



Farm of the Future

The Watson Partners and the Southern Minnesota Sugar Beet Cooperative

Adam Birr



May 2011

THE WATSON PARTNERS AND THE SOUTHERN MINNESOTA SUGAR BEET COOPERATIVE

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Case Series Editors: Ariela Summit, Louise E. Buck, Sara J. Scherr



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INTRODUCTION

A two hour drive west on US Hwy 212 from Minneapolis, Minnesota is the self-dubbed “cooperative capital”¹ of Renville, Minnesota. Renville is home to the Southern Minnesota Beet Sugar Cooperative (SMBSC). SMBSC is the heart of the sugar industry in Minnesota, which is part of the largest sugar beet-producing region in the United States. SMBSC has become one of the largest sugar beet processing facilities in the world. This distinction is the direct outcome of innovative growers and one of the longest successively and successfully functioning payment for ecosystem services (PES) programs in the nation.

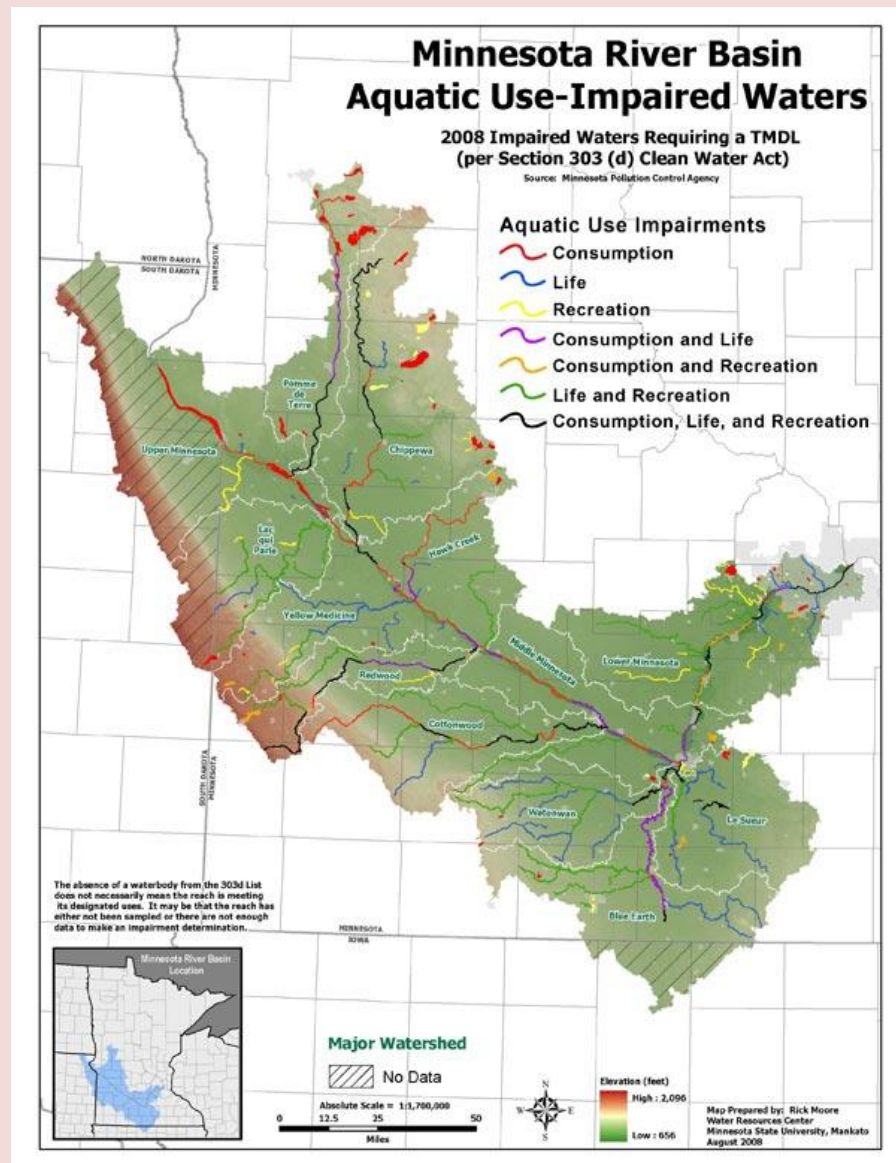
AGRICULTURAL AND ECOLOGICAL CONTEXT

According to the Minnesota Department of Natural Resources Ecological Classification System, SMBSC is located within the Minnesota River Prairie subsection of the Prairie Parkland Province. The Minnesota River Basin (MRB) is the defining physical feature of this area, covering approximately 16,770 square miles or roughly 10 million acres in total (Figure 1). With rich soil and a temperate climate, the Minnesota River Prairie region has proven to be exceptionally productive for agriculture. Over the last 150 years, the tall grass prairie and hardwood forests that covered the floodplains of the river have been converted to farmland, which now is the primary income source within the region and accounts for 82 percent of the land use (MNDNR 2006). The broad land use changes have had adverse ecological consequences, however. One of the most visible of these is the impairment of waterways and overall water quality in the region. The Minnesota River was listed as one of the twenty most polluted waterways in the United States in 1997 (American Rivers 1997).

Currently, a number of pollution issues affect water quality in the MRB, including turbidity, nutrients, fecal coliform, and bacteria (MPCA TMDLs and Bruce Henningsgaard, Pers. Comm., May 2010). Agricultural non-point source pollution has been one of the primary contributors to excess nutrient loading in the waterways and water impairment in the basin (Almendinger 1999). In addition, the expansion of farming has been accomplished through extensive drainage of wetlands in the basin, which has further exacerbated the water quality problem. Wetlands that once provided retention areas that naturally treated and removed nutrients and chemicals from the water are no longer available to serve that function.

¹ Renville is home to nine cooperatives that have established “value-added” processing facilities for raising fish, swine, and chickens, as well as tilapia aquaculture using waste heat from the processing of sugar beets to heat the water in fish tanks.

Figure 1. Minnesota River Basin aquatic use-impaired waters map



Definition of terms Aquatic Use Impairments (Johnson 2008)

1. **Aquatic Consumption Use (AQC):** Assessments of fish for human consumption based on fish contaminant data.
2. **Aquatic Recreation Use Support (AQR):** Assessments of whether the waters are of a quality to support primary body contact, based on in-stream monitoring of fecal coliform bacteria.
3. **Aquatic Life Use Support (AQL):** Assessments of whether the waters are of a quality to support the aquatic life that would be found in the stream under the most natural conditions, based on water chemistry data and biological and habitat information.

Source: Minnesota River Basin Data Center

Minnesota contained extensive wetlands in the MRB prior to the expansion of agriculture. The practice of draining wetlands continues today to allow farmers to cultivate what would otherwise be land too wet to farm. This drainage system forms an extensive network within the MRB, which originates in drain tile lying underneath the surface of the soil, capturing water and transporting it to open drainage ditches that empty into surface waters and then into the Minnesota River. Whether or not farms have frontage on surface waterways, they are directly or indirectly linked to the Minnesota River through this extensive drainage system. Once nutrients, chemicals and sediments enter that system through the drain tile or through runoff and overland flow into drainage ditches, they continue largely unimpeded into the Minnesota River and eventually the Gulf of Mexico.

The impact of this extensive drainage system, which is widespread in the agriculture-rich Upper Mississippi River Basin, has many dimensions. The system is designed to move water off of fields quickly and shorten the time required for that water to reach a surface waterway. The wetlands that formerly captured and stored water, and removed sediments and nitrogen, are now gone, thus eliminating opportunity for those natural processes to address water quality issues. In some cases, drain tile may also bypass installed riparian buffers, thereby limiting their effectiveness. The loss of storage also limits the ability of the basin to mitigate elevated rainfall levels and increases the potential for and impact of flooding. There are ongoing efforts in the MRB to restore or create wetlands and structure drainage ditches (Image 1) in a way that mimics natural systems, but there is still much to be done to address this issue.

The spatial pattern of the pollution being released into the Gulf of Mexico typifies the turbulent relationship between upstream and downstream users within a watershed or basin. Land use practices of upstream users such as the SMBSC growers have a direct impact on regional and national water quality. The structure of the cooperative and the large amount of farmland associated with it provide a unique opportunity to implement best management practices throughout the landscape. In this case, payments for ecosystem services have been successfully leveraged as a tool to improve the overall water quality of the region by offsetting new sources of pollution. Agricultural participants found that best management practices tied to pollution offset requirements also had

Image 1. Grass riparian buffer strip



Grassy areas along drainage ditches help filter nutrients and sediment out of water coming off fields.

Source: David Hansen, University of Minnesota

positive externalities, such as improved soil quality and yields.

REGULATORY CONTEXT FOR PAYMENTS FOR ECOSYSTEM SERVICES

The Clean Water Act of 1972 provided the legislative framework in response to which SMBSC established a phosphorus trading program in 1999. (The phosphorous trading program is the sources of the payments for environmental services.) Most significantly, the Clean Water Act forbids any discharge of a pollutant from point sources unless they have a permit. Point sources are nutrients and pollution sources not discharged from a single point: e.g., runoff from agricultural fields or feedlots. This permitting system is called the National Pollution Discharge Elimination System (NPDES). Site-specific water quality standards set allowable pollution levels for individual water bodies, and permits are granted under NPDES to allow pollutant discharges based on these levels. In Minnesota, the Clean Water Act is enforced and executed by the Minnesota Pollution Control Agency (MPCA).

Under the Clean Water Act, the Lower Minnesota River was identified as an impaired water body, meaning that it was not meeting allowable pollution levels set for it. In 1988, a Total Maximum Daily Load (TMDL) for low dissolved oxygen, driven by too much Biochemical Oxygen Demand (BOD), was established by the MPCA (MPCA 2005; 2007). A TMDL is a pollution reduction plan for an impaired water body, which outlines contributing sources and describes the reductions by source type necessary to put that water body in compliance with the federal water quality standards. The standards can be set for a wide range of pollutants including bacteria, nutrients, turbidity, and mercury. Standards determine how much pollutant can be present in the water while still allowing it to meet its designated uses (e.g. drinking water, fishing, or swimming) (MPCA 2010).

BOD loading in the Minnesota River located in the Twin Cities is a consequence of excessive phosphorus. In lakes and rivers phosphorus stimulates algal blooms. Dying and decaying algae are further decomposed by bacteria which utilize the available oxygen in the water as they break down the biomass creating heightened demand for oxygen. Increased BOD results in a reduction in dissolved oxygen which, once below a key threshold, threatens the survival of aquatic life and the overall vitality of the impacted waterway. In addition to point sources, agricultural runoff, storm water and septic systems are significant phosphorus dischargers (MPCA 1998). Phosphorus is a nutrient that promotes plant growth and is used in fertilizer applications primarily on agricultural lands. The Lower Minnesota River TMDL addressed BOD loading by regulating phosphorus discharge from point sources and specifically wastewater treatment facilities (MPCA 2007). At the time the TMDL was created all waste loads had been allocated to the existing point sources on the Minnesota River (MPCA 2007). As such, no new point-source discharges could be added without

violating the TMDL limits, which in effect restricted the expansion or construction of new point sources within the Minnesota River Basin.

In 1997 the Minnesota-based Rahr Malting Company created the first water pollutant trading program in the state, and one of the first in the country, to trade point nutrient sources for non-point nutrient source in order to meet TMDL requirements. Rahr was interested in expanding production as well as reducing its wastewater treatment costs, which necessitated the construction of a new wastewater treatment facility. In collaboration with Rahr, their engineering consultant, MPCA, the Minnesota Center for Environmental Advocacy (MCEA), and the Coalition for a Clean Minnesota River drafted a point-nonpoint source trading framework that allowed for Rahr to offset all of the Wastewater Treatment Facility (WWTF) discharge through implementation of Best Management Practices (BMPs) on land upstream. The Rahr point-nonpoint source trading framework was included in the National Pollutant Discharge Elimination System (NPDES) permit issued to Rahr in 1997.

The Rahr Malting Company NPDES permit describes the concept of point-nonpoint source trading as the substitution of nonpoint source pollutant load reductions for point source pollutant load discharge requirements by a NPDES permitted discharger. It defines a trade as a direct reduction in nonpoint source loading which is applied against a point source load. The permit also outlines what is required of trades such that they result in pollutant reductions. The requirements are equivalence, additionality, and accountability. As stated in the permit:

“Equivalence refers to the physical substitution of nonpoint reductions traded for point source loads, taking into account all relevant factors. Additionality requires that nonpoint source load reductions that are credited to a point source in a trade would not have occurred otherwise, in the absence of trading. Accountability refers to the need to ensure that a trade satisfies the above criteria of equivalence and additionality, and that terms of the trade agreement are being lived up to.”

In addition to developing some of the language with which point-nonpoint source trading is described, the framework also summarizes the extensive and exhaustive work to develop the trade ratios and pollutant equivalency credits that enable calculation of amounts traded. Furthermore, the permit lists the many assumptions recognized and risks associated with the development of such an innovative framework. Finally, the permit identifies seven general BMPs eligible for trades. The BMPs include soil erosion practices, livestock exclusion, rotational grazing with cattle exclusion, critical area set asides, constructed wetland treatment systems, alternative surface tile inlets, and cover cropping (MPCA 2007).

Under this framework Rahr was able to establish a one-time trade with enough local nonpoint sources to gain the required number of credits to completely offset the discharge from the newly constructed WWTF in perpetuity. To deal with uncertainty and environmental concerns, the trade was set up on a 2:1 ratio such that purchased credits represent twice as many nutrients removed as are being introduced by Rahr into the river. Rahr is required to maintain the stream bank modifications in order to maintain its permit. Those installed have remained in place and are currently operating as intended.

SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE PROFILE

The region's sugar beet growers have a long standing history of overcoming challenges through creative, collective solution finding. This is most clearly demonstrated by the founding of SMBSC, which occurred as a result of serious obstacles for sugar beet growers in the region. Up until March 1971, members of the Southern Minnesota Beet Growers Association had a market to sell their sugar beets at the processing facility in Chaska, Minnesota. That year the facility ceased operations and, in effect, closed the sugar beet market of the region, leaving the dedicated growers with no market for their crop.

As a result, the growers of the Southern Minnesota Beet Growers Association pooled their resources and formed SMBSC in late 1972. Plans for construction of a sugar processing facility to serve the needs of SMBSC's growers quickly developed. Construction of the facility began in 1973, and the dedication took place in 1975. After some financial and operational ups and downs, SMBSC took over full operation of its facility in 1978. As a new generation cooperative, SMBSC provides greater earnings to their shareholders by selling processed products instead of raw products. As a requirement to grow sugar beets in the region, each grower must own shares of SMBSC. Therefore, within the SMBSC, the titles of grower, shareholder, and owner are all synonymous. For every share, a grower is allowed to plant one acre of sugar beets. The sugar beets grown on the acre will then be purchased by SMBSC. A share system is employed to control the supply of raw products to SMBSC, because the capacity of SMBSC processing facility is limited. All the earnings from the processed products are passed back to the growers.

Like Rahr, SMBSC wanted to expand production but was curtailed by the TMDL limits in the Minnesota River Basin through the Clean Water Act. Expanding production necessitated increasing the capacity of its wastewater treatment facility by 220 percent to handle the additional waste generated by the increase in their sugar beet processing operations (Louis Knieper, Pers. Comm., 2010). As was the case with Rahr Malting Company, absent other arrangements, SMBSC would not have been able to get a permit for the expansion of its wastewater treatment facility. Pollutant emissions from the facility at the desired increased capacity would have elevated nutrients being

introduced in the MRB above what basin planning had approved. The similarities of the two situations suggested a solution.

The Minnesota Pollution Control Agency (MPCA) presented SMBSC with the option to implement a point-nonpoint source trading program similar to Rahr's. SMBSC, in collaboration with their consultant, Barr Engineering, the Minnesota Pollution Control Agency, and Minnesota Center for Environmental Advocacy finalized the terms for the NPDES permit issued to SMBSC in 1999. Table 1 lists the organizations involved in negotiating the agreement (Louis Knieper and Bruce Henningsgaard, Pers. Comm., May 2010). The option for other point source polluters in the region to implement this type of trading program is available. However, no entities have requested a new or expanded discharge. If desired and requested, it is likely that the MPCA would approve other point-nonpoint trading permits.

SMBSC has grown into a highly successful business model for farming. Today, after successful expansion of production, 587 sugar beet growers in 17 counties are shareholders of SMBSC and raise approximately 120,000 acres of sugar beets in seventeen counties in southern Minnesota (Figure 2). Annually, SMBSC produces 7.5 million cwt² of refined sugar from 2.6 million tons of sugar beets. SMBSC employs close to 350 full-time employees and infuses \$170 million into the local economy each year. This current level of production is the direct outcome of the updates in production systems and expanded capacity of the SMBSC processing facility (SMBSC 2010).

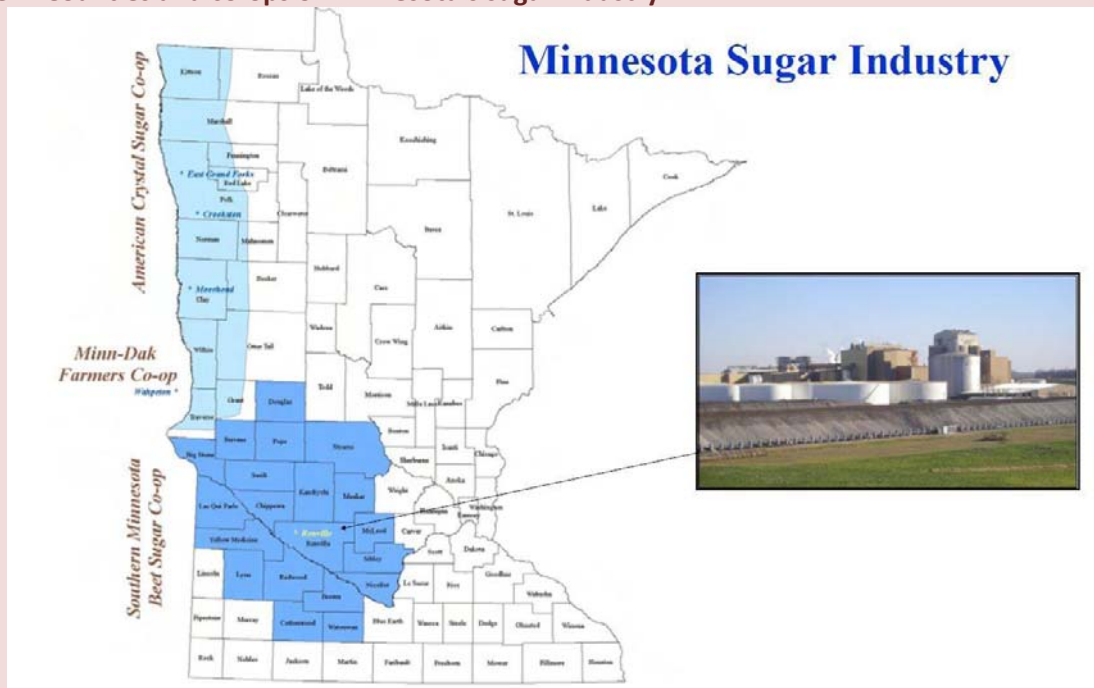
Within the SMBSC's NPDES permit a Phosphorus Management Plan addresses the principle nutrient of concern, phosphorus, and outlines general requirements for phosphorus trading. According to its permit, the SMBSC wastewater treatment facility is allowed to discharge from September through March. The annual phosphorus mass discharge is limited to 2,500 lbs per year (MPCA 2004 and Bruce Henningsgaard, Pers. Comm., May 2010). This discharge is completely offset by implementation of trade-eligible best management practices by sugar beet growers in the cooperative. Trade reduction credits are calculated by SMBSC according to the Phosphorus Trade Crediting Calculations and approved by the MPCA (Minnesota Pollution Control Agency 2011).

SMBSC is solely responsible for the implementation and maintenance of all approved best management practices. It is required to achieve and maintain the proper amount of phosphorus trade reduction credits for the life of the wastewater treatment facility discharge to surface waters. According to the permit, the required credits are to be 2.6 times the annual phosphorus mass discharge limit for the wastewater treatment facility, or 6,500 credits annually. All aspects of the

² Centum weight or short hundredweight is a US customary unit of mass and is defined as 100 pounds.

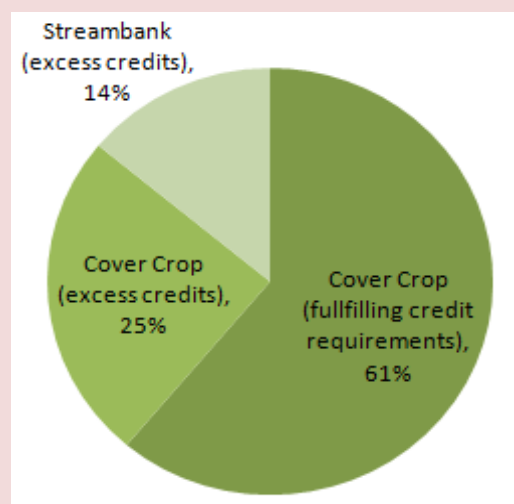
program are monitored and approved by the Minnesota Pollution Control Agency as well as an independent third-party auditor to guarantee fairness and transparency (MPCA 2004).

Figure 2. Counties and co-ops of Minnesota's sugar industry



Source: Southern Minnesota Beet Sugar Cooperative

Figure 3. SMBSC phosphorus trade reduction credits by percent of total for 2009



Source: Southern Minnesota Beet Sugar Cooperative

The large land base of SMBSC growers offers a unique opportunity to adopt best management practices on a large scale and fulfill the permit requirements. In 2009, SMBSC achieved 10,633 phosphorus trade reduction credits, well in excess of the 6,500 credits required by its permit. It was the policy of the cooperative to pay for credits from all producers. These credits were acquired through two trades: cover crops accounted for 86 percent of the total credits and stream bank stabilization accounted for 14 percent (Figure 3) (Louis Knieper, Pers. Comm., 2010). Cover crop BMP has proven to be extremely successful for SMBSC and its growers. Of the estimated 115,000 acres in sugar beet cultivation in 2009, an estimated 83,000 acres were cover-cropped in oats or wheat, which is equal to 72 percent of the total acres in sugar beet cultivation (Louis Knieper, Pers. Comm., 2010). To a lesser extent stream bank stabilization has been successful; this year SMBSC renewed a ten-year contract with a landowner for this practice.

Table 1. Organizations involved in negotiating terms for NPDES permit

Organization	Involvement and Interest
Southern Minnesota Beet Sugar Cooperative (SMBSC)	Sugar beet processing facility wanting to expand point source WWTF within the Minnesota River Basin.
Barr Engineering Company	Engineering consultant hired by SMBSC to provide environmental and engineering expertise.
Minnesota Pollution Control Agency (MPCA)	State government agency responsible for the monitoring and enforcement of water quality standards in the Minnesota River Basin.
Minnesota Center for Environmental Advocacy (MCEA)	Environmental non-governmental organization that was active in negotiating both the Rahr and the SMBSC pollutant trading agreements.

THE WATSON PARTNERS

The great success of the SMBSC phosphorus trading program is in large part due to its growers. While there were 355 growers involved in the trading program in 2010, this case study highlights one who has been involved with SMBSC since its formation and participated in the nutrient trading program since its inception. Curt Watson and his son Eric Watson, fourth and fifth generation farmers respectively, form a farming partnership called Watson Partners. Curt and Eric both have

embraced the farming lifestyle and have done so with success. They are proud of their family's history, having farmed in the area since the early 1900s. In their words:

“We are so blessed to have the opportunity to farm. We have learned so many lessons from our parents and grandparents and are eager to pass these lessons on to the next generation. As parents and grandparents ourselves we are able to pass on the lessons we learned to our children and grandchildren. It is a blessing to be able to have a multigenerational farm.”

Over the years the Watson's farming operations have grown. Today there are nine workers, Curt and Eric included, farming close to 7,500 acres year round (Figure 4). They also hire an additional 10 seasonal workers during planting and 25 during harvest. The majority of their farmland is located in the Hawk Creek Watershed of the Minnesota River Basin. They cultivate the entirety of their land with the exception of about 40 acres, parts of which are registered in the USDA's Conservation Reserve Program (CRP); Reinvest in Minnesota (RIM), a critical habitat match program within the state; and Conservation Reserve Enhancement Program (CREP), a combination of CRP and RIM specific to the Minnesota River Basin (Image 3).

Similar to other farms in the region, corn is the dominant crop on the Watson's land, while soybean and sugar beet are also major cash crops. In 2010 about half of the farm's acreage was planted with corn, 30 percent with sugar beets, and about 20 percent with soybeans. The three crops are on a four-year rotation. All of the 2,179 acres planted in sugar beet are cover-cropped in oats as part of the phosphorus trading program (Kurt Watson, Pers. Comm., 2010).

Image 2. Fifth and sixth generations of the Watson family farmers



Eric Watson and his son examine the sugar beet seedlings and the cover crop out in the family's fields
Source: David Hansen, University of Minnesota

Initially, when the phosphorus permit was negotiated the perception among agronomists and growers alike was that implementing a cover crop was not voluntary. After hearing of the changes and requirements, Curt thought that it was the strangest thing he had heard. Many growers just saw cover cropping as an added expense and another thing to do in their already busy springs. As a result the district agronomists set out to the fields and became the salesmen for the trading program. At first the agronomists were selling cover crop as a favor of growers to SMBSC. In this respect, many growers justified adopting cover crops as a responsibility of being part owners of SMBSC. As Watson Partners attests:

“As a grower in a cooperative, you have the benefit of ownership. If the coop is doing well, you do well. In the same way, if the coop is struggling, it will reflect on your bottom line. As a grower, you want the coop to succeed. Therefore you work hard at growing the best crop you can. In addition there is personal pride in being part of a larger group working together. As owners, it is ‘our coop’ not ‘their coop’.”

Curt, like many other growers, wanted SMBSC to succeed. In order for SMBSC to succeed (i.e., to increase production by expanding capacity) Curt needed to plant a cover crop in the spring on his beet fields (Images 3 and 4). With little thought Curt, like many other growers, adopted the practice

Figure 4. Watson Partners farm and relative location map



Source: Watson Partners

because it was the right thing to do for SMBSC and the right thing to do as a part of a collective whole of growers.

In addition, the adoption of cover crop as a best management practice for Curt was a continuation of the land stewardship lessons that had been passed down for generations in his family and community. The Watson Partners hope that their legacy of farming will continue through the next generation, and they realize that in order for this to happen, they must protect the soil that is their most important asset. After the start of the program the sales pitch shifted. Curt and other growers were presented with a financial incentive that covered half the cost of planting a cover crop, as well as the agronomic facts and economic benefits of a cover crop including sugar beet protection, better soil erosion control, and the potential for increased yield and revenues.

Image 3. Planted sugar beet field



Source: David Hansen, University of Minnesota

Image 4. Sugar beet field with cover crops



BENEFITS

The direct payment awarded to the growers was seen as a useful benefit of participating in the phosphorus trading program. Benefit from the program is not realized solely through the direct payment however, but also through the ecological and production co-benefits of the practice. Payment for the cover crop currently is \$4 per acre (Kurt Watson, Pers. Comm., 2010). This payment, however, does not include the total cost of the cover crop. In fact, for every \$1.00 received for cover crop, Watson Partners spends \$2.16. For Watson Partners the extra time, effort, and cost to implement the cover crop BMP is a small hindrance compared to the benefits from cover crops that are realized upon harvest of the sugar beets. In 2009 the mean revenue per acre on sugar beets for those growers who planted a cover crop was 2.23 percent higher than those who did not plant a cover crop.

The reason for the difference at the farm level is two-fold, according to Watson Partners. First, a cover crop prevents soil erosion by holding soil in place, reducing crusting, and protecting the soil from extreme wind and rain events. Watson Partners told of numerous times driving along county roads on windy days when they would pass through a dust cloud and then come upon a clearing free of dust and notice the land cover-cropped. This visual for them reinforced the effectiveness of cover crops in preventing soil erosion from wind.

Southern Minnesota is known for its strong spring winds. A sugar beet emerges with two symmetrical rudimentary leaves (a dicotyledon) making a perfect natural propeller, which the wind can catch and twist. The twisting action on the emerging sugar beet will often girdle the root and completely remove the sugar beet from the ground. Too many times the Watson Partners have heard of other growers losing established sugar beet crops to wind. They are very thankful for the added protection the cover crop affords their sugar beet crops. The additional aboveground biomass from a cover crop mitigates, if not eliminates, the destructive forces of the wind. This benefit is of great importance to growers because the most critical aspect in sugar beet production is crop establishment. Overall, the cover crop lowers the risk for growers. Within the cooperative, the cover crop best management practice is seen as a win-win, because it is beneficial for the environment and beneficial for the grower.

From a landscape perspective, the cover crop is most beneficial in ameliorating water quality issues and improving soil health. Cover crops improve water quality by preventing soil erosion and taking up excess nutrients. The additional biomass that the cover crop provides holds soil in place, reduces crusting, and protects the crop and soil from extreme wind and rain events. Taken together, less soil is entering waterways, which results in less sediment and nutrient loading. The cover crop enhances soil health by reducing compaction, improving soil structure, and adding organic material. These multiple benefits ensure continued richness and productivity of the soils. Since the cover crop is a temporary BMP occurring only in the spring, no added benefits to wildlife have been observed by growers.

Image 5. Reinvest in Minnesota Program



Programs such as RIM, CRP, and CREP compensate landowners for setting aside land for wildlife habitat and open space.

Source: David Hansen, University of Minnesota

PHOSPHORUS TRADING IN PRACTICE

The SMBSC phosphorus trading program is implemented on a case-by-case basis every year, when district agronomists present their sugar beet growers with an opportunity to cover crop their sugar beet fields. As such, the number of growers and acres contracted to the program changes annually, though overall both have had a positive trend. While the number of contracted growers and acres varies from year to year, the required number of phosphorus reduction trading credits remains 2.6 times the annual phosphorus mass discharge limit for the WWTF or currently 6,500 credits. A signed contract establishes an agreement between grower and SMBSC initiating a series of steps culminating in a payment for their ecosystem service.

Once a contract has been signed, growers are required to plant a cover crop on the acres of the designated sugar beet fields. Planting of sugar beets begins between early April and May. Typically a cover crop is planted one to three days before the sugar beet planting. The cover crops of choice for SMBSC growers are oats or wheat because these are easier to kill out. The cover crop presents an additional cost to the grower, so growers generally opt for cover crops that are inexpensive to establish and remove once they have served their main purpose.

Once the cover crop is established, a number of monitoring efforts are executed to verify the quality of phosphorus reduction credits generated. First, SMBSC photographs all contracted fields. Two photos of each field are reviewed and graded for compliance, and SMBSC determines the number of credits achieved for the year. Second, an independent third-party auditor randomly selects 10 percent of the contracted fields to conduct a number of auditing procedures including verification of cover crop and credits. This third-party auditing assures the accuracy and integrity of the monitoring process. Not long after the audits are complete the cover crop is killed, typically three to four weeks after sugar beet emergence. A final audit report is submitted to SMBSC. All of the information collected, including contracts, photos, audit findings, and credits, is then sent to the MPCA for approval. Upon credit approval and notification from the MPCA, payment for cover crops is calculated and checks are then written to contracted growers who appropriately implemented the BMP.

SCALING UP: CHALLENGES AND OPPORTUNITIES

While the Watson Partners shared the general challenges of their farming operation - profitability, maintaining fertility, improving drainage, and retaining/obtaining qualified personnel – they saw no challenges specifically associated with the trading program. In fact, the program helped farmers to appreciate the value of cover cropping. As for opportunities, Watson Partners see implementation of best management practices on their land as warranted by conditions on their farm. For growers making a living off the land, having and maintaining a bottom line is essential for their livelihoods

and the livelihoods of generations of growers to come. Therefore economically viable and sound research-based BMPs are implemented and will continue to be implemented on the Watson Partners' landscape. The success of generating credits from planting a cover crop and the trading program in general has reinforced the viability of an additional revenue stream from the trading of excess credits for many SMBSC growers.

For SMBSC, the greatest challenge is maintaining best management contracts for the trading program and the associated annual administrative work specific to cover crop contracts. They are optimistic about scaling up, however, and have a goal for expanding to 100 percent grower participation in the cover crop program. The positive trend in participation appears likely to continue into the future, as 2010 marks the largest number of growers and acres contracted to the program to date. In addition to the measurable advantages that cover crops provide in sugar beet cultivation, peer pressure also plays a role among growers in the adoption of the practice. Cover crops have become the socially accepted best management practice amongst growers, which is of particular import given the close ties of all the growers to each other through ownership of SMBSC.

SMBSC recognizes that the greatest opportunity for itself and the state would be the creation of a market-based trading program in which it could participate. Every year SMBSC generates phosphorus trade reduction credits almost two-fold greater than what is required in its permit. Meanwhile, every year SMBSC receives calls from municipal WWTFs and other point sources throughout the region seeking to purchase credits; there is clearly a market for phosphorus and other nutrients within the region and state. The challenge is how best to frame the market for the benefit of its constituents and the general public. SMBSC foresees an ability to play an important role in a market trading program and is optimistic about the future creation of a larger market.

Currently, Rahr is the only similar trading program conducted in the state, although there is a framework set up by MPCA's General Phosphorus Permit for the Minnesota River Basin anticipates continuing to develop the Minnesota River Basin phosphorus trading program. The framework will cover both point-point and point-non-point trading and will include other pollutants besides phosphorus. In addition, continued adherence to the TMDL is thought to be a driver of future pollutant trading and to play a more prominent role encouraging the establishment of trades between point and non-point sources in the near future. (Bruce Henningsgaard, Pers. Comm., 2010).

Beyond the trading program, SMBSC plans to continue initiating and implementing other BMPs locally and within the region. Deeply ingrained in the mentality of SMBSC is the growers' ethic of good land stewardship. Just as the growers continue to play such a vital role in the community and to SMBSC, so too has SMBSC strived to play an active role in the community and region.

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GLOSSARY OF ACRONYMS

BMP(s)	Best Management Practice(s) – water pollution control devices, techniques, or practices implemented to improve or enhance water quality
BOD	Biochemical Oxygen Demand – indicator of water pollution in a waterway, the amount of oxygen required by aerobic microorganisms to decompose the organic matter in sample of water
EPA	Environmental Protection Agency – Independent federal agency charged with researching, monitoring, setting, and enforcing national environmental standards.
MCEA	Minnesota Center for Environmental Advocacy – Environmental non-governmental organization and self-proclaimed legal and scientific guardian of Minnesota’s environment.
MPCA	Minnesota Pollution Control Agency – State agency charged with research, monitoring, setting and enforcing of national and state environmental standards.
NPDES	National Pollutant Discharge Elimination System – Permitting system established under the Clean Water Act to regulate point source pollution discharge.
PES	Payment for Ecosystem Services – voluntary and mutually beneficial program that promotes conservation of natural resources in the marketplace.
SMBSC	Southern Minnesota Beet Sugar Cooperative – Sugar beet growers cooperative and sugar beet processing facility in Renville, Minnesota.
TMDL	Total Maximum Daily Load – The maximum amount of a pollutant that a water body can receive while still meeting the water quality standards of the Clean Water Act.
WWTF(s)	Wastewater Treatment Facility (ies) – Principal point source discharger of pollutants to surface waters.