PRESCRIBED HERBIVORY FOR VEGETATION TREATMENT PROJECTS

An informational document prepared by the Range Management Advisory Committee

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OVERVIEW

This document has been produced by the Range Management Advisory Committee (RMAC) to provide assistance in implementing prescribed herbivory projects by CAL FIRE Vegetation Management Program (VMP) Foresters and others contemplating fuel reduction projects. Herbivores are currently an underutilized tool for strategically reducing hazardous fuel loads. The information included in this document will give the reader a broad overview of prescribed herbivory, the fuel types that may be treated, basic considerations for project design, and how to locate a contractor to perform the service.

Prescribed herbivory for hazardous fuel reduction is the intentional use of domestic livestock to remove, rearrange, or convert vegetation on wildlands to reduce the costs and losses associated with wildfires and to enhance the condition of forests, rangelands, and watersheds. The types of domestic livestock considered include sheep, goats and cattle. Sheep and goats are the favored animals for VTP projects because of their grazing and browsing habits and their relative ease of transport. Combinations of these animals, depending on project size and vegetation types, can be effective in creating fuel breaks in grass and shrub fuel types, and maintaining fuel breaks in grass, shrub and timber fuel types. Effective use of livestock requires the appropriate combination of animals, stocking rates, and timing.

Determining the goals and objectives of the user are critical in evaluating the potential use of prescribed herbivory, also referred to as “targeted grazing” or “targeted browsing.” In general, CAL FIRE initiated projects will include hazardous fuel reduction as the primary goal of the project. Resource protection, such as noxious weed treatment, may be a secondary goal of projects. This paper provides guidance on

- benefits and limitations of using livestock,
- factors to consider in a site evaluation,
- general animal characteristics,
- best management practices,
- contracting considerations,
- CEQA considerations, and
- resources for more information.

BENEFITS

Prescribed herbivory can offer a variety of benefits in comparison to other types of vegetation treatments. Herbivory is a historic, natural way of removing biomass and can yield a quality protein product for commercial benefit. Herbivores are essentially a “biological masticator” that can reproduce themselves and turn unwanted biomass into a consumable product. In addition to fire prevention benefits, carefully managed grazing can provide important environmental benefits such as increased soil organic matter, control of invasive species, and improved plant and wildlife habitat.

Consider using prescribed herbivory in the project when the following concerns arise:

- Air quality, when compared to the use of prescribed fire.
- Noise, when compared to mechanical and some manual treatments.
- Proximity to structures, when compared to risks of using prescribed fire or mechanical treatments.
- Steep slopes, when compared to prescribed fire, manual, or mechanical treatments.
- Soil compaction and surface disturbance, when compared to mechanical treatments.
- Noxious weed control, when compared to manual or mechanical treatments.

LIMITATIONS

There may be environmental, social, or project constraints that make prescribed herbivory an inappropriate treatment to consider, including, but not limited to, the following:

- Timing constraints on treatment implementation, especially in relation to the size and maturity of the vegetation. Browsers tend to eat the leaves and shoots and leave the larger woody material (one inch or larger) behind. Seasonal variations also affect the palatability and nutritional quality of vegetation.
- Goats may eat the bark of some tree species, which may kill the tree by girdling. This can be controlled through appropriate stocking rates and limiting their duration on site.
- Animals need shelter during wet weather accompanied by freezing or near-freezing temperatures.
- Herbivory will only remove live one- and ten-hour fuels (those less than about one inch). Additional treatments will be necessary if there are larger materials to be treated or a high quantity of dead fuels on-site.

SITE EVALUATION

Several characteristics and parameters of the site must be evaluated prior to designing a grazing/browsing management plan including, but not limited to, the following:

Vegetation Characteristics

Prescribed herbivory should be considered when the targeted vegetation to be removed or modified is grass, forbs, or shrubs. Herbivores may also be appropriate in forested vegetation types when the targeted vegetation is shrubs and brush, such as in fuel break maintenance. Vegetation characteristics to evaluate include:

- Species Composition: Understanding the vegetation species on the ground will aid the contract grazer in identifying the appropriate animal for the job. Any noxious weeds on site should also be identified. This information may dictate the timing of grazing for when the vegetation is most palatable and any noxious weeds are unlikely to be spread.
- Height: Goats can browse only as high as they can get their mouth when standing on their hind legs, or about 7 feet. Any vegetation higher than this is unlikely to be adequately grazed to meet fuel reduction goals.
- Diameter: Goats can browse shrub and tree stems up to approximately 1 inch in diameter. Material of greater diameter will likely be left on site, denuded of any smaller stems, branches, and leaves.
- Density: The relative density or quantity of the vegetation to be removed or modified will aid in determining the number of animals and the length of time necessary to complete the job.

Environmental Characteristics

Herbivores have the potential to damage other resources if their movement is not closely controlled. Potential resources of concern are watercourses, sensitive wildlife habitat, cultural resources, and any desirable vegetation to be left on-site. Special consideration may also need to be provided to neighboring landowners and residents when developing a prescribed herbivory project. Sensitive resources need to be identified and mitigation measures developed for their protection during project development. Any identified sensitive areas should be clearly marked in the field and identified on any project maps. The protection measures need to be included in the vegetation treatment plan and clearly communicated to the herder and project manager, including a pre-operational field visit when appropriate.

Infrastructure

Moving herbivores to the site requires trucks and trailers. Once the animals are onsite, water and containment to the desired vegetation must be addressed.

- Roads: Transportation of herbivores generally is by tractor trailer or pick-up truck with trailer, depending on the number of animals. It is important to note if the site has an adequate turn around and loading/unloading area to facilitate large truck traffic. This does not have to be directly at the project site as animals can be moved moderate distances on foot to the project area. Also note if there are access roads throughout the project area, and if the loading area will be different than the unloading area.
- Water: All herbivores require water on site. This can be from an on-site stock pond, a water supply line to a portable water trough, or can be shipped in by truck. All available water sources in the general project vicinity should be identified during project development.
- Containment: Herbivores will need to be contained to the project boundaries or smaller sub-units within the project area. Controlling animal movement controls the intensity and duration of grazing in the project area, is necessary to protect on and off-site sensitive resources, and to protect the herbivores themselves from predators. This will generally involve some combination of fencing, guard and herd dogs, and an on-site herder. Portable fencing is a common tool for contract grazers, but any existing fences or barriers to animal movement should be identified.

Scale

The size of the project and the amount of vegetation to be removed will have a strong influence on the economics of prescribed herbivory projects. As with mechanical treatments, the move in and set up costs are fixed regardless of project size. Herbivores also become more productive once they are familiar with the vegetative characteristics of the site. Larger projects will likely result in bids that are cheaper per acre or per animal day than smaller projects. However, small projects may still be competitive with other vegetation treatment methods, so the size of the project should not discourage the use of herbivores. The contracting section below goes into further detail on this topic.

ANIMAL CHARACTERISTICS

Generally animals can be divided into two categories, grazers and browsers; each category may overlap significantly depending on species, stage of growth, availability of forage, animal genetics, or previous training of animals. Cattle and sheep fall into the category of “grazers,” and tend to prefer the bulk cellulose of grasses and forbs. Goats fall into the broad category of “browsers,” and tend to feed on more readily digestible leaves and shoots of shrubs and trees within their reach. All these animals have a limited ability to shift among these feeding strategies.

Browsing multiple species (usually goats and sheep) together on the same site can be very effective for fuel reduction projects, particularly when the target vegetation is a combination of grass, forbs, and shrubs. Taking advantage of the dietary preferences of each herbivore can result in a more complete fuel reduction project. Grazing animals such as sheep will consume the grass and forbs, while browsing animals such as goats will consume the more woody material within their reach (up to 7 feet high).

Fuel reduction will also be dependent on the stocking rate, or the number of animals per unit area (density), over the specified period of time. Prescribed herbivory is generally performed at high stocking densities for short periods of time to encourage the animals to compete amongst each other for limited resources. This strategy encourages the animals to uniformly consume all the vegetation present and not preferentially browse and graze on only the most nutritious vegetation available. This strategy also helps with animal health as the livestock balance the amount of nutritious and less-nutritious vegetation

in their diet over short time periods. It is not uncommon to see stocking rates equivalent to 450-900 animals per acre for a 24 hour period.

Consumption per day of both grazers and browsers can be calculated by the following standard guidelines:

- Goats will eat approximately 3% of their body weight per day of the dry matter weight of the forage being consumed.
- Sheep, horses and cattle will eat approximately 2% of their body weight in dry matter per day.

A 100 pound goat would consume approximately 12 pounds of green brush per day. If the project objective is to remove one ton (2,000 pounds) of brush per day from a specified area, it would take approximately one hundred seventy (170) 100 pound goats to accomplish that objective. By calculating the amount of biomass to be removed, the project's necessary mob size (number of animals) and length of the foraging period can be calculated. These guidelines will help during the contracting phase of project development. There is not a typical mob size for multi-species systems; however, one herder can handle up to 1,500 head of goats and sheep and one semi-truck can transport approximately 450 goats and sheep. The ratio of grazers to browsers can be tailored to the targeted vegetation to be removed.

Forage species being targeted for herbivory may not always provide a nutritionally adequate diet for the animals. Energy, mineral, or protein supplements may be required to maintain animal health and productivity. Toxic plants can be a challenge, particularly with sheep. Goats seem to be resistant to most serious toxins but may limit their intake of scrub or forbs depending on the time of year or elevation. The contract grazer will be able to identify any special constraints on the site and may be able to suggest seasonal project timing that will best meet the project's objectives.

BEST MANAGEMENT PRACTICES

There are important best management practices to integrate into the design of a prescribed herbivory project to minimize or mitigate potential environmental or social impacts.

- Identify and establish appropriate buffer zones around environmentally sensitive areas such as riparian zones, sensitive plants, threatened or endangered animal habitat and archaeological resources.
- To prevent introduction of seeds from undesirable plant species to the site, consideration should be given to where the animals are coming from, and whether viable seeds of undesirable species are present. If this is the case, the herd should be fed a weed free diet for three days prior to being introduced to the grazing site. Any supplemental feed brought on site should be free of noxious weeds.
- Use the highest appropriate stocking density to achieve uniform utilization of the targeted vegetation.
- Post signs warning public of danger of electric fences and unleashed guard dogs when the project area is open to the public. Discuss public interactions with the on-site herder and grazing project manager.
- Conduct appropriate public outreach so that the public will understand the project objectives. The general public will be very interested in what the animals are doing. Consider project signage or a one page pamphlet or brochure available on-site describing the overall project, its objectives, and how herbivory is helping to achieve those objectives.
- Confirm that the contract grazer has well thought-out animal care procedures and protocols in place to ensure the animals are cared for in a responsible, humane fashion (ample stock

watering, safety from predators, and careful animal observation and action for sickness or disease).
- Consultation with Certified Range Managers (CRM) when appropriate.
- Develop a monitoring program that determines the effectiveness of the grazing/browsing program compared to the original planned results.

CONTRACTING

The following key points should be addressed in a contract with a prescribed grazer. A sample contract and Request for Proposals (RFP) are included in the appendices of this document for further guidance on this subject.

Finding the right Contract Grazing Operator for the project

There are a number of contract grazing outfits performing prescribed herbivory projects to meet specific objectives (ex. fuel reduction, invasive weed control, etc.), most often using some combination of goats, sheep and sometimes cows. The size and scale of these operators varies, from smaller operations using only a few dozen head to commercial operation of upwards of 2,000 head performing year-round grazing services. Determining the project's acreage and the targeted vegetation type and quantity will help determine the best contract grazer for the project. Often a Request for Proposal (RFP) or Request for Quote (RFQ) defining the project location and scope is announced to the general public and contract grazers are able to provide a bid or quote on the project (see Appendix A for an example RFP). Through this process the CAL FIRE project manager can determine which operator may be the best fit for the project.

A list of contract grazers can be found online through the links provided at the end of this document. Please take note that these are not the sole operators performing these services. Active contract grazers in the area can be found by contacting other organizations in the region that use prescribed grazing as a management tool. Some organizations to check with are local Resource Conservation Districts (RCD), Fire Safe Councils (FSC), or local city and county public works departments.

Site Assessment

Before a contract grazer is able to develop a quote and scope of work for a project, it is common for a tour of the site(s) that are being proposed for grazing. This allows the contract grazer to assess a variety of factors to determine the appropriate number of head, species and ratio of animals needed, water access points, fencing type, truck and trailer access, and camp trailer sites (when an on-site herder is necessary). Inviting proposed contract grazing operators to become familiar with the site will allow for the most accurate cost quote and approach to achieving the project's goals using herbivores for mastication of vegetation. Consider designating a day during the RFP period for potential bidders to tour the project site.

Cost Structures

The acreage, duration, time of year, and the project complexity are taken into consideration when contract grazers develop their quotes. There are two general types of cost structures for contract grazing services.

- The first cost structure is quoting the service fee by placing a charge per head per day. For example, there are 500 head of goats proposed to graze, a contract grazing operator might charge 50 cents per head per day. If the project is to consist of 30 days, the quote would be $7,500 (500 goats x $0.50/day x 30 days). It should be made clear whether transportation costs are folded into the cost per head per day, or is a separate, additional cost.

- The second cost structure, common in areas grazed around urban and suburban peripheries, is a service fee per acre grazed for a proposed project. Smaller acreage often is of greater cost per acre than large acreage, typically due to the transportation needs and impact of changing vegetation characteristics on animal performance. Again, it should be made clear whether transportation costs are folded into the cost per head per day, or is a separate, additional cost. Prices for contract grazing services will vary by region and project, however industry standard in 2014 in the urban periphery of the Bay Area can range from $300-$1,000 an acre for the service of targeted grazing for fire hazard reduction and/or stewardship goals. Most of these parcels being grazed are less than 100 acres and generally are in the range of 5-20 acres.

The highest demand months for contract grazers tend to be during the end of the spring growing season through the late summer months and sometimes early fall, depending on annual rainfall. This also varies from region to region. During those heightened demand months contract grazers often charge a premium for their services. Conversely, during the off-season months of fall and winter service fees may be less as the demand for contract grazing services is reduced during this time of year.

The Contract

Public agencies within the state of California have been using contract grazing for more than a decade and detailed contracts have been developed to address the needs and concerns of both the agency and the contractor. The contract generally stipulates insurance qualifications, labor details, grazing schedules and terms of an annual or multiple year contract. Please inquire with local or regional public agencies known to use contract grazing as a vegetation management tool for sample contracts common in the project area. A sample contract is included in Appendix B of this document as an example of the general items that should be covered in a prescribed grazing contract.

CEQA CONSIDERATIONS

The CAL FIRE project manager should investigate whether a prescribed herbivory project falls under one of the existing programmatic CEQA documents prepared by the Department. If it does, the program EIR will have a checklist that confirms whether the project is within the scope of that EIR, as well as any potentially significant impacts from the project and corresponding mitigation measures. Upon certification of the Vegetation Treatment Program (VTP) Program EIR, most prescribed herbivory projects will be covered by that EIR's checklist.

If the prescribed herbivory project does not fall under a program EIR checklist in whole or in part, it will require the completion of a separate CEQA Environmental analysis. The analysis may result in the filing of a Notice of Exemption or the completion and filing of a CEQA checklist and associated environmental documents (Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report). The Sacramento Headquarters Environmental Protection staff can provide guidance on the appropriate analysis and documentation.

An example environmental analysis has been provided in Appendix C as a reference for projects that are outside of the scope of existing CAL FIRE programmatic CEQA documents. Most prescribed herbivory projects will fall under a CEQA Class 4 (Minor Alteration to Land) Categorical Exemption. The example environmental analysis provided was conducted by the Bureau of Land Management (BLM) under the National Environmental Policy Act (NEPA). While the NEPA process differs slightly from CEQA, this document provides a look at some of the environmental impacts to consider during the CEQA process.