CHOOSING FUEL TREATMENT METHODS

This guide is one of a series of 5 that describe the steps recommended to create and maintain fire resistant vegetation in the City of Rolling Hills. Please also refer to the:

- How to Get the Work Done
- Creating Fire Safe Canyons
- Best Practices for Fuel Reduction
- Making and Keeping a Fire Safe Home

Goal of Fire Fuel Treatments and Available Methods

Effective fire fuel treatment results in fewer, smaller, and less damaging fires. The goal of fuel treatment is to reduce damage from a future fire by targeting the ignitability, rate of spread, and potential fire intensity. Specific techniques, equipment requirements, advantages, and additional considerations such as timing, limiting factors, and Best Practices are described for each of the following fuel reduction methods:

- Hand labor,
- Mechanical treatment,
- Chemical treatment, and
- Grazing.

A combination of techniques is often used to reduce fire hazard in a particular area. This section provides a comparison of methods and guidance regarding the most appropriate treatment types for your zone and habitat type.

Fire Fuel Treatment Zones

Treating fuels helps to reduce the risk of fire hazard to our homes, infrastructure, and communities. Fuels are anything that can burn – our homes and the vegetation that surrounds them. Fuels treatment is aimed at changing the fuels to calm a fire by altering the volume, size-class distribution, arrangement, moisture, or chemical content of these fuels. In Rolling Hills, vegetative fuel treatment is typically done by modifying the trees, shrubs and groundcovers immediately around structures, by roadways, and in canyons. Treatment zones addressed in this guide are defined as follows:

1. Defensible Space
2. Easements and Bridle Trails
3. Canyon Areas

Size of Treatment Area Matters in Selecting a Fire Fuel Treatment

It is important to consider the size of the area when selecting a fuel management treatment. Some treatments, such as those using mechanical, are appropriate only in large, open spaces. Other management options, such as the use of skilled labor or re-vegetation, are only cost-effective in small areas, such as in the area within 200 feet of a structure. Small area treatments can be executed with a greater degree of refinement than those in more extensive areas.

Hand Labor Treatments

Hand labor treatments involve pruning, cutting or removal of trees, shrubs, and grasses by hand or using hand-held equipment. Other hand labor methods include bark pulling, removing dead wood and litter, mulching, and planting new fire resistant or low-risk plants.

- Hand labor is typically used for spot application on small areas or areas with difficult access, where heavy equipment move-in costs may be high.
- Hand labor is also the treatment of choice for areas with sensitive environmental concerns.
- Hand labor may be dangerous for workers when use of sharp tools is required on steep and/or slippery terrain, or where poisonous plants are abundant.
- Hand labor generates debris from pulling, pruning, and cutting vegetation, which will have to be hauled away or chipped on site

Hand labor is enhanced with a include a variety of tools:

- shovels,
- weed whips (different blades are available to match to materials being treated)
- machetes,
- loppers.
- "weed wrenches" (tools that pull both shrub and root system out),
- chain saws,
- hand saws,
- pruning shears, and

Chippers are often used in conjunction with hand labor to cut materials into mulch for onsite distribution.

The actions, tools, advantages, and additional considerations for the various hand labor techniques are compared in a table at the end of this guide.

Mechanical Treatments

Mechanical treatment cut grasses, weeds, shrubs, and trees up to 24 inches in diameter through the use of a tractor or other machinery. Mechanical treatments include such operations as rototilling mowing, disking, and crushing. Heavy machinery is often used where the terrain and number of trees permit.

Heavy machinery can be used where shrubby vegetation is quite dense. It is best to match this treatment method to a site where the aesthetics of the immediate finished result are not the top concern.

- Heavy machinery for mechanical treatment is faster than hand labor and relatively inexpensive.
- There is limited selection over which plants are cut during these operations.
- Machines can be guided around isolated areas of concern that are marked prior to beginning treatment (with collateral damage to small vegetation, such as stripped tree bark or broken shrub crowns that may permanently disfigure plant materials).
- Heavy machinery can also create excessive disturbances to surface soils when the ground is soft; leaving ruts and exposed soil that could cause erosion or sediment in nearby streams.

Timing

- This technique can be used almost any time of year when the topsoil is dry.
- It is faster when done in the summer or fall when brush is brittle and grass has cured.
- They should be used with special precautions during high fire danger periods because the machines have motors and metal blades that can start fires.

Vehicles and equipment undercarriages should be cleaned prior to removal from the work site to reduce the risk of transferring unwanted material, disease vectors, or seeds to other areas.

Mechanical treatments need to be selected according to a site's topography, access, vegetation type, and potential for negative environmental impacts. This technique requires supervision and specialized training to ensure the desired results and minimize negative impacts. Several agencies own specialized equipment and have staff trained in its operation.

A variety of types of equipment can be specified for mechanical treatment techniques, as needed. These include:

Specific techniques, which are compared in the table below, can break apart or cut up vegetation into small pieces, tear up and bury the resulting debris, or remove plants entirely and pile the debris for burning or removal.

- Chippers,
- Mowers,
- Brush cutters,
- Grinders,
- Roller-cutters, and
- Tub grinders

Chemical Treatment (Herbicides)

Chemical treatments include the use of herbicides to kill plants or prevent their growth. Using herbicides to control invasive, fuel-laden plants can be an efficient and cost-effective method but should be used sparingly. Usually herbicides are used as part of an Integrated Pest Management (IPM) program. Chemical treatments are best used in as a follow up to other treatment measures (e.g., mowing, and hand removal), or cutting. Further concerns regarding water quality and other potential environmental impacts that may occur with prolonged use of and exposure to herbicides and other chemical applications further limit their frequent or widespread use as a treatment.

Hand Application: Application of herbicides and other chemicals is typically performed by hand, and can include sponging, spraying, or dusting chemicals onto unwanted plants.

Hand application provides flexibility in application and is ideally suited for small treatment areas.

Roadside application of herbicides may employ a boom affixed to or towed behind a vehicle.

Herbicides are often used to prevent plants from sprouting after they are cut. Herbicides can be specific regarding the type of plant (broadleaf or grass, thistle-type plants).

Herbicides do not remove any vegetation from an area's fuel load. The dead plant matter continues to exist at the site and could continue to be a fire hazard if not collected and disposed.

Timing is critical

- Needs to be applied while the grasses and weeds are still actively growing.
- Application following another treatment method in which plants are trimmed or shortened can increase the plants' intake of the herbicide and the effectiveness of the chemical treatment.

- Spray treatments aimed at foliage are generally not applied within seven days prior to significant rain because the herbicide may be washed off before it is effective.
- Foliar treatments also should not occur on windy days because of concerns for spray drift.

Licensed personnel is required

- Herbicide application requires specific storage, training and licensing to ensure proper and safe use, handling, and storage.
- Only personnel with the appropriate license are allowed to use chemicals to treat vegetation.
- Herbicide application is also only applied per a prescription prepared by a Pesticide Advisor licensed in that county.
- Personal protection equipment is essential to limit personnel exposure to chemicals, and includes long pants and long-sleeved shirts, gloves, safety goggles, hard hats, sturdy boots, face masks and, in some instances, respirators.

Grazing

This treatment method uses grazing animals to consume vegetation and reduce the amount or density of fuels. Grazing as a fire fuel treatment is most effective in grasslands (horses, cattle or sheep) or shrublands (goats).

Types of Animals: Rolling Hills has a rich history of grazing; cattle grazed Rolling Hills for several decades prior to development. More recently, horses graze several pastures throughout the City. Elsewhere, goats and sheep are used for fire fuel management. Although the concept of grazing is the same regardless of which type of animal is used, how each animal type conducts its grazing varies significantly. As a result, not all animals will be ideally suited for grazing treatments in all areas. To make this method effective it is critical that the plants are palatable to the animals selected.

- Goats can be used to create and maintain a fuel break.

- Horses, sheep and cattle do not effectively create fuel breaks in shrubby areas, but they can be used to maintain these features by shortening grasses and grazing the grasses or forbs within tree stands.

If the intent is to reduce grassland fuels in highly where accidental ignitions may occur, grazing should be used annually. As a fire fuel reduction technique, grazing does not need to be conducted each year if the intent is to control shrubs or maintain fuels under trees.

Grazing can be a relatively inexpensive treatment method. Success of this treatment method is dependant upon control of livestock movements and prevention of the impacts of overgrazing, such as increased erosion from groundcover loss. Using professional herders or portable fences may be an alternative to fixed fencing where the treatment is ephemeral. Additional controls are also needed for protection of selected plant materials and riparian zones, and to prevent erosion, sediments in nearby streams or other undesirable environmental impacts.

Livestock grazing include removes small diameter fuels and prevents the invasion of grasslands by brush. Livestock grazing can also benefit native grassland, wildflowers and habitat for wildlife which prefer short grasses, such as ground squirrels, and can improve habitat for amphibians. Grazing reduces thatch and increases nutrient cycling.

What are the most suitable vegetation management treatments for my vegetation type?

The frequency and type of treatment depends upon the vegetation in the area. The effectiveness and suitability of these treatment types and specific techniques within the different habitats found in Rolling Hills vary depending on vegetation structure and habitat sensitivity.

Hand thinning and grazing treatments are suitable for all habitat types, while the use of mechanical and chemical treatments should be avoided to the extent possible in riparian habitats due to concerns regarding water quality, soil erosion and temperature.

Tree removal and some thinning in shrublands can reduce vegetative cover, which can increase water temperature and drastically alter aquatic systems.

The following tables provide further information to help you determine which treatment types and specific techniques are appropriate for the habitat type in which you are working. More specific guidelines regarding these techniques should be reviewed before determining the best treatment for your needs.

COMPARISON OF HAND LABOR TREATMENTS FOR FUEL REDUCTION

Technique	Action	Tools	Advantages	Additional Considerations
Removal of small volunteer trees	Cut saplings and short trees of invasive species	Hand saws, loppers, chain saws	Effective in reducing ladder fuels. Avoids costs of removal in future after tree has grown	
Weed Whipping	Reduce the height of the fuel, without creating areas of bare soil, as the vegetation is not completely removed	Hand held tool (often gas powered) that cuts grass and very small shrubs with plastic line or cutting blade	Often the only type of "mowing" treatment possible if in steep wooded areas or landscaped slopes. Rate of weed shipping is low.	Using a steel cutting blade allows debris to be 'multi-cut' into a mulch. Worker safety is a concern. Can be used in some landslide-prone areas.
Chaparral/ Scrub Branch Removal	Masticate or chop off chaparral branches and break apart brittle materials that can act as ladder fuels	Machetes, chainsaws and other instruments	Fallen branches and material cut from chaparral can be further broken into compact mulch and distributed across the site or removed for disposal.	
Hand-Pulling	Weeds pulled three year in a row generally will be controlled in an area because of the repeated depletion of seeds or sprouting vigor	Pull weeds by hand	Often the greatest amount of control among hand labor techniques, but it is also very time-intensive	Most weeds pulled can be left on site as mulch; however, larger weeds, such as mustard, should be removed. To limit the spread of seeds, care should be taken to bag weeds securely if viable seeds are present.
Vista Pruning	Remove under-story shrubs, small trees and lower limbs of trees to a height of 8-10 feet to create a vertical separation between surface fuels and the tree canopy overhead.	Pole saws, loppers and hand-held chainsaws	Vista pruning lowers ignitability, decreases available fuel, decreases the potential for spotting and reduces heat output from understory fires, which in turn reduces the potential for fires to move from the ground to the tree crown.	Certified arborist recommended.
Mosaic Thinning & Drip-line thinning	In mosaic thinning, shrub "clumps' alternately thinned to varying degrees to create a mosaic of plantings. Drip-line thinning removes shrubs and smaller trees within the drip lines of overhead trees.	Pole saws, loppers and hand-held chainsaws	Because the material removedduring these operations typically consists of smaller tree and shrubs that result in larger debris sizes, chipping or offsite hauling is usually required	Used in shrubby areas. It works best where trees are infrequent.
Black Plastic Coverage	Plastic fixed to the top and sides of a cut stump to prevent photosynthesis, which in turn prevents new sprout form forming	5 mm or thicker plastic, rocks, stakes, nails or staples	As an alternative to herbicide application, securing black plastic over cut or treated tree stump can prevent sprouting	Black plastic can also be placed over surface areas to prevent germination of weeds, although groundcover growth is prevented as well. Remember to take the plastic off when prevention of sprouting or seeding is complete.
Mulch Application	Application of mulch, such as wood chips form pruning operations	Protective masks and gloves should be worn in distributing wood chips because fungus is typically present.	Can slow the growth of grasses, shrubs and saplings for up to one full season and acts as an effective temporary fuel reduction method	Mulches burn slowly and produce low flame lengths, but burn for a long time in any one place. This condition transfers considerable heat into the soil and can have longer term detrimental effects to the area. Keep a portion of the soil bare to preserve native bee habitat.

COMPARISON OF MECHANICAL TREATMENTS FOR FUEL REDUCTION

Technique	Action	Tools	Advantages	Additional Considerations
Mowing	Cut herbaceous and woody vegetation above the ground, often along roadways and using hand powered mowers, around homes	Mowers on wheeled tractors or other equipment or straight edged cutter bar mowers, or flails. Mowers may be walk-behind equipment	Reduces fuel height which in turn reduces the flame length and possible the rate of spread of a grass fire. Using a tractor-based mower approximately 1 acre per hour can be mowed, depending on surface topography and slope of the site. A walk-behind mower can cut approximately 2 acres per day	Mowing at the appropriate time to a height of approximately 4 inches minimizes weed and brush encroachment and reduces the amount of manual work needed to maintain the site. Slope instability should be absent to use a tractor-based mower.
Mechanical Cutting Crushing or Removal of Dead Material Only	Cut or crush shrubs and trees into small pieces that are scattered across the ground to act as mulch	Tractor with a variety of attachments or blades. Masticating equipment installed on Bobcats, wheeled or crawler type tractors, or other specialized vehicles.	Equipment that can carry large loads, can effectively remove large volumes of dead material, often with large pieces of material still intact. Particularly applicable in burned areas.	The soil surface is disturbed slighty where the tractor travels and when some shrubs are uprooted; however the surface is not scraped.
Chipping or Mulching	Use subsequent to other removal techniques and reduces the size of materials by passing them through a series of high speed blades.	Grinder	Small-sized materials produced may be removed form the site or redistributed as mulch. Natural compaction of this layer presents a fuel structure that is less likely to ignite	Mulch layers should be kepts to less than 4 inches deep. Retain up to 30% bare soil - in patches - as habitat for native bees