



Natural Resources Conservation Service

Minnesota



Woody residue treatment following a forest stand improvement. The remaining larger debris is windrowed into small loose piles that do not create ladder fuels while fine debris is scattered on the soil surface. Note the crop trees are undamaged and the soil is not significantly disturbed.

Woody Residue Treatment

Woody residues, also known as slash, waste or debris are the woody materials such as trunks, branches, limbs, twigs, needles and leaves created during forestry, agroforestry and horticultural activities and after a damaging natural event such as a blow down. Woody residue treatment is a practice that uses different methods on these materials to achieve specific management objectives. For a complete version of the conservation practice standard, go to the eFOTG.

(<http://www.nrcs.usda.gov/technical/efotg/>).

Purposes

Woody residue treatments will reduce hazardous fuels and risk of wildfire, eliminate habitats for harmful insects and diseases, clear access and improve forage for livestock and wildlife, create openings and soil building materials for seedlings, accelerate decomposition to enrich soil organic matter, lessen the risk of physical harm to livestock and humans, provide feedstock for renewable energy systems and enhance the aesthetics of sites near public access. Treatments that

reduce wildfire risk and avoid burning reduce hazards from smoke and fumes.

After forestry activities such as harvesting, forest stand improvement, pruning or brush management the woody materials left on the ground could be considered nutrient sources, soil enrichment materials, commercial products, harmful disease or insect habitats or an ugly waste.

Derechos (straight line winds), tornadoes, winter storms, floods, ice and other severe weather events as well as wildfires and insect and disease infestations result in, standing broken timbers or massive piles of downed woody debris that includes trunks, limbs and branches. These natural disturbances create more dangerous debris threats than human forest management activities.

There are considerations to account for when treating woody residues. The forest litter layers or O horizons and surface soil layers, usually A horizons, maintain a wide variety of ecosystem functions such as nutrient supply, erosion control, water retention and a medium for root development for trees, shrubs, forbs and grasses. Surface soil and litter layers should not be removed and disturbance should be minimized as much as possible. Residue removal could result in increased mortality of small conifer seedlings from direct heat damage and in increased competition from early successional hardwoods.

Where Used

Woody residue treatment is used where forest management activities or natural disturbances have resulted in harmful or dangerous levels of slash or woody debris to be allowed to decompose naturally. It may also be used to supply biomass or biofuel feedstocks for renewable energy systems following stand treatments that create slash. This practice is not used to clear sites for land use conversions to agriculture, pasture that includes hayland and grazing land, landscaping around farmsteads and building sites.

Resource Management System

Woody residue treatments including the condition and extent of residual slash is a

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planned activity and the method selected is based on identified purposes. This practice is used for a land unit having undesirable woody material that, if left alone, creates hazardous conditions to the forest, wildlife, livestock or humans. Timing of treatment coincides with achieving intended purposes and minimizing impact on other resources. Residual slash and debris left on the site after treatment is in a condition and amount that will not present an unacceptable fire, safety, environmental, or pest hazard nor interfere with other on-going or planned management activities.

The Woody Residue Treatment practice may be part of a resource management system (RMS) for a conservation management unit. For an RMS the practice should be combined with the practice Forest Stand Improvement (666), Tree/Shrub Pruning (660), Brush Management (314) or Windbreak/Shelterbelt Renovation (650). Prescribed Burning (338) may be used as a supplemental practice. Tree/Shrub Establishment (612) may be necessary to fully stock the site after treatment, this includes natural regeneration.

Woody Residue Treatment can be used to remove vegetative obstacles as a site preparation activity in conjunction with Tree/Shrub Site Preparation (490) if additional treatment is needed beyond just removing excess woody material.

Conservation Cover (327), Critical Area Planting, Structure for Water Control (587) or other erosion control or water management practices may be needed to fully recover the site.



A chopper roller reduces height of residues and puts residual material in contact with the soil surface.

Wildlife Benefits

Documenting and protecting existing wildlife habitats provides additional benefits. Refer

to the practice Upland Wildlife Habitat Management (645), Tree/Shrub Establishment (612), Early Successional Habitat Development (647) or another suitable wildlife practice to provide benefits for desired wildlife. Minimize adverse impacts to wildlife when selecting and implementing Woody Residue Treatment.

Methods of Woody Residue Treatment

Treatment methods include windrowing or piling, burning, chipping/masticating (crushing), lop and scatter, burying or off-site removal.

Windrowing slash into piles is primarily done to prepare the woody residue for burning or off-site removal such as for biomass or biofuel feedstock. It clears access trails for follow up activities such as additional site preparation treatments and/or plant establishment. However, windrowed piles could provide habitat for harmful insects and diseases and create ladder fuels increasing the risk of wildfires. Often the equipment used compacts the soil and scrapes the forest floor clear of organic matter and fine debris exposing bare soil to erosion, nutrient depletion and runoff and damages surface feeder roots. When considering this method keep in mind that wet conditions tend to favor fungal, bacterial and viral diseases while dry conditions favor insect invasions. Piling conifer slash is not recommended unless the piles are burned within 6 weeks of creation and before insects are active in the spring.

Burning piles or broadcast burning allows the locked up nutrients to be released quickly enhancing soil organic matter and nutrition, eliminating insect and disease habitats and reducing the risk of wildfire if done in a timely manner. However water soluble nutrients may be dissolved and washed away before infiltrating into the soil and wildfire risk will be enhanced if the piles or scattered debris become highly flammable. Smoke and noxious fumes may create breathing and health hazards for humans, livestock and wildlife or impair safety such as smoke covered roads. If debris is left near a public access the downed material may be viewed as wasteful or unsightly.

Chipping, masticating or crushing woody residues results in debris of 1 cubic inch or smaller. This material may be left scattered on the site or removed for biofuel feedstock. When left onsite, the smaller pieces are often crushed

into the soil to quicken decomposition thereby improving soil health by enhancing nutrient recovery, particularly calcium, magnesium and potassium, and increasing organic matter production. Overabundance of this residue may create an imbalance with the soil carbon/nitrogen ratio thereby depleting the site of nitrogen and inhibiting plant establishment and growth.

Lop and scatter involves using hand sized equipment such as used for pruning trees then scattering the boughs and branches around the site but away from tree trunks. The residue will be left, removed or burned. A light broadcast fire will reduce the risk of insect and disease infestations, release nutrients and increase soil health. When applied correctly, a prescribed burn will create little smoke hazard or other negative burning effects. As with all prescribed fires, wildfires are always a concern. If the slash is smaller than 2 inches in diameter it may be left, scattered on site, with a low risk of adverse impacts. Debris of 2 to 4 inches carries a risk of insect and/or disease infestations and should be treated according to the level of risk. Residues of 4 inches or greater should be further treated or removed; particularly for pine forests.

Burying woody debris is a drastic method used only when other options are untenable yet the site needs to be cleared of excess debris for reducing wildfire risk, insect and disease control, site preparation and plant establishment. The bury site should be no deeper or larger than necessary to handle the amount and size of debris.

Off-site removal reduces the amount of debris on the site and may or may not be commercially valuable. Completely removing all woody residues severely compromises the site for future forest production by reducing soil health through increased risk of soil erosion and/or compaction, nutrient depletion and runoff.

Specifications

General Specifications Required for all Purposes

Site-specific requirements are listed on the job sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See NRCS Conservation Practice Standard Woody Residue Treatment (384) for more information.

Treatment of woody residues will take into account the condition and extent of the materials

to be treated and shall comply with the following specifications.

All activities associated with applying this practice shall comply with state, tribal and local forestry and related laws and regulations. It is the landowner's responsibility to obtain appropriate permits and/or applications prior to commencing any activities related to this practice.

Soils, site conditions, and timing of application must be suitable for any ground-based equipment used for woody residue treatment to avoid excessive compaction, rutting or damage to the soil surface layer. For safety purposes and to protect site resources including residual trees, treatment methods involving ground-based heavy equipment are generally not applied on slopes exceeding 20 percent.

Web Soil Survey ratings for Harvest Equipment Operability, Haul Roads, Rutting Hazard and Erosion Hazards of severe, very severe or poorly suited require additional analysis on whether or not to implement the practice and a plan to reduce or eliminate the risks and hazards if the practice is implemented; for example, determining the timing, method and intensity of the practice or planning supplemental practices. A moderate rating will require additional analysis to determine whether supplemental practices are needed to adequately protect the resources. These analyses must be documented in the case file.

High levels of biomass removals may impact some Minnesota soils; for example: soils that are very shallow over bedrock or are deep ombrotrophic peats (all water is from precipitation, not stream or spring fed) – which have lower nutrient capital than the average soil. Removing biomass will negatively affect their productivity.

Wounds and branch stubs are major vectors for fungal and bacterial infestations such as cankers, stem decays, galls and blights. Residual trees must be protected during the implementation of the practice; marking either leave trees or remove trees is required. Avoid during early growth periods since tissues are more vulnerable during this time.

For areas with residual trees suitable woody residue treatments include lop and scatter, windrowing and piling, burning, chipping, masticating or crushing, and/or removal.

For areas with few or no residual trees suitable woody residue treatments include lop and

scatter, windrowing and piling, burning, chipping, masticating or crushing, prescribed (broadcast) burning, and/or removal. Any leave trees should be marked for protection against accidental removal.

Any burning, whether windrows, piles or broadcast, will follow criteria in the conservation practice standard Prescribed Burning (338) and be conducted to minimize heat damage to residual trees, their roots and underlying soil. Even low intensity burns can harm beneficial mycorrhizal fungi and surface feeder roots.

Woody residue removed for improved forage access and growth will be in compliance with current federal, state and local wetland regulations in relation to vegetative removal.

ADDITIONAL SPECIFICATIONS BY PURPOSE

Additional Specifications to Reduce the Risk of Harmful Insects and Disease

In general dry conditions favor insects and associated diseases while wet conditions favor fungal, viral and bacterial infections.

Bark Beetles

Untreated woody residue provides excellent habitat for bark beetles. Bark beetles by themselves may be a serious forest pest but rarely lead to tree death. More importantly they transport fungal pathogens that act as secondary vectors that kill trees. Bark beetles attack weakened and recently broken larger branches and downed trees with or without attached root systems. Once that food supply is exhausted they often attack nearby healthy trees. Both conifers and hardwoods are attacked by bark beetles; conifers are more susceptible than hardwoods. If bark beetles are present or possible, time treatments late summer to early winter (September 1 to January 30) only.

Fungus, Bacteria, Viruses Including Wilts, Blights, and Yellow

Wilts, blights and other fungal, viral or bacterial diseases slow growth rates and some will kill trees by plugging either phloem or xylem vessels. Sanitation is the best method to control the spread of these diseases including completely removing infected trunk and branch material from the site. If complete removal is not possible then debark and chip to less than 1 cu in. or burn the residue. Treat pruned branch collars with pruning paint immediately to stop sap flow and provide a barrier to infection.

Diseases

Conifers: needlecasts and blights, rusts, cankers wilts, mildews.

Hardwoods: knots, cankers, galls, blights, wilts and molds.

Additional Specifications to Improve Access to Forage for Livestock and Wildlife, to Reduce the Risk of Harm to Humans and Livestock, and Enhance Aesthetics

Woody areas used for livestock grazing require a Prescribed Grazing Plan (528). Remove any large debris that could cause harm or dangerous conditions to the livestock grazing area. Debris should be less than 4 inches in diameter and shorter than 2 feet long. As necessary, use Access Control (472) or Fence (382).

Soil Ratings of severe or very severe for Soil Rutting Hazards should be taken into account when grazing in wooded areas as hooves may damage trees by compacting the soil and destroying surface roots.

Retain slash piles that show evidence of use by wildlife; for example look for black bear dens.

Additional Specifications to Improve the Site for Natural or Artificial Regeneration

Use of prescribed fire, at low intensity, is recommended for fire adapted communities. Chipping and mastication exposes the soil mineral layer important for germination of some species such as oaks and walnuts.

Avoid dense slash layers that smother seedlings or cause bent or crooked stems; these seedlings will not recover.

Operation and Maintenance

This practice will be maintained for 10 years. Herbaceous and woody invasive species likely to invade the treated site will be monitored and the site will be treated should an infestation occur. Use of Site Preparation (490) and Tree/Shrub Establishment (612) will be used if recommended to fully recover the site. Tree establishment through natural regeneration is allowed as long as the 612 standard criteria are met.