

## Working Lands Watershed Restoration Program: Project Update September 2017

*Is it possible to improve water quality and the aquatic environment in Minnesota while maintaining the prosperity of the agricultural sector?*

### The Problem

In spite of Minnesota's significant commitment to clean water and habitat through the Clean Water, Land and Legacy Amendment, the quality of Minnesota's lakes, rivers, streams, and groundwater has largely failed to improve or is showing only modest improvements. The Minnesota Nutrient Reduction Strategy and other studies show that excess phosphorous, nitrogen, and sediment are impairing water quality. Runoff from agricultural land and lakeshore development raises the amount of phosphorus in Minnesota lakes, which in turn causes algae to grow. Nitrate pollution from septic systems, fertilizers, and manure can affect public and private water supplies.

Changes in agricultural practices have resulted in conversion of small grains and hay, once common parts of the farming system, to corn and soybeans, while subsurface tiling has altered hydrologic systems. The market for ethanol has increased pressure for conversion of sensitive or marginal lands to corn production. About a third of Minnesota's corn production now goes to produce ethanol and its byproducts. And both corn and soybeans leave farmland essentially bare for much of the year, making it vulnerable to wind and water erosion and nutrient leaching.

There is increasing recognition among conservation professionals, researchers, farmers and other engaged citizens that in order to "move the needle" on water quality we need more vegetation on the land for longer periods of time. But is it possible to increase this 'conservation footprint' on the landscape without taking additional land out of production?

One possible solution that has been discussed for over a decade is to increase production of **perennial crops as energy feedstocks** for multiple uses, including advanced biofuels that could supplement or replace ethanol. In 2015 and 2016, a coalition of renewable energy, environmental and



*Interseeding equipment and cover crop plots, U of MN Morris Soil Health Field Day, June 2017*

agricultural organizations promoted a bill that would incentivize planting of perennial crops to improve water quality, and in 2016 the Minnesota Legislature directed BWSR to prepare a plan and feasibility study for a Working Lands Watershed Restoration Program (see sidebar).

## Multiple Solutions

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While the original legislation was focused on the potential for biofuel development, to be deployed in conjunction with existing ethanol plants, it became apparent that there are technical and policy barriers to widespread production of ethanol from perennials, termed “cellulosic ethanol” or “advanced biofuel.” These range from the falling prices of conventional fuels to difficulties in processing the tougher plant fibers of perennial grasses for ethanol.

BWSR and project partners are therefore looking beyond ethanol production to other potential uses for perennials, as well as for winter annual crops that hold the soil in place. New technologies for interseeding row crops into annuals such as winter rye and oilseeds now make it more feasible to maintain living cover outside of the relatively short growing season. Innovations in crop breeding and production methods by the University of Minnesota’s Forever Green Initiative are improving the yield and hardiness of many perennial crops.

Potential end uses for these alternative crops include bio-jet (biodiesel) fuel, combustion for heat and power, products such as animal bedding and plant-derived packaging material, animal feed and forage for beef and dairy cattle, and even food products such as those made from Kernza wheat. Not all crops can feasibly be grown in all watersheds, but each of the initial pilot watersheds has conditions appropriate for some crops.

## Who’s Involved?

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- **Interagency Advisors:** Departments of Agriculture, Health, Natural Resources, and MPCA
- **Economic and Social Capacity Analysis:** University of Minnesota Water Resources Center (contractor for analysis and survey)
- **Water Quality Modeling:** MPCA
- **Federal Farm Programs and Policies:** Environmental Initiative
- **Stakeholder Committee:** Ag Utilization Research Institute, Cattlemen’s Association, MN Corn Growers Assn., Friends of the Mississippi River, Great Plains Institute, MN Ag Water Resources Center, MN Environmental Partnership, MN Farm Bureau, MN Farmers Union, MN Rural Water Association, MN Soybean Growers, Pheasants Forever, St. Croix Research Station, U of MN Forever Green.

## What did the Legislature direct BWSR to do?

Develop a detailed plan to implement a working lands watershed restoration program to incentivize the establishment and maintenance of perennial crops, including:

- a process for selecting **pilot watersheds** that are expected to result in the greatest water quality improvements and exhibit readiness to participate in the program;
- an assessment of the **quantity of agricultural land** that is expected to be eligible for the program in each watershed
- an assessment of **landowner interest** in participating in the program;
- an assessment of the **contract terms** and any recommendations for changes to the terms, including consideration of variable payment rates for lands of different priority or type;
- an assessment of the opportunity to **leverage federal funds** through the program and recommendations on how to maximize the use of federal funds for assistance to establish perennial crops;
- an assessment of how **other state programs** could complement the program;
- an estimate of **water quality improvements** expected to result from implementation in pilot watersheds;
- an assessment of how to best integrate program implementation with **existing conservation requirements** and develop recommendations on harvest practices and timing to benefit **wildlife production**;  
(cont.)

## Which Watersheds Will Be Surveyed?

Watersheds were selected for geographic and physical diversity, diversity of cropping systems, previous planning efforts and level of community engagement. Many other watersheds could have been selected, but survey requirements limited us to six major watersheds. Within each major watershed, one or more minor watersheds were selected for water quality modeling:

- Minnesota River – Mankato Watershed (Nicollet County) – Rogers Creek
- Le Sueur River Watershed – Upper Cobb River and Cobb Creek
- Chippewa River Watershed – Shakopee Creek Headwaters
- Sauk River Watershed – Getchell Creek / County Ditch 9
- Root River Watershed – Watson Creek
- Buffalo–Red River Watershed – Whiskey Creek

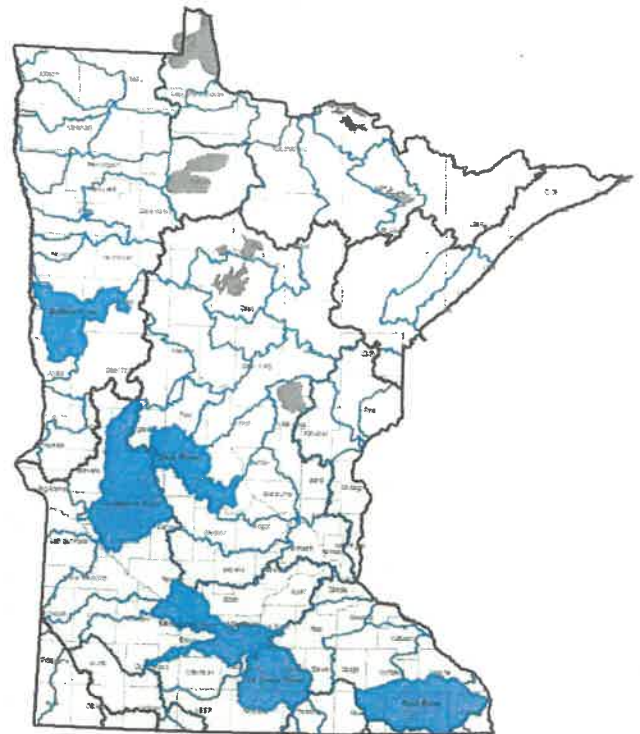
## Which Crops are Being Considered?

There are many perennial and cover crops currently in use or under development, many by the University of Minnesota's Forever Green Initiative. Among those being considered are:

- Switchgrass
- Miscanthus
- Kernza wheat (Intermediate wheatgrass)
- Alfalfa
- Mixed forage crops for managed grazing
- Camelina and Pennycress (oilseeds)
- Winter rye

- an assessment of the potential viability and water quality benefit of **cover crops** used in biomass processing facilities;
- a **timeline for implementation**, coordinated to the extent possible with proposed biomass processing facilities; and
- a projection of **funding sources** needed to complete implementation.

[Laws 2016, c. 189, s. 4](#)



## Which Biomass Crop Scenarios Will Be Assessed?

The project team and Water Resources Center have identified up to seven scenarios to assess. For each one, production costs, potential uses and revenues will be quantified and compared to row crops being grown in the selected watersheds. Only certain scenarios will be assessed in each watershed. Examples of scenarios include:

- Perennial Grass (Switchgrass, Miscanthus) for Heat and/or Power Generation
- Perennial Grass (Switchgrass, Miscanthus) for Bio-Jet Fuel
- Oilseeds (Camelina, Pennycress) for Bio-Jet Fuel, Bioproducts
- Kernza Wheat for Heat, Bio-Jet Fuel, Food, Forage
- Forage Crops/Cover Crops for Managed Grazing
- Mixed Biomass Sources for Heat (fuel pellets)
- Winter Rye in a Corn/Soy Rotation

## What's Next?

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- A survey of up to 500 landowners in each of the six major watersheds was mailed out in late August. Results will be evaluated beginning in October.
- Biomass crop scenarios will be evaluated and potential contract terms will be developed.
- Existing federal farm bill policies and ideas for the next farm bill are being evaluated and discussed.
- An interim report is due to the Legislature by **October 15, 2017**.
- The final report is due on **February 1, 2018**.

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*Switchgrass (panicum virgatum)*



*Cover crops being grown at the West Central Research and Outreach Center, UM-Morris*