NATURAL RESOURCES 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 or 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

On all lands except active cropland where the removal, reduction, or manipulation of woody (non-herbaceous or succulent) plants is desired.

This practice does not apply to removal of woody vegetation by prescribed fire (use Prescribed Burning (338)) or removal of woody vegetation to facilitate a land use change (use Land Clearing (460)).

CRITERIA

General Criteria Applicable to All Purposes

Brush management will be designed to achieve the desired plant community based 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. This will be accomplished by mechanical, chemical, burning, or biological methods either alone or in combination.

Mechanical methods are available with this document in *Table 2 Specification Guide for Mechanical Brush Management***.** When prescribed burning is used as a method, the Prescribed Burning standard (338) will also be applied.

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

NRCS shall not develop biological or chemical treatment recommendations except for biological control utilizing grazing animals. In such cases, Prescribed Grazing (528) is used to ensure desired results are achieved and maintained.

NRCS may provide clients with acceptable biological and/or chemical control references. Statewide references for chemical control methods are located in the OSU extension agent's handbook, located in Section I of eFOTG under references, other references.

Additional references that may be used based on species of concern are located in Table 1. When these recommendations are used from another extension service make sure the labeled rates are consistent with Oklahoma pesticide laws. Reference to this material is located at:
http://www.oda.state.ok.us/forms/cps/cpl.pdf

On rangeland, do not remove more woody species than what is listed as historic for the site in the Ecological Site Description (Technical Range Site Description or Range Condition Class Guide).

Table 1

Publication	Woody Plants
Texas Extension B-1466	Eastern Red Cedar, Mesquite, Red Berry Juniper, Salt Cedar, Sumac, Prickly Pear
Current Kansas Report of Progress Publication(2012 –SRP-1063)	Buckbrush, Osage Orange, Sumac, Sand Sagebrush, Multiflora Rose and Plum

Follow-up treatments may be necessary to achieve objectives when applying brush management. A systems approach may be necessary which may include treatment alternatives applied over several years for multiple species. Re-treatment will be delayed until adequate top growth has occurred to assure translocation of the herbicide.

Bulldozing shall not be used when treating re-sprouting species such as honey locust, hedge and oak. Do not apply any treatment of brush management to a root-sprouting species unless follow up treatment is recommended.

Examples of follow up treatment

Plant	Maintenance interval
Mesquite	When trees return to short-shoot stage of growth. This can be 1 - 5 years following chemical treatment.
Redberry juniper	3 - 5 years following chaining or burning.
Postoak and Blackjack oak	When sprouts reach 4 ft. tall.
All other species	When the brush reaches moderate densities.

Infestation Levels

Infestation Levels	% canopy	Trees/ac
Light	<10	<100
Moderate	10 - 30	100 - 199
Heavy	>31	>200

Light levels represent brush that is not an immediate concern but could become a concern. Control at these levels is most cost effective using IPT (Individual Plant Treatment) methods. **Moderate to Heavy levels** are brush that is currently in need of treatment, unless the brush is needed to facilitate other planned treatments, such as wildlife habitat management.

It is often desirable to control unwanted brush species at less than moderate infestations especially when they are known to be extremely invasive. Treatment at lower levels will reduce the likelihood that a more costly treatment method would be needed in the future. Examples of these species include juniper, mesquite, saltcedar, baccharis, blackberry, Osage orange, winged elm, honey locust, multiflora rose, and other aggressive species.

Where mixed brush exists, control measures will be prescribed for the species that is the greatest concern. Multiple treatments can be prescribed if they are compatible. Treatments for secondary species may be recommended if compatible.

The best chemical control of brush species is achieved when plants have adequate foliage and are actively growing when using translocated herbicides. Brush should not be mowed or brush-hogged during the growing season prior to treatment. Allow brush to return to short-shoot stage of growth before treating. Do not mow or brush-hog for at least 90 days post treatment.

Rootplowed areas must be planted to permanent vegetation. Refer to Range Planting (550) standard for guidance.

Mechanically disturbed areas on rangeland may need to be replanted if 20% or more of the existing grass cover is destroyed and is not expected to recover in a reasonable amount of time. If the mechanical treatment coincides with the proper planting dates, then seeding must be done to the disturbed area according the Range Planting (550) standard. If mechanical brush management is done outside the proper planting dates, then the guidelines for seedbed preparation, etc., listed in the Range Planting (550) standard are to be followed.

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Mechanical treatment of brush may result in excess slash and plant residue on the soil surface that will interfere with livestock access, replanting, or other needs. When treating heavy infestations of brush, stacking or piling may be needed following mechanical treatment.

Prescribed grazing shall be applied to assure the desired response from treatments. Refer to Oklahoma Prescribed Grazing (528) standard.

Chemical brush management will be applied in accordance with all state and local laws and ordinances, including Restricted Areas for Application of Hormonal Type Pesticides.

There is the possibility of adverse effects to cultural resources when using mechanical brush management. Mechanical treatments that disturb the soil shall comply with NRCS policy on Cultural Resources.

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. Materials that are helpful for this are Technical Range Site descriptions and soil survey reports for rangeland composition and plant productivity.

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.

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 for wildlife species of concern as determined by an approved habitat evaluation procedure.

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 Wetland Wildlife Habitat Management (644) and Upland Wildlife Habitat Management (645).

Any brush management activity shall comply with the NRCS policy for endangered species identified. Section II of the FOTG contains information on listed species and location maps.

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 Prescribed Grazing (528).

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, facilitate the future application of prescribed fire.

CONSIDERATIONS

Consider using Integrated Pest Management (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 and consider mechanical methods of brush management that minimize the entrainment of particulate matter.

PLANS AND SPECIFICATIONS

Plans and specifications for the treatment option(s) selected by the decision maker will be recorded for each 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. These documents will contain the following data as a minimum:

Goals and objectives clearly stated.

Pre-treatment cover or density of the target plant(s) and the planned post-treatment cover or density and desired efficacy.

Maps, drawings, and/or narratives detailing or identifying areas to be treated, pattern of treatment (if applicable), and areas that will not be disturbed.

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.

For Mechanical Treatment Methods: Plans and specifications will include items 1 through 4, 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 4, 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) using WIN-PST or other approved tool.
- Acceptable dates or plant growth stage at application to best effect control and dampen reinvasion
- 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
- Reference to product label instructions

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

- Acceptable biological treatment references for containment and management or control of target species
- Kind of 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 associated with the selected treatment(s)

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, 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** 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 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 may be expected. Spot treatment of individual plants or areas needing re-treatment should be completed 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 (Integrated Pest Management) technology;
- respond to grazing management and complex plant population changes; and
- avoid the development of plant resistance to herbicide chemicals.

REFERENCES

Branson, F. A, G. F. Gifford, K. G. Renard, R. F Hadley, and E. H. Reid, ed. 1981. Rangeland Hydrology, 2nd ed., Society for Range Management, CO.

Heady, H. F. and D. Child, 1994. Rangeland Ecology and Management, Westview Press, CO.

Holechek, J. L., R. D. Pieper and C. H. Herbel. 2000. Range management principles and practices, 5th edition. Prentice Hall, NJ.

Krausman, P. R., ed. 1996. Rangeland Wildlife. Society for Range Management, CO.

Monsen, S. B., R. Stevens, and N.L. Shaw, comps. 2004. Restoring Western Ranges and Wildlands, Volume 1. Gen. Tech. Rep. RMRS-GTR-136-1, USDA, Forest Service, Fort Collins, CO.

United States Department of Agriculture, Natural Resources Conservation Service. 2003. National Range and Pasture Handbook. Washington, DC.

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.

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE GENERAL SPECIFICATION

BRUSH MANAGEMENT

(MECHANICAL)

(Ac.)

CODE 314

GENERAL SPECIFICATIONS

Procedures, technical detail, and other information listed below provide additional guidance for carrying out selected components of the named practice. This material is referenced from the conservation practice standard for the named practice and supplements the requirements and considerations listed therein.

Table 2. Specification Guide For Mechanical Brush Management.

SPECIES	METHOD	TIME	TECHNIQUES OF OPERATION
baccharis, catclaw, lotebush, yaupon, and other low-growing, non-thicket forming brush species	Rootplow, treedoze, powergrub, hand grub	Anytime [1/]	Plow or grub below any resprouting zone. A heavy offset plow that cuts brush below the budzone is also acceptable. Rootplow blades should be equipped with kickers to bring roots to the surface. Fins should be attached at a 22-degree angle, not over 30” apart and long enough to project through the soil. Follow-up by repeat dozing, hand grubbing, fire, goats, or herbicides as necessary to control sprouts.
blackjack oak, post oak, winged elm, Osage orange, Russian olive, and other tree-type species	Rootplow, treedoze, powergrub, hand grub	Anytime [1/]	If needed, remove top growth prior to rootplowing. Follow-up to control sprouts. Plow 12-14 inches and 18 inches on deep sands. Rootplow must be equipped with fins at a 22-degree angle, not over 30 inches apart and long enough to extend through soil surface. Control sprouts with goats, chemicals, burning, or mechanical means.
	Chaining	Anytime [1/]	Chains must weight 50 lbs. per link or more. Chain two ways. Follow-up treatment will be necessary with goats, chemicals, burning or mechanical means.

SPECIES	METHOD	TIME	TECHNIQUES OF OPERATION
junipers[2/], pinon pine	Chain one way	Anytime	Chains must weight 50 lbs. per link or more. Apply when ground is moist for effective control. Re-apply in the opposite direction 24 months or later if needed.
	Chain two ways	Anytime	Chains must weight 50 lbs. per link or more. Apply when ground is moist for effective control. A choice where junipers exceed 35% canopy and two-way chaining is needed to gain adequate initial control.
	Elevated Chain Chain one way	Anytime	A chain is pulled between two dozers, with a ball or cylinder in the middle that elevates the chain to impact the trees at about 3 ft. height. The weight of the chain is approximately 27 lbs. per foot. This treatment is for trees > 8 ft. tall and is used as a preparation to build fuel load prior to prescribed burning.
	Ax, saw, clip, treedoze, or powergrub	Anytime	Remove all green growth and the above ground foliage or sever the plant below the lowest limb. (Not applicable to redberry juniper.) For treedozing or powergrubbing, the tree is uprooted.
Juniper, redberry [2/]	Treedozing	Anytime [1/]	Trees must be uprooted below the bud zone. Blades are not as desirable because they can destroy the seed source and remnant desirable plants located near the base of the tree.
Mesquite	Rootplow, powergrub, treedoze, hand grub.	Anytime [1/]	For rootplowing, the blade should be equipped with kickers or fins to bring roots to the surface. Fins should be attached at a 22-degree angle, not over 36” apart and long enough to project through the soil. If stand is predominantly seedling mesquite, plow 8” to 10” deep. Uproot trees below bud zone for power grubbing and hand grubbing.
Saltcedar	Rootplow, powergrub, treedoze	June, July, August	Plow at least 12” deep. Rootplow must be equipped with fins to bring roots to the surface. In moist soil, stem sprouting will occur. Follow-up treatment with sprout removal or chemical treatment will be necessary. Rootrake as needed to remove all roots.
	Integrated treatment Chaining or rollerchopping with chemical	June, July, August	Use chaining or rollerchopping to scrape one square inch of bark off of at least two stems. Broadcast apply 2, 4-D (65% AI.) 4 oz./gallon, within one hour of scraping.
Sand sage	Mowing	June	Mow for two successive years. Disadvantages are stobs that remain after mowing operation.

SPECIES	METHOD	TIME	TECHNIQUES OF OPERATION
Shin oak	Shred, rollerchop	April 15 - July 15	Has only annual benefits. Follow up to control sprouts with chemicals, goats (refer to 528 standard) or additional mechanical treatment. Can be used to release herbaceous plants to build fuel load for prescribed burning.
	Deep plowing [1/]	Winter or summer	Not applicable to dune or blowout areas. Plow 20" to 30" deep. Follow-up to control re-sprouts.

[1/] These practices may require replanting because of the percent ground disturbance. Seeding will be done during the current or next applicable date. Schedule treatment in the fall or early winter if seeding is planned for the next spring.

[2/] Junipers will re-establish quickly from carry-over seed. Therefore, prescribed burning can be a companion practice for juniper control that must be applied within 1-5 years following treatment while fuel loads are sufficient and junipers are less than 6 feet tall. Chemical and follow-up mechanical control are also choices.

NRCS, OK

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