

Practice Specification Brush Management (Code 314)

SCOPE

This document establishes the technical details, workmanship, and quality and extent of materials required to install the practice in accordance with the Conservation Practice Standard.

GENERAL USE

Brush Management will achieve the desired control of the target woody species and protection of desired species. This will be accomplished by mechanical treatment, chemical treatment, biological treatment, or a combination of these methods. A detailed Brush Management plan that follows the guidance in this specification must be developed for each planned instance of this practice.

Brush management will not be applied to only a part of a pasture unless the entire management unit can be managed according to the needs of the treated area. Treated areas may be temporarily fenced off to achieve management goals.

In the Pacific Islands Area, when managing for invasive woody species that are difficult to control and typically require more than one treatment, Brush Management may be planned multiple times. For contracting purposes, the species must be listed on the PIA Pervasive Weed List.

Where brush mixtures occur that include one or more species for which approved methods have been established, the recommended control will be that prescribed for the species that is the greatest problem, provided one method will give adequate control. If this is not possible, separate control methods may be needed.

Rarely does a single treatment of target species solve a woody plant problem but rather a system approach may be needed. This may include a combination of treatment methods and ongoing follow-up maintenance applied consistently over several years.

Response by vegetation is often the determining factor influencing the success of a brush management practice.

- If increased forage is the objective, forage species must be able to take quick advantage of improved growing conditions to ensure success.
- If fuel load reduction is the objective, acceptable levels of woody plant control should be specified.
- If water quality improvement is the objective, reasonable chances of improving herbaceous cover while reducing woody cover should exist.

Brush management shall not be utilized where loss of the woody plant cover would increase soil erosion, unless the area will be established in more erosion-retarding type of vegetation.

Revegetation operations that are needed must be planned and carried out as soon as possible after brush clearing has been completed. Complete the brush clearing operation as close to the start of the rainy season as possible. Document revegetation needs in the Brush Management Plan and consult the Range Planting (550) or Forage and Biomass Planting (512) or other appropriate practice specifications (as applicable) for details and procedures for developing a revegetation plan following treatment. Brush management plans must consider timing of application, revegetation needs, and time needed for site recovery.

Where livestock are present, Prescribed Grazing (528) shall be applied to ensure the desired response from treatments.

For all Brush Management activities, equipment, tools and vehicles coming from off- site shall be clean and free of weed seeds.

Prior to commencement of any mechanical clearing, a utility check must be completed to make sure all underground utilities are avoided. The landowner/ operator or contractor shall call 1-866-423-7287 or 811 or appropriate local utilities to determine the existence of utilities at least 5 days prior to excavation.

Figure 1



VARIANCES

Any requests for variances must be submitted to the State Rangeland Management Specialist and must receive written approval prior to the commencement of the Brush Management plan.

BRUSH MANAGEMENT PLAN

The appropriate PIA Brush Management IR must be used when developing Brush Management plans. If a Brush Management plan requires a combination of treatment methods, a separate IR must be completed for each method.

Each conservationist must analyze the brush stand with the land user and consider the total impact of brush management on the environment. It is the responsibility of the planner and the client to identify a proven strategy for use on targeted species under this practice.

Brush management plans must consider multiple factors including:

- objectives of the land user
- type of land and/or site
- topography
- species of woody plants (whether they are root-sprouters or non-sprouters)
- size, abundance, and distribution of woody plants
- hazards of treatment (if any)
- costs in relation to expected benefits
- extent of existing erosion or erosion potential.

Prepare brush management plans and specifications that conform to all applicable Federal, State, and local laws. These documents will contain the following data as a minimum:

1. Goals and objectives clearly stated.
2. Pretreatment cover or density of the target plant(s) and the planned post-treatment cover or density and desired efficacy.
3. Maps, drawings, and/or narratives detailing or identifying areas to be treated, pattern of treatment (if applicable), and areas that will not be disturbed.
4. A monitoring plan that identifies what should be measured (including timing and frequency) and that documents the changes in the plant community (compare with objectives) will be implemented.

Mechanical Treatment Methods. Plans and specifications will include items 1 through 4 above, plus the following:

1. Types of equipment and any modifications necessary to enable the equipment to adequately complete the job.
2. Dates of treatment to best effect control.
3. Operating instructions (if applicable).
4. Techniques or procedures to be followed including measures to prevent water quality impacts from sediment.
5. Appropriate revegetation practice following treatment to ensure the resource concern is addressed.

Chemical Treatment Methods. Plans and specifications will include items 1 through 6, above, plus the following:

1. Acceptable chemical treatment references for containment and management or control of target species. Refer to CTAHR's [*Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide*](#) and the [*Practitioner's Guide for Effective Non-Restricted Herbicide Techniques to Control and Suppress Invasive Woody Species in Hawai'i*](#) for approved herbicide recommendations.
2. Document techniques to be used, planned dates, active ingredient with application rate.
3. Evaluation and interpretation of herbicide risks associated with the selected treatment(s) using WIN- PST.
4. Acceptable dates or plant growth stage at application to best effect control and reduce reinvasion.
5. Any special mitigation, timing considerations or other factors (such as soil texture and organic matter content) that must be considered to ensure the safest, most effective application of the herbicide
6. Reference to product label instructions. Material safety data sheets and pesticide labels may be accessed on the Internet at: <http://www.greenbook.net/>.

Biological Treatment Methods. Must follow the Prescribed Grazing (528) standard and specification and document biological control grazing plan on the Prescribed Grazing Jobsheet. Plans and specifications will include items 1 through 4, above, plus the following:

1. Acceptable biological treatment references for the selected biological agent (grazing/browsing animals only) used to contain and manage the target species
2. Document release date, kind, and number of livestock
3. Timing, frequency, duration and intensity of grazing or browsing
4. Desired degree of grazing or browsing use for effective management of target species
5. Maximum allowable degree of use on desirable non-target species
6. Special mitigation, precautions, or requirements associated with the selected treatment(s)

COMMON PIA TARGET SPECIES

Plant phenology and environmental constraints must be considered if initial treatments are to be successful. In addition, acceptable control levels shall be specified in the planning phase. Some examples of major target species addressed by this practice include:

Albizia+	(<i>Falcataria moluccana</i>)
Apple-of-Sodom	(<i>Solanum americanum</i> , syn. <i>S. linnaeanum</i>)
Black wattle*+	(<i>Acacia mearnsii</i> , syn. <i>A. decurrens</i>)
Catsclaw, mysore*	(<i>Caesalpinia decapetala</i> , syn. <i>C. sepiaria</i>)
Christmasberry**	(<i>Schinus terebinthifolius</i>)
Firetree*	(<i>Morella faya</i> , or <i>Myrica faya</i>)
Formosa koa**	(<i>Acacia confusa</i>)
Gorse*	(<i>Ulex europaeus</i>)
Guava**	(<i>Psidium guajava</i>)
Ironwood**	(<i>Casurina spp.</i>)
Java plum*	(<i>Syzygium cumini</i>)
Kiawe	(<i>Prosopis pallida</i>)
Klu, sweet acacia*	(<i>Acacia farnesiana</i>)
Koa haole, tangantangan	(<i>Leucaena leucocephala</i>)
Lantana**	(<i>Lantana camara</i>)
Melastoma**	(<i>Melastoma malabathricum</i> , <i>M. candidum</i>)

Miconia*	(<i>Miconia calvescens</i>)
Panini, prickly pear cactus**	(<i>Opuntia monacantha</i>)
Silkoak*	(<i>Grevillea robusta</i>)
Sourbush*	(<i>Pluchea spp.</i>)
Tibouchina**	(<i>Tibouchina spp.</i>)
Waiawi, strawberry guava**	(<i>Psidium cattleianum</i>)
*These plants will require more than one treatment, or a combination of different treatments (eg, mechanical <u>and</u> chemical) to achieve eradication goals.	
+ Known root-sprouter	
**Do <u>not</u> use mechanical treatment (mowing, bulldozer, etc) on <i>Opuntia</i> . It will spread readily from any green tissue parts that are left behind.	

BRUSH TREATMENT AND CONTROL METHODS

Mechanical Treatment Methods

Mechanical brush treatments must carefully consider site topography and any slope limitations to safe equipment operations. Plan treatment areas in increments that are reasonable and practical to successful treatment and revegetation.

Mechanical brush management is often applied to woody species with heavy densities and top growth.

Many times, it is impossible to get satisfactory control without removal of top growth as a necessary part of brush management. All operations needed for brush management, with or without seeding, will be included as necessary elements. This may include any combination of the following as needed: doze, rake, stack, disc, root plow, power grub, axing, etc.

General guidelines for control of root sprouting species or those species that re-sprout from basal stems are as follows:

1. Do not apply primary brush treatment when target species are root sprouters and no follow-up treatment is planned.
2. Identify and schedule any necessary follow-up treatment when the target plant re-sprouts and/or seedlings are expected to reach an approximate height of 2-3 feet (~6 months - 2 years following primary brush treatment).

Root plowing or disking may be planned only when soil conditions are such that a stand of grass can be readily established.

Mechanical treatments may cause significant structural changes of plant communities and treatment areas may require substantial time to recover. The impacts which these changes may pose on plant and animal communities should be carefully considered during the planning phase. In most instances, where woody infestations are light to moderate, other alternatives such as spot-grubbing or individual plant treatment with herbicides should be considered.

Where brush removal will create a temporary erosion hazard, clearing will be done in alternating strips across the predominant slope, and brush will be windrowed across the slope prior to revegetation. Whenever feasible desirable natural vegetation should be retained. Brush that is removed shall not be stored or deposited along the banks of any stream, river, or natural water course.

Bulldozer. A brush rake should be used in place of the standard dozer straight blade wherever feasible. This is an effective method to remove trees and heavy brush. Avoid unnecessary disturbance or removal of the topsoil. Bulldozing should not result in large amounts of soil mixed with brush. Areas with root-sprouting species may need to be disced following grubbing. See below.

Heavy Offset Plow Rome Disk. This method is recommended on sites with soil depths exceeding 10 inches and where stones will not interfere with the disking operation. Large offset disks can effectively control light to moderate stands of brush. Heavy brush stands will need to be grubbed to remove top

growth first. The disks should be set to cut brush roots below the crown. Two passes are usually needed for brush control. The second application should be plowed perpendicular to the first plowing. The Rome disc must be at least 30 inches in diameter. For species that will regrow from root segments, the second disking may need be timed a few weeks after the first to exhaust the plants stored energy and ensure adequate control. Trash or brush may be grubbed and piled appropriately or, if small enough, chopped up and incorporated with the soil.

Rolling Chopper. This method is recommended for use on brush species with stem or trunk diameters of up to 5 inches. The crushing and chopping effectively controls non-sprouting brush, small trees or slash.

Rotary Brush Mower. This method should be used on rock free areas with brush species and sprouts of up to 3 inches in diameter. Rotary cutters, shredders and roto-beaters cut brush near ground level and chop it into mulch. They are effective in controlling upright annuals and are useful for frequently repeated treatments of sprouting species.

Grubber. Grubbers remove individual trees or shrubs by cutting the roots below the soil surface and lifting the plants from the ground. They are effective in removing scattered stands of sprouting plants. Because this method is time consuming, it is not well suited for removing dense stands of brush.

Root Plow or Undercutter. This method is effective in killing all types of vegetation. Root plows or undercutters are blades (usually V-shaped) mounted between two shanks. The shanks are usually attached to a hydraulically operated toolbar. The blades are pulled laterally through the soil, cutting all roots at the desired depth. This method is not adapted to rocky soils.

Masticator - A masticator grinds, chips and crushes vegetative material into woody debris close to or into the soil. With an average chip length of less than 6 inches, the residue creates a mulch-like layer on the soil surface. However, resprouting species will usually require follow-up treatments, such as individual plant treatment with herbicide. Masticator head shall be mounted on a tracked vehicle capable of operation on slopes up to 30 percent.

Hand-tools / Chainsaws. This method is effective for reducing brush in remote locations or on inoperable ground or for removing large scattered individual plants. Operator will use appropriate safety equipment and procedures appropriate to the tools used. This method is often used in conjunction with herbicide for cut stem applications. It is crucial any necessary follow-up treatment is applied in a timely manner.

Windrows. Brush that has been mechanically cleared will be pushed into piles or windrows oriented across the slope. These piles will be a maximum of 15-25 ft wide, 10 to 15 ft tall, densely piled and free of topsoil. Large piles will be broken every 200 ft by a 30 ft gap to act as a firebreak and facilitate equipment and livestock movement. Piles will not be made on the banks or within the flow channel of any stream or waterway.

Chemical Treatment Methods

Chemical controls include various timing and application methods, including aerial, ground, and spot spraying. When herbicides are identified as an alternative treatment, an environmental risk evaluation must be completed using Windows Pesticide Screening Tool (Win-PST).

When using herbicides in Hawaii, the recommendations of the University of Hawaii, College of Tropical Agriculture and Human Resources (CTAHR) AND the product label must be followed. If a recommendation published by CTAHR is not available, contact the PIA State Rangeland Management Specialist for guidance.

The NRCS office in Guam may provide clients with published chemical control references from the University of Guam's Cooperative Extension Service-Agriculture and Natural Resources (ANR) Unit and the NRCS office in Saipan may provide clients with published chemical control references from the Northern Marianas College-Cooperative Research Extension and Education Service, if available. If no published recommendations are available, follow the published UH-CTAHR recommendations or contact the PIA State Rangeland Management Specialist for assistance.

File a hard copy of the University's herbicide recommendation(s) in the contract folder with the job sheet.

NRCS does not originate specific instructions, specifications, formulations, or recommendations regarding herbicides.

Herbicide users should be cautioned as follows: If herbicides are handled or applied improperly, or if unused portions are not disposed of safely, they may injure humans, domestic animals, desirable plants, fish or other wildlife, and may contaminate water bodies, nearby crops or other vegetation. Follow the directions and heed all precautions on the container label. Landowners and applicators should be aware of and adhere to the provisions of state and federal laws and regulations concerning the use of agricultural chemicals.

Conformance with permits of all state and federal regulations for use of chemicals shall be the responsibility of the cooperator. Permits for use of chemicals will specify legally required setbacks from watercourses, ponds, residences, etc.

Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS). Material safety data sheets and pesticide labels may be accessed on the Internet at: <http://www.greenbook.net/>.

Where herbicides are used following mechanical control measures, timing and application method of treatment will be that which is known to be effective on the target species.

Foliar. This method is the most common for applying herbicides. Applications can be made using hand sprayers, power sprayers or aircraft. In addition, wipe-on systems and very- and ultra-low volume applicators are available.

Cut-surface (injection, notching, cut-stump, frilling). The bark of brush and trees is mechanically penetrated, and the herbicide placed directly into the sapwood (xylem). This is an effective method. Tree injectors are available that pierce the bark and deposit the herbicide. The bark may be notched with an ax or machete. Herbicide is then squirted into the wound. With the cut-stump method, herbicide is applied to the surface of the freshly cut stump that is at or near ground level. Frilling is where the trunk is girdled, and herbicide applied to the wound-ring completely around the trunk.

Basal Application. The trunk is wetted from the base to about 20 inches above the soil line with a mixture of an oil soluble herbicide and a light oil. The oil is used to penetrate the bark. The solution is either sprayed or brushed on the trunk. Complete coverage of the treated area is important as misses or skips could allow buds to sprout. This includes the base of the trunk to ensure that buds will not sprout from the root crown.

Soil Application. Granular or pelleted herbicides are applied by hand, with a mechanical spreader or by aircraft. The herbicide is taken up by the plant roots. This method is particularly suited for brush control in remote areas or areas with rough terrain where hauling of spraying equipment and water is difficult.

Broadcast treatments refer to the application of herbicides evenly across an entire area. The most common types of broadcast treatments use foliar sprays or soil-applied herbicides.

Individual Plant Treatment (IPT) refers to treating each plant of the target species individually. Foliar sprays, cut-surface treatments, basal applications, and soil applications can all be applied using the IPT method.

- Individual Plant Treatment (IPT) has proven to be cost effective and much more effective than most broadcast treatments.
- Conservationists must consider the type of targeted species when selecting herbicidal IPT. IPT basal treatments are most feasible on plants with 1-2 basal stems. IPT foliar treatments are most feasible on multiple stemmed plants less than 8 feet tall.
- Plant densities in terms of plants/acre rather than crown canopy should be used when determining whether or not to use IPT. As a general rule of thumb, densities of greater than 300 plants per acre should be controlled by means other than IPT. Plant size also influences the feasibility and cost of IPT.

- Research indicates that substantially less herbicide may be needed per acre when using IPT as opposed to standard broadcast methods. This makes IPT an environmentally sound choice as well as a more economically sound one.
- IPT has broadened the application window considerably. Low volume basal treatments can be applied anytime during the year. Foliar sprays often can be applied during most of the growing season.

Biological Treatment Methods

Biological controls use living organisms (natural enemies) to suppress populations of weeds

NRCS will not develop biological treatment recommendations except for biological control utilizing grazing and browsing animals. A grazing plan that follows the Prescribed Grazing (528) practice standard and specification must be developed and followed to ensure desired results are achieved and maintained any time grazing or browsing animals are used for a biological control agent. Use the Prescribed Grazing jobsheet to document all grazing prescriptions used for biological control.

Livestock are best used for follow-up treatments after mechanical control. The use of livestock should never be planned as the primary brush treatment unless the brush is already in a state that is accessible for control by livestock.

OPERATION AND MAINTENANCE

Operation

Brush management practices must be applied using approved materials and procedures. Operations will comply with all local, State, and Federal laws and ordinances.

Success of the practice shall be determined by evaluating post-treatment regrowth of target species after sufficient time has passed to monitor the situation and gather reliable data. Length of evaluation periods will depend on the woody species being monitored, proximity of propagules (seeds, branches, and roots) to the site, transport mode of seeds (wind or animals), and methods and materials used.

The operator will develop a safety plan for individuals exposed to chemicals, including telephone numbers and addresses of emergency treatment centers and the telephone number for the nearest poison control center. The National Pesticide Information Center (NPIC) telephone number in Corvallis, Oregon, may also be given for nonemergency information: 1-800-858-7384, Monday to Friday, 6:30 a.m. to 4:30 p.m. Pacific Time. The national Chemical Transportation Emergency Center (CHEMTRAC) telephone number is 1-800-424-9300.

- Follow label requirements for mixing/loading setbacks from wells, intermittent streams and rivers, natural or impounded ponds and lakes, and reservoirs.
- Post signs, according to label directions and/or Federal, State, Tribal, and local laws, around fields that have been treated. Follow restricted entry intervals.
- Dispose of herbicides and herbicide containers in accordance with label directions and adhere to Federal, State, Tribal, and local regulations.
- Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS). MSDS and pesticide labels may be accessed on the Internet at: <http://www.greenbook.net/>.
- Calibrate application equipment according to recommendations before each seasonal use and with each major chemical and site change.
- Replace worn nozzle tips, cracked hoses, and faulty gauges on spray equipment.
- Maintain records of brush/shrub control for at least 2 years. Herbicide application records shall be in accordance with USDA Agricultural Marketing Service's Pesticide Recordkeeping Program and State-specific requirements.

Maintenance

Following initial application, some regrowth, re-sprouting, or reoccurrence of herbaceous weeds should be expected. Spot treatment of individual plants or areas needing re-treatment should be completed as needed when weed vegetation is most vulnerable to desired treatment procedures.

Important maintenance procedures include:

- Reviewing and updating the plan periodically in order to:
 - incorporate new control strategies and technology
 - respond to grazing system and weed complex changes
 - avoid the development of weed resistance
- Maintain mitigation techniques identified in the plan in order to ensure continued effectiveness
- Re-treat areas as needed to ensure control

SAFETY

Landowners or operators, sponsoring organizations, and contractors shall be liable for damage to utilities and damage resulting from disruption of service caused by construction activities.

The Natural Resources Conservation Service makes no representation on the existence or non-existence of any utilities. Absence of utilities on the drawings is not assurance that no utilities are present at the site.

It is the responsibility of the landowner or operator to determine if there are buried or overhead utilities in the vicinity of the proposed work. They should take proper procedures to insure that the utilities shall not be jeopardized and that equipment operators and others will not be injured during construction operations.

The operator will develop a safety plan for individuals exposed to chemicals, including telephone numbers and addresses of emergency treatment centers and the telephone number for the nearest poison control center.

- The National Pesticide Information Center (NPIC) telephone number in Corvallis, Oregon, may also be given for non-emergency information: **1-800-858-7384**.
- The national Chemical Transportation Emergency Center (CHEMTRAC) telephone number is: **1-800-424-9300**.

BASIS OF ACCEPTANCE

The application of this practice shall conform to the details of this specification.

The completed job shall be workmanlike and present a good appearance. The contractor or participant shall conduct all work in accordance with proper safety procedures.

After the practice has been completed, a site inspection will be made to determine whether the practice was properly applied and adequate control has been achieved. A practice certification form will be completed by the planner.

Specific Site Requirements