

Appendix A – DFPZ Maintenance Methods

This appendix describes general treatment methods that are likely to be used to maintain DFPZ's, and to control noxious or other invasive weeds that might invade DFPZ's. The methods are grouped into two main categories, construction and maintenance. Maintenance methods are listed to follow the order established in Chapter's 2 and 3, beginning with Prescribed fire, Mechanical, Hand (Manual) and Herbicide. Also included are brief descriptions of Browsing/Grazing, Integrated Pest Management and Preventative Noxious Weed Strategies. Descriptions of the specific herbicides are presented in Appendix E.

Silvicultural tools used in maintaining treated DFPZ's

Prescribed Fire

Prescribed fire reduces the hazard of catastrophic fire and restores historic fire regimes. Objectives for hazard reduction respond to the need to:

- change forest vertical structure by killing small trees and other vegetation that serve as fuel ladders for fire to reach into the forest tree canopy; and
- remove dry, dead surface vegetation which can fuel forest fires.
- restore forest ecosystem structure in advance of reintroducing natural fire regimes.

Flame lengths describe different levels of fire intensity. Treatments for underburning with a specific flame length take into account environmental conditions, such as fuel moisture, air temperature, humidity, and wind. The site-specific variation in microclimate and fuels naturally leads toward a mosaic of potential fire effects across a forest. Prescribed underburning used in the Supplemental Draft EIS alternatives burns with an average flame length less than 4 feet at the head of the fire. These underburns typically kill all seedlings, small trees, and brush up to 4 inches dbh in the fire path. Forty to sixty percent of trees and vegetation between 6 and 8 inches in diameter may burn. Trees between 10 and 24 inches in diameter may also perish, but usually no more than 30 percent of the trees. The overstory canopy is not significantly affected, but torching of individual trees may occur on up to 10 percent of the burn area where high surface fuel concentrations and ladder fuels occur together. Up to 85 percent of surface fuels less than 1-inch in diameter incinerate. Large logs are reduced in volume but are rarely completely consumed. Likewise, duff and litter thickness decreases but duff and litter do not entirely disappear. Ground cover standards remain within environmental guidelines and soils have little damage. Canopy gaps of a quarter- to a half-acre may result from individual trees or small cohorts of trees burning.

Traditionally, planners have thought of prescribed fire in terms of uniform stands or vegetation types. At larger landscape and watershed scales, prescribed fire can also create forest mosaics of vegetation that meet ecosystem management objectives in national forests. Prescribed fires in landscapes and watersheds last longer than prescribed fires in a single stand. Fire effects vary and depend on the fuels, weather, and topographic conditions at the time of the fire. These fires burn under environmental conditions where flame lengths are likely to range between 2 to 6 feet. In all instances, damage to large old trees would be small. A prescribed fire plan that defines the area, details the resource goals, and includes measurable objectives sets the course of large-scale prescribed burns.

Prescribed fire prescriptions are developed, modeled, and tested to meet specific resource objectives. These prescriptions are not necessarily specific to a particular season, but rather to achieving a desired fire effect. The “window” of time for implementing is based on the availability of fuels to burn. This can range from early spring to late fall, similar to historic fire regimes found in the Sierra Nevada. The primary difference is that fire is applied to a very different landscape condition than that of the past. Current conditions typically have heavy fuel loads, denser stands of smaller trees, and species mix that is outside of the historic range due to timber harvesting, fire exclusion or both.

Pile Burning (see Machine Piles and Hand Piles)

Stem and Stump Burning

Hand carried burners (typically fueled by propane or butane) are used to burn around the basal exteriors of woody stems of shrubs. This is not widely used in California because of significant worker safety risks and the potential for igniting unwanted forest fires. Stem burning does not directly affect shrub root system; so shrubs re-sprout following treatment.

Stump burning to control unwanted hardwood sprouting has been tried experimentally, but unsuccessfully, on tanoak. Despite apparent complete incineration of the stumps, new rapidly growing sprouts developed from the partially burned tanoak burl.

Mechanical

Mechanical treatments can vary widely, depending in part on the treatment scale, vegetation type, terrain and objectives. There are several kinds of mechanical treatments that could be used for DFPZ maintenance.

Tractor Crushing

Crawler tractors move over unwanted woody vegetation, breaking stems and crushing tops lower to the ground. This does not kill the sprouting shrubs typical in the HFQLG Pilot Project Planning area, which sprout back rapidly. It can be used prior to prescribed burning to add dead fuel to the area being burned.

Tractor Piling

Crawler tractors, equipped with dozer blades, brush rakes, or subsoiling treatment equipment (such as vertically-mounted blades for soil-ripping, or winged-subsoiler blades for plowing) are used to pile unwanted vegetation, often including all or parts of root systems. Use of brush rakes and sub-soiling equipment probably will be severely limited in DFPZ maintenance because of potential damage to feeder root systems of the overstory trees. Piles are burned after they have cured and when adjacent fuels are wet and pose little risk of escape.

Tractor Pushing and Tractor-drawn disc

Crawler tractors are used to uproot unwanted trees. This can be an effective control of otherwise hard-to-control trees such as tanoak because tractor pushing can uproot the underground burl. Slope limited, tractor pushing can cause substantial localized soil disturbance.

A tractor-drawn disc cultivator is used to uproot unwanted vegetation (herbaceous plants and small shrubs) on slopes up to about 25 percent. Generally, use is limited by slope restrictions (safety) or

presence of large woody plants, large rocks, stumps, or logs. Discing for DFPZ maintenance could be restricted further by concerns about risks of damage to feeder root systems of the overstory trees. Such risks can be mitigated by discing shallow. There is no recent experience in the HF-QLG Planning area.

Mastication

Specialized machines with various types of cutting heads (typically rotary) shred unwanted woody vegetation, turning the wood into small fragments, which often are left on site. These machines have undergone significant development over the last 3 decades. Once limited to slopes less than about 30 percent for safety reasons, some modern masticating machines have capabilities of operating safely on steeper slopes. Since mastication does not kill the root systems of target sprouting shrubs and hardwood trees, these plants typically sprout rapidly following mastication treatments. This method is not effective in controlling herbaceous plants. It has a significant advantage in changing fuel profiles where vegetation cannot be burned or otherwise removed from the site. This method has severe limitations on rocky sites. Keeping the cutting head low to the surface can cause unsafe conditions for other on-site workers because of dislodged rocks. Also, hitting rocks can cause excessive machine downtime. If the cutting head is kept above the rocks, treatment effects on target plants are minimum because the plants are not cut close to the ground surface.

Feller-Bunching

A feller-buncher cuts trees with its scissor-like horizontal blades and holds the severed stems in bunch, while removing the stems to piles. This operation is limited to gentle terrain, less than 25 percent slopes. Not effective for controlling unwanted trees that can sprout from stumps or root crowns. Generally, not efficient if the target plants are thinner than about 4 inches diameter-at-breast height (dbh).

Hand (also called “Manual” methods)

Hand Cutting and Felling

Refers to felling of unwanted trees by hand tools including motor-driven tools. The tops of unwanted plants and trees are cut off. For woody plants, typically the cut is made on the stem close to the soil surface. Most woody plants respond by sprouting from the severed stem or a root burl. The growth rates of the sprouts depends on species, site quality, and when the cutting is done; the slowest re-growth occurs in the period of the yearly growth cycle when carbohydrates in the root systems are at lowest levels. Extensive experience with hand cutting in California forests has shown that the typical response of sprouting shrubs or hardwood trees is rapid.

Hand Grubbing

Also called “hand scalping.” Unwanted plants are pulled by hand, or otherwise removed by hoe or other hand tools. The intent is to remove all or portions of the root systems that have the potential to sprout. Most effective to control herbaceous vegetation or shrubs with short root systems. However, this method is not effective where the unwanted plants have well-developed root systems, or can sprout rapidly from roots unaffected by the treatment, so the kinds of plants that are hand-grubbed typically are smaller than those that are hand-cut. Consequently, grubbing costs typically are lower than cutting costs, and the follow-up fuels cleanup is less expensive.

Hand Piling

Fuels are hand-piled for burning or carried off-site. Production rates are much slower, and the costs are much higher, than for tractor piling. This method is typically associated with small areas or sensitive sites.

Herbicides

Herbicides are specially formulated chemicals to kill all or parts of target plants. There are many kinds of herbicides, varying from broad-spectrum herbicides, effective against all plants or specific broad classes of plants (for example, just woody plants or just grass-like plants) to narrow-spectrum herbicides, which are effective against just specific kinds of target plants. Herbicide formulations come in both liquid and solid (pellet) forms.

Herbicides can either be “foliar active” (intended to be taken up by the target plants through their leaves and stems) or “soil active” (taken up by the target plants through their root systems); from which entry points the herbicide is translocated to the growing regions of the plants, where the herbicide interferes with plant biochemical processes.

Only herbicide formulations presently approved or approved prior to use (registered) by the U. S. Environmental Protection Agency and the California Department of Pesticide Regulation *for the intended use* can be considered for use in the QLG Planning Area, and lawful application must comply with requirements of the specific herbicide label for that intended use.

Herbicide formulations consist of “active” and non-active (“inert”) components. Active components are chemicals that directly cause the intended herbicidal effects on the target plants. The non-active chemicals (typically additives to improve herbicide effectiveness, impurities, etc.) are chemically active, but do not directly cause the herbicidal effects.

There are several methods that could be used to apply herbicides for DFPZ maintenance.

Hand Application

Uses hand sprayers (such as backpack-mounted or hand-held containers with a variety of spray nozzles), spreaders, and injectors. The major hand application methods are:

Basal sprays apply herbicide on the stem of an unwanted tree or shrub. The herbicide penetrates through the bark into the phloem, and translocated to the growing parts of the target plant.

Thin Lining

Thin lining is a form of basal spray application; only a thin line of herbicide is sprayed on the stem. Like other hand application methods, basal spray applications are labor-intensive.

Broadcast Sprays

This method entails area-wide spray or dissemination of pellet-form herbicide, typically in swaths. It is applicable to all types of target vegetation; however if a foliar herbicide were used, the target vegetation must be short enough that the herbicide can be safely applied across the tops of the target plants. Non-target vegetation may have to be protected by physical barriers (typically plastic cones

are used) during the spray application. Much of the hand herbicide applications done in the Region 5 have involved broadcast spraying of liquid herbicides, using backpack tanks.

Cut and daub

This method combines manual hand cutting or felling with a hand herbicide application “painted” onto the freshly cut woody surface of the unwanted tree or shrub, next the herbicide is translocated into the growing parts of the remaining stem and root system.

Directed Sprays

Directed sprays apply herbicides to particular target plants, avoiding non-target areas or plants. Along with broadcast sprays, directed spray methods have been the most common hand herbicide application methods in Region 5 in the last decade. Applicable to all types of target vegetation, but subject to the same plant size restrictions as for broadcast sprays.

Hack and Squirt

Hack and squirt involves spraying a small amount of herbicide into freshly cut wounds around the stem of an unwanted tree. Cut and daub is more practical for shrubs because of the multiple small stems for each plant. A major advantage of both hack and squirt and cut and daub is that the herbicide is applied only directly to wounds in the target plants.

Spot-gun

Spot-gun delivers a stream of a measured amount of pre-emergent liquid herbicide to a spot target area on the soil under or adjacent to the target plant. One to several “spots” may need to be treated around the target plant, depending on the target plant size. An advantage of the spot-gun over other hand methods is the applicator spends very little time treating each target plant.

Ground Machine Application

No longer a common application method in California forest lands, liquid herbicides are sprayed from tanks on tractors, trucks, or other specialized motorized vehicles. If used to maintain DFPZ’s, application would be restricted to gentle slope and other site conditions that would be safe for vehicle operations.

Browsing-Grazing

Livestock, such as cattle, sheep, or goats, are used, under permit, in areas with palatable vegetation. Effective controls in areas with marginally palatable vegetation may require fencing to force significant livestock consumption of the target vegetation. There are no specific cost data available from the QLG Planning Area or other comparable areas in the Sierra Nevada. General experience elsewhere is that costs (and revenues to the Government) are both highly variable and site-specific. In situations where the livestock have highly palatable vegetation and nearby water supplies, typically there are no costs, but the Government receives revenues from the Permittee. However, in situations requiring fencing, specialized animals, or moving water supplies, or other costs to the Permittee, there are costs to the Government, but typically not high unit costs. Given the absence of QLG Planning Area-specific data, and the variable nature of costs, and revenues, elsewhere, for the purposes of this SEIS analysis, we assume that the typical unit costs for browsing or grazing are negligible.

Integrated Pest Management (IPM)

It is the policy of the U.S. Department of Agriculture and the Forest Service to use integrated pest management (IPM) strategies. Integrated pest management is the selection, integration, and implementation of pest-control tactics in a systems approach on the basis of anticipated economic, ecological, and sociological consequences. As the definition of IPM implies, the selection of a particular control method, or combination of methods, for a specific situation would include considerations such as the effects of the uncontrolled pests on various resources, alternative control tactics and strategies, effects on non-target species and the environment, and the cost and cost-effectiveness of various methods in both the short and long term.

Pest management strategies, based on sound practices and the ecology of the pest-host system, consist of combinations of tactics, such as preventative measures and direct control of pests. All of the Alternatives, except for the No-Maintenance Alternative, are IPM alternatives; they require systematic detection, evaluation, and monitoring, as well as appropriate treatments.

Preventative Noxious Weed Control Strategies

The primary strategy for reducing the need for vegetation management treatments to maintain DFPZ effectiveness is to maintain live tree overstory cover; which suppresses growth and development of understory plants. This suppression effect occurs primarily because of underground root competition for scarce soil moisture. The already-established large root systems of the large trees have significant competitive advantages over the smaller root systems of the understory hardwood trees, shrubs, forbs, grasses, and other plants. Plants in the HFQLG Pilot Planning Area also compete for sunlight, nutrients, and growing space. Established overstory trees also have the competitive advantage with respect to these limited resources. The referenced suppression effects vary by kind of vegetation and site quality, but are thought to delay DFPZ maintenance treatments.

The strategies for avoiding noxious or other invasive weed spread into DFPZs vary according to the specific ecological requirements, by species, for such weed establishment. Generally, noxious or invasive weeds require a bare soil surface (little or no litter layer) to become established, so avoidance of treatments, such as hot prescribed fires and machine treatments that remove both desired existing vegetation and the soil litter layer would be preferred. Another strategy would be planting or seeding desired native plants.

There is no practical strategy for preventing weed seed dissemination into weed-free areas by wildlife, but dissemination by livestock can be reduced or prevented by several methods. One is preventing the livestock out of weed-infested areas during flowering and seed dissemination periods. A second method is to keep livestock that have been in weed-infested areas in such periods in holding pens for about 2 weeks before moving them to weed-free areas. A third method is to use only weed-free supplemental feed.

Another preventative method is to wash machinery prior to leaving weed-infested areas to prevent machines from inadvertently vectoring weed seeds that temporarily adhere to machine surfaces. Likewise, field workers who move from weed-infested areas should clean clothes, or otherwise remove weed seeds stuck to clothes, prior to entering weed-free areas.

Steam is ejected onto target plants from a nozzle hooked to a steam-generating machine. Sometimes used to reduce vegetation along railroad tracks. Steam would be impractical or impossible to use

away from roads capable of supporting heavy equipment, so steam was deemed to be impractical for typical DFPZ maintenance work.