Perennial Herbaceous Biomass Production and Harvest in the Prairie Pothole Region of the Northern Great Plains

Best Management Guidelines to Achieve Sustainability of Wildlife Resources

Bill McGuire and Susan Rupp, 2013

Although the use of biomass for heat and fuel production is not new in the United States, there has been a renewed interest in bioenergy production in response to increasing energy costs, dependence on foreign oil, greenhouse gas emissions and climate change. Recent legislation reflects the high level of interest. For example, the 2007 Energy Independence and Security Act (110 P.L. 140) raised the Renewable Fuel Standard (RFS-2) to require biofuels blending (with gasoline) of 36 billion gallons per year by 2022 of which 21 million are to come from non-corn sources with the focus on cellulosic materials. The northern Great Plains holds some of the greatest potential for the production of cellulosic biomass, but the region is also critical for wildlife producing 50-80% of waterfowl populations and providing breeding habitat for more than half of the bird species that breed in North America.

The Best Management Guidelines (BMGs) presented in this document were developed through a process that involved an advisory group of natural resource professionals with expertise in agronomy, production aspects of energy crops, wildlife (amphibians, birds, insects, mammals, reptiles), and native ecosystems.

• In the event chemical pesticides are necessary, consider withholding application in a buffer adjacent to wetlands/ponds/ponds (width determined in consultation with NRCS and the state fish and wildlife agency).
• Monitor fertility and minimize use of fertilizers through stand development and beyond with the aid of an NRCS precision nutrient management program plan designed specifically for perennial grasses, (saves cost, benefits water quality, and is easier on wildlife).
• Consider periodic spring prescribed burns (prior to peak nesting season) on portions of field with enough stubble residual from the previous year to carry a fire (stimulate grasses and benefit wildlife).

Harvest

• Add flushing bars to equipment to minimize bird injuries and deaths.
• Harvest fields from the interior of the field to the exterior to encourage wildlife to flush into surrounding areas.
• Leave at least 4" to 6" stubble after harvest to elevate windrows (aid airflow and speed up drying), and catch/retain snow to boost soil moisture. Higher stubble heights (>10") are recommended to benefit wildlife.
• Leave wildlife cover in the form of taller stubble (10" or taller) after harvest on unproductive portions of fields (e.g., wet depressions, highly eroded areas) or adjacent to potholes/wetlands. This stubble will provide winter habitat and spring nesting cover – blocks are better than strips (5% of the total field area is recommended).
• Avoid harvest until after the first frost to avoid disturbance of nesting wildlife and improve quality of biomass (i.e., reduce moisture and nutrient content) for bioenergy production.
• Consider incremental harvest after the end of growing season (i.e., store portions of the biomass as a standing crop) versus harvesting all at once – this will leave some cover for wildlife.
• Consider leaving a portion of the field as a standing crop and delaying harvest until the end of the next growing season, at which time another area can be deferred.

We encourage the adoption and adaptation of these high-level guidelines to best benefit local conditions while minimizing negative impacts of bioenergy production on wildlife. It is hoped that the BMGs will make it easier for the bioenergy industry, agricultural producers, policymakers, and others to understand and integrate wildlife needs as bioenergy advances in the Prairie Pothole Region of the Northern Great Plains as well as in adjacent geographies.

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www.nwf.org/pdf/Wildlife/BiomassBMGPPR.pdf
Wildlife management is complex. The effects of bioenergy production on wildlife will depend on the combination of several factors that influence both the wildlife and the habitat. Wildlife sustainability necessitates considering (in the context of the differing needs of individual wildlife species) the feedstock selected, the surrounding habitat, the habitat that is replaced, the method of establishment, how intensively the stand will be managed, what inputs (herbicides, fertilizers, etc.) will be used, how much area the feedstock occupies, and how it is to be harvested as well as the timing of those operations. The advisory group of natural resource professionals worked together to harvest and develop a containment plan.

Two feedstocks were selected – switchgrass and a 3-species mix of big bluestem, indiangrass, and sideoats grama. These feedstocks are currently the focus of collaborative efforts funded by the U.S. Department of Agriculture to create a Midwestern regional system for producing advanced transportation fuels derived from native perennial grasses. Guidelines were designed to focus on site selection, planting design, establishment, management, and harvest of these feedstocks on wildlife and their habitats (i.e., food, water, cover, and space). Effects on grassland songbirds, waterfowl, shorebirds, mammals, amphibians, reptiles, insects, and aquatic organisms are discussed.

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The following BMGs reflect compromise in recognition of energy purposes and economic needs of industry and agricultural producers by focusing on the basic level of wildlife conservation needed to sustain species, not the maximum that is possible.

### Best Management Guidelines (BMGs)

#### Landscape and Site Selection Considerations

- Do not convert prairie/sod, wetlands, or other rare native ecosystems.
- Plant biomass crops on existing cropland or other land with a cropping history.
- Plant biomass crops, as much as possible, on fields adjacent to native prairie/sod or established stands of native warm-season grasses to increase native ecosystem health.
- Use native grasses as biomass feedstocks. Locate big bluestem, indiangrass, and sideoats grama mixtures on drier sites and switchgrass on either dry or wet sites (depending on cultivate – upland or lowland) to take advantage of the range of growing conditions native grasses provide.
- Avoid tilling or ditching to drain water from land or in-field low areas that provide important wetland habitat in the early spring.
- Be aware of potential resources (food, water, cover) in the surrounding area and, as feasible, plant feedstocks that complement those resources.
- Consider using biomass plantings as conservation practices for existing cropland; for instance, place plantings along water bodies (streams, ditches, lakes, rivers, wetlands) to reduce erosion and chemical runoff, and on highly erodible soils to reduce erosion.
- In the event hybrid or genetically-modified varieties are considered for use, consult with the state fish and wildlife agency to determine potential risk to nearby native prairie/sod and develop a containment plan.

#### Planting Design

- Match the native grass feedstock to local/regional soil types and vegetation to enhance yield potential and ecosystem compatibility.
- Consider growing a diverse mixture of big bluestem, indiangrass, and sideoats grama as well as switchgrass to create diversity of habitat (structural and spatial) on the landscape and reduce risk to the producer through crop diversification.
- Create a native warm-season grass/forb buffer zone around potholes, wetlands or other bodies of water to provide habitat (pollinators included) and an agrochemical barrier. These buffers should be as wide as possible (100’ minimum recommended), seeded at the lowest NRCS rate, and include a 50’ unmowed area (closest to the pothole/wetland) with the remainder harvested at a height of 10” or higher.
- Establish native warm-season grass/forb field borders on portions of the field not connected with potholes/wetlands to retain inputs on site and provide additional wildlife habitat. These field borders should be wide enough to address site-specific wildlife needs (consult the state fish and wildlife agency to determine the appropriate width) and managed to create early successional habitat by burning, disking, or haying every 3 to 5 years.
- Consider enrolling field borders and wetland buffers in wildlife-friendly conservation programs, which also provide a constant and dependable source of revenue.

#### Establishment

- Follow NRCS recommended seeding rates and do not exceed as doing so increases establishment cost and makes stands less desirable for ground-dwelling wildlife.
- Avoid the use of fertilizer during the establishment year to minimize excessive weed growth (which can slow growth of the grasses planted) and potential runoff into streams and wetlands.
- For fields that were planted to a winter cover crop the previous fall, prepare/plant fields as early as practical, but avoid planting during the peak nesting period. Check with the local NRCS office and state wildlife agency for local peak nesting seasons and dates.
- Plant no-till fields as late as practical to leave residual food/cover longer for wildlife.
- Plant bare, conventional-tiled fields as soon as possible to reduce erosion and improve quality of water feeding wetlands/potholes.
- Use only the minimum rate of herbicides needed to establish biomass plantings and consider the alternative of mowing when weeds are about 12” tall (leave 6” stubble).
- Avoid the use of herbicide in field borders and wetland buffers.

#### Management

- Avoid use of fertilizer, herbicide, or mowing in core buffer areas around potholes, wetlands and other bodies of water and in unharvested field borders – manage upland buffers with prescribed fire or shallow disking (to set back plant succession) once every 3 to 5 years, prior to April 15 or after August 1 to avoid peak nesting season.
- With the technical assistance of NRCS, develop and follow an integrated pest management plan that takes advantage of avian and insect predators and minimizes the use of chemical pesticides.