

Working Lands Watershed Restoration Program: Project Update December 2017

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

What would it take to induce landowners to convert land planted in corn, soybeans, or sugar beets to a new crop that promises to improve water quality and wildlife habitat but which lacks a guaranteed market?

The Problem

Minnesota has made a significant commitment to clean water and habitat through the Clean Water, Land and Legacy Amendment and decades of investment in conservation programs. While the quality of Minnesota's lakes, rivers, streams, and groundwater is improving, the pace of progress is not as fast as hoped. The Minnesota Nutrient Reduction Strategy and numerous other studies show that excess phosphorous, nitrogen, and sediment are impairing water quality. Runoff from agricultural and urban 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 threatens 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, and subsurface tiling has altered hydrologic systems. Both corn and soybeans leave farmland essentially bare for much of the year, making it vulnerable to wind and water erosion and nutrient leaching. The timing and intensity of precipitation are changing, increasing the risks of destructive flooding and soil loss. In spite of improvements in agricultural practices, such as conservation tillage, improved manure and nutrient management, and land set-aside programs, water quality is increasingly threatened by these forces.

There is increasing recognition among conservation professionals, researchers, farmers and other engaged citizens that in order to increase the pace of progress 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



Interseeding equipment for cover crops. U of MN Morris Soil Health Field Day, June 2017



Kernza wheat at U of MN St. Paul

multiple uses. In 2015 and 2016, a coalition of renewable energy, environmental and agricultural organizations promoted a bill that would incentivize planting of perennial crops and build markets for their productive use while also improving water quality. 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

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 livestock, 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?

- **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,

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.)

Pheasants Forever, St. Croix Research Station, U of MN Forever Green.

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, along with some potential uses:

- Perennial grasses: Switchgrass and Miscanthus – biofuel, livestock bedding, soil conditioning (biochar)
- Kernza wheat (Intermediate wheatgrass) – forage, food products, biofuel
- Alfalfa – for hay or as part of mixed forages, other livestock feed, new value-added products
- Mixed forage crops for managed grazing by beef and dairy cattle (grass-fed beef, organic dairy, dairy heifer, cow-calf operations)
- Oilseed “cash cover crops”: Camelina and Pennycress – oils (camelina oil is edible), bio-jet fuel, bio-products, livestock feed
- Mixed cover crops (legumes, brassicas, annual grasses) for soil health

- 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.

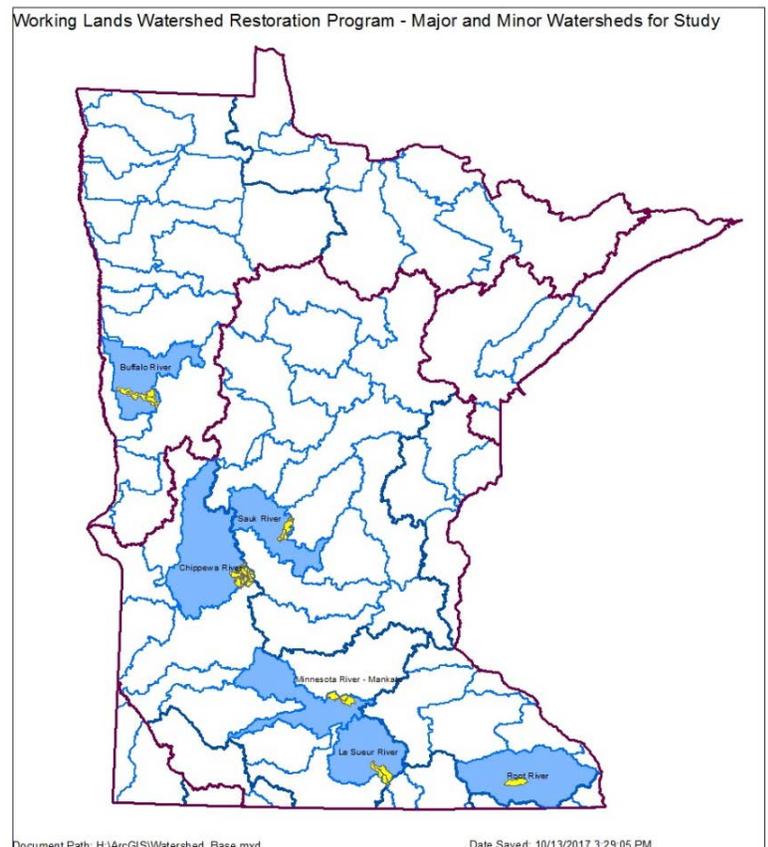
[Laws 2016, c. 189, s. 4](#)

Watershed Surveys and Modeling

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:

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

A survey of landowners in each of the major watersheds is underway, with results expected by the end of 2017. The survey assesses landowner



familiarity with the alternative crops, their interest in planting those crops, and the factors that would encourage them to participate in a contract program.

Effects of land conversion on water quality are being assessed using a computer simulation program called [HSPF](#), which is used by the MPCA and other agencies to calculate the amount of pollutants – nitrogen, phosphorus and sediment – entering waterways via overland runoff or tile drainage. HSPF can model the effects of converting land from row crops to perennials or adding cover crops to existing cropland.

Potential Elements of a Working Lands Program

How would a working lands program lead to more widespread adoption of alternative crops that improve water quality and soil health, but currently lack dependable markets? Essentially, the program needs to subsidize the alternative crops while working to create or improve their markets, so that subsidies will eventually become unnecessary. According to preliminary landowner survey results and stakeholder input, the following factors may encourage participation in a working lands program:

- **Profitability:** Landowners want a reasonable return from alternative crops.
- **Flexibility:** Landowners want to be able to choose which crops to plant and where to plant them; choices that may change from year to year.
- **Simplicity:** “Red tape” is minimized.

Program elements currently being discussed by stakeholders include:

- **Different contract terms:** The program would need to establish different contract terms for 1) cover crops (where the primary crop remains), 2) cash cover crops (where the primary crop remains but yields may be reduced) and 3) perennials (where the primary crop is replaced).
- **Flexibility:** landowners could choose which alternative crops to plant in any growing season, as long as perennial cover is sustained.
- **Risk management:** A contract should provide assurance of a base level of payment for a defined period (e.g., 5 or 10 years). Future crop insurance eligibility would be maintained if possible.
- **Watershed or “supplyshed” focus:** To be able to model and monitor water quality improvements, a focus on specific watersheds is preferred. However, if a potential processing facility wanted to work with producers establish a reliable supply chain, a “supplyshed” spanning multiple watersheds could be considered.
- **Prioritize environmentally-sensitive lands, multiple benefits:** The program could be structured with variable payment rates, with the highest rates going to those lands that contribute the highest loads of pollutants to waterways. Lands that offer multiple benefits in addition to water quality, such as wildlife and pollinator habitat, could also be prioritized.



Winter camelina harvest. Photo: Forever Green

Strategies other than a contract program will also be considered, including potential **new conservation practices** within existing **federal farm bill programs** such as the Conservation Reserve Program and potential adjustments to the **crop insurance program**.

Many aspects of this program are still under discussion but will be examined in more detail in a final report, to be delivered to the Legislature by February 1, 2018. *For further information: see*

<http://www.bwsr.state.mn.us/planning/WLWRP/wlwrp.html>