



water quality trading:
offsetting point source
phosphorus with non-
point source reductions

16 Years of practice at
Southern Minnesota Beet
Sugar Cooperative

Southern Minnesota Beet Sugar Cooperative

factory is located on 2.5 sections in southern Minnesota

processes 3,000,000+ tons of sugarbeets annually

500 grower owners on 120,000 acres land annually

400 full time and seasonal workers

\$920 million impact on area economy



NPDES/SDS permitting history

SMBSC's wastewater treatment system was converted in 1999 from a spray irrigation facility to a wastewater treatment plant with stream discharge

- 1970s, 1980s, 1990s: the facility used spray irrigation to dispose of treated water
- with wastewater generation in fall, winter, spring, with pond storage until irrigation, the old system generated odors and hydrogen sulfide
- wastewater treatment plant with a new discharge was proposed in 1999 in-part to address odor issues
- the new system requires less storage of untreated wastewater

pre-1999 wastewater treatment system—spray irrigation

120 (or so) acres of pond surface

wastewater originates from the beets that are 70% water

wastewater can be very strong—up to 30,000 mg/L COD

wastewater must be stored before irrigation—that storage can be a significant source of odor and hydrogen sulfide



impaired waters downstream—lower MN River, summer low flow, low dissolved oxygen impairment

the state's understanding of the impaired waters and the impacts of point sources and nonpoint sources on the impairment have evolved over time

- low flow sampling efforts in the early 1980s informed modeling and waste load allocation studies
- 1988 historic low flow conditions and CBOD₅ WLA established
- 1992 river listed impaired for dissolved oxygen during low flow
- 1999 SMBSC discharge permit with phosphorous non-point source trading
- 2004 – EPA approves MN River low DO TMDL
- Point-point source phosphorous trading permit established
- 2012 – low flow sampling meets TMDL goals

water quality trading was used to overcome a prohibition on new and expanded dischargers to impaired waters

the 1999 goal for the lower MN River was 40% reduction of sediment and phosphorus loading. SMBSC had to offset its full permitted phosphorus loading via water quality trading.

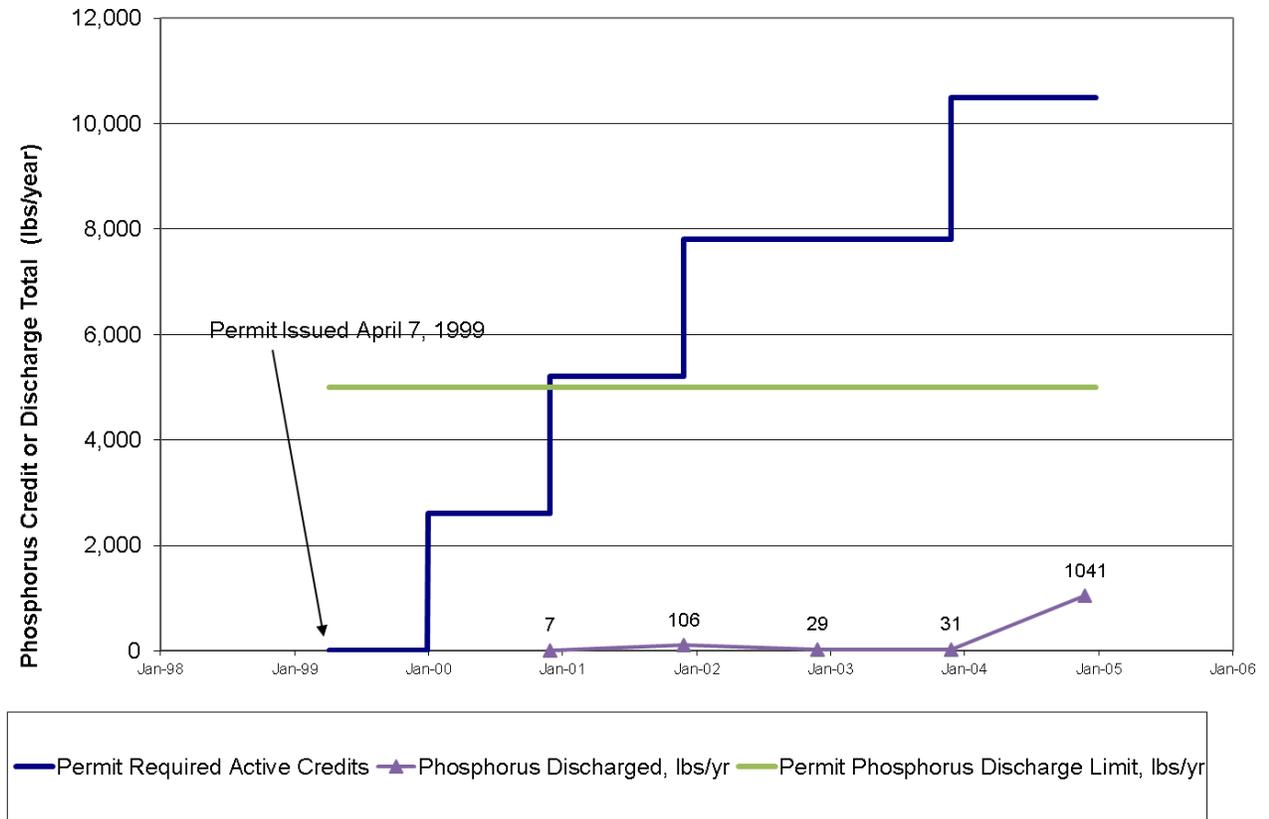
- annual mass cap for phosphorus discharged was 5,000 lbs P per year
- nonpoint BMPs were the source of trades
- the permit specifies the eligible BMPs and the method for computing trade value
- eligible trades: soil erosion BMPs (cover cropping), cattle exclusion, rotational grazing, critical area set aside, constructed wetland treatment systems, alternative surface tile inlets
- one credit equals one pound of NPS reduction
- the permit requires a 2.6:1 trade ratio

1999 MPCA antidegradation evaluation

- “The conversion from spray irrigation of wastewater to a surface water discharge and subsequent changes to the wastewater treatment facility are intended to result in substantial reductions in odor and hydrogen sulfide emissions.”
- “The proposed wastewater treatment facility addresses air quality issues and produces an effluent meeting water quality standards with minimal impacts to the receiving water.”

1999 SMBSC NPDES permit considerations

the permit allowed time for SMBSC to develop, plan, and build NPS BMPs

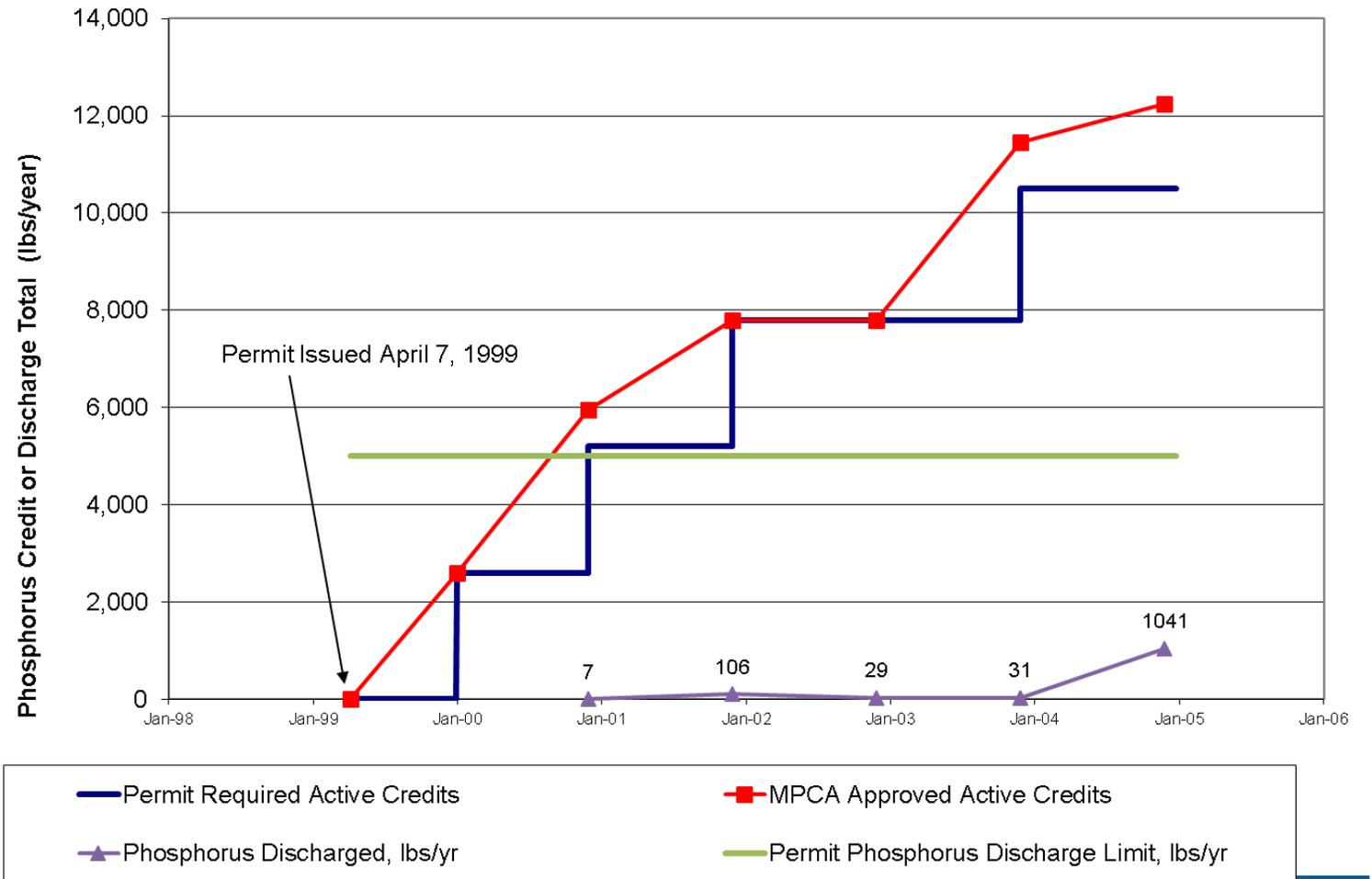


1999 SMBSC NPDES permit considerations—other considerations

- “hot spots” in local waters were prevented by limiting discharge to summer periods when stream flow residence time was less than 3.0 days (i.e., algae growth, doubling time)
- all trades had to be within MN River basin, downstream of an “impoundment”
- \$300,000 “trust fund” for trades
- credit approval/issuance process
 - 45% at contract signing
 - 45% after construction
 - 10% for vegetation establishment
- where state and federal funds were used, credit was allowed only for the portion funding by SMBSC
- credit stacking was not allowed—wetland credits could not also be generated
- annual reports and MPCA conducted audits

1999 SMBSC NPDES permit results

SMBSC was able to meet its permit requirements for water quality trading



cattle site – exclusion and streambank stabilization

1,475 credits



cover crop on sugar beets—about 0.2 credits per acre

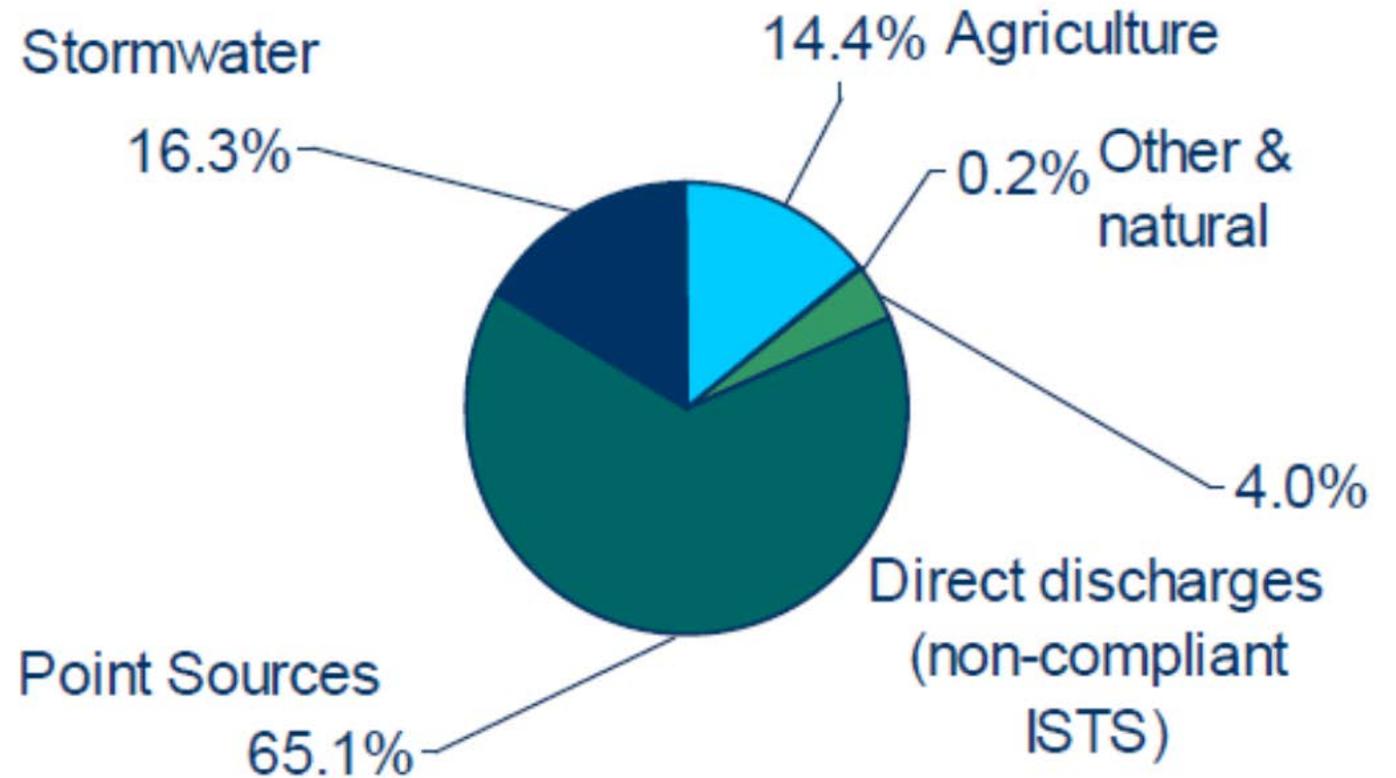


small grain cover crop, planted with sugar beets, killed or removed when sugar beets near full canopy



by 2004, point sources were understood to be the significant contributor to the MN River impairment

the 2004 TMDL and WLA focused on point sources not nonpoint sources



2004 permit conditions

issues

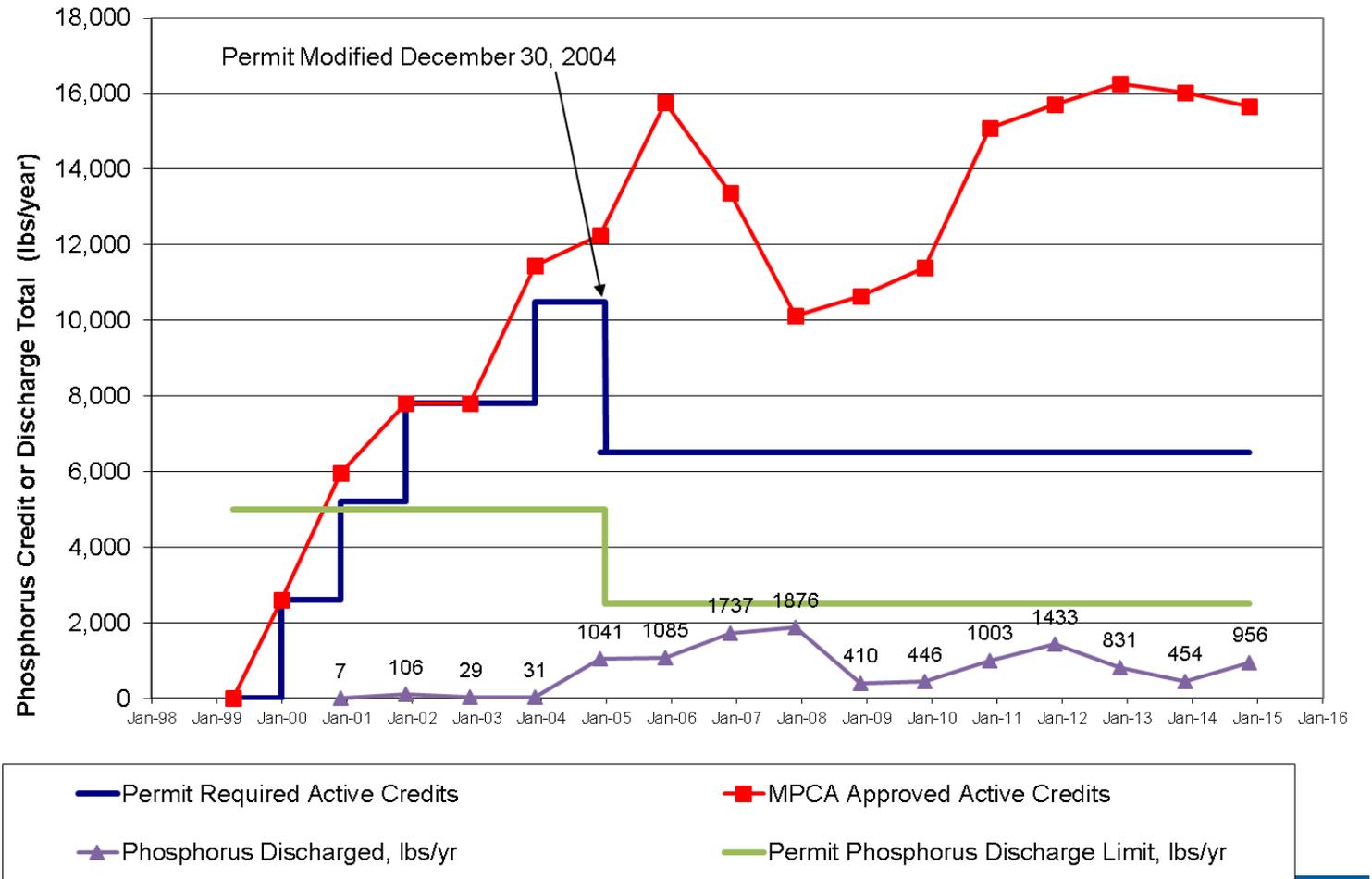
1. local surface water impacts
2. summer impacts on MN River
3. SMBSC, with seasonal discharge, does not cause or contribute to MN River impairment
4. water quality concerns for Lake Pepin, impairment known and TMDL was underway
5. MPCA was spending too much time on the permit
6. SMBSC did not need its full mass cap

resolution

1. discharge moved to limited resource value water
2. seasonal discharge—September through March
3. SMBSC and MPCA considered terminating trading program
4. continued the trading program, but allowed up to 20% out of MN River basin (upstream of Lake Pepin)
5. created an auditing function/requirement in the permit
6. SMBSC took a lower permit limit, 2,500 lbs P per year mass limit

2004 SMBSC NPDES permit results

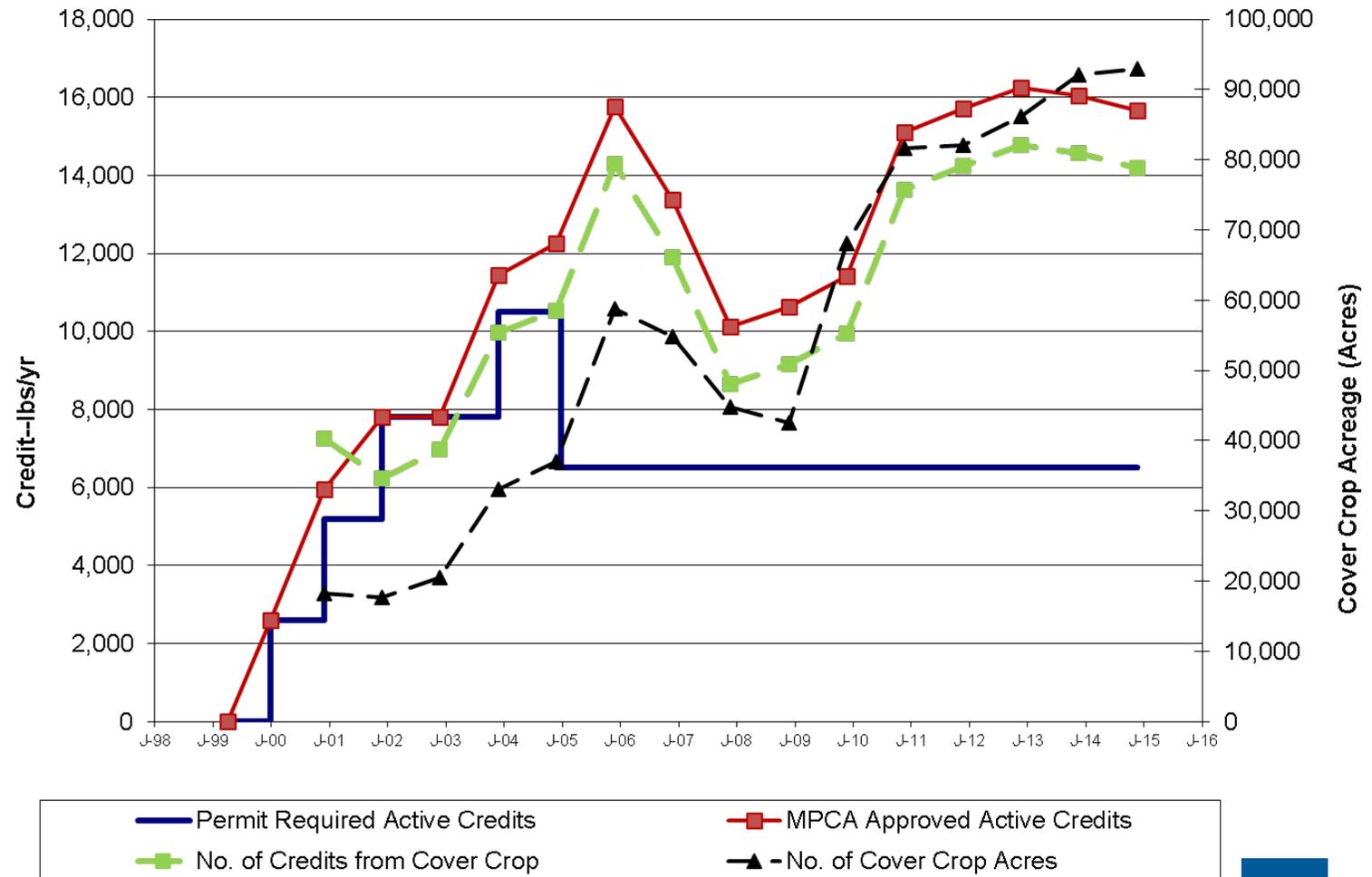
SMBSC has been able to meet its permit requirements for water quality trading, largely due the success of the sugar beet cover crop BMP



cover crop BMP adoption took off after 2004

why?

- grower achieved higher sugar production with BMP than without BMP
- mainly due to less spring replant
- spring replant is needed when early stage sugar beets are damaged by the wind
- cover crop reduced wind damage and thus reduced the need for replant



trading and discharge since 2005—cumulative 2005-2014

- credits approved, 140,000 (one credit equals one pound P)
- credits required, 65,000
- discharged P, 10,200 lbs P (discharge allowed, 25,000)
- actual trade ratio is 13.7:1

SMBSC's overall experience with trading—a summary

- water quality trading (and its complete offset of P) helped SMBSC obtain a permit to discharge treated effluent
- a permit to discharge helped SMBSC eliminate reliance on pond storage and irrigation
- eliminating its reliance on pond storage and irrigation helps SMBSC reduce hydrogen sulfide emissions and odor
- water quality trading is a huge administrative burden to implement and document—each BMP must be documented annually: one major cattle exclusion BMP site and just shy of 1,000 cover crop fields each year

vision and guiding principles for water quality trading programs

1. accomplishes regulatory and environmental goals
 2. is based on sound science
 3. provides accountability, transparency, accessibility, and public participation to ensure that promised water quality improvements are delivered
 4. does not produce localized water quality impacts
 5. is consistent with the CWA regulatory framework
 6. includes appropriate compliance and enforcement provisions to ensure long-term success
- ...and provides efficient and effective ways for point sources to meet their CWA goals and provides the right conditions for landowners to participate
 - source: “building a water quality trading program: options and considerations”, June 2015, National Network on Water Quality Trading

questions

