

Prairie Vegetation and Energy Production Harvest Plan for WMAs

Considerations for the management of prairie lands and harvesting of native prairie vegetation for use for energy production in a manner that does not devalue the natural habitat, water quality benefits, or carbon sequestration functions.

A report to the Minnesota Legislature,
Environment and Natural Resource Committees
(Minnesota Session Laws 2008, Chapter 179, Section 7, Subdivision 14)

Submitted by the
Minnesota Department of Natural Resources

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January 2009

DATE: 1-20-09

LEGISLATIVE REPORT - Cost of Preparation

NAME OF LEGISLATIVE REPORT -

Prairie Vegetation and Energy Production Harvest Plan for WMAs

Based on: DNR staff analysis

Minnesota Statute Reference: Minnesota Session Laws 2008, Chapter 179, Section 7, Subdivision 14)

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Description of Cost	Further explanation if necessary	Amount
Staff Time	Agency staff (including project staff & other DNR personnel staff to review & approve report)	4760
Duplication Cost (includes paper)	printing and copies	40
Other:	Direct Project Expenses (meeting expenses & travel for lead project staff)	200
TOTALTOPREPAREREPORT (Note: Right click on amount cell and choose update to complete)		\$ 5000.00

Executive Summary

The 2008 Minnesota Legislative Session appropriated to the Minnesota Department of Natural Resources (MNDNR) capital bond funds for acquisition and development of State Wildlife Management Areas (WMAs) for the purpose of providing habitat and public recreation for public benefit. As part of the capital bonding bill, the DNR was directed to develop a plan for biomass harvest specifically on the management of native prairie lands and harvesting of native prairie vegetation for use for energy production in a manner that does not devalue the natural habitat, water quality benefits, or carbon sequestration functions. (Minnesota Session Laws 2008, Chapter 179, Sec. 7, Subd 14)

This plan meets this legislation's requirement and is submitted to the chairs on environment and natural resources.

This plan covers several aspects of bio fuels including relationship of bio fuels and State Wildlife Management Areas, vegetation management, research and demonstration, jump starting a sustainable grass-based energy industry and planning and operational guidelines for bio fuel harvest.

Prairie Vegetation and Energy production Harvest Plan for WMAs

Concerns over climate, energy prices, national security and job creation have lead state and federal policy makers to numerous initiatives that move the nation towards renewable energy resources including biomass. These initiatives include a variety of state and federal incentives and renewable energy standards. Perhaps most significant is the move towards cellusic biofuels established in the federal renewable fuel standard. A significant portion of the policy discussion at the state and national level is the source and sustainability of biomass supplies. Many conservation and environmental interests are actively looking for opportunities to contribute to landscape level ecological restoration efforts through biomass crop production systems.

It is in this context that the Minnesota Department of Natural Resources (DNR) began to evaluate the use of managed haying as a management tool for grassland resources. In 2007, the DNR's Section of Wildlife initiated its first partnerships with a renewable energy project to provide biomass through managed haying. The Glenwood and Willmar Area Wildlife Offices established agreements on six Wildlife Management Areas (WMAs) in need of disturbance management.¹ The efforts were first initiated out of the Glenwood Wildlife Office, where a difficult spring bum season left a number of sites unmanaged. The emergence of a biomass market at the University of Minnesota, Morris represented an opportunity to pursue an alternative course of management. In addition, this management offered the state an opportunity to begin to experiment and evaluate biomass production on grasslands.

The DNR documented these efforts in a fact sheet and then circulated the fact sheet during the 2008 Legislative Session. As part of the capital bonding bill, the DNR was directed to develop a plan for biomass harvest specifically:

The conzmissioner shall submit a plan to the legislature and the chairs of the house and senate committees with jurisdiction over the environment and natural resources on the management of native prairie lands and harvesting of native prairie vegetation for use for energy production in a manner tlzat does not devalue the natural habitat, water quality benefits, or carbon sequestration functions. (Minnesota Session Laws 2008, Chapter 179, Sec. 7, Subd 14)

This report is being filed to comply with the statutory directive.

¹ North American prairies evolved in an environment that was subject to periodic disturbance. This primarily included wildfire and intensive grazing by large numbers of native herbivores such as the American bison. Without such disturbance, praire plant communities will tend to decline and also be subject to severe encroachment by trees. DNR staff periodically burn off old prairie vegetation to ensure the health of the system. .

Scope of Plan

This plan pertains specifically to WMAs under the management of the DNR Section of Wildlife. The statutory directive was located within the bonding bill subdivision that funded WMA acquisitions. In addition, WMAs represent the most likely and most significant resource base that can be managed by DNR with periodic hay harvests. Hay harvest will likely prove to be a suitable management technique for other public lands managed by the DNR (e.g. State Parks). As experience grows, other land managing units within DNR will be able to develop prairie vegetation harvest plans and protocols that address the specific needs and situations for the Outdoor Recreation System units under their control. .

Grass hay harvested from DNR lands would be suitable for two primary markets. The first is the traditional agricultural forage market. The second is the emerging bioenergy industry. At this time, there is a well-developed forage market with clear economics. The energy market for grass biomass is nascent, with only a small handful of businesses actively seeking material.

There are approximately 1,290,185 acres of WMA land within Minnesota (Prairie Parkland Province WMAs total 202,008 acre, Tallgrass Aspen Parkland Province WMAs total 330,873 acres, Eastern Broadleaf Forest province AMAs total 139,219 acres, and Laurentian Mixed Forest Province WMAs total 618,085 acres). However, only portions of these lands are suitable for potential harvest. For example the Southern DNR Region has 57,000 of total grassland and some is not practical for harvest. Resource managers will avoid harvest in areas with sensitive resources, inappropriate topography and portions of units in cover other than grass. **This plan focuses primarily on prairie restoration sites (sites planted to native prairie vegetation) and not tracts of high quality, remnant native prairie.** In addition, other management tools, principally prescribed fire, will continue to be used. Accounting for appropriate disturbance cycles and minimizing impacts on hunters and other users, harvesting may grow to an activity that covers perhaps several thousand acres per year. The ultimate extent of harvest from WMAs will depend on the long-term efficacy of haying as a management tool, the development of suitable markets and the relative cost and value of the material harvested.

The Relationship of Bio fuels and State Wildlife Management Areas

One of the primary purposes of acquiring WMAs is for their habitat value. Habitat value is often based on the diversity of vegetation present on the site. Important goals for WMAs are to: establish and maintain optimal population levels of wildlife while maintaining ecological diversity; maintain or restore natural communities and ecological processes; and maintain or enhance populations of native species (including uncommon species and state and federally listed species).

Maintaining grasslands, particularly native prairies and restored native grassland, have been a challenge to the Division of Fish and Wildlife. Invasive species, such as exotics and woody plants, as well loss of diversity, signify the need for planned disturbance of existing stands.

All management occurs within state and federal regulations pertaining to the management of public Wildlife lands (see appendix). Grassland biomass harvest from WMAs shall be in concert with fish and wildlife habitat management activities,

consistent with the habitat or wildlife species management goals and habitat management objectives for each individual WMA. Grassland biomass harvests in WMAs, including harvest design, and regeneration plans, shall be coordinated between the Divisions of Fish and Wildlife, Forestry and Ecological Services, as per the Forestry Wildlife Coordination Policy, and must be approved by the appropriate Area Wildlife Manager prior to such activity.

State WMAs are also managed for public recreation such as hunting, hiking, bird watching, and nature study. These recreational pursuits will be carefully considering when performing any habitat management activity including biomass harvests.

Vegetation Management

Natural disturbance in the form of fire and grazing maintains native grassland diversity and productivity. The interaction between these two dominant disturbances is important in maintaining grassland biodiversity. Prescribed fire has most often been the tool of choice. Grazing is a relatively recent addition to land managers' tool box.

Haying, and now grassland harvest for biomass/bioenergy, can act as surrogates to these important natural disturbance factors. Well planned harvest of grass for biomass/bioenergy can be seen as just an additional tool. The latest Best Management Practices (BMPs) are utilized under any such harvest regime.

Research and Demonstration – transfer to private lands

Section of Wildlife staff see the potential to improve wildlife habitat, water quality, and habitat diversity over a broad landscape if private landowners "accept" and manage prairie-type bio fuels as a crop. Efficiently growing and harvesting biomass (perennial grasses) for conversion to bio fuel, while at the same time storing carbon, would provide multiple benefits for society, fish and wildlife, and water quality.

Research is still needed to provide the most-efficient means to use biomass management as a tool for improving wildlife habitat on state WMAs. Detailed information will continue to be needed in the years ahead relating to vegetation response, control of "invasive species", harvest timing, harvest methods and equipment, harvest costs, transport costs, carbon sequestration benefits and the economic "value" of the biomass on the open market.

The University of Minnesota (Twin Cities and Morris campuses) is currently conducting research on various aspects of biomass harvest including impacts of biomass harvest on wildlife habitat management and populations. The Department of Natural Resources Wildlife Research Group is also conducting research on impacts of fall harvest of restored prairie vegetation and how this harvest compares to prescribed burning management. Such research will assist in the fine-tuning of best management practices that will benefit both prairie vegetation and the wildlife that depend on this vegetation for habitat.

The DNR has established a set of Best Management Practices (BMPs) in approaching biomass harvest scenarios on State WMAs. These BMPs will be revised and updated as we learn new information. The BMPs will also be used in making recommendations to private biomass producers as well as "end-users" of the biomass.

Jump-start a sustainable grass-based energy industry

The Department of Natural Resources has a desire to see more grass lands on the landscape of southern and western Minnesota. Grasslands provide habitat that is critically needed by upland game birds, waterfowl, and a host of grassland/prairie obligate species. The occurrence of large acreages of grassland in recent years is directly attributable to federal and state conservation programs such as CRP, RIM and CREP. Such programs provide payments to landowners to "idle" critical riparian areas and marginal croplands. These grassland areas should be periodically disturbed or managed. The majority of these lands, however, are not readily available for biomass harvest. Furthermore, it is likely in the near-term, that CRP acreages in Minnesota will be significantly reduced and replaced with more lucrative grain production acres.

DNR sees its role as one to initiate and catalyze the broader development of a sustainable perennial grass industry. It does not see itself as a primary grass biomass resource over the long term. The DNR recognizes that it has a resource base that can help to jump start this emerging enterprise. Experience gained with these harvests will not only help resource managers understand how and where to best apply managed harvest, but it will also provide energy facilities with initial feedstock supplies to work with as well as provide harvesters the valuable experience working with a more diverse range of harvest conditions.

Planning and Operational Guidelines – Strategies for preventing and mitigating biomass harvest impacts

Expanding the acreage of restored prairie for bioenergy feedstocks may provide an opportunity for Minnesota DNR to galvanize its core mission of protecting natural resources, providing outdoor recreation, and promoting sustainable commercial use of natural resources. Bioenergy "green" fuels have the potential to actually improve wildlife habitat, protect soil and water quality, and sequester carbon. Natural resource benefits from bioenergy feedstocks largely depend on what is planted, where and how feedstocks are grown, and how the bioenergy crop is managed and harvested. As mentioned earlier, WMA lands can serve to demonstrate and develop sustainable commercial-scale harvest practices. Applying the following operational guidelines will ensure that WMA biomass harvests are in concert with the natural resource values for which they were established.

Habitat Value

Native grassland systems and the wildlife species dependant upon them developed under a regime of natural disturbance. Through thoughtful planning, haying for biomass can be used as a tool to improve habitat condition. Harvest plans that appropriately guide the timing, frequency, and extent of harvest operations will help safeguard the habitat values of WMA lands. Following the planning of operational guidelines below can also mitigate risks of invasive species transportation or negative impacts to rare natural features.

Water Quality

WMAs provide significant water quality benefits to watersheds throughout the agricultural regions of the state. The deep-rooted, sod forming grasses that dominate the uplands of southern and western Minnesota hold soil in place year round, reducing sedimentation of waterways. These sites are not treated with fertilizers and are sparingly treated with herbicides for noxious weed control. In addition the deep rooted sod in

combination with wetlands, which are located on many WMAs act as a sponge. Rainfall and snowmelt is captured and allowed to infiltrate into soils. This sponge capacity helps to reduce peak flows in streams and rivers and thereby reduces the extent of scouring and bank erosion. Biomass harvest on WMAs will be implemented as a management tool to enhance the vigor of native plant species. The improved vigor of native plants will serve to maintain and potentially enhance the sites capacity to absorb precipitation. It should also help to reduce the need for herbicide application, as the native plants will more likely out compete noxious weeds. Applying the planning and operational guidelines below will ensure that soils remain stable and chemicals that threaten water quality are not entering waterways.

Carbon Sequestration

The rich black soils beneath WMA grasslands provide a long-term carbon repository. The deep roots of native prairie plants comprise a significant portion (75 to 90 percent) of the plants total biomass. Historically, the above ground biomass was regularly consumed by fire or grazers, releasing the captured carbon back to the atmosphere. Living roots, and the organic matter from decaying roots represents the primary mechanism that prairie vegetation captures and stores carbon. Periodic harvest of biomass will not disturb the sod or soil. Therefore, the primary carbon stock on these lands will not be negatively impacted. Rather, it is anticipated that improved vigor of native warm season grasses and legumes resulting from enhanced management will likely provide a modest enhancement of carbon capture and storage. Following the planning and operational guidelines below ensure organic carbon remains sequestered in WMA soils.

Planning Guidelines

- 1) **Identification of Goals and Objectives** - Harvest objectives and goals should be specifically defined and consistent with WMA long-term management goals of providing wildlife habitat. Examples of harvest objectives might be reduction or removal of invasive species, encouraging early secession plant communities, or creating the structural diversity required by some wildlife species.
- 2) **Information Collection** -- Biomass harvest projects managers should check with DNR Natural Heritage Database for rare species occurrences. If a rare species is present, there should be consultation with specialists from the Ecological Resources division. While soil maps and other resource can help identify areas sensitive to soil disturbance, a site visit is also necessary to identify site features potentially impacted by harvest operations.
- 3) **Mapping and Documentation** -- Harvest sites under consideration should be mapped. This map should be a part of the formal contract/agreement. Maps need to clearly indicate:
 - areas to be harvested
 - designated traffic/haul areas
 - wetland or stream crossings
 - rare or sensitive feature
 - unit boundaries
 - designated equipment maintenance area
- 4) **Agreements and Contracts** - All WMA's harvested for grassland biomass need to be covered by a formal agreement or contract. Contractor/cooperator performance must be clearly defined in the document. The operational guidelines below will help describe the performance standards to include in a formal agreement.

- 5) **Permits** – Biomass harvest project managers should determine if any permits are required: E.g. SHPO clearance, WCA permit, or permission to harvest on land still enrolled in WRP/CRP/RIM.
- 6) **Project Monitoring** - The biomass harvest project manager is responsible for monitoring the harvest operations and insuring contractor/cooperator performance. Example activities to monitor include bale removal from the site, rutting, trespass, and other non-conformance.

Operational Guidelines

- 1) **Operational Practices** – The guidelines below applied to any party harvesting biomass from WMA lands. Agreements or plans developed in planning a WMA biomass harvests should incorporate these guiding
 - a) *Extent of harvest area* – Leaving undisturbed grassland habitat it is important and requires that management rotates through the unit so that no more than approximately one-third of the land area is disturbed by any management activities in one growing or breeding season. Rotation of disturbances - such as mowing, grazing, harvesting, and burning - helps assure that some residual vegetation is always available for those species that require it. Grassland parcels should be managed as shapes that maximize the core interior area (area away from neighboring habitats). Patches that are round or square have more interior area than comparably sized patches of other shapes, and are preferred. It may be necessary to remove woody cover in interior areas first to maximize interior grassland patch size. Habitat strips, if used, should be at least wide enough to reduce the negative effects of increased nest predation, parasitism, and possibly competition near edges.
 - b) *Frequency and timing* - Dormant season harvest is the preferred management practice as disturbance to nesting/breeding wildlife is greatly reduced, native plant nutrient removal is minimized and biomass for energy generally requires low moisture feedstock. Some management objectives may require a non-dormant harvest - for example woody plant or noxious weed control. When non-dormant season harvest is necessary, harvest plans should include a refuge component for disturbed or displaced wildlife species. Flushing bars and other techniques can be used when harvest is necessary during the nesting/breeding season. Frequency of harvest will likely vary according to the management objectives. For example, frequent harvests may be necessary to reduce woody species. Most grassland systems are maintained on a rotation of disturbance activity (about 3 to 5 years). Again, meeting the WMA habitat goals should drive the frequency and timing of biomass harvests.
 - c) *Cutting height* - In rough terrain, cutting height adjustments should be made to reduce scalping. Stubble height is also an important consideration, especially for non-dormant season harvests. Harvesting operations should strive to maintain a stubble height of 4 inches or greater in order to minimize soil disturbance and protect growing points of plants. Taller stubble can provide greater habitat value; however leaving unharvested areas can mitigate this.
 - d) *Soil disturbance* – Traffic from harvest operations should be confined to trails and roadways when possible. Harvesting operations should not occur on soils unable to support equipment where rutting is likely. Operations on wet soils should only occur under frozen ground conditions.

- e) *Harvest storage* - The harvested biomass should be removed from the field before the bales cause damage to the site, and brought to designated bale storage area(s). This includes any broken bales. If left in the field too long bales can kill or weaken the vegetation under them and provide opportunities for invasive plant species to establish. Off-site bale depot areas are preferred. If on-site site storage of the harvested biomass is necessary, it should be for a short and designated period of time. On-site bale storage areas should be confined to areas that will not be damaged, such as graveled parking lots or WMA roads.
- f) *Equipment maintenance* - Designate on-site equipment maintenance and refueling sites. Maintain and refuel equipment away from open water sources, wetlands, and native prairie. Designated bale storage areas and parking lots are preferred areas.
- g) *Facilities and structures* – Road, culverts, or structures should not be development for the sole purpose of facilitating commercial biomass harvests. The purpose of installation of facilities and structures on WMA’s should be an overall greater ability to manage habitat. When existing roads or trails are not sufficient for the purposes of removing the biomass, trafficking should be limited to designated areas.
- 2) **Rare Natural Resource Protection** - Public WMA’s often serve to protect rare and unique natural resources. An example of this would be the Species in Greatest Conservation Need (SGCN) identified in Minnesota's State wildlife Action Plan (SWAP). SWAP includes a problem assessment that identifies habitat loss and degradation as the predominant challenges facing prairie SGCN’s. Applying the planning and operational guidelines above will help minimize harvesting disturbance to known occurrences of rare plant and animal species. The following features should be buffered from concentrated harvest activities:
- Known occurrences of listed plant and animal species
 - Areas providing critical habitat for SGCN - where harvest activities jeopardize the species
 - Sensitive riparian zones - where harvest activities compromise soil or water integrity
- 3) **Managing Invasive Species Risks** – Because invasive species themselves may be targeted for biomass harvesting, harvest plans should include measures to reduce pathways for the introduction or spread of invasive species. Movement of equipment, organisms, and organic and inorganic material, are all potential pathways. Each of these pathways must be considered and addressed to reduce the risks associated with invasive species movement into new sites.

Further guidance is provided in MNDNR Operational Order 113 - Invasive Species http://files.dnr.state.mn.us/assistance/grants/habitat/heritage/oporder_113.pdf.

It is possible that biomass harvest could be used to manage some invasive species such as Reed canary grass. In such cases the project managers should ensure that invasive species, particularly those that are noxious weeds, are not being introduced to new locations via harvest operations.

- a) *Sanitation protocols* - Before arriving and leaving a harvest site, inspect for and remove all visible plants, seeds, mud, soil, and animals from equipment, animals, and persons. Protocols for harvesting equipment:

- Before leaving harvest site: remove or open access panels or doors and clean, open any trap doors and sun machine until the loose material is removed.
 - Before entering new harvest site: select an area where material can be swept up and disposed of properly. Open all access doors, traps, and elevators and run the machine until loose material is all removed. If necessary, use high-pressure water to dislodge remaining debris.
- b) *Common prairie invasive species* - The following is a partial list of invasive species to avoid dispersing during in biomass harvest operations. Additional information on terrestrial invasive species can be found at <http://www.dnr.state.mn.us/invasives/terrestrialplants/index.html>.
- | | |
|----------------------|-------------------------------|
| • Birdsfoot trefoil | • Reed canary grass |
| • Canada thistle | • Smooth brome grass |
| • Purple crown vetch | • Wild parsnip |
| • Leafy spurge | • Spotted knapweed |
| • Queen Ann's lace | • White & yellow sweet clover |

4) **Mechanisms for Accomplishing Harvest**

The Area Wildlife Manager has the experience and habitat management knowledge to determine when and where a management action is needed. Criteria used will include vegetation vigor (height, density), litter build-up, habitat quality as it relates to key wildlife being managed for, weather, terrain, proximity to limiting factors (e.g. prescribed burns in high population areas may be difficult to perform), invasive species management, presence of undesirable woody vegetation, removal of undesirable or difficult to manage vegetation (Reed canary grass), etc. See also checklist below.

The DNR and the Section of Wildlife stress that biomass production on public lands is primarily a resource management tool. Providing a product with a market value is simply a by-product of the management. As noted above, healthy grasslands need to be periodically disturbed through fire, grazing or haying. Prescribed fire is the preferred method, but resource managers do find challenges in adequately applying this management treatment. The process is labor intensive and usually must be done within a relatively narrow window. Mechanical harvest presents an opportunity to provide the needed management as well as to lower the overall cost of management. The value of the by-product presents the opportunity to essentially finance the desired management.

c) Contract types to accomplish work

The Department has administrative options in which biomass can be harvested from State WMAs.

Option 1: The primary tool will be the use of a Cooperative Farming Agreement whereby a cooperator harvests biomass under a specific set of criteria. The State retains a portion of the crop and "barter" for herbicide, seed and fertilizer, etc. equal to the value of the State's crop for use by the State the following year. There is no money exchanged as per Federal Aid rules. The State may use a competitive bid process or lottery in cases where more than one individual desired to do the work.

Option 2: State Agricultural "Lease" awarded by a competitive process or by lottery.

Option 3: State "contract" awarded under a competitive bid process (e.g. Class I bid when the desired management practice exceeds the value of the biomass "product").

Option 4: Request for Proposal (RFP) awarded under a competitive bid process. The process will be used for large, complex habitat improvement project involving biomass harvest.

Furthermore Special Use Permits and/or interagency Agreements may be appropriate in some circumstances.

Checklist – Site potential for biomass harvest

	Land administrator goals and mandates	✓
1.	Harvest consistent with land administrators goals and within compliance of State and Federal mandates	
	Natural and cultural resource protection	
2.	Harvest will not conflict with protection and management of cultural, historical, and recreational values	
3.	Harvest will not impact known occurrences of plant and animal species	
	Scale of harvest site	
4.	It is recommended that project site be at least 5 acres in size	
	Operational criteria	
5.	Harvest site can be effectively managed to enhance prairie management objectives.	
6.	Harvest site has minimal prohibitive characteristics such as rocks, steep slope, or sensitive soils	
7.	Harvest site is within a reasonable distance of needed processing infrastructure	
	Isolation and Invasive species requirements	
8.	Harvest area is free of invasive species*	

* except Reed canary grass which can be effectively "managed" as a bio fuel.

Appendix A
RIM- Clean Energy BMPS

103F.518 of Minnesota Statutes Directed the Board of Water and Soil Resources to Develop a Reinvest in Minnesota – Clean Energy program in consultation with a board appointed stakeholder committee. The BWSR completed the legislative report in early 2008. The stakeholder committee also reviewed and recommended BMPs for the management of the program. MN DNR staff provided a base recommendation for the RIM-CE BMPS. These BMPs were developed understanding that the program was designed and intended with biomass production as an equal goal with resource conservation.

The report and background on the process can be found at:

<http://www.bwsr.state.mn.us/RIM-CE.html>

Appendix B
"Draft" Directive

Title: Grassland **Biomass/Bioenergy** Harvest on **WMAs & AMAs**

Effective Date:

Directive Approval: _____

Division Director

Date

Affected Units: *WMA* *General Use AMA* *Restricted Use AMA*
 Other

Definitions: Grassland: A plant community dominated by graminoids with a forb component that can approach codominance with the graminoids.

Native Vegetation: Plant species that are indigenous to Minnesota, or that expand their range into Minnesota without being intentionally or unintentionally introduced by human activity and are classified as native in the Minnesota Plant Database. (M. R. 8420.0110 subp. 31d)

Directive: The purpose of this document is to provide direction for using grassland biomass harvest as a habitat management practice on WMAs and AMAs. Additionally this directive describes foundational best management practices (BMPs) for harvesting biomass from grasslands.

Grassland biomass harvest from WMAs and AMAs shall be in concert with fish and wildlife habitat management activities, consistent with the habitat or wildlife species management goals and habitat management objectives for each individual WMA/AMA.

All grassland biomass harvests in WMAs and AMAs, including harvest design, and regeneration plans, shall be coordinated between the Divisions of Fish and Wildlife, Forestry and Ecological Resources, as per the Forestry Wildlife Coordination Policy, and must be approved by the appropriate Area Wildlife Manager or Wildlife/Fisheries Area Manager prior to such activity.

Authority: MS §86A.05 Subd. 8 –establishes WMAs for the purpose of establishing and perpetuating wildlife habitat for maximum production of a variety of wildlife species.
MS §86A.05 Subd. 14 –establishes AMAs to protect, develop, and manage lakes, rivers, streams, and adjacent wetlands and lands that are

critical for fish and other aquatic life, for water quality, and for their intrinsic biological value.

M.S. 97A.135 Subd. 1 (a) Food and cover plantings are authorized

M.S. 97A.135 Subd. 3: Authorizes Cooperative Farming Agreements on WMAs

M.S. 86A.026 authorizes contracts for the establishment of food and cover plantings on WMAs and AMAs

M.S. 92.50 Subd. 1 (4) authorizes the Commissioner to enter into leases for uses consistent with the interests of the state.

Background: One of the primary purposes of acquiring both WMAs and AMAs is for their habitat value. Habitat value is often based on the diversity of vegetation present on the site. Important goals for WMAs and AMAs are to: establish and maintain optimal population levels of wildlife/fish while maintaining ecological diversity; maintain or restore natural communities and ecological processes; and maintain or enhance populations of native species (including uncommon species and state- and federally-listed species).

Natural disturbance in the form of fire and grazing maintains native grassland diversity and productivity. The interaction between these two dominant disturbances is likely important in maintaining grassland biodiversity. Haying, and now grassland harvest for biomass/bioenergy, can act as surrogates to these important natural disturbance factors.

Maintaining grasslands, particularly native prairies and restored native grassland, have been a challenge to the Division. Invasive species, such as exotic and woody plants, as well as loss of native plant diversity, signify the need for planned disturbance of existing stands. Prescribed fire has most often been the tool of choice. Managed grazing is a relatively recent addition to managers' toolbox. Haying has been used on WMAs to meet management objectives. Well-planned harvest of grass for biomass/bioenergy can be seen as an additional tool to accomplish habitat and wildlife management objectives.

Federal Aid Implications:

50 CFR § 80.5 Eligible undertakings. The following are eligible for funding under the Acts: (a) *Federal Aid in Wildlife Restoration Act. (1)* Projects having as their purpose the restoration, conservation, management, and enhancement of wild birds and wild mammals, and the provision for public use of and benefits from these resources.

Federal aid regulations 50 CFR Part 80.14 also require that lands acquired and developed with federal aid funds must continue to serve the purpose for which acquired or developed and shall not be used to produce income unless incidental to approved purposes. Income derived from incidental production shall be accounted for as program income.

The harvest of grass biomass on WMAs and AMAs must be for habitat management purposes consistent with federal regulations. The harvesting of grass biomass from WMAs and AMAs for the sole purpose of meeting a biomass harvest objective or other Department/partner goal or deriving income is not allowed on federal aid interest lands.

Procedure:

Action	Responsibility
<i>Determine if management activity is needed</i>	Area Wildlife manager
Consult WMA Management Guidance Document	Area Wildlife Manager
<i>Consult Natural Heritage Database</i>	Area Wildlife manager
Check for permit requirements	Area Wildlife Manager
<u>Design Project</u>	
Coordinate review with Eco Resources and Forestry	
Complete formal agreement/Coop Farming agreement	Signature?

Supporting Documents:

Best Management Practices for Harvesting Grassland Biomass on WMAs and AMAs, *Forestry* wildlife Coordination Policy, Forestry Wildlife Habitat Management Guidelines, WMA Management Guidance Documents, Lake States-Central Hardwoods Regional FSC Standard, SFI 2005-2009 Standard, Voluntary Site-Level Forest Management Guidelines (including the biomass harvest chapters) and, A *Field Guide to the Native Plant Communities of Minnesota*.

Related Directives:

- Directive 090607 Woody Cover Habitat in Grassland Systems on WMA/AMAs
- Directive 070205 Timber Harvesting on WMAs, AMAs, and FPOs
- Directive 010105 N Use of Native Vegetation for Permanent Habitat on WMAs & AMAs
- Directive 022504 Compliance CRP CREP Conservation Easements on State Wildlife Management Areas and Aquatic Management Areas.
- Directive 031504 Annual Farming Practices to Provide Wildlife Food and Cover on WMAs and AMAs.
- Directive 011603 Participation in Fed Farm Subsidy Through Cooperative Farming Agreements and Agricultural Leases

Appendix A. Best Management Practices for Harvesting Grassland Biomass on WMA and AMAs

Introduction:

WMNAMA grassland biomass harvest for wildlife management objectives likely will not maximize biofuel potential due to differences in timing, frequency, and extent of harvest but never the less can be beneficial for both wildlife and energy production. In terms of wildlife, grassland biomass harvest, if conducted at the right time and with the right frequency can reduce DNR management obligations, prepare sites for the next step in a management sequence (e.g. conversion from cool season to warm season grasses), be cost effective, and allow for more frequent management than might otherwise be feasible under current staffing and financial conditions. Likewise from an energy perspective, harvesting grasses on WMA/AMA lands provides additional acres (albeit at a reduced level from dedicated energy acres) that can potentially provide significant energy resources.

Rationale:

Fire, grazing and climatic variability (i.e. natural disturbances) are essential and interactive factors shaping the structure and function of mesic grassland ecosystems. These natural disturbances across a heterogeneous landscape lead to the high species diversity of these ecosystems. The rationale for using grassland biomass harvest as a management tool is that natural disturbance patterns across Minnesota have been dramatically altered. Thus truly replicating natural disturbance on Minnesota grasslands is essentially impossible. However, mimicking or emulating, natural disturbance through management is possible, and in fact critical for the continued maintenance and sustainability of grasslands on WMAs and AMAs. Grassland biomass harvest, like prescribed fire, managed grazing, or well-timed haying, is a management tool that if properly planned and managed, can mimic natural disturbance and thus maintain grassland ecosystems.

These Best Management Practices (BMPS) are divided into Planning and Operational Issues sections. The Planning Issues section will help a manager decide if grassland biomass harvest is appropriate on a given site within a WMA or AMA. Once it has been determined that biomass harvest is appropriate for a specific site, the Operational Issues section helps the manager insure that the harvest operation is carried out in a way that sustains the grassland or meets a specific management objective.

Planning

Identify Goals and Objectives: Harvest objectives and goals should be specifically defined and be consistent with WMNAMA long-term management goals. Consult with the WMA's or AMA's Management Guidance Document (MGD). Why is biomass harvest being considered? What will be accomplished from a wildlife/habitat management perspective?

Consider the Extent of Harvest with the Unit: Because of the importance of idle grassland habitat it is generally important to rotate management through the unit so that no more than approximately one-third of the land area is disturbed by any management technique or techniques in a given year. Rotation of disturbances — such as mowing, grazing,

harvesting, and burning—through subunits within a habitat block helps assure that some residual vegetation is always available for those species that require it.

Manage grassland parcels as shapes that maximize the core interior area (area away from neighboring habitats). Patches that are round or square have more interior area than comparably sized patches of other shapes, and are preferred. It may be necessary to remove woody cover in interior areas first to maximize interior grassland patch size. Habitat strips, if used, should be at least 220 yards wide. Reducing edge will reduce the negative effects of increased nest predation, parasitism, and possibly competition near edges.

Landscape-level considerations should be considered. How does this harvest affect adjacent habitats? Are refugia nearby? How large is the unit? Are large interior grassland patches present, or restorable?

Consider the Frequency of Disturbance: The frequency of harvest will likely vary according to the management objective. For example, over time, short rotations (every 1-2 years) reduce or remove woody vegetation. Rotations of at least five years and longer tend to favor and maintain a woody component, such as upland shrub communities. In most cases annual harvest (or even every other year) will be too frequent unless there is a specific management objective. Three to five year prescribed fire rotations have been cited as a general rule-of-thumb for maintaining grassland breeding bird productivity.

If the natural disturbance patterns for a native plant community under management consideration are known, use this information to guide the frequency of management. In many cases managers should maintain a spectrum of different site ages within a unit (for example fallow fields, old fields, and old and young plantings of grasses and forbs) by varying the length of disturbance cycles; this also encourages structural diversity among sites.

Information Collection: Check with DNR Natural Heritage Database for rare species occurrence. If a rare species is present, consult with Ecological Resources. Are there any existing management agreements? Should/can the management agreement be amended to include biomass harvest? Check existing cultural resources inventories, assess cultural resource potential.

When planning on conducting biomass harvest in a native prairie or wetland, it is required to determine the native plant community class.

Consult soils maps to determine if soils sensitive to rutting are present.

Permits: Determine whether any permits are required: E.g. SHPO clearance, WCA permit, permission to harvest on land still enrolled in WRP/CRP/RIM

Maps: All harvest sites under consideration should be mapped. Maps need to clearly indicate areas to be harvested, designated traffic/haul areas, areas to be avoided, wetland or stream crossing areas, rare features or sensitive areas, designated bale depots, designated equipment maintenance areas, and unit boundaries. This map must be a part of the formal contract/agreement.

Formal Contract/Agreement: All sites harvested for grassland biomass need to be covered by formal agreements or contracts. Contractor/cooperator performance must be clearly defined in the document. Consult with Regional managers on which method to use.

Operational Issues

Timing: **Dormant season harvest** is the preferred management practice as disturbance to nesting/breeding wildlife is eliminated, native plant nutrient removal is minimized and biomass for energy requires the crop to have a low moisture content. Schedule harvest in the spring before the nesting/breeding season or after it in the fall when most grasses and forbs have senesced. Some management objective may require a non-dormant harvest - for example woody plant or noxious weed control. When **non-dormant harvest** is necessary, harvesting should generally be early enough to promote some fall regrowth, which provides residual vegetation cover the following spring. This means mowing should be done by early September (for cool-season grasses) or early August (for warm-season grasses) in most years.

Wetland basin harvest (if allowed) should occur during the winter when the wetland is frozen to minimize soil impacts.

Stubble Height: Stubble height is an important consideration, especially for **non-dormant harvests**. For non-dormant harvests, maintain a stubble height of 4 inches or greater in order to minimize soil disturbance and protect growing points of plants. This cutting height leaves more leaf area for rapid regrowth to rebuild root reserves for next year's production. These plants are also better able to cope with drought. Regardless of the amount of regrowth, never take a second cutting. Doing so can reduce yield over time by as much as 50 percent and will encourage weeds.

Stubble height for **dormant harvest** is less critical than during non-dormant harvest, as the plants have senesced and carbohydrate reserves are completely within the root system. Managers should determine the appropriate stubble height based on their management goals and considerations. This stubble height should be explicitly communicated to the contractor/operator in the farming agreement/contract.

Rutting: Harvesting operations must be suspended when wet. No cutting of sod, or uncut ruts greater than 4 inches are allowed.

Equipment Maintenance/Refueling: Designate on-site equipment maintenance and refueling sites. Maintain and refuel equipment away from open water sources, wetlands, and native prairie. Designated bale depots and parking lots are preferred areas.

Storage of biomass: The harvested biomass must be removed from the field before the bales cause damage to the site, and brought to designated bale depot areas. If left in the field too long bales can kill or weaken the grass and provide sites for invasive plant species invasion. Off-site bale depot areas are preferred. If on-site site storage of the harvested biomass is necessary, it should be for a short, and designated period of time. Long-term storage on the WMA is not allowed unless there is a specific management purpose (for example to smother a large patch of Canada thistle). On-site bale depots should be confined to areas that will not be damaged, such as graveled parking lots or WMA roads.

Rare species/plant communities: Rare species and/or plant communities require special care and additional coordination. Early coordination with Ecological Resources will be necessary. The contractor will be required to work closely with the AWM to identify, clearly delineate, and avoid or apply special practices as necessary in these areas.

Exotic/Invasive Species: Equipment used for both harvesting and removal of bales must be thoroughly cleaned and free of any plant debris prior to entering the WMA/AMA to prevent the introduction of undesirable species (e.g. Purple Loosestrife, leafy spurge, spotted knapweed, etc.) to the site. Maintain the recommended stubble height to minimize soil disturbance. Strictly enforce the rutting restrictions. Remove bales in a timely manner.

Hydrological Issues: Maintain the existing hydrology of the harvest site - do not add culverts, or stream crossings to facilitate biomass removal. The harvest of wetland basins (e.g. hybrid cattail) may be desirable under certain circumstances (e.g. hybrid cattail).

Roads/Haul Roads: No road development will be allowed for the purposes of harvesting biomass. Use existing roads, trails. When existing roads or trails are not sufficient for the purposes of removing the biomass, limit trafficking to designated areas. Minimize the number of trips that equipment travels off main roads.

Pre-harvest Site Visit: Conduct a pre-harvest site visit. Flag/mark sensitive and all other areas in the vicinity of the harvest site where equipment is restricted. Insure that the harvest site is clearly defined, either by natural features or flagging, etc. When necessary to insure contractor compliance with harvest objectives, mark bale depots, equipment maintenance areas, and haul roads.

Communicate with the Contractor/Cooperator: Prior to the beginning of harvest, clearly communicate all harvesting specifics with the contractor/cooperator. Review the map from contract and make sure contractor understands all important issues such as rutting, clean equipment requirement, bale removal schedule, operational objectives (wildlife management), etc.

Post Operations: The Wildlife Manager is responsible for closing the project and insuring contractor performance. All biomass bales need to be removed from the site, including broken bales; remove all equipment, trash, fuel, oil, etc. Inspect area for rutting, trespass, and other non-conformance.

Online links to useful resources for managing grasslands

<http://mdc.mo.gov/landown/grass/hay/>

Guide to Native Grassland Management in Nebraska

Guidelines and Recommendations for Habitat Management.

Appendix C

Policy Recommendations Pertaining to Sustainable Biomass Production

The Minnesota Next Gen Energy Act

The Act established a state policy goal of dramatic reduction of greenhouse gas emissions over the next Generation, and included interim goals as follows:

- 2005 Base line year
- 2015 15% reduction from baseline
- 2025 30% reduction from baseline
- 2050 80% reduction from baseline

The bills also established the goal that 25% of energy measure across all energy sectors used in the state of Minnesota be derived from renewable resources.

Minnesota Climate Change Advisory Group

The Minnesota Climate Change Advisory Group was appointed by Governor Pawlenty in compliance with the Next Gen Energy Act of 2007's requirement to create a plan for greenhouse gas reductions consistent with the goals specified in the act. The Minnesota Department of Commerce and the Minnesota Pollution Control Agency worked with a consultant, Center for Climate Strategies, to create and manage the MCCAG. This 56-member group, representing a vast range of public and private-sector organizations and citizen interests, used a stakeholder-based consensus building process to develop set of state-level policy recommendations for reducing or sequestering greenhouse gas emissions.

The full report is on line at: <http://www.mnclimatechange.us/MCCAG.cfm>

Relevant MCCAG Recommendations:

AFW –2: Traditional land protection and RIM-CE (or similar program) to develop biomass resources.

AFW –3: Reduce the carbon content of ethanol fuels, largely by displacing in-plant fossil fuels with biomass fuel supplies. (This is the #2 recommendation based on total carbon emission reductions).

AFW – 4: Expanded use of Biomass for Electricity, Heat or Steam Production (The 2007 Legislature also expanded the 10% for electric power utilities make a good faith effort to supply 10% of their sales with renewable energy to a firm 25% percent mandate.)

Minnesota Statewide Conservation and Preservation Plan

The University of Minnesota's Institute on the Environment and the Legislative-Citizen Commission on Minnesota Resources (LCCMR) released the Statewide Conservation

and Preservation Plan in July 2008. It offers comprehensive assessments and recommendations pertaining to the future of Minnesota. The Statewide Conservation and Preservation Plan (SCPP) charts long-term strategies for addressing critical issues and trends impacting Minnesota's environment and natural resources, one of which is energy. Many of the recommendations included expansion of the use of sustainably-produced biomass. The DNR efforts to demonstrate and evaluate biomass harvest as a prairie vegetation management tool directly or indirectly relate to several of the recommendations.

Energy Recommendation 3: Invest in perennial biofuel and energy crop research and demonstration projects on a landscape scale.

Energy Recommendation 4: Develop policies and incentives to encourage perennial crop production for biofuels in critical environmental areas

Energy Recommendation 10: Invest in research and demonstration projects to develop, and incentives to promote, combined wind power/biomass, wind power/natural gas, and biomass/coal co-firing electricity projects.

Energy Recommendation 11: Invest in research and enact policies to protect existing native prairies from genetic contamination by buffering them with neighboring plantings of perennial energy crops.

Energy Recommendation 12: Invest in efforts to develop sufficient seed or seedling stocks for large-scale plantings of native prairie grasses and other perennial crops.

Energy Recommendation 13: Invest in research and policies regarding "green payments"

Energy Recommendation 15: Invest in efforts to develop, and research to support, community-based energy platforms for producing electricity, transportation fuels, fertilizer, and other products that are locally/cooperatively owned.

Energy Recommendation 17: Promote policies and incentives that encourage carbon-neutral businesses, homes, communities, and other institutions with an emphasis on learning from institutions already working toward this goal (e.g., UM, Morris)

Appendix D.
WMA Authorities and Regulations

Authority: MS §86A.05 Subd. 8 – establishes WMAs for the purpose of establishing and perpetuating wildlife habitat for maximum production of a variety of wildlife species.

M.S. 97A.135 Subd. 1 (a) Food and cover plantings are authorized
M.S. 97A.135 Subd. 3: Authorizes Cooperative Farming Agreements on WMAs
M.S. 86A.026 authorizes contracts for the establishment of food and cover plantings on WMAs
M.S. 92.50 Subd. 1 (4) authorizes the Commissioner to enter into leases for uses consistent with the interests of the state.

Federal Aid Implications:

50 CFR § 80.5 Eligible undertakings.
The following are eligible for funding under the Acts:
(a) Federal Aid in Wildlife Restoration Act. (1) Projects having as their purpose the restoration, conservation, management, and enhancement of wild birds and wild mammals, and the provision for public use of and benefits from these resources.

Federal aid regulations 50 CFR Part 80.14 also require that lands acquired and developed with federal aid funds must continue to serve the purpose for which acquired or developed and shall not be used to produce income unless incidental to approved purposes. Income derived from incidental production shall be accounted for as program income.

The harvest of grass biomass on WMAs must be for habitat management purposes consistent with federal regulations. The harvesting of grass biomass from WMAs for the sole purpose of meeting a biomass harvest objective or other Department/partner goal or deriving income is not allowed on federal aid interest lands.

Supporting Documents: Best Management Practices for Harvesting Grassland Biomass on WMAs and AMAs, WMA Management Guidance Documents, A Field Guide to the Native Plant Communities of Minnesota.

Related Directives: Use of Native Vegetation for Permanent Habitat on WMAs & AMAs

Compliance with existing Federal (CRP) contracts and State (CREP) Conservation Easements on State Wildlife Management Areas and Aquatic Management Areas.
Annual Farming Practices to Provide Wildlife Food and Cover on WMAs and AMAs.