

UNIVERSITY OF MINNESOTA

EXTENSION

Forest Lands and Brush Lands in Minnesota: The Minnesota Biomass Harvesting Guidelines

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Fueling the Future:

The Role of Woody and Agriculture Biomass for Energy Workshop

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Roosevelt

Sponsored by:

University of Minnesota Extension, Roseau and Lake of the Wood Counties;
Minnesota Department of Natural Resources

www.extension.umn.edu/agroforestry

Woody Biomass Harvesting Guidelines for Forest Lands and Brushlands in Minnesota





2005 MN legislation

- Expanded the definition of “farm-grown closed-loop biomass” that public utilities seeking to fulfill the state’s **Biomass Mandate** must meet, to include “sustainably managed woody biomass”



2005 MN legislation

“Sustainably Managed Woody Biomass” includes:

- Upland and Lowland brush harvested as part of brushland habitat management
- Logging slash or residue created by timber harvest, TSI, fuel management, or insect & disease control or treatments



2005 MN legislation

- DNR & MFRC must develop guidelines or best management practices for harvest of “sustainably managed woody biomass”
- Strongly encouraged the University of Minnesota to conduct research (literature review) addressing potential ecological impacts of woody biomass harvesting



DNR & MFRC assembled a technical committee to produce guidelines under the direction of the MFRC

- Science based
- Consensus based
- Collaborative process
 - Representation from state, county and federal land management agencies, industry, academics and research





Scope of The Guidelines

- Site-level guidelines
- Address the sustainable harvest of woody biomass while protecting the soil, water, wildlife habitat and biodiversity
- Address the harvest of woody biomass, not traditional “round wood” harvest
- Not address agro-forestry

Intended audience includes: equipment operators, contractors, biomass procurement agents, loggers, natural resource managers and landowners



Timeline

Process

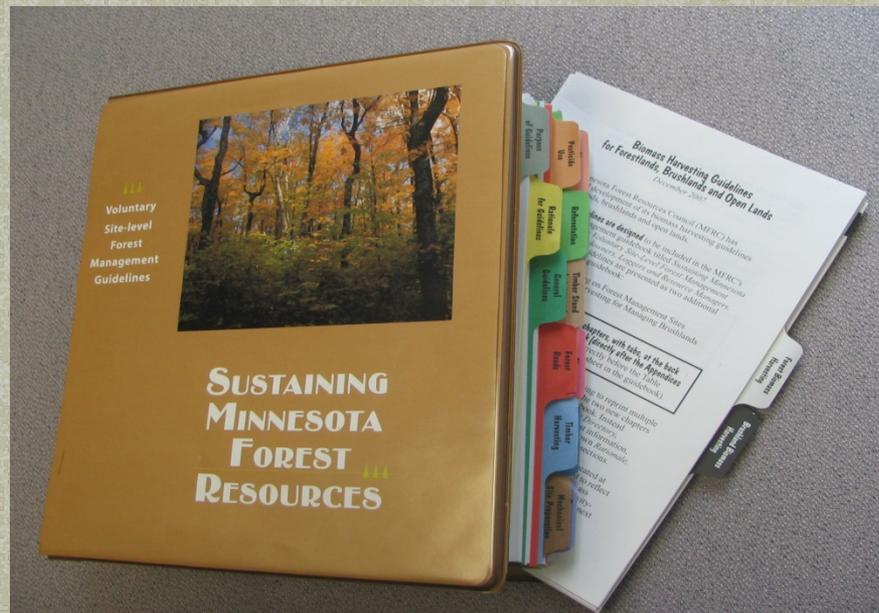
- First Committee meeting April 2006
- Draft guidelines completed Jan. 2007
- Peer Review completed Feb. 2007
 - BCG met and made improvements
- Public Review completed March 2007
 - BCG met and made improvements
- Final draft approved (with modifications) by MFRC on May 16, 2007
- Guidelines printed January 2008

- Implementation Training started Spring of 2008
- Monitoring may be conducted with forest management guideline monitoring

Final Product

■ Two Documents

- Biomass Harvesting on Forest Management Sites in Minnesota
- Woody Biomass Harvesting on Brushlands and Open Lands in Minnesota





Let's Look some Details





Forest
Management
Sites

How Much to Leave?





■ The following forest stand components are often considered as biomass
biomass harvesting guidelines recommend retaining some components

Forest Stand Components

- Snag**: A photograph of a dead tree trunk standing in a forest.
- Brush**: A photograph of a dense thicket of dry, tangled branches and shrubs.
- Fine woody debris (slash)**: A photograph of a pile of small, thin branches and twigs.
- Coarse woody debris (downed logs)**: A photograph of a large pile of cut logs and branches on the forest floor.
- Stumps**: A photograph of a tree stump with a flat top and roots exposed.
- Non-merchantable stems**: A photograph of several thin, vertical tree stems that are too small or irregular to be sold as lumber.



Wildlife Habitat and Biodiversity



- Existing FMGs address wildlife and biodiversity
- Biomass harvest has potential to remove greater amounts of snags, CWD, FWD....
 - Science identifies the importance of these components
 - Science is unclear as to how much - few studies have quantified the amounts needed to maintain populations, especially for FWD
- Emulating natural disturbance may provide best guidance



Wildlife Habitat and Biodiversity - Biomass Guidelines



- Retain all snags & CWD
- Avoid biomass harvest in leave tree clumps - except tops & limbs normally removed
- Retain approximately 1/3 of FWD on site by:
 - Retain and scatter tops and limbs from 20% of trees harvested
 - Retain tops and limbs from incidental breakage (10-20%)



Soil Productivity



Existing guidelines:

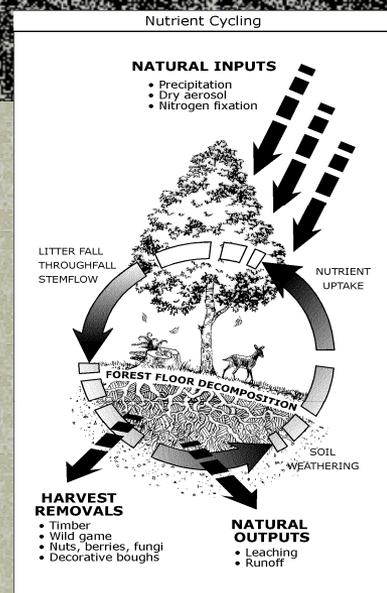
- Manage physical impacts through:
 - Timing of activity, equipment management, managing infrastructure, avoiding rutting and compaction
- Address nutrient concerns through conservation strategies including:
 - Slash retention on certain sites, species conversion, nutrient supplement (ash), rotation length

Biomass harvesting introduces new potential for impacts: additional traffic, possible re-entry onto sites, and additional removal of soil nutrients



Soil Nutrients

- Biomass harvesting removes more *nutrients* from forest sites than conventional timber harvests
- *In general*, Minnesota soils can tolerate large removals of biomass without harmful effects
- *However*, not all soils are impacted the same.

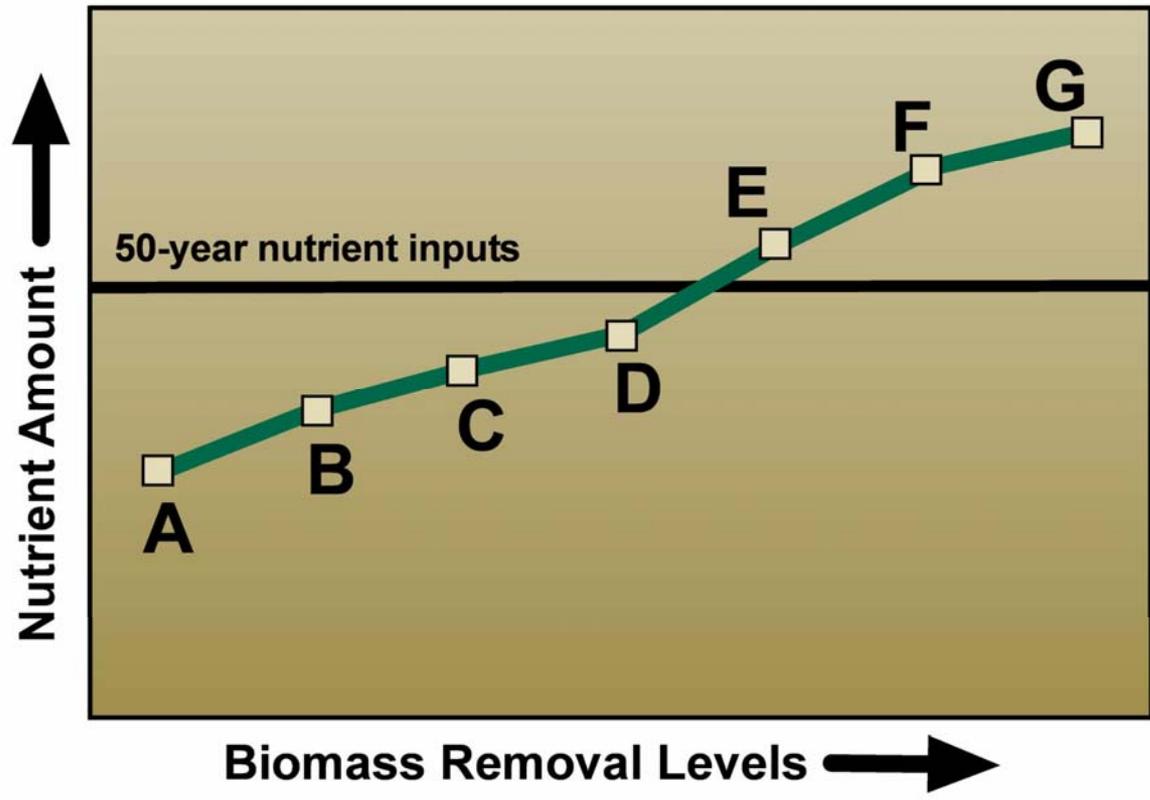




Soil Nutrients

Comparison of Biomass and Nutrients Removal Levels with Natural Nutrient Inputs (typical aspen-birch cover, 50-year rotation, 20 cords/acre yield)

Note: The nutrient capital of an average Minnesota Forest soil is about 20 times greater than that removed under scenario "G"





Soil Productivity - Guidelines

- Avoid additional biomass harvest on:
 - Deep organic (ombrotrophic) sites
 - Aspen or hardwoods on shallow soils (<8")



- Caution on droughty sands and 8-20" soils
- Do not remove forest floor (litter) or root system
- < 3% of site in infrastructure
- Avoid re-entry into general harvest area
- Re-establish erosion control and rehabilitate infrastructure if re-entering on infrastructure

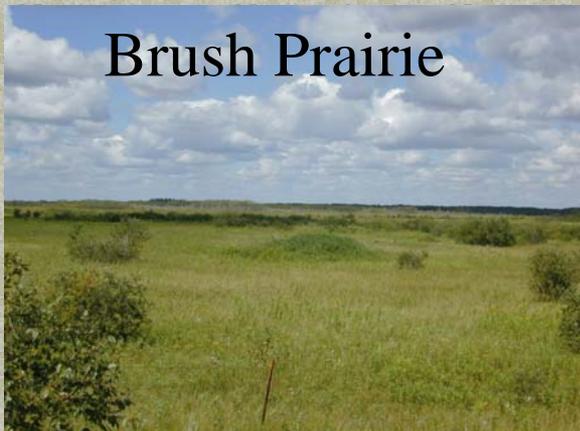


Brushlands
and
Open lands

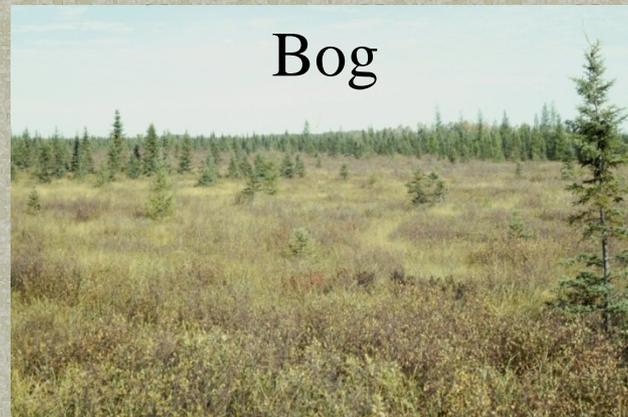


Woody Biomass Harvesting on Brushlands and Open Lands

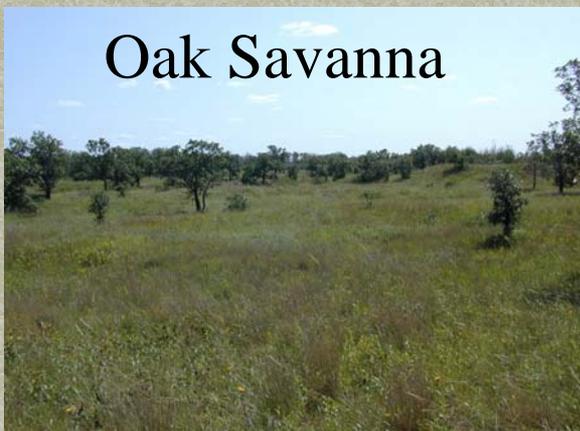
Brush Prairie



Bog



Oak Savanna



Shrub Swamp





Brushlands
and
Open lands



Woody Biomass Harvesting on Brushlands and Open Lands



- 1.3 million acres of brushland in MN
- Early successional habitats that require periodic disturbance (fire) to maintain
- Many species use or are dependant on brushland and open land habitats
- Biomass harvest may provide a market for utilizing the woody biomass on these sites



Brushlands
and
Open lands

DNR Pays to Have Brushlands Mowed, Sheared, or Burned





Brushlands
and
Open lands



Woody Biomass Harvesting on Brushlands and Open Lands

A change of perspective is required to address the guidelines for brushlands and open lands

Structural stand components in forest sites hold less significance in brushlands and open lands



Brushlands
and
Open lands



Let's look at some details





Brushlands
and
Open lands



Soil Productivity

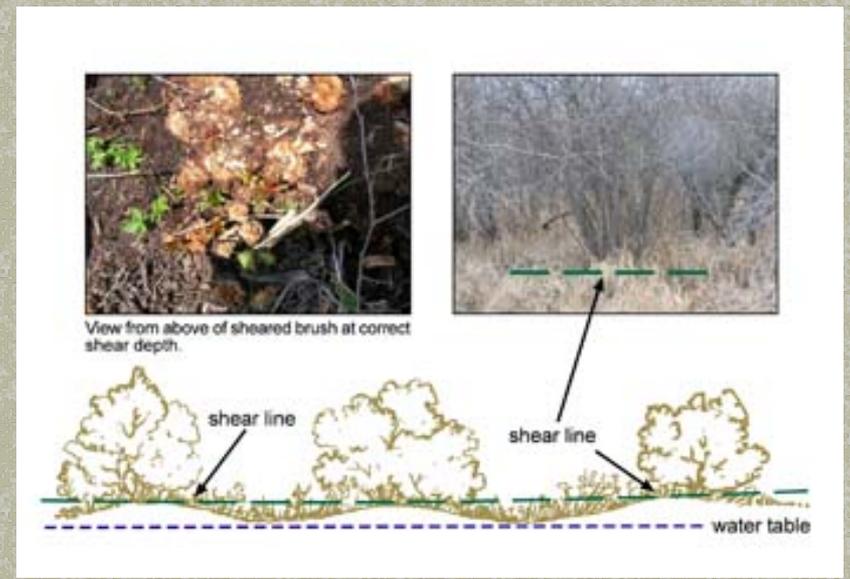


- Similar issues as forest sites
 - Removing woody biomass removes nutrients
 - Operation of heavy equipment has potential physical impacts
- Different harvest operations and rotation ages result in slightly different guidelines



Soil Productivity

- Operate on frozen soils
- Avoid rutting
- Avoid shearing hummocks



- Soil Nutrient Conservation
 - Much less research available on brushland nutrient budgets
 - Let a site's inherent productivity guide the frequency of biomass harvest
 - As indicated by density and height of regeneration



Brushlands
and
Open lands



■ Riparian Management Zones

- **Provide for a RMZ width of 50 feet** from the stream course edge for all designated trout waters and Public Water Inventory water courses
- **Manage vegetation composition within the RMZ appropriate to desired native plant community**
- **Avoid operation of heavy equipment within the RMZ of streams or shorelines of waterbodies.**



Brushlands
and
Open lands



■ Riparian Management Zones

■ Brushland RMZ guidelines apply to RMZs in a brushland landscape

NOT

brushy RMZs in a forest landscape





Summary

- Address the sustainable harvest of woody biomass while protecting soil productivity, water quality, wildlife habitat and biodiversity
- Legislatively mandated
- Collaborative – science based process
- Public and Peer review
- Printed in Jan 2008
- Implementation training started April 08
- Monitoring – 2009?
- Incorporated into Minnesota's Voluntary Site-Level Forest Management Guidelines

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- Copies of guidelines available at www.frc.state.mn.us (look for Forest Management guidelines)



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End



Silvicultural Examples

- Examples of where biomass might or might not work to accomplish silvicultural objectives
 - Swamping
 - Artificial Regeneration
 - Browse Deterrent
 - Natural Regeneration
 - Bark Beetle Management
 - Thinning Stands



- These are generalized examples intended to stimulate critical thinking – they are not guidelines



Biomass Guideline Committee

Process



- Dick Rossman (DNR Forestry) (chair)
- Dave Grigal (Professor Emeritus, Soil Science Department, Univ. of Minn.)
- Bill Berguson (Program Director, NRRI)
- Steve Merchant (DNR Wildlife)
- Kurt Rusterholtz (DNR Eco-Services)
- John Thompson / Dan McCourtney (St. Louis county)
- Steve Olson (Fond-Du-Lac forestry)
- Erv Berglund (retired Hydrologist)
- Tom McCabe (McCabe Forest Products)
- Barb Luelling (Superior National Forest)
- Patrick Orent (Ainsworth Engineered)
- Bill Berg (retired DNR & Sharptail Grouse Society)



Re-entry into Harvest Sites To Retrieve Biomass



- **Avoid re-entry into the general harvest area** of a site once regeneration has begun or planting has been completed
 - If needed restrict traffic to infrastructure
- **Re- establish erosion control measures** on roads and landings