



**State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES**

Jim Doyle, Governor  
Matthew J. Frank, Secretary

101 S. Webster St.  
Box 7921  
Madison, Wisconsin 53707-7921  
Telephone 608-266-2621  
FAX 608-267-3579  
TTY Access via relay - 711

## Wisconsin's Forestland Woody Biomass Harvesting Guidelines

Sarah Herrick  
Joe Kovach  
Eunice Padley  
Carmen Wagner

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**Table of Contents**

Introduction

Guidelines

    General Guidelines

    Site Specific Guidelines

Appendix 1: Definitions

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**A Note About the June Draft:** This document is a work in progress. When the proposed Guidelines are approved by the Advisory Committee, this document will be modified into a booklet format with additional explanatory material included as needed.

## **Introduction**

Higher energy prices and incentives to produce renewable energy have increased interest in sources of bioenergy. The expansion of a wood-based bioenergy industry could potentially benefit Wisconsin's economy by expanding markets for forest products, creating jobs and reducing reliance on fossil fuels. However, concerns have also been raised about sustainability and the environmental impacts of increased removal of woody biomass from Wisconsin's forests. Understanding these impacts and assuring that the harvest of woody biomass is done within the framework of sustainable forest management is a priority of the Wisconsin Council on Forestry. The Forestland Woody Biomass Harvesting Guidelines were developed to forestall impacts that could adversely affect forest ecosystem sustainability.

These guidelines focus on the sustainable harvest of woody biomass from forested areas within the context of generally accepted forestry practices, and provide considerations and recommendations applicable to stand and site-level management based on best available information. The guidelines address the impacts of increased biomass harvesting on biodiversity conservation, soil nutrient depletion, physical properties of soil, and water quality. The objective is to provide guidance to forest resource managers, loggers, equipment operators, contractors, and landowners in Wisconsin, and to facilitate operational analysis and informed decision-making regarding the harvest of woody biomass from forestland.

The guidelines are a tool to enable sustainable forest management by presenting users with practical and reliable recommendations that are easy to understand and implement. Implementation of the Forestland Woody Biomass Harvesting Guidelines is voluntary. Furthermore, the guidelines should be considered a "work-in-progress" based on best available information; they will be subject to periodic review and revision as better information becomes available.

The guidelines were drafted at the request of the Wisconsin Council on Forestry by a technical team comprised of WDNR staff using best available information. The completed guidelines underwent technical review by a select group of experts, and a stakeholder review by an advisory committee selected by the Wisconsin Council on Forestry. After review and approval by the Advisory Committee, the guidelines will be presented to the Wisconsin Council on Forestry. If the draft guidelines are accepted, the Council may solicit public input prior to final approval.

The Forestland Woody Biomass Harvesting Guidelines are divided into two categories: general, and site specific. General guidelines are designed to be applicable to and should be implemented at any site where fine woody debris will be harvested. Site specific guidelines address specific conditions which are not present at all sites. These guidelines should be implemented only on sites which exhibit specific conditions and are not applicable to all sites

## Guidelines

### General Guidelines

These guidelines are generally applicable to any site. It is expected that these guidelines will be implemented in addition to any applicable silvicultural guidelines, forest management guidelines (FMGs) and best management practices (BMPs). In cases where these guidelines are modified or not applied, then documentation of the rationale, including the expected impacts of the deviation, is recommended. Examples of where a deviation may be warranted include site preparation to facilitate planting operations, and control of invasive or exotic species.

#### 1.A Reminder: Follow Silviculture Handbook – Chapter 24 – Marking Guidelines.

#### Recommendations for tree and snag retention in managed stands are:

- Even-aged rotations
  - ✓ Retain as many snags as possible.
  - ✓ Retain reserve trees and patches at 5-15% crown cover or stand area, including large vigorous trees, mast trees, and cavity trees. Reserve trees and patches are not cut during stand rotation. Harvesting may occur in the future or may be foregone to achieve other benefits.
- Even-aged intermediate treatments
  - ✓ Retain as many snags as possible.
  - ✓ Retain  $\geq 3$ , preferably large, cavity trees per acre.
  - ✓ Retain  $\geq 3$ , preferably large, mast trees per acre.
  - ✓ If previously established, manage reserve trees and patches. Management may include timber harvesting or passive retention. Consider retaining  $\geq 3$  trees per acre to develop into large, old trees and to complete their natural lifespan. These trees may also satisfy cavity and mast tree recommendations. These trees will often become large snags and coarse woody debris.
- Uneven-aged systems
  - ✓ Retain as many snags as possible.
  - ✓ Retain  $\geq 3$ , preferably large, cavity trees per acre.
  - ✓ Retain  $\geq 3$ , preferably large, mast trees per acre.
  - ✓ Consider retaining  $\geq 3$  trees per acre to develop into large, old trees and to complete their natural lifespan. These trees may also satisfy cavity and mast tree recommendations. These trees will often become large snags and coarse woody debris.

#### When applying retention guidelines, be sure to consider:

- ✓ Individual trees can satisfy multiple benefits. For example, three large oak trees with cavities could satisfy the mast tree and cavity tree recommendations, as well as the large, old tree consideration.
- ✓ Retention of both vigorous and decadent trees will provide an array of benefits.
- ✓ In general, species diversity is encouraged when selecting trees to retain
- ✓ Large trees and snags are  $>12$  inches dbh, and preferably  $>18$  inches dbh.
- ✓ Trees retained can be scattered uniformly throughout a stand or irregularly dispersed, as single trees, groups, and patches. Retention in aggregated patches (0.1-2 acres) generally provides the most benefits. The general recommended strategy is to retain irregularly distributed patches along with scattered groups and individuals.
- ✓ Patches retained can satisfy multiple benefits. For example, at stand rotation, an unharvested buffer along a stream may satisfy BMP (water quality) and reserve tree retention guidelines.
- ✓ Retention of snag diversity (species and size) can potentially provide the greatest array of benefits.
- ✓ Snags that are determined to be a threat to human safety can be cut and retained on site as coarse woody debris.
- ✓ Clearly designate, in writing and/or by marking, which trees should be retained (not cut) prior to any cutting operations.

**Additional consideration:** where fine woody material will be harvested, consider reserve tree retention levels at the upper limits (i.e. 10-15% retention) to compensate for increased impacts of increased biomass removals.

**2.A Retain and limit disturbance to down coarse woody debris (CWD) already present.**

**Exception:** Coarse woody debris can be rearranged to facilitate tree regeneration operations.

**3.A Retain a minimum of 4 tons/acre fine woody debris (FWD) on site.**

- **If possible, leave most of the FWD well-distributed throughout the site to maintain nutrient cycles.**
- **Retaining some small slash piles may benefit some animals and plants.**
- **FWD in tree retention patches is included.**
- **Examples illustrating 4 tons/acre fine woody debris will be provided.**
- **In a typical Wisconsin forest, tree crowns contain 8-16 tons/acre of fine woody material (FWM).**

**4.A Do not remove the forest litter layer, stumps, and/or root systems for utilization as biomass.**

**5.A No more than 3% of the harvest area should be occupied by permanent roads and landings that remove forestland from production. Roads, landings and skid trails should not occupy more than 15% of the harvest area.**

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### **Site Specific Guidelines**

These guidelines will be applicable only to sites which contain these specific conditions. These guidelines are not applicable to all sites. It is expected that these guidelines will be implemented in addition to any applicable silvicultural guidelines, forest management guidelines (FMGs) and best management practices (BMPs). In cases where these guidelines are modified or not applied, then documentation of the rationale, including the expected impacts of the deviation, is recommended. Examples of where a deviation may be warranted include site preparation to facilitate planting operations and control of invasive or exotic species.

#### **1.B Do not harvest fine woody material within sites where Federal or State Endangered or Threatened Species are known to exist or are discovered during operations (element occurrences).**

- Consult specialists and databases to assess potential occurrences, habitat requirements, and management recommendations.
- **Exception:** If harvests of fine woody material have been demonstrated to maintain or improve habitat for the species present, then follow appropriate management guidelines to sustain the occurrence or condition. Limit, to the extent possible, the establishment of landings and roads in these areas.

#### **2.B Consideration: For sites where State Special Concern Species or Species of Greatest Conservation Need (those not listed as Federal or State endangered or threatened) are known to exist or are discovered during operations, determine if harvesting of fine woody material will be consistent with sustainable management of these species and their habitat. Consult specialists and species specific management guides to assess potential occurrences, habitat requirements, management recommendations, and potential impacts of proposed management activities.**

#### **3.B Do not harvest fine woody material within listed Element Occurrences of Wisconsin Natural Heritage Inventory (WNHI) Community Types.**

- Consult specialists and databases to assess occurrences, community characteristics, and management recommendations.
- **Exception:** If harvests of fine woody material have been demonstrated to maintain or improve the element occurrence, then follow appropriate management guidelines to sustain the occurrence or condition. Limit, to the extent possible, the establishment of landings and roads in these areas.

#### **4.B Consideration: For sites which represent exceptional community composition or structure, or sensitive site types (those not listed as element occurrences), and which may provide habitat for rare or uncommon species, determine if harvesting fine woody material will be consistent with management to sustain these community and site types. Consult specialists to evaluate potential impacts of proposed management activities.**

- Examples of exceptional community types and sensitive site types: old-growth forest, old forest, large bogs, vernal pools, seeps, cliffs, rock outcrops, ravines, and caves.

#### **5.B Salvage: In stands that have been severely disturbed (e.g. blowdown from tornado, crown fire), and if salvage operations that include harvest of fine woody material are intended:**

- Retain at least 5% of area in unsalvaged (no harvest) patches 0.1-2 acres in size. These should include large diameter reserve trees, mast trees, cavity trees, snags, and down coarse woody debris if present.
- **Exception:** Effective sanitation methods to control pathogen outbreaks may require the removal of specific woody materials.

#### **6.B Do not harvest fine woody material on shallow soils where bedrock is within 20 inches of the surface.**

#### **7.B Do not harvest fine woody material on nutrient-poor soils . A list of soil series is [will be] attached.**

- **Exception:** Jack pine stands may be harvested for woody biomass at rotations of 40 years or longer.

**8.B Do not harvest fine woody material on soils classified as dysic Histosols. These are soils with 18 inches of organic material that are nutrient-poor with a low pH. A list of soil map units will be attached.**

**9.B Do not harvest fine woody materials (FWM) on erosion prone sites.**

**10.B Do not harvest fine woody materials (FWM) within 35 feet of the banks of dry washes and non-navigable streams.**

**11.B Do not harvest fine woody materials (FWM) within 100 feet of wetlands.**

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## Appendix 1: Definitions

**Biological Diversity (biodiversity):** The spectrum of life forms and ecological processes that support and sustain them. Biological diversity occurs at four interacting levels: genetic, species, community, and ecosystem.

**Biological Legacy:** An organism, a reproductive portion of an organism, or a biologically derived structure or pattern inherited from a previous ecosystem. Biological legacies often include large trees, snags, and down logs left after harvesting to provide refugia and to structurally enrich the new stand.

**Bolewood Utilization:** The utilization of trunks, tops and any limbs of trees up to a 4-inch dib (diameter inside bark).

**Cavity (den) Tree:** A (partially) hollow living tree used by wildlife.

**Clearcut:** The removal in one operation of essentially all the trees in a stand.

**Coarse (down) Woody Debris (CWD):** Dead woody material, greater than or equal to 4 inches diameter inside bark at the small end, on the ground in forest stands or in streams.

**Community:** An assemblage of plants and animals living together and occupying a given area.

**Dry Wash:** An incised, often V-shaped, gully that receives precipitation to directly initiate flow or surface runoff to indirectly initiate flow. Little or no water is contributed by seeps or springs. Dry washes often have a coarse rubble or bedrock bed.

**Endangered Species: (Wisconsin):** Any species whose continued existence as a viable component of Wisconsin's wild animals or wild plants is determined by the Department to be in jeopardy on the basis of scientific evidence. These species are protected by state law (see State Statute 29.604 and Administrative Rule NR27). There are additional species that receive protection under the federal Endangered Species Act that are not listed as endangered or threatened by the state of Wisconsin.

**Erosion Prone Sites:** Sites that are rated "severe" or "very severe" erosion hazard (off-road, off-trail) by the USDA NRCS. A site's erosion hazard rating can be viewed at: <http://websoilsurvey.nrcs.usda.gov/app/>

**Federally-listed Species:** Species federally-listed as endangered or threatened (legally protected) and those proposed for federal listing or candidates for federal listing, or their proposed or designated critical habitats. Impacts to federally-listed species are subject to requirements of the U.S. Endangered Species Act.

**Fine (down) Woody Debris:** Dead woody material, less than 4 inches diameter inside bark at the large end, on the ground in forest stands or in streams.

**Fine Woody Material:** Woody material, living or dead, less than 4 inches diameter inside bark at the large end; including fine woody debris and portions of standing living and dead shrubs and trees.

**Forest:** An ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, structure, age class, and associated processes. Typically, tree cover will exceed 50% crown cover, except following a severe disturbance and during stand (re)establishment. Productive forest stands are capable of growing wood volume at an average rate of at least 20 cubic feet per acre per year.

**Habitat:** The place (environment) where an animal, plant, or population naturally or normally lives and develops.



**Logging Residue:** The unused portions of trees cut or killed during logging and left in the woods.

**Mast:** Fruit and nuts consumed as food by wildlife.

**Passive Management:** A deliberate decision to not manipulate forest vegetation.

**Reserve Tree (standard, legacy tree, green tree retention):** Living trees,  $\geq 5$  inches dbh, retained after the regeneration period under even-aged or two-aged silvicultural systems.

**Slash:** The residue left on the ground after logging or accumulating as a result of storm, fire, girdling, or delimiting.

**Snag:** Standing dead tree.

**Special Concern Species (Wisconsin):** Any species with some problem of abundance or distribution suspected but not proved. The main purpose of this category is to focus attention on certain species before they become endangered or threatened. The Wisconsin Natural Heritage Inventory program maintains a list of species currently tracked by the WDNR. Some species listed as Special Concern are federally-listed and thereby protected under the U.S. Endangered Species Act. In addition, several other state and federal laws may apply to some of these species (see [dnr.wi.gov/org/land/er/laws/](http://dnr.wi.gov/org/land/er/laws/) for more information).

**Species of Greatest Conservation Need (Wisconsin):** Animal species identified as at risk or declining in the Wisconsin Wildlife Action Plan (WDNR 2006). They include threatened and endangered species, as well as many other species whose populations are of concern. Designation of a species as SGCN does not, alone, offer legal protection; however, many of the SGCN are either state or federally-listed. In addition, several other state and federal laws may apply to some of these species (see [dnr.wi.gov/org/land/er/laws/](http://dnr.wi.gov/org/land/er/laws/) for more information).

**Sustainable Forest Management (sustainable forestry):** 1) WDNR: The practice of managing dynamic forest ecosystems to provide ecological, economic, social, and cultural benefits for present and future generations. 2) SAF – UN: The practice of meeting the forest resource needs and values of the present without compromising the similar capability of future generations. 3) SAF – EU: The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and potential to fulfill, now and in the future, relevant ecological, economic, and social functions at local, national, and global levels, and that does not cause damage to other ecosystems.

**Threatened Species (Wisconsin):** Any species which appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered. These species are protected by state law (see Statute 29.604 and Administrative Rule NR27). There are additional species that receive protection under the federal Endangered Species Act that are not listed as endangered or threatened by the state of Wisconsin.

**Variable Retention Harvest System:** An approach to harvesting based on the retention of structural elements or biological legacies from the harvested stand for integration into the new stand to achieve various ecological objectives.

**Whole-tree Harvesting:** Cutting and removing an entire upper portion of a tree consisting of trunk, branches, and leaves or needles.

**Wildlife:** All non-domesticated animal life.

**Woody Biomass:** Wood materials, such as wood, bark, sawdust, timber slash, and mill scraps. **Note: The woody biomass harvesting guidelines refer to woody biomass that comes directly from forestland harvest, i.e. wood, bark, etc. This definition is for the purpose of this document and is not meant to supplant or conflict with the definition of sustainable woody biomass approved by the WI Council on Forestry.**

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