Woody Biomass Harvesting Guidelines on Forest Lands, Brushlands and Open Lands in Minnesota

2005 MN legislative session

- HF 1026 & SF 69
  - Modified Mn state statute 216B.2424
  - Expands 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"

HF 1026 & SF 69

- "Sustainably Managed Woody Biomass" includes:
  - Brush and trees removed from rights of way
  - 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

HF 1026 & SF 69

- DNR & MFRC must develop guidelines or best management practices for "sustainably managed woody biomass"
  - **DNR** for utilizing woody biomass while managing and maintaining brushland and open land habitat on public and private lands
  - **MFRC** for logging slash, and removal of woody biomass from forest lands with particular attention to soil productivity, biological diversity and wildlife habitat
  - Guidelines must be adopted by July 1 2007

Biomass Guideline Committee (BGC)

- DNR and MFRC consolidated to one team creating two sets of guidelines under the direction of MFRC
  - Consensus based
  - Science based
  - Representation from state, federal, county, and tribal land management agencies, industry, and research

Biomass Guideline Committee (BGC) Membership

- 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)

Scope of The Guidelines

- Guidelines will address the sustainable harvest of woody biomass while protecting the soil, water, wildlife habitat and biodiversity that are essential to a healthy and sustainable ecosystem.
- Guidelines will apply statewide
- 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.

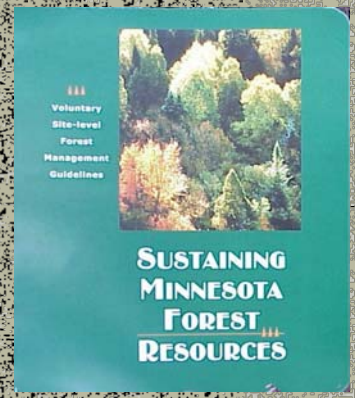
Progress

- Biomass Guideline Committee (BGC) finalized draft biomass harvesting guidelines in late December 2006
  - Peer Review completed Feb. 2007
  - Public Review completed March 2007
  - Scheduled for final review by MFRC May 16th

Biomass Harvesting Guidelines Final Draft

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

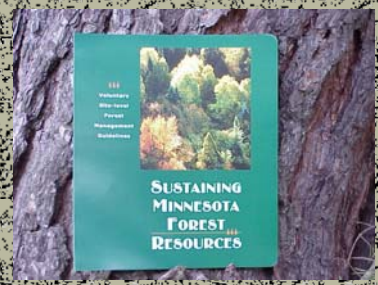
Existing Voluntary Site-Level Forest Management Guidelines (FMGs)



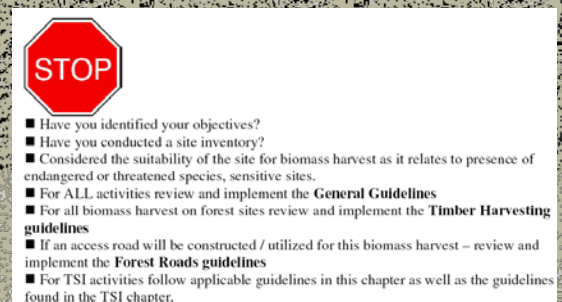
- Sustainable Forest Management Guidelines that address:
  - Cultural Resources, Forest Soil Productivity, Riparian Areas, Visual Quality, Water Quality, Wetlands, and Wildlife Habitat
- Activity Specific Chapters including:
  - General Guidelines, Timber Harvesting, Forest Roads, Reforestation, TSI, Mechanical Site Prep, and Recreation

Biomass Harvesting on Forest Management Sites

- Designed as an additional chapter in the current Site-Level Forest Management Guidelines (FMGs)

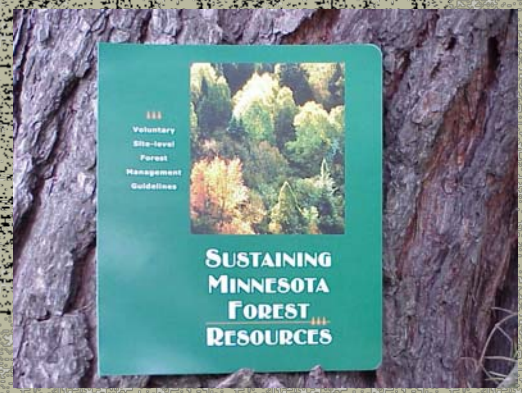


- Includes references to general guidelines, timber harvesting guidelines and TSI chapters



Woody Biomass Harvesting on Brushlands and Open Lands

- Designed to be stand alone
  - Incorporates re-worded General Guidelines
  - Makes references to Site Level FMGs
- Will be inserted (with modifications) as a chapter in the current FMGs



Let's Look at the Details

Biomass Harvesting on Forest Management Sites

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Biomass Harvesting on Forest Management Sites

- Primary discussion issues (Rationale)
  - Wildlife habitat and biodiversity
  - Water Quality
  - Riparian Zones
  - Soil Productivity

How Much to Leave?

Biomass Harvesting on Forest Management Sites

- **Wildlife Habitat 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

Existing Forest Management Guidelines (FMGs)

- Leave tree retention
  - 5% of site OR
  - Minimum of 6-12 scattered leave trees
- Retain all snags possible
- Create or retain 2-4 bark on down logs
  - Rotten log retention is implied
- Modify management to accommodate ETS species

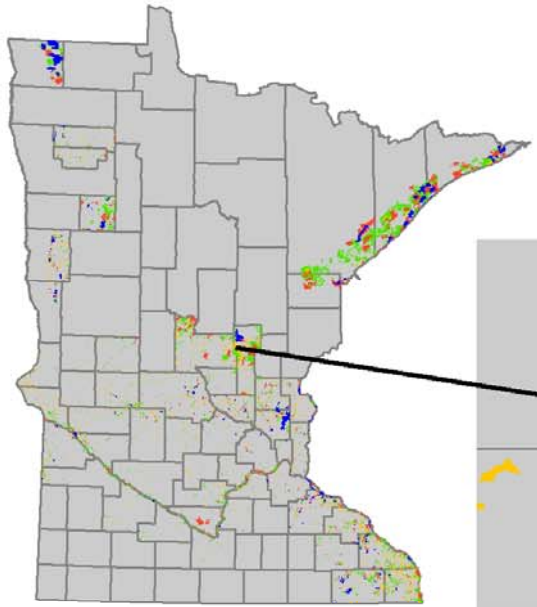
Biomass Harvesting on Forest Management Sites

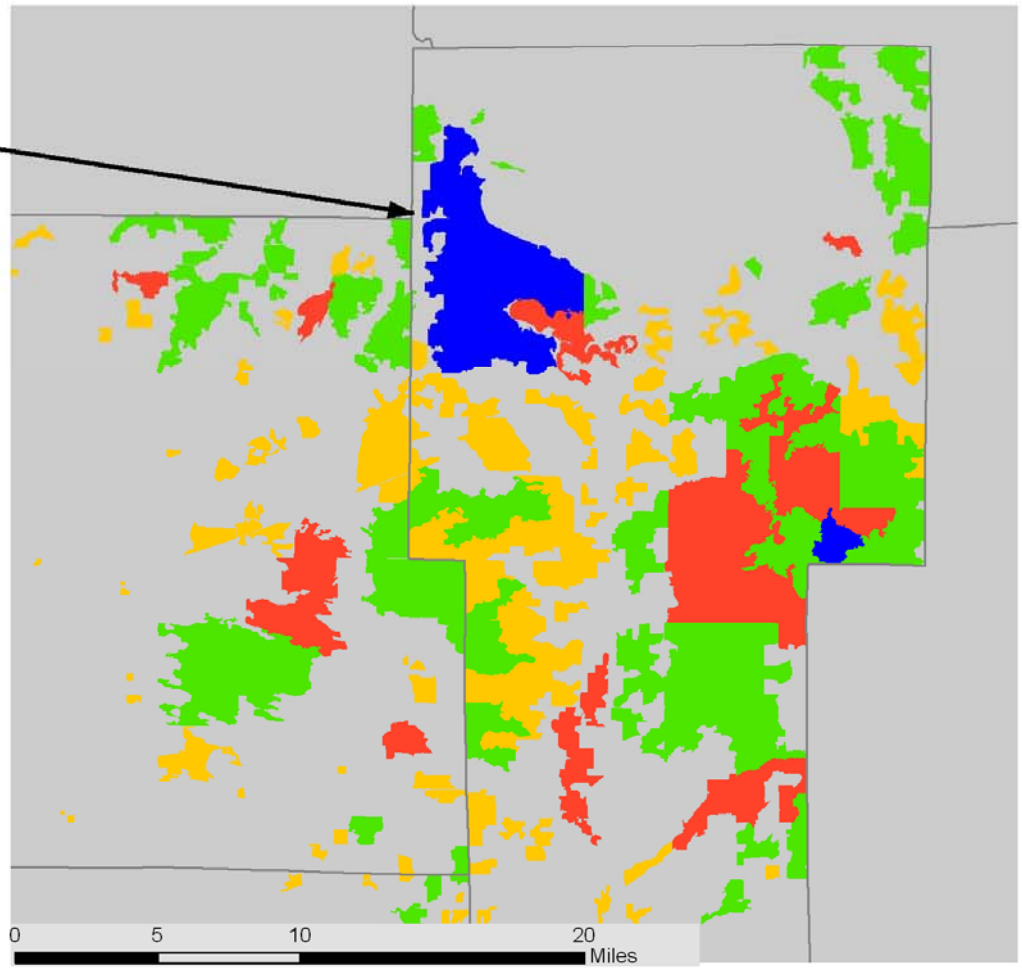
- **Biomass Guidelines**
  - Wildlife habitat and biodiversity
    - Retain all snags & CWD
    - Avoid additional biomass harvest in leave tree clumps (except tops & limbs normally removed)
    - Retain approximately 1/3 of FWD on site by
      - Retain and scatter tops and limbs from 20% of trees harvested
      - Retain tops and limbs from incidental breakage (10-20%)
      - **Goal is approximately 1/3 of FWD**
        - Examples: CTL, Full tree Skidding
    - Leave 20% of brush and small trees on site (material can be run over or cut, but left on site as FWD)

Biomass Harvesting on Forest Management Sites

- **Biomass Guidelines:**
  - Biomass harvest on ecologically sensitive sites
    - Avoid sites identified as High or Outstanding biological diversity significance in the Minnesota County Biological Survey (MCBS)
    - Avoid native plant communities ranked as critically imperiled or imperiled in Minnesota
    - Avoid sites known to support ETS species
      - Nest sites, dens, specific plant populations

Minnesota County Biological Survey
Areas of Biodiversity Significance





Legend

- County Boundary
- Below
- High
- Moderate
- Outstanding
- State of Minnesota

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Biomass Harvesting on Forest Management Sites

- **Water Quality**
  - Existing FMGs focus on avoiding direct impacts from equipment, utilizing filter strips, and erosion control practices
  - Existing guidelines do not address re-entry into sites for biomass removal, or removal of additional stand components within filter strips

Biomass Harvesting on Forest Management Sites

- **Riparian Zones**
  - Existing FMGs cover RMZs in detail
    - Variable from 50' – 200' depending on activity and type of water body.
      - Some timber harvest allowed with minimum Basal area limits depending on management
  - Existing FMGs do not address removal of tops & limbs, brush, or small trees from RMZs

Biomass Harvesting on Forest Management Sites

- **Biomass Guidelines:**
  - Water quality and RMZs
    - Avoid removal of CWD and snags from filter strips
      - Allows for harvest of tops and limbs of trees harvested during roundwood harvest
      - Allows for cautious harvest of unmerchantable trees and brush
    - Avoid harvest of additional biomass from RMZs except for tops and limbs of trees harvested under existing timber harvest guidelines

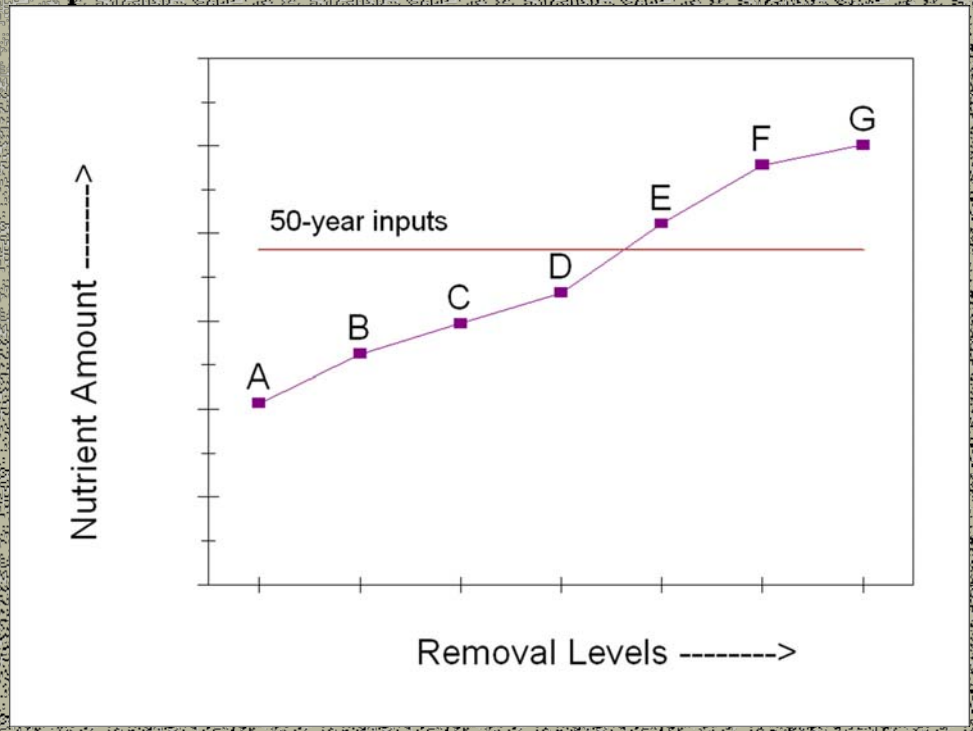
Biomass Harvesting on Forest Management Sites

- Soil Productivity
  - Current FMGs cover physical impacts well
    - Focus is on avoiding impacts through timing of activity, managing infrastructure, avoiding direct impacts such as rutting and compaction
    - Biomass harvesting introduces new potential for impacts due to additional traffic and re-entry onto sites

Biomass Harvesting on Forest Management Sites

- **Soil productivity (nutrients)**
  - Existing FMGs address nutrient concerns through conservation strategies including retaining slash on some sites.
  - **Biomass** removal has potential to remove more woody material, therefore more nutrients
  - Recent research has modified assumptions on nutrient budgets on several fronts
  - Research suggests refining our definition of sites with nutrient conservation needs (slash retention)
    - We propose limiting to deep peats (ombrotrophic), and sites with ≤8" of mineral soil over bedrock
    - Caution on droughty sands and 8-20" soils over rock

Fig 1.**Comparison of relative amounts of nutrients removed with increasing biomass removal compared to natural nutrient inputs**

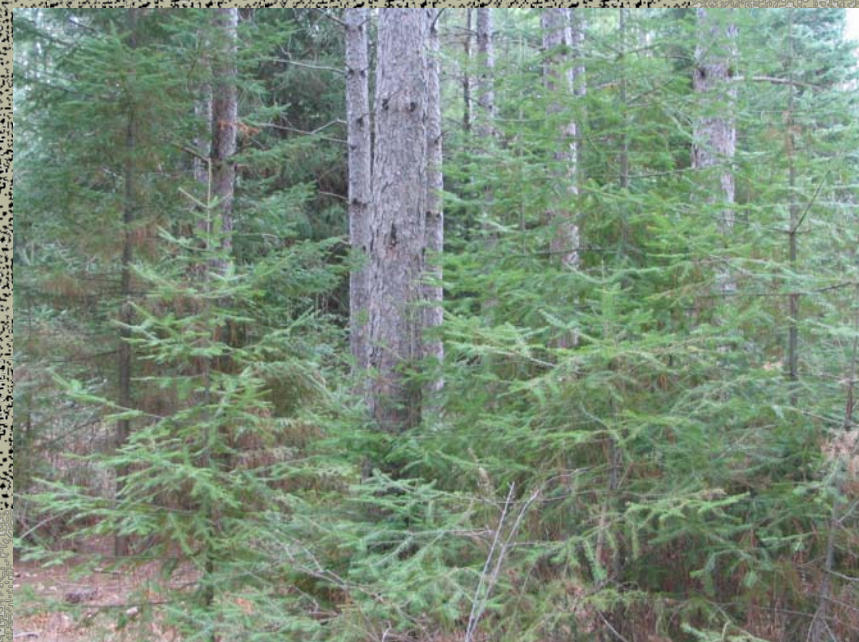


Biomass Harvesting on Forest Management Sites

- **Biomass Guidelines**
  - Soil Productivity
    - Avoid additional biomass harvest on
      - Deep organic (ombrotrophic) sites
      - Aspen or hardwoods on shallow soils (<8") over bedrock
    - Do not remove forest floor (litter) or root systems
    - No more than 3% of site in infrastructure
    - Avoid re-entry into general harvest area
    - Re-establish erosion control and rehabilitate infrastructure if re-entering on infrastructure

Biomass Harvesting on Forest Management Sites

- **Biomass Guidelines**
  - Fuel reduction
    - Retain 20% of understory vegetation in reserve patches
    - Retain large snags and CWD
      - >12" diameter



Biomass Harvesting on Forest Management Sites

- **Biomass Guidelines**
  - Salvage following blowdown or fire with no roundwood harvest
    - Retain 25% in reserve patches
    - When present retain at least 10 large snags (12”+ dbh)
    - Retain or create 2-4 bark on large down logs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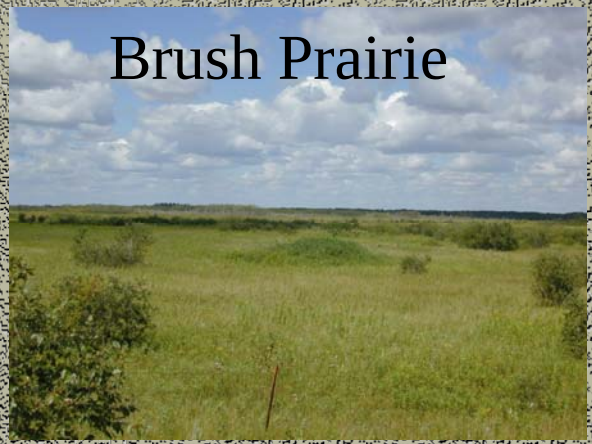
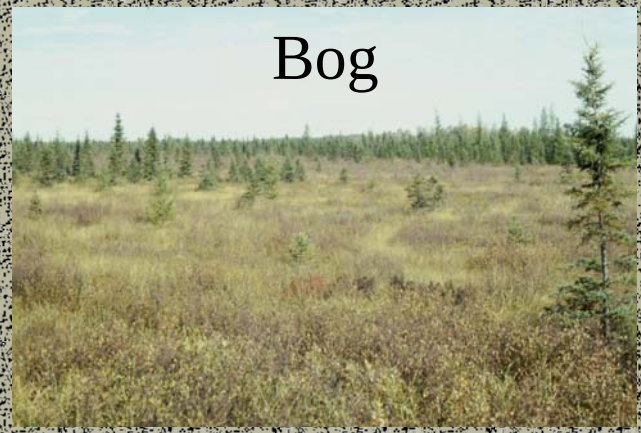
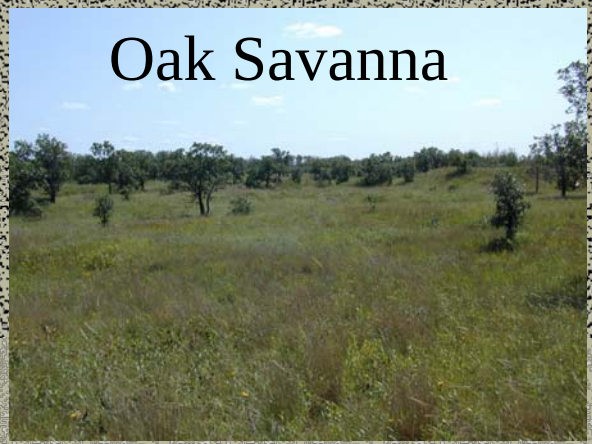
Biomass Harvesting on Forest Management Sites

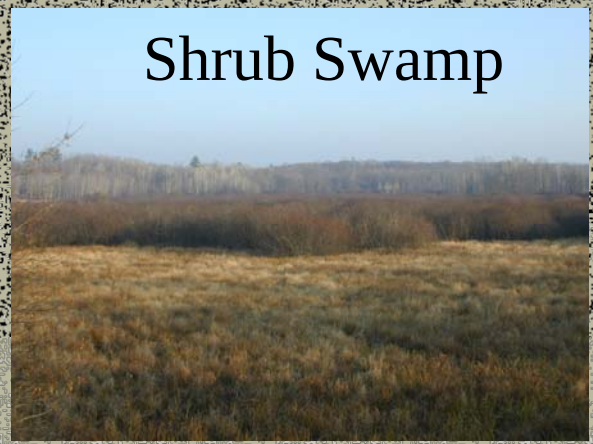
- **Silvicutural Examples**
  - Examples of where biomass might or might not work to accomplish silvicultural objectives
    - Swamping
    - Artificial Regeneration
    - Browse Deterrent
    - Natural Regeneration
    - Bark Beetle Management
    - Thinning Stands

Woody Biomass Harvesting on Brushlands and Open Lands









Woody Biomass Harvesting on <u>Brushlands and Open Lands</u>

- 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

MnDNR pays to have brushland mowed, sheared, or burned

Let’s look at some details

Woody Biomass Harvesting on Brushlands and Open Lands

A change of perspective was required by the BGC to address the guidelines for brushlands and open lands

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

Woody Biomass Harvesting on <u>Brushlands and Open Lands</u>

- Contents reflect existing General Guidelines (GGs) and layout of FMGs
- Many guidelines were pulled forward from the General Guidelines
  - Modifications made to GGs to fit brushlands and open lands
- **Most modifications dealt with the nature of open landscapes**

Woody Biomass Harvesting on Brushlands and Open Lands

- Primary discussion issues
  - Which guidelines to use?
  - Ecologically Sensitive sites
  - Visual quality
  - Soil productivity
  - Riparian management Zones
  - Reserve areas

Woody Biomass Harvesting on Brushlands and Open Lands

- **Which guidelines to use?**

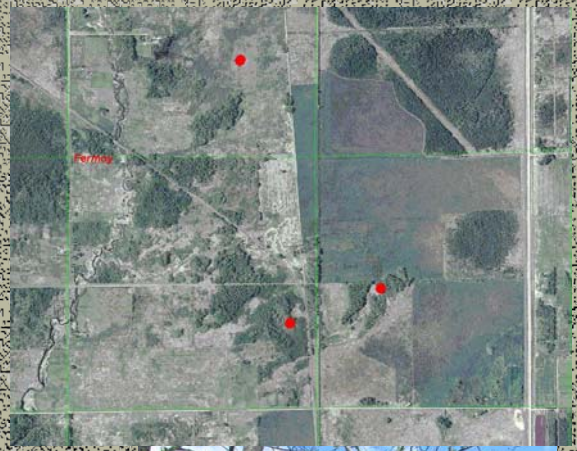
A. Is the woody biomass harvest intended to create, restore, or maintain an open landscape[1]?
   Yes. Go to B.
   No. Go to C.

B. Is the woody biomass harvest intended to reduce future density or cover of woody plants?
   Yes. Apply *Open Land Woody* Biomass Harvest Guidelines
   No. Apply *Brushland Woody* Biomass Harvest Guidelines.

C. Is the site dominated by shrubs, grasses, sedges, or herbs?
   Yes. Go to D.
   No. Apply *Forest Woody* Biomass Harvest Guidelines

D. Has the site recently been harvested for timber?
   Yes. Apply *Forest Woody* Biomass Harvest Guidelines
   No. Apply *Brushland Woody* Biomass Harvest Guidelines.

Brushland Site Management or Forest Site Management



Woody Biomass Harvesting on Brushlands and Open Lands

- Biomass harvest on **sensitive sites**
  - Avoid sites identified as High or Outstanding biological diversity significance in MCBS
  - Avoid native plant communities ranked as critically imperiled or imperiled in Minnesota
  - Avoid sites known to support ETS species
    - Nest sites, dens, specific plant populations
  - The key is to identify these sites in the planning process

Woody Biomass Harvesting on Brushlands and Open Lands

- Soil productivity (nutrients)
  - Brushland guidelines do not identify sites where no biomass harvest is recommended, rather these guidelines focus on letting the sites reflect nutrient status (therefore frequency of harvest) through vegetative regrowth
    - Sites with highest biomass and associated greatest rates of nutrient removal associated with harvesting are also sites with highest levels of nutrient capital and highest rates of nutrient replenishment. As a consequence, data indicate that the nutrients lost during harvest are usually replaced in less than 10 years.
    - On less productive sites, rates of nutrient replenishment are lower. However, biomass and hence nutrient removal are also lower, and the consequence is that the nutrients lost during harvest are replaced in less than 10 years.
    - In other words, a site's inherent productivity influences the rate of nutrient removal and helps maintain the site's appropriate nutrient balance.

Woody Biomass Harvesting on Brushlands and Open Lands

- Soil Productivity (physical impacts)
  - Focused on reducing impacts through timing of activity, limiting direct impacts and managing infrastructure (same as FMGs)
  - In addition new guidelines include:
    - Avoid activity on water tracks and lagg areas
    - When shearing brush ensure that soils are well frozen to avoid uprooting vegetation
    - Avoid shearing off hummocks

Woody Biomass Harvesting on 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
  - **Retain canopy or shrub cover of 35%** within the RMZ (50 feet from the waters edge) to protect water temperatures and hydrological functions during re-growth of vegetation.
  - **Avoid operation of heavy equipment within the RMZ of streams or shorelines of waterbodies.**
    - Utilize hand felling or equipment with the ability to reach into this zone (boom cutting heads) as a means of managing vegetation.

Woody Biomass Harvesting on Brushlands and Open Lands

- Reserve areas
  - **Retain 5-10% of the area in reserve areas** (habitats in reserve patches can be dominated by grasses, sedges, or brush, but should be typical of the plant community). A minimum patch area of one acre is recommended.
  - **Use Table 2** to determine the recommended composition of reserve areas.
    - Table 2 describes recommended composition of reserves areas
      - For example, see Wet Meadow/Carr

Table 2. Structural Habitat Components of Reserve Areas and RMZs in Woody Biomass Harvest Sites.

Habitat Class	Ecological System[1]	Open Land Habitat	Brushland Habitat
Lowland Shrub	See definitions of below table.		
	Open Peatlands[2]	Primarily herbaceous; no live trees, shrubs and snags over 2 meters or 6.6 feet tall.	Herbaceous with widely scattered stunted trees and snags (<10 meters or 33 feet) and sparse tall shrubs.
	Forested Rich Peatland	Tall shrub dominated (>50% cover); no live trees and snags >2 meters or 6.6 feet tall (Note: applies primarily to Northern Alder Swamp.).	Apply Forest Woody Biomass Guidelines
	Wet Meadow/Carr	Primarily herbaceous with sparse (<25% cover) tall shrubs. No live trees, tree regeneration, and snags	Variable tall shrub cover; tall (>10 meters or 33 feet) trees occasionally present. Leave all snags and downed CWD.
	Wetland Prairie[2]	Primarily herbaceous; No trees, tall shrubs, and snags.	Same as Open Land Habitat
Upland Shrub			
	Upland Prairie[2]	Primarily herbaceous with sparce low shrubs. No trees, snags, tall shrubs and CWD.	Same as Open Land Habitat
	Rock Outcrop[3]	Primarily herbaceous with variable shrub density. No live trees and snags.	Primarily herbaceous with variable shrub density with widely scattered tall trees and snags. Retain all downed CWD.
	Fire Dependent Forest/Woodland (cut-over)	Primarily herbaceous; no live trees, shrubs and snags over 2 meters or 6.6 feet tall.	Apply Forest Woody Biomass Guidelines
Old Fields[4]	None	Primarily herbaceous; sparse tall shrubs acceptable. no live trees and snags.	Dependent upon management objectives

Questions?

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

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