MANAGING COMPETING AND UNWANTED VEGETATION

METHODS INFORMATION PROFILE

Manual

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There are five primary methods for treating vegetation: manual, mechanical, prescribed fire, biological, and chemical. These profiles are intended to aid Forest Service project managers, workers,and the public in planning and performing vegetation management projects. Manual methods are discussed here.

Hand operated tools are used to cut, clear, thin, girdle, or prune herbaceous and woody plant species. Competing vegetation or noxious weeds are removed and the immediate environment is modified to favor desired species.

Non-powered hand tools include axes, brushhooks, hoes, hand girdlers and hand clippers. Powered tools include chain saws and motorized brushcutters (weed-eaters with a saw-type blade). Manual methods also include use of mulch, weed barrier, cloth, and other materials to inhibit the growth of vegetation.

Implementation

Scalping is one of the most commonly used manual methods when planting seedlings. A small area is cleared with a hand tool to remove potentially competing vegetation before the seedling is planted.

Power saws are commonly used to release newly planted trees. Competing brush is cut, providing the crop tree more space and nutrients. This method has increased as an alternative to the use of herbicides. Release is occasionally achieved by hand-pulling weeds or small competing seedlings and girdling larger stems.

A comparison of chainsaws, brush cutters, and machetes used for thinning concluded that there was no significant difference between chainsaws and machetes, while brushcutter production was less efficient due to greater maintenance and down time. Other factors, such as physical demand of using a machete or safety may also affect the choice of hand tools, (Jannick, 1989).

Hand labor is frequently used at recreation and administrative facilities, tree nurseries, and occasionally along roadsides that have been invaded by noxious weeds.

As in all methods, the timing of manual treatments is critical. The resprouting of brush is partly dependent on when it was cut and the effectiveness of hand pulling depends on

when weeds germinate.

Advantages

Hand methods are highly selective and have the least impact on soil. In riparian areas and sites with sensitive plant species, they can remove the target species without disturbing adjacent vegetation. When vegetation removal must be very selective, the cost-efficiency of hand treatment methods generally increases.

Because hand methods are labor-intensive, the number of employment opportunities created is relatively high.

Disadvantages

Because manual methods are labor-intensive, they can be more expensive. For broad scale treatments, production rates can be lower, and per acre costs higher than for alternative methods.

Plant species which resprout from the stem of roots pose greater difficulty for effective manual treatment unless their root systems can be removed. In some species, especially when they are seedlings, the entire plant can be pulled manually. When pulling is not possible, other treatments may be timed to take advantage of reduced resprouting at certain times of year. These treatment windows have not been identified for all species.

Chain saws and motorized brushcutters can also cause injuries.

Environmental Effects

Soil disturbance caused by manual methods is usually negligible. The duff layermay be disturbed in a very small area. If large areas are cleared of duff and debris on steep slopes, there is a potential for accelerated erosion.

Manual cutting severs vegetation above the ground; soil is seldom exposed. Residues are usually left in the treatment area, promoting nutrient cycling as they decompose. This may temporarily increase fire hazard.

Manual clearing, chopping, and weeding have a low potential for adverse impacts on waterquantity or quality. Measures must be taken to prevent oil and fuel used in power tools from entering streams.

Human Health Effects

The risk of any effect on human health from vegetation treatment is based on two factors. First, what are the hazardous characteristics of the tool that could cause illness or injury? Second, when and how would people be exposed to these hazardous characteristics?

The FEIS made quantitative, or numerical estimates of all known risks associated with each vegetation management tool and method. It also reviewed the quality of the scientific data that was used in making these risk estimates. For individual projects, site-specific quantitative estimates need not be calculated in order to assess project risks. Rather, particular characteristics of the project should be identified that might expose either workers or the public to greater risks than those estimated in the FEIS. Then planners must identify mitigating measures, from the FEIS or elsewhere, and qualitatively describe how effective they would be in reducing particular concerns about exposure.

Hazard

Working with such handtools as axes, brush hooks, machetes, and chainsaws can be hazardous under any circumstance. In forestry work, where site conditions can be extreme, handtools can be an even greater hazard.

Noise level, hand gasping power, body posture, andweightofequipnientrmycontdbutetopotential

health effects from vibrating equipment (Miyakita et. al., 1990). Noise coupled with vibration may, produce more pronounced effects than either stressor alone.

The heavy physical work involved in brush clearing on steep slopes may result in elevated heart rates (Li etal., 1990). Sustained elevated heart rate may be a potential

human health effect if sufficient rest periods are not provided. Lighter equipment and lower temperatures facilitate quicker recovery during rest periods, while rain or high humidity increases load on the hearl

When temperatures are high, workers may experience increasead fatigue, heat exhaustion, or heatstroke. Power equipment is loud and can require the use of protective gear toprevent hearing impairment.

Workers can be cut by their tools or fall onto the sharp ends of cut stumps or brush. Injuries can range from minor cuts, sprains, bruises, or abrasions to severe injuries such as major arterial bleeding or compound bone fractures. The possibility of injuries fi-om power tools such as chainsaws increases if crew members are working closetogether. Worker fatigue can be a contributing factor.

Falls or other accidents may adversely affect pregnant female workers. Continued work in rugged terrain may initiate or exacerbate chronic health effects, such as ligament damage orarthritis. In extreme cases, exertion from manual methods in rugged terrain may bring on a heart attack or stroke in workers who are prone to such health effects. In addition, workers could be exposed to poison oak, ticks, bees, and poisonous snakes.

A limited amount of scientific literature indicates that vibration from the sustained use of motorized equipment (such as chainsaws) and/or heavy equipment (such as tractors) can result in potential human health effects. Vibration may cause restricted blood flow to the fingers and possibly other extremities such as feet and ears, (Sakaldbara,1991), which in turn may cause whitening, pain, reflex flushing, and discomfort as circulation returns. The symptoms can be triggered by exposure to cold. These symptoms are collectively referred to as vibration disease or vibration-induced white flnger. Correlations between vibration disease and increases in 1) neck and upper limb musculoskeletal disorders, 2) back pain (Boshuizen et. al., 1990) and 3) depressive symptoms (Mino eL al., 1991) have been reported. In the case of depressive symptoms (e.g. sleep disturbance, confusion), no causal relationship between vibration disease and depression has been established.

Exposure

The likelihood of injury depends on the amount of time on the job and the type of work being performed. Other factors include terrain, type of vegetation, and worker experience.

Members of the public are not likely to come close enough to any operations to be exposed to manual treatment hazards.

Risk

Minor injuries are almost certain to occur with the use of handtools. Severe injuries may occur, but they are anticipated to be at a much lower frequency. Chainsaws are of particular concem. The incidence of such injuries can be reduced with precautions such as training, protective gear, rest breaks, and equipment maintenance and repair.

Quality of Information on Health Effects

The relationship between hours worked and frequency of injuries appears to be reliable which suggests that the quality of data is fair to good. One factor, job experience, is not accounted for in available studies. Associations between using these tools and long-term health effects are not yet supported by quality data-

Measures for Reducing Environmental and Human Health Effects

· An analysis of worker exposure to potential and risks must beperfonned. Measures for reducing the risk will be implemented when required by circumstances.

Depending on the tools which are employed, risk assessment should include the following:

-Physical dangers: falls, sprains, falling snags cuts, exposure to poisonous plants, snakes or insects.

- Exposure to exhaust gases, vapors when mixing fuel, dust, or temperature extremes.

Injuries inflicted by chainsaws are of particular con cern. Appropriate training, scheduled rest breaks and equipment maintenance and repair can procuce them

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