

**NATURAL RESOURCE CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

BRUSH MANAGEMENT

(Ac.)

CODE 314

DEFINITION

The management or removal of woody (non-herbaceous or succulent) plants including those that are invasive and noxious.

PURPOSE

- Create the desired plant community consistent with the ecological site.
- Restore or release desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality and enhance stream flow.
- Maintain, modify, or enhance fish and wildlife habitat.
- Improve forage accessibility, quality and quantity for livestock and wildlife.
- Manage fuel loads to achieve desired conditions.

CONDITIONS WHERE PRACTICE APPLIES

Brush Management may be applied on all lands except active cropland where removal or manipulation of woody (non-herbaceous or succulent) plants is desired.

Brush Management practice does not apply to removal of woody vegetation by prescribed fire (use Conservation Practice Standard Prescribed Burning (Practice Code 338)) or removal of woody vegetation to facilitate a land use change.

CRITERIA

General Criteria Applicable to All Purposes

Brush management will be planned to achieve the desired plant community on species composition, structure, density, and canopy (or foliar) cover or height.

Brush Management will be applied in a manner to achieve the desired control of the target woody species and protection of desired species, and will be accomplished by mechanical, chemical, biological, or prescribed burning methods either alone or in combination of these methods. When prescribed burning is used as a method, the Conservation Practice Prescribed Burning (Practice Code 338) will also be applied.

When the intent is to manage trees for silvicultural purposes, use Forest Stand Improvement (Practice Code 666).

NRCS will not develop chemical treatment recommendations. The only biological control recommendation that may be developed is the utilization of grazing animals. In such cases, Conservation Practice Standard Prescribed Grazing (Practice Code 528) is used to ensure desired results are achieved and maintained. NRCS may provide clients with acceptable biological and/or chemical control references.

Follow-up treatments may be necessary to achieve objectives.

When brush management is planned to be applied on an area within a pasture the entire pasture must be managed according to the needs of the treated area.

No single treatment of target woody species is adequate to solve a woody plant problem but rather a system approach should be employed. The system approach may include a combination of treatment alternatives utilized over several years.

Where brush mixtures occur that include one or more species for which approved control methods have been established, the prescribed control method will be for the species that is the greatest problem. However,

the selected method must provide adequate control of all target species so that none of the species will continue to be a problem. If one control method for multiple species is not possible, separate control methods may be needed.

Mechanically disturbed areas must be re-vegetated if 25% or more of the existing grass cover is destroyed by mechanical disturbance or if reseeding from existing seed sources will not provide adequate cover. Refer to Conservation Practice Standard Forage and Biomass Planting (Practice Code 512) or Conservation Practice Standard Restoration and Management of Declining Habitats (Practice Code 643) for more guidance.

Where livestock are present, Conservation Practice Standard Prescribed Grazing (Practice Code 528) will be planned, applied and monitored to ensure the desired response from brush management treatments.

Brush management will be planned in a manner that will not adversely affect threatened or endangered species or their habitats.

Cultural resources will be considered when planning brush management. Brush management has the potential for adversely affecting cultural resources and compliance with GM 420, Part 401 during the planning process is necessary.

Where appropriate, local cultural values will be incorporated into practice design in a technically sound manner.

Brush Management will be applied in accordance with all applicable federal, state, and local laws and regulations, including permits, permissions, or notifications if required.

Additional Criteria for Creating the Desired Plant Community Consistent with the Ecological Site

Use applicable Ecological Site Description (ESD) State and Transition models, to develop specifications that are ecologically sound and defensible. Treatments must be congruent with dynamics of the ecological site(s) and keyed to state and plant community phases that have

the potential and capability to support the desired plant community. If an ESD is not available, base specifications on the best approximation of the desired plant community composition, structure, and function.

Additional Criteria for Restoring or Releasing Desired Vegetative Cover to Protect Soils, Control Erosion, Reduce Sediment, Improve Water Quality or Enhance Stream Flow

Choose a method of control that results in the least amount of soil disturbance if soil erosion potential is high and revegetation is slow or uncertain leaving the site vulnerable to long-term exposure to soil loss.

In conjunction with other conservation practices, the number, sequence, and timing of soil disturbing operations shall be managed to maintain soil loss within acceptable levels using approved erosion prediction technology. Refer to Conservation Practice Standards Conservation Cover (Practice Code 327), Restoration and Management of Rare and Declining Habitats (Practice Code 643), and Forage and Biomass Planting (Practice Code 512).

Additional Criteria to Maintain Modify, or Enhance Fish and Wildlife Habitat

Brush Management will be planned and applied in a manner to meet the habitat requirements of the wildlife species of concern as determined by completing IL Biology Technical Note 18 or other habitat evaluation model appropriate for the wildlife species of concern.

Conduct treatments during periods of the year that accommodate reproduction and other life-cycle requirements of target wildlife and pollinator species and in accordance with specifications developed for Conservation Practices Wetland Wildlife Habitat Management (Practice Code 644) and Upland Wildlife Habitat Management (Practice Code 645).

Additional Criteria to Improve Forage Accessibility, Quality and Quantity for Livestock and Wildlife

Timing and sequence of brush management shall be planned in coordination with specifications developed for Conservation Practice Prescribed Grazing (Practice Code 528).

Timing and sequence of brush management will be planned to ensure needed forage is available for grazing animals.

Additional Criteria to Manage Fuel Loads to Achieve Desired Conditions

Control undesirable woody plants in a manner that creates the desired plant community, including the desired fuel load to reduce the risk of wildfire and to facilitate future applications of prescribed fire.

CONSIDERATIONS

Consider using Conservation Practice Integrated Pest Management (Practice Code 595) in support of brush management.

Consider the appropriate time period for treatment. Some brush management activities can be effective when applied within a single year; others may require multiple years of treatment(s) to achieve desired objectives.

Consider impacts and consequences to obligate species (species dependent on the target woody species) when significant changes are planned to existing and adjacent plant communities.

Consider impacts to wildlife food supplies, space, and cover availability when planning the method and amount of brush management.

State issued licenses may be required when using chemical pesticide treatments.

For air quality purposes, consider using chemical methods of brush management that minimize chemical drift and excessive chemical usage. Consider mechanical methods of brush management that minimize the entrainment of particulate matter.

Areas of critical wildlife habitat should be pointed out and the landowners encouraged to

exclude those areas from the treatment area, such as:

- Areas on steep escarpments, ravines, rocky hillsides, and other rough formations and
- Tree-lined drainages.

PLANS AND SPECIFICATIONS

Plans and specifications for the treatment option(s) selected by the decision maker will be recorded for each pasture, field, or management unit where brush management will be applied.

Prepare brush management plans and specifications that conform to all applicable federal, state, and local laws and regulations, including permits, permissions, or notifications if required.

Brush Management plans and specifications will be based on the practice standard and may include narratives, maps, drawings, job sheets, or similar documents. As a minimum, the following data will be included:

1. Goals and objectives clearly stated.
2. Pre-treatment cover or density of the target plant(s) and the planned post-treatment cover or density and desired efficacy.

Count will be quantified using either transect line locations and percent canopy and/or species numbers and basal diameter per acre of the target plant(s).
3. Maps, drawings, and/or narratives detailing or identifying areas to be treated, pattern of treatment (if applicable), and areas that will be left undisturbed.
4. Plans for revegetating when needed.
5. Management following brush management treatment.
6. A monitoring plan that identifies what should be measured (including timing and frequency) and documents the changes in the plant community (compare with objectives).

For Mechanical Treatment Methods, plans and specifications will include 1 through 6 above, plus the following:

- Types of equipment and any modifications necessary to enable the equipment to adequately complete the job.
- Dates of treatment to best effect control.
- Operating instructions (if applicable).
- Techniques or procedures to be followed.

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

- Acceptable chemical treatment references for containment and management or control of target species.
- Evaluation and interpretation of herbicide risks associated with the selected treatment(s) (such as WIN-PST Soil Pesticide Interaction Loss Potential and Hazard Rating Report).
- Acceptable dates or plant growth stage at which the application will provide the best control and dampen reinvasion.
- Any 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.
- Reference to read and follow product label instructions.

Woody plants vary among species in susceptibility to herbicides, and accurate knowledge of target species is essential. For additional guidance on specific herbicides refer to the ["REFERENCES"](#) Section. Preferred methods of treatment may include:

Foliage stem sprays: Sprays are applied to stem and foliage. This type of application is least effective on resprouting species. Application is most effective when sprays are applied just after full-leaf expansion in the spring or early summer. Preventing drift to surrounding areas is more difficult with this method.

Low-pressure coarse sprays with drift reduction additives are recommended.

Basal Bark Spray: Basal spraying is a technique to deaden small trees, shrubs, and occasionally vines by spraying the green bark of the lower trunk (12 to 15) inches with herbicide.

The intent is for the herbicide to penetrate the bark and kill the tree and any basal buds that might sprout.

Herbicides used for basal spraying are generally applied in oil carriers. The technique is effective on trees less than four to six inches in diameter. As bark becomes rougher and thicker, the basal bark spray technique becomes less effective. Care must be taken when herbicide is applied to minimize the amount that runs into the soil, not only from an environmental quality standpoint, but also to avoid damaging non-target species.

Cut Stump: Chemical is applied to freshly cut stump surfaces. Treat plants before the cut surface dries (within two to three hours after cutting) for optimum control. How much of the stump requiring treatment depends on the herbicide formulation. Many of the herbicides labeled for cut stump application are water-soluble; therefore treating the entire stump is not necessary. The critical area of the stump that must be treated to prevent sprouting is the sapwood and bark of the stump's cut surface. Stump treatment with water-soluble herbicides must be done immediately after cutting the tree or vine in order to be effective.

Other herbicides labeled for cut stump applications are formulated to be mixed with oil. Herbicides mixed with oil do not move readily within the plant, but penetrate the bark. For effective suppression of stump sprouting, the entire stump, and particularly the bark and exposed roots must be thoroughly sprayed. Timing is critical with herbicides mixed with oil since downward movement from the cut surface is important to distribute the herbicide. In situations where immediate treatment of stumps is not possible, use a herbicide with a oil carrier rather than one with a water carrier.

Treatment with an oil-carried herbicide is recommended in the spring when treating species that exhibit a spring “sap flow”. Water-carried herbicides will usually not be adequately absorbed to be effective during the spring “sap flow”.

Frill, hatchet, or girdling: Frilling and girdling are methods of controlling standing trees and may be applied with or without herbicide. The bark around the base of the trunk is cut and the herbicide is either applied as a separate step or injected simultaneously in the cambium area. Techniques such as frill, hatchet, or girdling require a considerable amount of time and labor to implement.

Space Cuts – Tree injection: Tree injection involves introducing herbicide into the undesirable tree through spaced cuts made around the trunk of the tree with an axe, hatchet, or tree injector. The amount of herbicide to be placed in the cut is specified on the herbicide label, but is generally around 1 to 2 milliliters. There are various tree injectors available on the market that are hatchets constructed to inject herbicide when struck into a tree.

Soil Application: Includes application of pellets, beads, granules or concentrated liquids. The herbicide moves through the soil to the root zone where the herbicide is absorbed and translocated upward to kill the plant. Treatment is usually made at the base of the plant within the dripline.

Nearby trees may be injured or killed if their roots extend into the treated area.

Soil applied herbicides usually remain active in the soil for several months or even years. Treatments can be made at any time of the year when the ground is not frozen, but control will only occur after sufficient rain has fallen. Soil applied herbicides should only be used on non-erosive soils and areas not susceptible to ground or surface water contamination.

For Biological Treatment Methods, plans and specifications will include items 1 through 6 above, plus the following:

- Acceptable biological treatment references for containment and management or control of target species.
- Kind of biological agent or grazing animal to be used, if applicable.
- Timing, frequency, duration and intensity of grazing or browsing.
- Desired degree of grazing or browsing use for effective control of target species.
- Maximum allowable degree of use on desirable non-target species.
- Special mitigation, precautions, or requirements with the selected treatment(s).

Refer to “[ATTACHMENT 1](#)” for guidance in utilizing goats as a biological management option.

For Prescribed Burning Treatment,

- Refer to Conservation Practice Standard Prescribed Burning (Practice Code 338) for guidance.
- Species controlled by prescribed burning are generally more effectively and economically controlled when stems are small (less than 2 inches in diameter at ground line).
- A backfire will result in most species that are less than a 2-inch basal diameter to be killed to the ground, causing basal resprouting the following year.
- Successive prescribed burn treatments may be necessary to maintain desired control.

Needs and Priorities for Treatment:

The kind and density of the species present and the land use objectives govern brush management planning on grasslands.

Crown canopy is defined as the percent of the ground shaded by a species with the sun in a vertical position over the species.

Brush management priorities are determined by the percent crown canopy of the species of concern.

When undesirable brush species increase to 10 to 40% canopy cover the brush is significantly reducing the growth of desirable herbaceous vegetation.

Certain brush species such as Red Cedar, Osage Orange, Honey Locust, Multiflora Rose, (a secondary noxious weed), Bush Honeysuckle, Autumn Olive, and Russian Olive provide a seed source that is capable of serious infestations.

Grazing management and other management practices can generally control undesirable species that occur at lower densities.

OPERATION AND MAINTENANCE

Operation: Brush Management practices shall 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. The plans will include 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** 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 areas 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 two 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, resprouting, or reoccurrence of brush should be expected. Spot treatment of individual plants or areas needing re-treatment should be done as needed while woody vegetation is small and most vulnerable to desired treatment procedures.

Review and update the plan periodically in order to:

- incorporate new IPM technology;
- respond to grazing management and complex plant population changes; and

- avoid the development of plant resistance to herbicide chemicals.

REFERENCES:

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- **United States Department of Agriculture, Natural Resources Conservation Service.** 2008. General Manual: Title 190 – Ecological Sciences: Part 404 – Pest Management. Washington, DC.
- **Valentine, J. R.,** 1989. Range Developments and Improvements, 3rd ed. Academic Press, MA.
- **Vavra, M., W. A. Laycock, R. D Pieper, eds.** 1994. Ecological Implications of Livestock Herbivory in the West. Society for Range Management, CO.

ATTACHMENT 1

BIOLOGICAL CONTROL

Use goats for follow-up treatment after dozing, chopping, mowing, prescribed burning, shredding, or for initially controlling Multiflora Rose, Honeysuckle, or other brush species. The use of goats is never the primary brush treatment unless the brush is already accessible for control by goats. Allow livestock to browse heavily in the spring after leaves are fully developed to assure complete defoliation by June 1. Limit the area to be controlled to where the goats can be concentrated for sufficient defoliation. Pastures that are being "goated" for brush management will not be grazed with other kinds of livestock. Certain other kinds of livestock (i.e. sheep) may be used in place of goats; however monitor results to ensure objectives are met.

The following methods will be used to control brush with goats:

1) Priority Pastures

Choose two pastures to rotate goats between and assign one pasture as first priority and the other as second priority.

A sufficient number of goats are needed to maintain 85 percent defoliation in the first priority pasture and 65 percent defoliation in the second priority pasture, if brush is mechanically controlled in that pasture.

Control the brush mechanically in the first priority pasture.

Initiate "goating" when leaves are fully developed in late April or early May. Place the goats in the first priority pasture at the rate needed and as often as necessary to maintain at least 85 percent defoliation. When the goats are not in the first priority pasture, they will be placed in the second priority pasture. Maintain the rotation for the full growing season. If possible, defer the pasture during winter and spring while the brush is dormant.

During the second year, reverse priority on the pastures and proceed with the rotation.

Pastures scheduled to be mechanically treated and goated in the following spring should have grazing deferred during the prior fall and winter.

2) Thirty (30) Days In and 30 Days Out

The most effective control occurs when new leaves and twigs are browsed in the initial stage of growth immediately following full leaf expansion. Stock with sufficient goats to obtain at least 65 percent defoliation in approximately 30 days. After defoliation, rest the pasture for approximately 30 days. The system is a 30-day in and 30-day out grazing system with goats - resulting in at least 3 months of rest each growing season. A minimum of 3 years of goating is generally needed to obtain desired control. Defer pastures during winter and spring while brush is dormant.

3) Fifteen (15) Days In and 15 Days Out

Apply the system in the same manner as the 30-day in and 30-day out except that a 15-day in and 15-day out rotation is utilized.

