chemical applications

### **KD Ecological Services Applied Herbivory Program**

◆ KD Ecological Services:

- Local company supplying successful applied herbivory treatments in western North Carolina
- Dedicated to environmentally sound practices, evidence-based management planning, and animal welfare
- Prescribes site-specific goat stocking densities
- Provides strategic project planning and oversight of herbivory applications
- Collects detailed records on each herbivory application including pre-/interim/post- application datasets and replicable multi-point photo documentation

◆ Regular goals of KDES goat herbivory applications:

- To reduce non-native invasive plant abundance
- To arrest vegetation community succession

◆ Frequent target species: kudzu, multiflora rose, Chinese/European privet, Japanese honeysuckle, bush honeysuckle, oriental bittersweet, autumn-olive, tree-of-heaven, red maple, blackberry, garlic mustard

◆ Current KD Ecological Services Goat Herds:

Primary (Permanent) Herd

- 15 goats: 6 dairy goats; 9 brush/meat goats [6 does (females); 9 wethers (neutered males)]
- Dairy goat breeds: Alpine, Oberhasli, Saanen
- Brush/meat goat breeds: Boer, Kiko

Secondary (Leased) Herd

- 13 goats: All brush/meat goats [12 does; 1 wether]
- Brush/meat goat breeds: Boer, Kiko