Guidance for Implementing Water Quality Trading in WPDES Permits

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This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

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Abbreviations and Acronyms

This list contains the most common abbreviations used in this document.

AWQMP	Areawide water quality management plan
BCC	Bioaccumulative chemicals of concern
BMP	Best management practice
BOD_5	5-day biochemical oxygen demand
CAFO	Concentrated animal feeding operation
DATCP	Department of Agriculture, Trade and Consumer Protection
DMR	Discharge monitoring report
GIS	Geographic information system
HUC	Hydrologic unit code
LA	Load allocation
LCD	Land Conservation Department
MOU	Memorandum of understanding
MGD	Million gallons per day
mg/L	Milligrams per liter
NOI	Notice of Intent to Conduct Water Quality Trading
MS4	Municipal separate storm sewer system
NPS	Nonpoint source
NRCS	Natural Resources Conservation Service
P	Phosphorus
PI	Phosphorus index
POTW	Publicly owned treatment works
PRESTO	Pollutant Load Ratio Estimation Tool
PS	Point source
SWDV	Surface Water Data Viewer
TBEL	Technology-based effluent limitation
TMDL	Total maximum daily load
TP	Total phosphorus
TRM	Targeted runoff management
TSS	Total suspended solids
µg/L	Micrograms per liter
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
WDNR	Wisconsin Department of Natural Resources
WLA	Waste load allocation
WPDES	Wisconsin Pollutant Discharge Elimination System
WQBEL	Water quality-based effluent limitation
WQT	Water quality trading
WWTF	Wastewater treatment facility

Chapter 1 – Introduction and Background

Last revised: June 2019

The purpose of this document is to provide guidance and protocols to stakeholders and Wisconsin Department of Natural Resources (WDNR) staff on water quality trading, with an emphasis on developing trades and implementing trading in Wisconsin Pollutant Discharge Elimination System (WPDES) permits. Wisconsin's Water Quality Trading program is authorized in s. 283.84 Wis. Stats.: "Trading of water pollution credits". This document builds on the trading protocols presented in *A Water Quality Trading Framework for Wisconsin* (WDNR 2011), and previous publications of *Guidance for Implementing Water Quality Trading in WPDES Permits – Version 1* (WDNR 2013) and *A Water Quality Trading How to Manual* (WDNR 2013). This publication serves to supplant the above documents as a sole source of formal WDNR guidance on water quality trading.

Water Quality Trading (WQT or "trading") may be used by municipal and industrial WPDES permit holders to demonstrate compliance with water quality-based effluent limitations (WQBELs). Generally, trading involves a point source facing relatively high pollutant reduction costs compensating another party to achieve less costly pollutant reduction, resulting in an overall water quality benefit while meeting regulatory requirements. In other words, trading provides point sources with the flexibility to acquire pollutant reductions from other sources in the watershed to offset their point source load so that they will comply with their own permit requirements. Trading is not a mandated program or regulatory requirement, but rather a market-based tool that enables some industrial and municipal facilities to meet regulatory requirements more cost-effectively.

Deciding to Select Trading

Trading allows point source dischargers to work with nonpoint sources and other facilities in the same watershed to achieve compliance with WPDES permit limits. There are many benefits to trading:

1. Permit compliance through trading may be economically preferable to other compliance options.
2. New and expanding point source dischargers can utilize trading to develop new economic opportunities in a region, while still meeting water quality goals.
3. Permittees, and the point and nonpoint sources that work cooperatively with them, can demonstrate their commitment to the community and to the environment by working together to protect and restore local water resources.

This guidance document is applicable to a variety of pollutants; however, more detail is provided for phosphorus and total suspended solids (TSS) since numeric water quality criteria for total phosphorus (TP) and recently approved total maximum daily loads (TMDLs) for TP and TSS will generate added interest in the trading of these pollutants.

It is important for WDNR staff to promote consistency when implementing permit requirements. This guidance was created to help ensure consistency across all water quality trading efforts in Wisconsin. This guidance document will be updated as experience is gained in developing and implementing trading strategies. Individual chapters or appendices may be revised and the "last revised" date will reflect the most recent date changes were made. All changes to this document are subject to Department guidance protocol including public

comment period. If you wish to suggest changes to this guidance or suggest additional issues that may need to be addressed, contact the WDNR Statewide Water Quality Trading Coordinator. Contact information for statewide and regional trading coordinators can be found on the WDNR's website searching "Water Quality Trading" or by visiting: https://dnr.wi.gov/topic/SurfaceWater/documents/phosphorus/coordinatorList.pdf

1.1 Adaptive Management vs. Water Quality Trading

Adaptive management (AM) is often confused with trading, as both options allow permittees to work with nonpoint or other point sources of phosphorus in a watershed to reduce the overall phosphorus load to a given waterbody. However, these options are not the same (Figure 1). Adaptive management is typically focused on phosphorus compliance and improving water quality so that the applicable phosphorus criterion is met. Trading is not limited to phosphorus and may be used to meet limits for various compounds. Trading must result in improved water quality (according to s. 283.84(1m)(a), Wis. Stats.), which is achieved by causing a greater stream pollutant load reduction at the discharger's point of compliance than would otherwise be achieved via compliance without trading. Additionally, trading is not subject to the AM eligibility requirements specified in s. NR 217.18, Wis. Adm. Code.

In other words, trading focuses on compliance with a discharge *limit* (offsetting the amount of a given pollutant in the effluent); while adaptive management focuses on compliance with phosphorus *criteria* (meeting an acceptable in-stream phosphorus concentration). More detailed information about adaptive management has been presented in the Adaptive Management Handbook. Please refer to that document if you are interested in learning more about this option. For additional information on adaptive management, and for a comparison between trading and adaptive management, visit: https://dnr.wi.gov/topic/wastewater/adaptivemanagement.html.

Adaptive Management	Water Quality Trading
• Permittee improves water quality in a watershed by reducing in-stream phosphorus concentrations • Permit compliance is demonstrated by reducing in-stream phosphorus concentrations and eventually acheiving phosphorus water quality criteria • Typically for phosphorus compliance only	• Permittee purchases "credits" in the watershed to achieve permit compliance • Permit compliance is demonstrated by comparing permittee discharge data, available credits and permit limits • Can be used to comply with a number of pollutants, not just phosphorus

Figure 1. Adaptive Management vs. Water Quality Trading

Chapter 2 – Water Quality Trading Overview

Last Revised: May 2020

To ensure consistency with the Clean Water Act, United States Environmental Protection Agency (USEPA) guidance (USEPA 2003, 2004 and 2007), EPA Trading Memo (2019), and s. 283.84, Wis. Stats., this section of the guidance presents an overview for trading in Wisconsin.

To improve reader understanding, a few terms used throughout this document are explained here. A ***pollutant reduction*** is the outcome of a trading practice, whether from a point or nonpoint source. A ***pollutant credit*** (credit) is the amount of the traded pollutant that is made available to the ***credit user.*** The credit user demonstrates compliance with their WQBELs by using credits to offset part of their discharge. Credits are made available by the ***credit generator***, which may be either a point source or nonpoint source, by providing a ***pollutant load reduction*** (load reduction) in excess of that required of the credit generator[1]. Together, the credit generator and credit user are identified as ***trading partners***.

At times, a trade may be described as a "point to point" trade or a "point to nonpoint" trade. In this guidance, the classification of the credit user is stated first. For example, when the credit user is a point source and the credit generator is a nonpoint source, the trade will be described as a ***point to nonpoint*** trade. When describing trading as "upstream" or "downstream," this guidance document uses the location of the credit user as the point of reference. That is, the credit generator is located upstream of the credit user in ***upstream trades***, and the credit generator is located downstream of the credit user in ***downstream trades***.

What are "point sources"?
Point sources are discernible, confined, and discrete conveyances from which pollutants may be discharged into waters of the state and are regulated by Wisconsin Pollutant Discharge Elimination System permits.

What are "nonpoint sources"?
Pursuant to s. 281.65(2)(b), Wis. Stats., nonpoint sources are land management activities which contribute runoff, seepage, or percolation which adversely affects water quality and are not a "point source" under s. 283.01(12), Wis. Stats.

Trades may involve more than credit generators and credit users. A ***credit broker*** is a third party that facilitates the trade by bringing potential trading partners together. A broker performs the research necessary to match credit users and credit generators based on location, pollutant type, amount, and timing. The credit broker does not purchase and resell credits. Although brokers may assist in trading negotiations, they do not sign or regulate trade agreements. Brokers do not assume any liability for individual trades. The credit broker may be a state agency, conservation district, private entity, or other organization or person. A ***credit exchange or clearinghouse (hereafter referred to as exchange)***, on the other hand, is a third party that collects pollutant reduction credits from credit generators to sell to credit users.

[1] Note that a pound per year of load reduction provided by the credit generator does not necessarily equal a pound per year of credit for the credit user, as explained in Section 3.4 Trade Ratios, p.26.

Credit User	• The point source using trading credits to comply with a permit limit.
Credit Generator	• The permitted discharge or other person or entity that reduces their own pollutant load so that "credit" is generated.
Credit Brokers	• A third party that brings potential trading partners together. A broker matches credit users and credit generators based on location, pollutant type, amount, and timing.
Credit Exchange	• Third parties/markets that collect pollution reduction credits from credit generators to sell to credit users.

Figure 2. Trading Participants and Roles

Pursuant to s. 283.84 (1)(c), Wis. Stats., the WDNR and local government units may play a somewhat modified role as a credit exchange by using money received from credit users to reduce pollutant loads or provide cost−sharing, for the purposes of s. 281.16 (3) (e) or (4), Wis. Stats (see Appendix A – Section 283.84, Wis. Stats., p. 61).

See the Abbreviations and Glossary, pp. iii and 56 for a list of terms used throughout the guidance document.

When to Consider a Broker or Exchange

In some watersheds, credit generators are easily identifiable and willing participants in trading. Additionally, some point sources already have working relationships with potential credit generators, making trading even more likely to succeed.

Credit brokers or exchanges may be useful to facilitate trades between point and nonpoint sources, find potential credit generators, or bridge communication between credit user and generator when working relationships are not well-established. Although some point sources, like cheesemakers, have strong connections with farmers, the majority of point sources in Wisconsin do not have a working relationship with these and other nonpoint sources. Studies have shown that working with a broker or exchange that understands the concerns and challenges facing these entities can improve the probability that trading will be successful[2]. Trust between an agricultural credit generator and a credit bank/exchange can greatly reduce perceptions of uncertainty and fear of regulation, while increasing the sense of equity for agricultural producers. If a credit

[2] Example: Granovetter, Mark (Nov., 1985). Economic Action and Social Structure: The Problem of Embeddedness. *Amer. Jrnl. Of Sociology* 91(3). 481-510.

broker or exchange can bring these qualities to trading, the probability of working with agricultural nonpoint sources may be greater than if a point source tried to work with a farmer directly.

Finding a Credit Broker or Exchange

Credit brokers or exchanges currently are not well established in the state of Wisconsin; however, there are several potential entities that can serve as a credit broker or exchange. If a credit exchange is used, a formal trade agreement between the exchange and the credit user is required to successfully implement this type of market structure (see Section 3.5, p. 34). If a credit broker is used, the credit user and broker may wish to enter into a Memorandum of Understanding (MOU), but an actual trade agreement between these entities is not required. MOUs are recommended agreements between credit users and their broker to specify deliverables, milestones, and necessary compensation. These contractual agreements can help protect both the point source and the facilitator throughout the trading process. MOUs do not have to be submitted to WDNR, nor are they required. If an applicant submits a MOU to WDNR staff, it will be for informational purposes only. WDNR will not validate or comment on these documents but may consider them when evaluating the adequacy trading strategies.

Counties: The County Land Conservation Department (LCD) may be one partner that can effectively bridge communication between point and nonpoint sources, identify potential credit generators in the watershed, and oversee trading. County LCDs have expertise in agricultural performance standards compliance and cost-share agreements, among other things. County LCDs also have ties to effectively reach out to, and work with, farmers and municipalities in their area. There is some precedence in Wisconsin for county LCDs serving as credit brokers for WPDES permittees within their county.

Partnerships with county LCDs can be mutually beneficial given the overlap in goals and experience. However, county staff are not required to assist with trading activities, and some may have limited time for trades due to multiple existing programs they administer. Point sources and county LCDs should determine their appropriate level of involvement and necessary compensation for these projects. To find county staff in your area visit: https://wisconsinlandwater.org/about/directory-search.

Consultants: Some environmental consultants may be interested and willing to serve as credit brokers. You may wish to seek out consultants that have experience working in your watershed, knowledge of nonpoint source runoff, and/or familiarity with outreach and education to help improve the feasibility of implementing a successful trade. Consultants and other third parties facilitating trades do not need direct ties to farmers in your watershed, but should be perceived as unbiased, so that farmers and other nonpoint sources are willing to partner with them. Trusted social relationships will likely create a more efficient marketplace for trading and may even reduce transaction costs for trading.

Other: Other partnerships may also be beneficial to provide technical expertise, assist with project outreach and education, provide alternative funding sources, or seek out trading credits. When determining the potential for other partners it is important to identify regional groups already active in land use/water quality issues. For example, local agricultural groups and/or environmental groups can help identify credit generators or install

best management practices (BMPs). Non-governmental organizations or other partners may also be willing to serve directly as a credit broker.

WPDES Permit Requirements

Pursuant to s. 283.84 (1), Wis. Stats., a binding, written agreement (trade agreement) is required between trading partners. Pursuant to ss. 283.84 (3r) and (4), Wis. Stats., the credit user's WPDES discharge permit and, if one is required, the credit generator's WPDES discharge permit must be issued, reissued or modified to enable trade agreements to be implemented. The permit must include terms and conditions related to the trade agreement before trading of credits may occur. For a point source trade, this would include modifying applicable pollutant WQBELs for the credit generator. For additional information go to Section 4.4, p 48, Incorporation of WQT in WPDES Permits.

General Conditions for Water Quality Trading

Trading should not create localized exceedances of water quality and must not result in the exceedance of WQBELs for acute toxicity as derived pursuant to ch. NR 106, Wis. Adm. Code. This includes limits for acute whole effluent toxicity and limits based on acute criteria for temperature. Further, pursuant to s. 283.84 (1m)(a), Wis. Stats., trading credits must result in improved water quality. Trading results in improvements to water quality by achieving a greater in-stream pollutant load reduction at the point source's point of standards application than would otherwise be achieved absent trading. Trade ratios provide flexibility to consider pollutant reductions of varying certainty, location, and type while supporting the requirement that water quality standards be met.

2.1. Pollutant Parameters for Water Quality Trading

The WDNR will consider any pollutant parameter for trading except bio accumulative chemicals of concern such as those identified in ch. NR 105, Wis. Adm. Code.

Cross-pollutant trading is the use of credits for one pollutant parameter to demonstrate compliance with WQBELs for a second pollutant parameter. Cross-pollutant trading is acceptable when there is adequate information to establish and correlate impacts between the two pollutant parameters. An example is trading credits for phosphorus to allow a discharger to demonstrate compliance with WQBELs for 5-day biochemical oxygen demand (BOD_5) when the limits are based on preventing oxygen depletion in the receiving water.

2.2. Water Quality Trading Applicability

Trading may be used by holders of WPDES permits to demonstrate compliance with WQBELs. Credits may be used to offset part of the permittee's discharge with the difference between the permittee's discharge and available credits being compared to WQBELs to demonstrate compliance, as depicted in Figure 3.

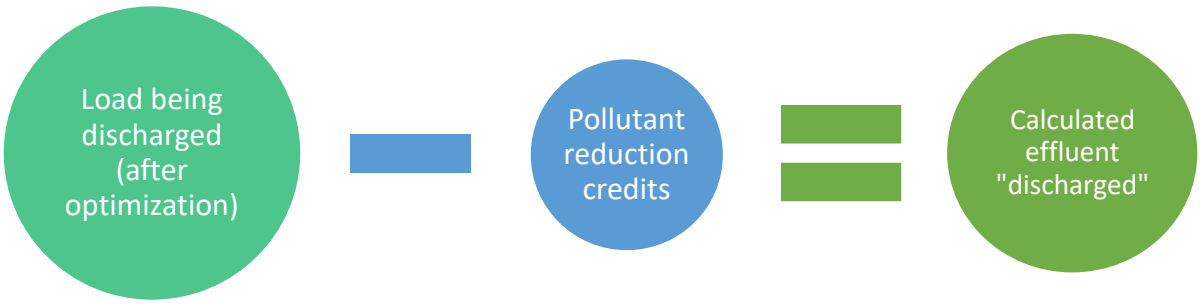


Figure 3. Determining Compliance with a WQBEL Using WQT

Trading may also be used to offset an increase in pollutant load from an existing discharger or the entire load of a new discharger. For example, a finding that water quality is not being lowered, as addressed by s. NR 207.04 (1)(c), Wis. Adm. Code, may be supported by trading to offset an increasing pollutant load or a new discharge. Further, s. NR 217.13 (8), Wis. Adm. Code, identifies trading as one of three options that can be used to allow a new discharger to discharge phosphorus to phosphorus-impaired surface waters.

Trading and Technology-based Effluent Limitations

The use of trading to demonstrate compliance with technology-based effluent limitations (TBELs) established pursuant to ss. 283.13(1) through (4), Wis. Stats., is not allowed unless authorized by the administrative rule that establishes the TBEL. Trading cannot be used to demonstrate compliance with a TP TBEL derived pursuant to Subchapter II of ch. NR 217, Wis. Adm. Code. Trading can only be used to demonstrate compliance with WQBELs.

Trading and Statewide Performance Standards

Nonpoint sources and permitted municipal separate storm sewer systems (permitted MS4s) are not allowed to be credit users to meet the runoff pollution performance standards contained in ch. NR 151, Wis. Adm. Code. Trading may be used to meet requirements promulgated under s. NR 151.004, Wis. Adm. Code. For example, MS4s may use trading to comply with Waste load allocations from TMDLs.

Trading may not be used by concentrated animal feeding operations (CAFOs) to meet phosphorus delivery minimization requirements of s. NR 243.14(5), Wis. Adm. Code. However, trading can be used to comply with effluent limits for a permitted manure treatment system.

2.3. Identifying Partners

In order to meet water quality goals, the parties to a water quality trade must discharge, either directly or indirectly, to the same water body as discussed in Section 2.5, p. 11. For example, a discharge to the East River, a tributary of the Fox River in Green Bay, would be considered an indirect discharge to the Fox River.

Pursuant to s. 283.84, Wis. Stats., trading may occur between two or more point sources and between point sources and nonpoint sources. If one permittee holds more than one WPDES permit, such as a municipality with a permit for its wastewater treatment system discharge and a permit for municipal stormwater discharge, trading may occur between the point sources identified in the two permits. A permittee may generate credits

for its own use by constructing a project or implementing a plan that reduces the amount of a pollutant discharged from sources other than those covered by the permittee's permit.

Successful trades between point sources and agricultural nonpoint sources may require working with persons with prior experience, skills, and relationships with agricultural producers and landowners. In Wisconsin, the following persons may be best suited serve this role: 1) county land conservation department (LCD) staff who work to control nonpoint source pollution; 2) non-governmental organizations and 3) private consultants, including, but not limited to, certified crop advisors. Collectively, these persons are referred to as "NPS implementers". Appendix C – Nonpoint Source (NPS) Implementation of this guidance provides additional information on NPS implementers and the roles they can play to develop and implement successful trades with agricultural nonpoint sources.

Targeting Willing Partnerships

Willing credit generators can include partners who have already identified themselves as potential credit generators, are interested in installing new practices or expanding management practices or are willing to go above and beyond their current pollutant control strategies. It is strongly encouraged to work with these willing partners to help improve the social acceptability of the trade and to mitigate administrative costs associated with finding potential trading partners in the watershed.

Point sources will likely be the most easily identifiable credit generators in the watershed. Point source credit generators may view trading as a way to offset some of their costs to upgrade their treatment technology and may, therefore, be more likely to seek out credit users. Additionally, trades between wastewater treatment plants will be the most administratively straightforward, given that both credit user and credit generator will have a WPDES permit that will maintain the trade over time.

In some watersheds, urban stormwater or nonpoint source credit generators are also easily identifiable. County LCDs, local agricultural groups, regional planning commissions, or other entities may already know of potential credit generators in the watershed or can easily develop this list. Although less likely, urban stormwater and nonpoint sources can also identify themselves as potential credit generators in the watershed. Working with willing urban stormwater or nonpoint source credit generators is one of the best ways to alleviate some of the complexities associated with these types of trades. If willing partners exists in a watershed, logistical concerns associated with finding partners and credits can be greatly reduced, which can have a direct impact on the economic and administrative viability of trading. Other administrative costs may exist, however, for activities such as preliminary trade negotiations, developing trading agreements, and maintaining and verifying trading practices over time. Despite these costs, trades with nonpoint sources can still be far more economical than traditional wastewater treatment facility upgrades.

Local environmental groups may also know of water quality improvement projects such as wetland restoration and bank stabilization projects that can be implemented to generate credits. These groups may have third party funding sources that can help offset some of the trading costs associated with these projects or may have staff resources that can contribute to the project's viability.

Working with Significant Sources of Pollution

You may be aware of a number of significant pollution-generating sites in your watershed; while in other watersheds, you may need to actively seek out these locations. If you have several potential sites to choose from, it is recommended to work first with the most significant contributing sites in your watershed. The most significant contributors will likely be able to generate the most cost-effective credits possible.

If significant pollution-generating sites are unknown, data collected in the field can be used for decision-making purposes to help identify these locations. It is strongly recommended that sites be targeted based on their pollution load contribution, and/or the owner's willingness to partner. Targeting significant sites, also called "critical source areas," means that you will be able to capture more of the pollutant of concern with fewer trading partners. Working with these sources will help create a more efficient marketplace for trading, decrease administrative overhead, and may even reduce transaction costs. The critical source areas in your watershed may be point or nonpoint sources. Additional discussion regarding identifying critical source reduction areas can be found within the Adaptive Management Handbook found here: https://dnr.wi.gov/topic/wastewater/adaptivemanagement.html

When identifying these contributors, it is strongly recommended to work with county LCDs, Natural Resources Conservation Service (NRCS), Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), WDNR NPS coordinators, and/or others familiar with the nonpoint source conditions within the watershed.

2.4. Calculate Pollutant Offset Needed

The goal of this step is to calculate the pollutant offset required. To make this calculation you need to know your current treatment capabilities and your applicable WQBEL.

Optimization of Existing Wastewater Treatment Systems

Prior to using credits to demonstrate compliance with WQBELs, the permittee may wish to optimize existing wastewater treatment for the pollutant addressed by the trade. Treatment optimization utilizes minor operational changes or modifications to capture and remove as much of the traded pollutant as possible. For example, if a wastewater treatment system currently utilizes chemical addition, adding more chemicals or adding chemicals more frequently to recover more of the pollutant of concern may constitute treatment optimization. Removal of collected solids from a lagoon represents another example of treatment optimization.

Determine Your Applicable WPDES Permit Limit(s)

To evaluate whether trading is a viable option for your facility, you need to know the applicable limits for the pollutant(s) of concern. WDNR will calculate and provide pollutant limits to permittees during the permit reissuance process. If your facility's WQBELs are not already included in your WPDES discharge permit, or are not yet available, you may wish to calculate draft limits for planning purposes. Guidance is available to help you calculate draft limits:

- See Section 2.01 of the Phosphorus Implementation Guidance document to calculate phosphorus limits at https://dnr.wi.gov/topic/wastewater/phosphorus.
- See Chapter 3 of the Thermal Implementation Guidance document to calculate temperature limits at http://dnr.wi.gov/topic/surfacewater/thermal.html.

Quantify Offset Needed

To calculate the amount of offset needed to comply with your WQBEL, use the most restrictive limit for the given pollutant in the following equation:

Needed Offset = Expected Discharge (lbs./month*) – Permit Effluent Limit (lbs./month*) × 12 months/year

Where: Permit Effluent Limit = Most restrictive WQBEL for the pollutant, on a mass basis;

Expected Discharge = Pollutant loading for the duration of upcoming trading permit term

*note: TSS limits may have weekly limit averaging periods

Example:

Point Source A is a municipal wastewater treatment facility (WWTF) with an effluent discharge that averages 1.3 million gallons per day (MGD) and 0.5 mg/L total phosphorus. The facility's average annual design flow equals 1.9 MGD. The facility discharges to a waterbody with an in-stream total phosphorus concentration of 0.12 mg/L, which exceeds the water quality criterion for total phosphorus of 0.10 mg/L. Therefore, total phosphorus WQBELs equal to 0.1 mg/L as six-month averages (0.1 mg/L × 1.9 MGD × 8.34) and 0.3 mg/L as a monthly average (0.1 mg/L × 3) are applicable to the facility's discharge. Since the six-month average limit of 0.1 mg/L is the most restrictive limit, needed total phosphorus credits equal:

(0.5 mg/L – 0.1 mg/L) × 1.3 MGD × 8.34 × 365 days/year = 1,583 lbs./year

Where: 0.5 mg/L = Point Source A's current average discharge of total phosphorus;

0.1 mg/L = Total phosphorus WQBEL expressed as a six-month average concentration;

1.3 MGD = Point Source A's current average discharge flow rate;

8.34 = A factor for converting effluent concentration and flow rate to a daily mass (lbs./day); and

Point Source A currently requires 1,583 pounds per year of total phosphorus offset. Note that the effluent flow rate used in the above calculation represents current average flow and not design flow. Therefore, as influent flows to the facility increase during the facility's design life, additional phosphorus credits will be required.

Planning for Variable Discharges and Limit Averaging Periods

As discussed above, the amount of credit needed to comply with a WQBEL is based on the mass of pollutant discharged in excess of the WQBEL over a given period of time. When using nonpoint source pollution reductions in a water quality trade, the resulting credits are made available for use on an annual basis. While this approach allows flexibility for using differing quantities of credits from month to month, consideration must be given to the applicable averaging period of the WQBEL at hand. In general, WQBELs with shorter averaging periods use more credits than WQBELs with longer averaging periods because there are more opportunities for the pollutant discharged to exceed the WQBEL. This effect, coupled with a variable pollutant discharge, may cause a facility to use more credits than anticipated if the shorter averaging period was not accounted for when determining credit need. Different averaging periods for phosphorus (monthly) and TSS (weekly) may be an important consideration.

Contingency Planning for Nonpoint Source Projects

Practices employed as part of a water quality trade may vary in reliability and logistical complexity. When compliance with a WQBEL is determined by availability of water quality trading credits, a trading project may seek to establish additional credits, or reserve credits, that can be relied upon should a planned practice fail to produce credits in a given year. It is the permittee's responsibility to gauge the likelihood of success for practices to generate enough pollutant reduction and credits to offset the discharge over the permit term. For example, structural practices on permittee-owned landed may have a high likelihood of success as many variables are under the permittee's control. Annual practices implemented by an agricultural producer may be influenced by a greater amount of external forces (e.g., Weather may not cooperate and/or cover crops may not become successfully established on a field). Uncertainty factors included in trade ratios, p. 26, do not account for practice failure or non-installation due to unforeseen circumstances.

2.5. Location of Water Quality Trades

This section of the guidance describes the location and geographic requirements for the generation of credits. Two categories define the geographic extent of trades. The first addresses trading to meet WQBELs derived from an approved TMDL (i.e., TMDL WQBELs). The second addresses trading to meet WQBELs that are not based on TMDLs (i.e., non-TMDL WQBELs).

> *NOTE: The following guidance provides a general discussion of location and geographic requirements for trading. The location of the credit user with respect to the credit generator and the possible presence of impoundments, lakes or other features between the trading partners also impact the delivery of credits. See Section 3.4, p. 26 for more details.*

Trading to Meet TMDL WQBELs

Approved TMDLs assign WLAs to point sources and LAs to nonpoint sources so that the impaired water (or impaired segment) will meet water quality standards. These allocations are assigned to pollutant sources that drain to or contribute to the impaired segment. This contributory area is referred to as the drainage area in this document.

In most cases, a credit generator will be able to trade with other dischargers within the drainage area of the impaired segment that resulted in the allocation being assigned to it. Trades may occur both upstream and downstream of the generator's discharge point provided that the potential for localized water quality standard exceedances is adequately addressed. The ultimate extent of the area available for trading is limited to the drainage area contributing to the impaired segment, lake, or reservoir.

When large bodies of water are used to calculate upstream TMDL WQBELs, the eligible trading area may be substantially expanded. See Appendix O of the Wisconsin River Basin TMDL Report and Appendix K of the Upper Fox and Wolf River Basin TMDL report for more information.

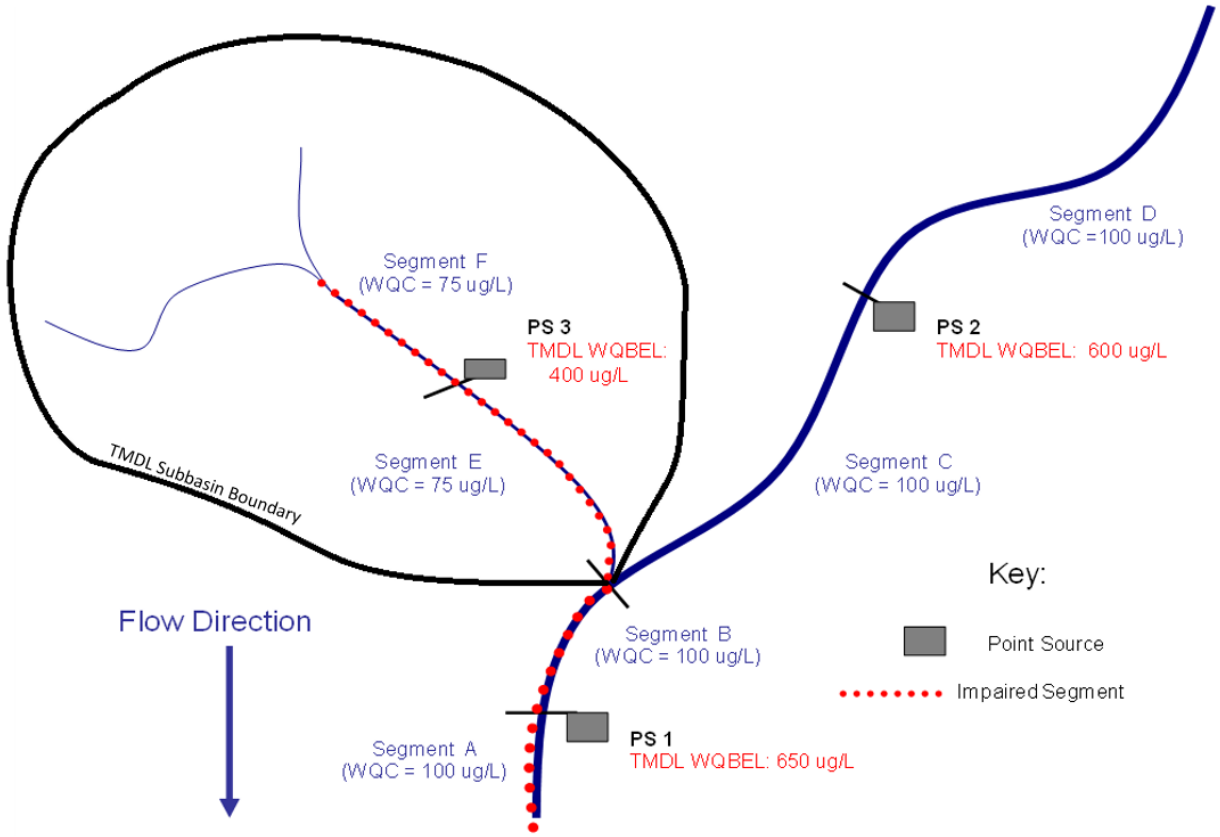


Figure 4. WQT within an Approved TMDL

Figure 4 provides an illustration of the proposed location for a trade under an approved TMDL. The figure shows impaired segments of a river and a tributary to the river with TMDLs for Segments A, B, E, and F. Segment boundaries are depicted by lines drawn across the river and tributary. Trading may occur as follows:

- Point Source 1 (PS 1), located at the top of Segment A, received a TMDL allocation based on meeting water quality standards in Segment A and seeks credits. PS 1 may trade for credits generated by sources in the contributory drainage area for Segment A, which includes Segments A, B, C, D, E, and F.
- Point Source 2 (PS 2) received a TMDL allocation based on meeting water quality standards for Segment B. PS 2 may trade with the contributory drainage area to Segment B, which includes Segments, B, C, D, E, and F to demonstrate compliance with TMDL WQBELs provided the discharge from PS 2 does not result in a violation of water quality standards in Segment C. PS 2 may receive a non-TMDL WQBEL in addition to the TMDL WQBEL to prevent a violation of water quality standards in Segment C. Use of trading to demonstrate compliance with non-TMDL WQBELs is discussed in the next section of this guidance.
- Assuming in this example that the WLA for Point Source 3 (PS 3) is based on protecting Segment E, PS 3 may trade within the drainage area for Segment E, which includes Segments E & F.

Trading to Meet Non-TMDL WQBELs

If a facility wants to trade to meet a non-TMDL WQBEL, in most cases the trade will need to occur upstream of the credit user's discharge point to prevent local violations of water quality standards. However, when a discharger is a small percentage of the in-stream pollutant load at the point of discharge, or if the point of standards application is downstream of the credit user, the point source may have the ability to trade with downstream sources within the reach without exceeding water quality standards. This requires evaluation on a case-by-case basis. Downstream trading should not occur beyond the HUC 12 scale. In other words, downstream trades need to result in a pollutant reduction occurring at the downstream-most point of the credit user's HUC 12 watershed. The pollutant reduction may be achieved in contributory HUC 12 watersheds.

> *NOTE: This guidance document proposes an approach in calculating trade ratios that will minimize the risk of localized impairments with downstream trades. For more information see Section 3.4, p. 26.*

In non-TMDL scenarios, the point of standards application is typically the credit user's point of discharge. When the direct receiving water is classified as a limited aquatic life system, however, the point of standards application for a TP WQBEL may be downstream of the credit user's discharge point (see Section 3.4, p. 26).

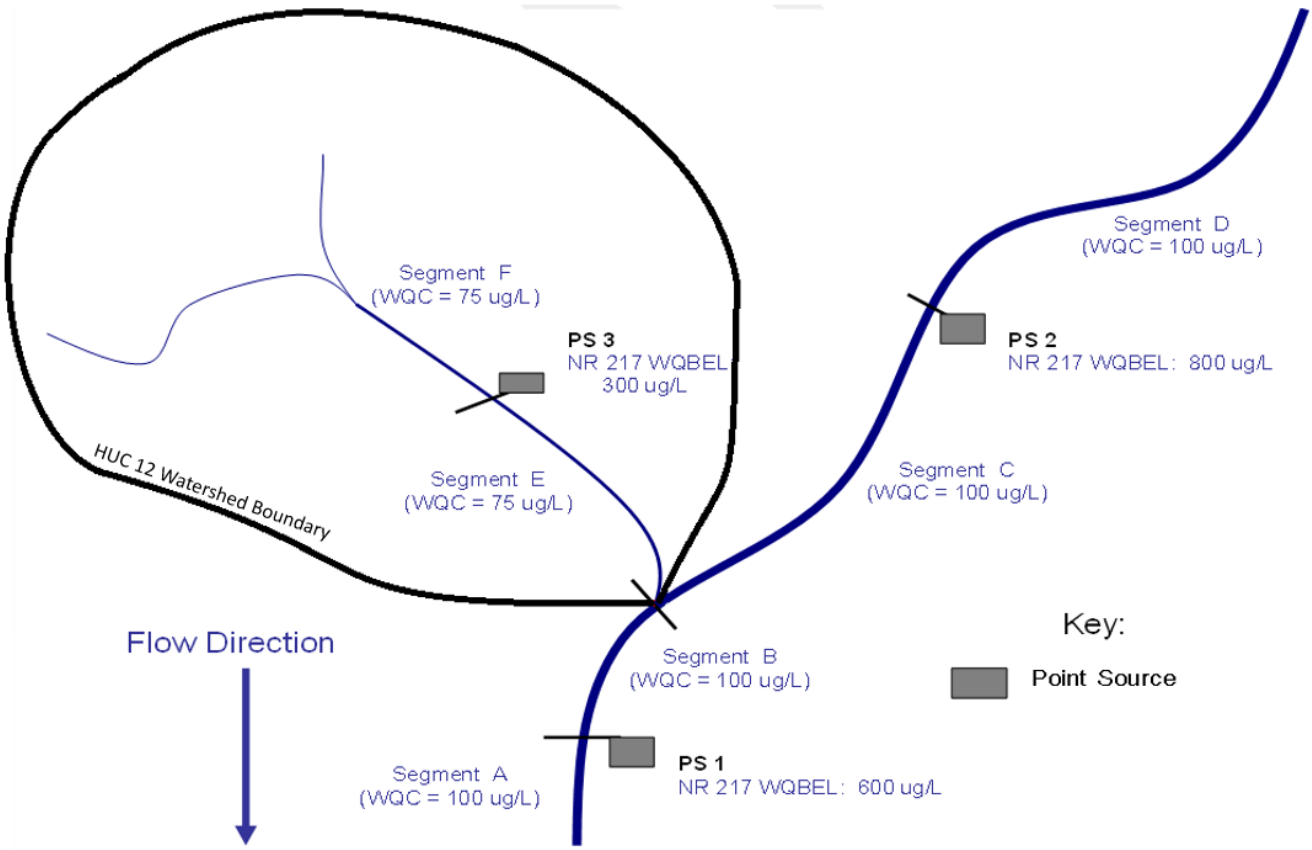


Figure 5. WQT without a TMDL

Figure 5 shows non-TMDL WQBELs based on water quality criteria for TP (according to s. NR 217.13, Wis. Adm. Code). Trades may occur as follows:

- Point Source 1 (PS 1) may trade with sources generating credits in Segments B, C, D, E, and F.
- Assuming that Point Source 2 (PS 2) is an insignificant source of the pollutant load to Segment C (calculated through a quantification of phosphorus loads), PS 2 may trade with sources in Segment D and could likely trade with downstream sources in Segment C if Segment C is within the same HUC 12 watershed as PS2. See Section 3.4, p. 26 for more information.
- Assuming that Point Source 3 (PS 3) is a significant source of the pollutant load for Segment E, PS 3 may trade with sources draining to Segment F, however trading with sources located downstream of its discharge point may not be appropriate due to local exceedances of water quality standards.

It is important to note that upstream trading is not limited to any extent within a watershed. A discharger may acquire credits from credit generators located many miles upstream in the headwaters of the system provided the pollutant reduction impacts the discharger's receiving water. Evaluation of pollutant delivery may be required for certain upstream areas, as described in section 3.4 of this guidance.

Chapter 3 – Water Quality Trading Components

Last Revised: May 2020

3.1 Quantifying Pollutant Load Reductions

Credit users must quantify pollutant reductions made by the credit generator to establish compliance with their WQBEL. The following information will be needed to make this calculation: current pollution load, pollution load post-trading implementation, and credit threshold (see Section 1, p. 18). The method for quantifying the current pollution load and the credit threshold will depend on the credit generator type. Therefore, this section of the guidance is broken up by credit generator. Credits will also need to be generated throughout the permit term to maintain compliance through a trading offset throughout the permit term. Section 283.84(1m)(a), Wis. Stats., requires that a trade result in water quality improvement.

Point Source Credit Generator

For a wastewater treatment plant to be a credit generator, the point source must accept a lower discharge limit than would otherwise be given to them in their WPDES permit. This revised limit will be set below the applicable WQBEL of the credit generator to ensure that net water quality improvements are made from the trade. The difference between the pre-trade effluent pollutant load (assuming compliance with a WQBEL) and post-trade effluent pollutant load resultant from complying with a lower WQBEL is the amount of credit that is generated for trading (Figure 6). The averaging period for this limit will be the same as the credit user's averaging period. See Section 4.4, p. 48 for more details.

Figure 6. Quantifying Wastewater Point Source Credits

Effluent monitoring will be used to verify compliance with the trading WQBEL. The frequency and sampling protocols for effluent monitoring will be specified in the WPDES permits of the credit generator and credit user. Reporting requirements will also be specified in the WPDES permit. Questions on these permit requirements may be submitted to the local wastewater engineer or specialist, or trading coordinator.

For the purpose of quantifying load reductions, MS4s and other permitted stormwater sources are considered nonpoint sources because the pollutant source is diffuse and dependent on precipitation and climatic factors.

Nonpoint Source Credit Generator

Field scale modeling should be used to quantify a pollutant reduction. Currently, models are available to quantify pollutant reductions for the two most likely traded pollutants, phosphorus and sediment.

Urban Sediment and Phosphorus: To quantify load reductions for sediment and phosphorus resulting from the implementation of urban management practices, the most current version of SLAMM (http://www.winslamm.com/), P8 (http://www.wwwalker.net/p8/), or an equivalent methodology approved by the WDNR should be used. For implementation of practices that are not simulated by the models, the process outlined in ch. NR 151, Subchapter V, Wis. Adm. Code, should be used.

Agricultural Sediment and Phosphorus: For trades involving agricultural sources, load reductions should be determined using RUSLE2 for sediment (http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm) and SnapPlus for phosphorus (https://snapplus.wisc.edu/). SnapPlus may also be used for sediment predictions; however, the RUSLE2 model may provide more options. For implementation of practices that are not simulated by the models, the process outlined in ch. NR 151, Subchapter V, Wis. Adm. Code, should be used. See Appendix C – Nonpoint Source (NPS) Implementation and Appendix D – Using SnapPlus to Quantify Phosphorus Trading Credits for additional information for using SnapPlus.

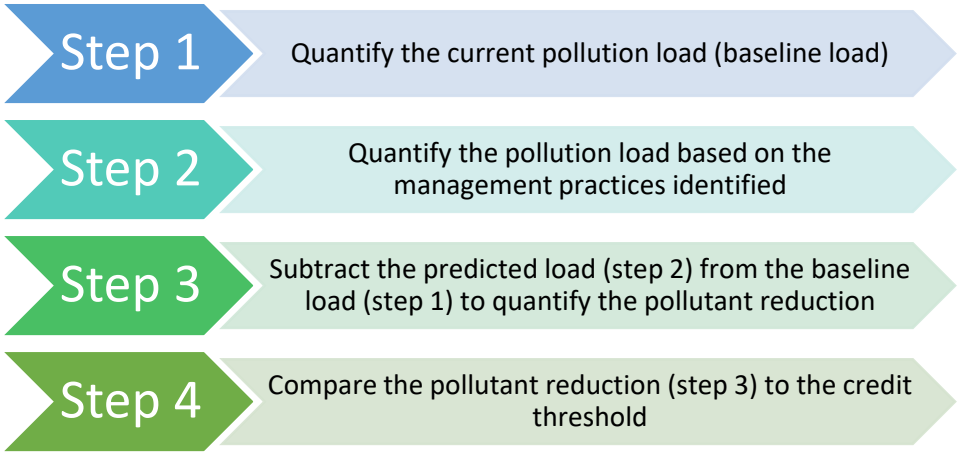


Figure 7. Quantifying Nonpoint Source Credits

Figure 7 illustrates the process for quantifying credits being generated from agricultural and urban management practices. Modeling will likely be used to quantify the current pollution load as well as the reductions made from agricultural and urban management practices. The following models have been applied throughout Wisconsin to help estimate phosphorus and TSS reductions through improved landscape practices:

- Program for Predicting Polluting Particle Passage thru Pits, Puddles, & Ponds (P8)
- SnapPlus (Wisconsin Phosphorus Index)
- Spreadsheet Tool for Estimating Pollutant Load (STEPL)
- Soil and Water Assessment Tool (SWAT)
- Source Loading and Management Model for Windows (WinSLAMM)
- UW Barnyard Tool APLE-LOTS WI

- NRCS Erosion Estimator Tool

The type of management practice will dictate which model(s) is appropriate for use. Recommended models by management practice are listed in Appendix H - Management Practices and Associated Information, p. 148. While the models listed in this guidance have traditionally been used to simulate phosphorus and TSS reductions from the landscape with typical BMPs, permittees are not limited to those models cited. If permittees have questions about another model's applicability, they can contact the WDNR water quality modeling group (dnrwaterqualitymodeling@wisconsin.gov) for input.

Step 1: Baseline Load
The baseline load is the existing pollution load from a given source. The baseline load for most nonpoint sources, such as barnyard loads, runoff from cropland, and streambank erosion, can be quantified for a given calendar year from the models listed above. Because field-based management practices often are implemented over a crop rotation, an averaging period for the field may be used to quantify the baseline load. The baseline condition should reflect the previous full crop rotation, tillage, nutrients and current soil nutrient levels from the fields. Nutrient management plans/records should contain these data, if available. If unavailable, landowner interviews and other reasonable field cropping data collection methods should be utilized to develop an appropriate baseline load. When working with agricultural fields modeled in SnapPlus, a minimum of two years should be used to make this calculation. Other types of pollutant reductions may require consideration of site-specific or practice-specific factors when determining a minimum baseline duration.

Steps 2 and 3: Predicted Load and Establishing Reductions
Once the baseline load is quantified, modeling can be used to predict the future pollution load once management practices are installed. The reductions from the installation of agricultural and urban management practices are converted to credits by applying applicable trade ratios. See section 3.4 - trade ratios.

> *Note: In most cases previously installed BMPs cannot be counted towards "credit generating" activities because they would be counted in the baseline load (step 1), as well as the predicted load (step 2). See minimum baseline duration under Step 1. If historic practices were funded with cost-sharing dollars, these are expected to be included in the baseline condition (see "Credit for Past Practices", p 33).*

Step 4: Long-term vs. Interim Credit
As mentioned in Section 3.3, p. 23, nonpoint sources can generate either interim or long-term credit. Long-term credit will be given for all reductions in non-TMDL areas and for those that go above and beyond the load allocation in TMDL areas. Interim credit will be given for reductions made to comply with TMDL load allocations or obtain a level of reasonable progress towards meeting agricultural edge of field targets, referred to as the "interim floor". Interim credit is available for up to ten years. More details have been included in Section 3.3, p. 23.

Practices Addressing Multiple Pollutants or Multiple Credit Users
In some instances, a practice installed as part of a trade will provide reductions in more than one pollutant. These pollutant reductions are eligible for generating credits of each pollutant type. The pollutant reduction

should be quantified with department approved methods and models for each pollutant. Trading does not allow multiple point sources to take credit for the same pollutant reduction. Careful coordination, timing, and tracking is necessary to avoid "double counting". However, there are some circumstances where credits can be divided between point sources so that "double counting" does not occur (Table 1). Trade agreements required under s. 283.84(1) Wis. Stats., must be executed for each point source utilizing credits.

Table 1. Practices Addressing Multiple Pollutants

Circumstance	Example
The credit generator produces more credit than one credit user needs and splits these credits between multiple credit users.	A point source generator produces 100 lbs./day of phosphorus credit. The point source sells 60 lbs./day to credit user A, and 40 lbs./day to credit user B.
The management practice used to generate credits controls multiple pollutants.	A buffer strip is used to capture excess phosphorus and sediment runoff. Credit user A takes credit for the phosphorus reductions generated by the buffer strip, and credit user B takes credit for the sediment reductions.

Technical Standards for Management Practices

To generate credits, urban and agricultural management practices must be constructed and maintained in accordance with applicable technical standards from the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) or the WDNR's technical standards. NRCS standards may be found at: http://efotg.sc.egov.usda.gov/toc.aspx?CatID=16855 and WDNR technical standards can be found at: http://dnr.wi.gov/topic/stormwater/. Appendix H - Management Practices and Associated Information includes a list of practices and their applicable NRCS standards.

3.2. Pollutant Reduction Credit Threshold

The credit threshold denotes the level of pollutant loading below which reductions need to be made to generate credits; however, there is an exception for interim credits (see Section 3.3). When trading in a watershed with USEPA approved TMDLs, the credit threshold ensures that the assumptions and modeling supporting the allocations contained in the TMDL are maintained. In Wisconsin, TMDLs can provide less stringent effluent limits and mass allocations for municipal and industrial wastewater dischargers than calculated under s. NR 217.13, Wis. Adm. Code.

For nonpoint sources, the credit threshold applies in watersheds that have USEPA approved TMDLs and generally corresponds with the assigned load allocation or corresponding percent reduction for that watershed, agricultural field, or nonpoint source. For permitted MS4s, the credit threshold corresponds to the wasteload allocations and the corresponding percent reduction assigned in a USEPA approved TMDL as well as requirements contained in s. NR 151.13 (2)(b)1.b, Wis. Adm. Code. For industrial and municipal wastewater dischargers, a credit threshold applies both inside and outside of watersheds with an USEPA approved TMDL.

The presence or absence of a credit threshold varies based on the type of credit generator and is explained in more detail in the following sections.

Point Source Pollutant Reduction Credit Threshold

For trades between two wastewater point sources, the credit threshold is set equal to the more restrictive of the point source's effluent limits for the traded pollutant, or current level of discharge, whichever is lower.

> *NOTE: Section 283.84(1m)(a), Wis. Stats., requires trades to result in water quality improvement. This guidance defines water quality improvement to be a greater pollutant load reduction at the credit user's point of standards application than would otherwise be achieved absent trading. A point source credit generator's pollutant load must be reduced below its current level of discharge or wasteload allocation to ensure water quality improvement.*

Pursuant to s. 283.84(3r) Wis. Stats., to generate credits, the point source credit generator must accept a lower permit effluent limit to reflect the credits that the facility is generating. This effluent limit will likely be more restrictive than the existing effluent limit. The difference between the revised, more restrictive effluent limit and the previous pollutant loading (below the credit threshold) is the amount of credit that is generated.

> Example: A point source discharge has a TP WQBEL of 0.5 mg/L, expressed as a monthly average. At current effluent flows, the pollutant load, expressed as a mass value is 6 lbs./day. Through minor wastewater treatment improvements, the point source is able to achieve an average monthly TP effluent concentration of 0.3 mg/L. To serve as a credit generator, the point source accepts revised effluent limits of 0.3 mg/L and 3.6 lbs./day as monthly averages in their WPDES permit, which makes 2.4 lbs./day as a monthly average of TP available to trade.

Interim effluent limits in effect during a compliance schedule for TP pursuant to s. NR 217.17 (3)(c), Wis. Adm. Code, should not be used as the credit threshold. Only the final TP WQBEL may be used as a credit threshold.

If the WPDES permit does not contain an effluent limit for the pollutant being traded, the credit threshold should be set equal to the credit generator's current level of discharge. Statistical methods presented by USEPA in its *Technical Support Document for Water Quality-based Toxics Control* (USEPA 1991) may be used to develop effluent limitations from current discharge data to represent the credit threshold. To generate credits, the point source credit generator must accept a permit effluent limit that reflects a discharge less than the current discharge.

Permitted Urban Stormwater Pollutant Reduction Credit Threshold

For municipal separate storm sewer systems with a WPDES permit (permitted MS4s), the credit threshold will depend on the presence or absence of an approved TMDL. In the absence of an approved TMDL, permitted MS4s have a credit threshold corresponding to the 20 % TSS reduction in accordance with Stage 1 requirements contained in s. NR 151.13 (2)(b)1.b., Wis. Adm. Code, and applicable WDNR guidance, http://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html . For pollutants other than TSS, the credit threshold shall be set at the pollutant level corresponding to the 20 % TSS reduction.

The credit threshold for permitted MS4s covered by an approved TMDL is equal to either the WLA or the 20 % TSS reduction, whichever is more restrictive. The credit threshold can be expressed either on a mass basis (lbs./year) or on a percent reduction basis as measured from the baseline condition represented in the TMDL calculations. See the applicable TMDL report for details about the WLA and the corresponding percent reduction.

> Example: A permitted MS4 is required to get 20 % TSS reduction through modeling of proposed stormwater practices pursuant to ch. NR 151.13 (2)(b)1.b, Wis. Adm. Code. Through modeling, the MS4 determines that they are complying with the 20 % TSS requirement and have accomplished a 23 % reduction. As part of a trade agreement with a wastewater treatment plant the MS4 installs additional management practices that further increases their TSS reduction to 30 %. Credits would be generated between the credit threshold of 20 % and the proposed reduction of 30 %.

To generate credits, the MS4's approved stormwater management plan must demonstrate lower pollutant effluent loading than the more restrictive WLA or 20 % TSS reduction. The stormwater management plan should be modified to reflect conditions of the trade.

Nonpoint Source Pollutant Reduction Credit Threshold

The credit threshold for a nonpoint source, which includes both agricultural sources and non-permitted urban sources, is set to reflect the load allocation from an approved TMDL. If the nonpoint source is located in a watershed without an approved TMDL, the credit threshold is not set by a TMDL.

To generate credits, the current pollutant load must be reduced through urban or agricultural management measures and practices. For nonpoint sources the term "current pollutant load" refers to the pollutant load existing at the time that the trade agreement is reached pursuant to s. 283.84, Wis. Stats. Modeling will likely be used to quantify the current pollutant load as well as the reductions made from agricultural and urban management practices.

Examples of credit thresholds for nonpoint sources are provided below.

Agricultural Nonpoint Sources: The credit threshold for an agricultural area that is not addressed by an approved TMDL is set at the current pollutant load even when the current pollutant load is less than the state-wide performance standard in ch. NR 151, Wis. Adm. Code. The current pollutant load represents historical operations prior to the change made to generate credits. The current load for most nonpoint sources such as barnyard loads, streambank erosion, and wetland restoration can be quantified through modeling for a given calendar year by a method approved by the WDNR. For field-based management practices, the current load will be established through modeling the previous full crop rotation, with a minimum of two years and current soil nutrient levels.

For agricultural areas addressed by an approved TMDL, the credit threshold is defined by using the TMDL load allocation. The load allocation may be expressed either as a mass over a specific period (day, month, or year), a percent reduction from a defined baseline condition, or a modification of statewide performance standards in

ch. NR 151, Wis. Adm. Code. The baseline condition reflects the cumulative pollutant load generated by nonpoint sources within the TMDL area.

For some TMDLs, the department has defined baseline condition for agricultural nonpoint sources as edge of field values (i.e., lbs./acre/year) using SnapPlus software. The credit threshold for a WQT project within a TMDL area can be determined by applying the TMDL percent reduction to the TMDL baseline condition. When agricultural LAs are expressed using SnapPlus, it is expected that pollutant load reductions in a WQT will be also be modeled using SnapPlus. To ensure a water quality improvement and generate credits pursuant to s. 283.84 (1m)(a), Wis. Stats., the nonpoint source credit generator's pollutant load must be reduced below its current level. To uphold TMDL requirements, reductions must achieve or go below the interim floor or long term TMDL credit threshold – see section 3.3. below for interim and long-term credits.

When working with agricultural sources that are encompassed by the edge of field value, it is expected that modeling done to quantify pollutant reductions will be conducted using SnapPlus. If there are field specific factors such as tile drainage, gully erosion, or cropping practices that are unable to be accurately reflected by SnapPlus, it may be more appropriate to apply the required % reduction to current conditions to arrive at the credit threshold. Trade plans that employ this approach should provide a detailed documentation of what field specific factors are not accounted for in the TMDL baseline or unable to be accurately accounted for in SnapPlus.

Unless specifically assigned an allocation or reduction, barnyard runoff, stream bank erosion, wetland restoration and other nonpoint sources will have a credit threshold based on current conditions and the percent reduction stipulated for nonpoint sources in the TMDL.

Please consult with WDNR to determine the applicable baseline condition, percent reduction, and credit threshold for a WQT project within a TMDL area. These values can vary by sub-watershed within a TMDL area and some TMDL implementation plans have explicitly listed credit thresholds. SnapPlus was intended to evaluate agricultural field management practices and associated phosphorus and sediment loss at rates associated with NRCS nutrient management, compliance with NR 151 performance standards, and tolerable soil loss rates. The loss rates corresponding with many TMDL agricultural load allocation values may be on the lower end of the calibrated and validated predictive range for SnapPlus. Therefore, the TMDL load allocation values may be rounded up to the nearest 0.5 lbs./acre/year increment. See Appendix E for more details.

Concentrated Animal Feeding Operations: Agricultural operations with 1,000 animal units or more are required to obtain a WPDES permit and be identified as CAFOs. The WPDES permits for CAFO facilities cover the production area, ancillary storage areas, storage areas, and land application areas. Any runoff from CAFO land application activities conducted in compliance with a permit is considered a nonpoint source and is covered in the TMDL through the load allocation. CAFOs must comply with all WPDES permit conditions which include the livestock performance standards and prohibitions in ch. NR 151, Wis. Admin. Code and nutrient management requirements in ch. NR 243 Wis. Admin. Code. Specific WPDES permit conditions for the production area specify that CAFOs may not discharge manure or process wastewater pollutants to navigable waters from the production area, including approved manure stacking sites, unless all the following apply:

- Precipitation causes an overflow of manure or process wastewater from a containment or storage structure.
- The containment or storage structure is properly designed, constructed and maintained to contain all manure and process wastewater from the operation, including the runoff and the direct precipitation from a 25-year, 24-hour rainfall event for this location.
- The production area is operated in accordance with the inspection, maintenance and record keeping requirements in s. NR 243.19, Wis. Admin. Code.
- The discharge complies with surface water quality standards.

For ancillary service and storage area, CAFOs may discharge contaminated stormwater to waters of the state provided the discharges comply with groundwater and surface water quality standards. The permittee shall take preventive maintenance actions and conduct periodic visual inspections to minimize the discharge of pollutants from these areas to surface waters. For CAFO outdoor vegetated areas, the permittee shall also implement the following practices:

- Manage stocking densities, implement management systems and manage feed sources to ensure that sufficient vegetative cover is maintained over the entire area at all times.
- Prohibit direct access of livestock or poultry to surface waters or wetlands located in or adjacent to the area unless approved by the Department.

Consequently, because of these permit requirements, trades are not allowed for pollutant reduction activities associated with a CAFO's production area; however, trading credits can be generated associated with land application sites because land applications of manure and process wastewater associated with a CAFO are considered nonpoint sources. If the CAFO is in compliance with its nutrient management plan and WPDES permit, discharges from land application activities are considered agricultural stormwater and reductions that go beyond permit requirements and required nutrient management activities are available for trades. A CAFO can use trading to off-set a discharge that occurs as the result of an installation of a permitted surface water outfall as part of a manure treatment system.

When located in an area covered by a TMDL, the credit threshold for CAFO nonpoint sources is the same as that for agricultural nonpoint sources; however, except for phosphorus for which the credit threshold is established by s. NR 243.14(5), Wis. Adm. Code.

Urban Nonpoint (Stormwater) Sources Lacking a WPDES Permit: For urban areas not required to hold a WPDES permit (non-permitted MS4s) pursuant to ch. NR 216, Wis. Adm. Code, the current pollutant load represents existing urban controls calculated by a method approved by the WDNR. WDNR urban stormwater guidance is available at: http://dnr.wi.gov/topic/stormwater/standards/ms4_modeling.html. NOTE: At the time this guidance document was adopted, the urban stormwater guidance document referenced above was not finalized. It may be updated or revised prior to adoption under the guidance procedures in s. 227.112 Wis. Stats. In the absence of a TMDL, the credit threshold equals the current load at the time of the trading agreement.

If covered by an approved TMDL, non-permitted MS4s will have a credit threshold set equal to the LA, or to the percent reduction identified in the TMDL.

Development Projects Subject to Stormwater Permit Requirements: While it is anticipated that most water quality trading efforts will focus on installing treatment technology or best management practices, some trades may seek pollutant reductions from broader land use changes, such as conversion from agricultural to residential land use. Although these activities may be quantifiable in terms of a pollutant reduction, the entire pollutant reduction may not be eligible to generate credits. Full compliance with legal requirements, including those found in any applicable construction and stormwater permits, is required before credits are generated. Pollution reductions going beyond reductions that occur as a result of permit requirements are eligible to generate credits. Please consult with your local water quality trading coordinator when determining the credit threshold, credit calculations, and credit amounts for projects involving land use changes.

Other Nonpoint Sources: If sources other than agricultural and non-permitted MS4s, such as septic field discharges, are assigned reductions in an approved TMDL, the credit threshold would be set at the load allocation or specified percent reduction in the TMDL.

3.3. Interim vs. Long-term Credits

Nonpoint source credit generators, including non-permitted MS4s (not permitted MS4s), that are located in a subwatershed with an approved TMDL may generate two types of credits; interim credits and long-term credits. Interim credits are generated by load reductions that achieve the interim credit floor or credit threshold and, therefore, can be generated only when the current pollutant load exceeds the applicable load allocation. Long-term credits are generated by load reductions obtained below the load allocation (credit threshold).

> *NOTE: This section of the guidance only applies to trades with a nonpoint source credit generator in a TMDL area. It does not apply to credit generators such as municipal and industrial wastewater facilities, or concentrated animal feeding operation production areas.*

The duration of interim credits equals the lifespan of the management practice employed or the period that the management practice is effective and functioning to reduce pollutant loads or 10 years from the date of practice establishment, whichever is shorter. Once interim credits have expired, the credit user may replace them with new interim credits or long-term credits. If the credit user wants to avoid having to replace interim credits over time, they should collect enough long-term credits to meet their WQBELs.

The duration of interim credits will be stated in the credit user's WPDES permit. If a TMDL is approved during the term of a WPDES permit that already allows trading, interim credits and their duration will be specified in the permit when it is reissued or modified. See "Transitioning Established WQT Practices Under a new TMDL" below. The duration of long-term credits is defined in Section 3.4, p. 32.

> **Example: Interim and Long-term Credits**
> A point source credit user trades with a nonpoint source credit generator to comply with WQBELs derived from an approved TMDL. In the TMDL subwatershed, farm fields for the nonpoint source

have a load allocation equivalent to a P loss of 4 lbs./acre/year. The farm fields selected to generate credits have a current phosphorus loss of 10 lbs./acre/year. The point source pays for the installation of management practices on the farm fields to reduce phosphorus loss down to 1 lb./acre/year. The lifespan of the management practice is 15 years. Given the information above, 9 credits are available, broken out as follows:

Interim Credits (Limited to the first 10 years): 6 lbs./acre/year (i.e., 10 - 4 = 6)

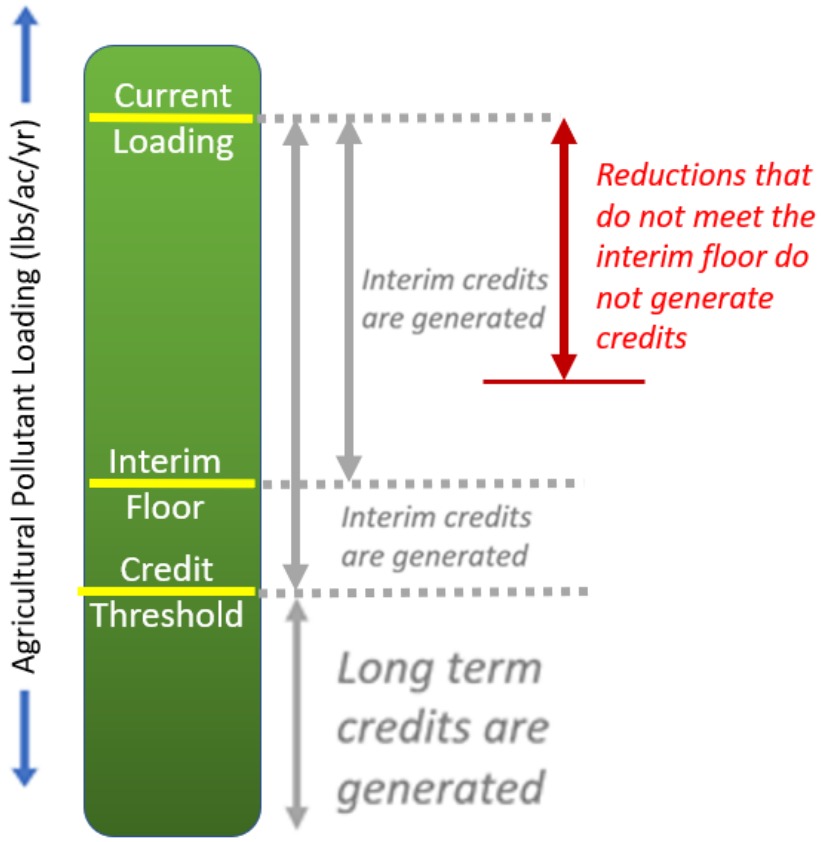
Long-term Credits (Available beyond first 10 years): 3 lbs./acre/year (i.e., 4 - 1 = 3)

For the first 10 years, the point source gets the full credit of 9 lbs./acre/year (i.e., 10 lbs./acre/year minus 1 lb./acre/year). With the credit threshold set equal to the TMDL LA, 3 lbs./acre/year are long-term credits (i.e., 4 lbs./acre/year minus 1 lb./acre/year) and 6 lbs./acre/year are interim credits.

After the first 10 years, all interim credits expire, and the point source may claim 3 lbs./acre/year as long-term credits for the remaining useful life of the management practices. Lost interim credits need to be replaced through either treatment changes at the facility or with new interim or long-term credits.

Interim Floor when using SnapPlus

When utilizing SnapPlus to quantify practices involving agricultural fields, an edge of field number (lbs./acre/year) will generally be compared to edge of field load allocation values found in TMDL reports or using similar TMDL analyses from WDNR. This method, as discussed above, is suitable for distinguishing between long term and interim credits. It has been recognized that meeting the TMDL load allocation values on some agricultural fields may not be attainable with typical agricultural practices. To better target these fields for pollutant reductions, an interim floor may be utilized. The interim floor, established for each TMDL (appendix E), represents an edge of field number than can be achieved using multiple systems of agricultural best management practices that measurably reduce phosphorus and sediment losses from the field and improve water quality from current conditions, but do not meet the TMDL load allocation value. Agricultural pollutant reductions that achieve the interim floor are eligible to generate interim credits.



The main purpose of the interim floor is to ensure a base level of water quality improvement and progress towards TMDL implementation, while affording increased flexibility for new partnerships. From an agricultural producer's perspective, economic and ancillary benefits of involvement in trading may be increased by adopting multiple systems of best management practices.

When converting agricultural land to perennial vegetation, and high soil test phosphorus values prevent attainment of the interim floor value, the establishment of perennial vegetation may generate interim credits without having to reach either the credit threshold or interim floor value. The amount of interim credits can be determined by applying the applicable trade ratio to the reduction achieved between the current loading and the loading resulting from the establishment of perennial vegetation. Harvesting perennial vegetation, over time, may draw down soil phosphorus values and necessitate additional soil sampling.

Transitioning established WQT practices under a new TMDL

When a new TMDL is developed, practices already in place on behalf of existing WQT efforts will be subject to applicable credit thresholds as defined in the new TMDL. When updating WQT plans (at time of permit reissuance or otherwise) permittees should evaluate future credit availability based on the credit threshold and any applicable interim floor values. Practices used for compliance via WQT prior to a TMDL being established are eligible to generate interim credits for up to 10 years after the approval date of the TMDL. A TMDL's approval

date is defined as the date shown on the EPA document that grants final approval. WDNR will work with permittees that have pre-established trades to share expectations and answer questions regarding timing, credit availability, and ongoing compliance with WQBELs via trading.

3.4 Trade Ratios

This guidance utilizes trade ratios to ensure that the amount of reduction resulting from a trade has the same effect as the reduction that would have occurred had the credit user made reductions. For example, a trade ratio of 2:1 means two pounds of pollutant reduction is equivalent to one pound of credit. The usage of a trade ratio also allows for more flexibility in the water quality trading program while ensuring improvements in water quality occur.

The trade ratio equals the sum of separate factors including delivery, downstream, equivalency, and uncertainty. As discussed below, factors are derived independently and combined into a trade ratio using the following equation:

Trade Ratio = (Delivery + Downstream + Equivalency + Uncertainty):1

Delivery Factor

The delivery factor[3] accounts for the distance between the credit generator and the credit user and the impact that this distance has on the fate and transport of the pollutant in surface waters. In most cases, a delivery factor will not be necessary when the credit generator and credit user are both located in the same 12-digit hydrological unit (HUC-12) because of the negligible impacts of fate and transport at this scale. A delivery factor within a HUC-12 subwatershed may be necessary; however, to account for lakes or impoundments between the credit user and credit generator. Methods for analyzing delivery should account for the movement of sediment bound and soluble forms of the pollutant through the system.

> *NOTE: HUC-12 subwatersheds are approximately 10,000 to 40,000 acres (16 to 60 square miles) in size. There are approximately 160,000 HUC-12 watersheds in Wisconsin.*

To account for delivery when trading partners are located in different HUC-12 subwatersheds, two approaches are recommended depending on the type of effluent limit assigned to the credit user for the traded pollutant, TMDL WQBEL or non-TMDL WQBEL as explained below.

TMDL WQBEL Delivery Factors: In a TMDL, allocations are assigned to pollutant sources to ensure impaired receiving waters meet water quality standards. The TMDL report outlines the methods used to calculate the allocations including those accounting for delivery and transport of pollutants (TMDL reports can be found at: http://dnr.wi.gov/topic/tmdls/tmdlreports.html). When trading to meet a TMDL WQBEL, any delivery factors used in the TMDL also must be used to calculate the delivery factor of the trade. If the TMDL assumes no

[3] In this section of the guidance, delivery factor refers to the in-stream transport of the pollutant between credit user and credit generator, not delivery from pollutant source (such as field edge) to the receiving water.

delivery factors or does not simulate fate and transport, the trade does not have to account for delivery because the delivery factor is implicit in the allocations and, therefore, reflected in the credit threshold (i.e., the delivery factor equals 0).

When TMDLs do not include fate and transport, pollutant loads are assumed to move through the system in a conservative fashion with no losses due to settling of other processes. This results in downstream allocations being lower with an implicit margin of safety because there are no pollutant loses assumed to have occurred in the system.

Non-TMDL WQBEL Delivery Factors: In the absence of an approved TMDL, the SPARROW model may be used to derive delivery fractions for phosphorus, nitrogen, and sediment when fate and transport need to be addressed. The SPARROW model was developed by the United States Geological Survey (USGS) and relies on regression equations from monitoring data to create a delivery fraction between two points in a watershed.

The SPARROW model produces a delivery fraction (0 to 1) which represents the fraction of the load leaving a reach that arrives at the end of a selected downstream target reach or outfall after accounting for the mass of the constituent of interest that is removed by natural attenuation processes. The delivery factor that should be used in the trade ratio equation equals:

Delivery Factor = (1/SPARROW delivery fraction) - 1.

See Appendix G – SPARROW How-To Guide for instructions on calculating delivery factors using the SPARROW model in WDNR's Surface Water Data Viewer website application.

Downstream Trading Factor

A downstream trading factor is needed when the credit generator is located downstream from the credit user's point of standards application. The downstream trading factor is used to minimize the likelihood in a violation of water quality criteria in the receiving water between the point of standards application and the where the credits are being generated. The point of standards application is typically the point of discharge in non-TMDL scenarios, or the bottom of the reach that generated the credit user's wasteload allocation in TMDL scenarios. For some pollutants (such as TP), however, the point of standards application in the absence of a TMDL may be downstream of the credit user's discharge point when the direct receiving water is classified as a limited aquatic life system.

A downstream trading factor is not needed for trades that occur when the credit generator is upstream of the point of standards application (i.e., Downstream Trading Factor = 0).

The downstream trading factor, as provided in Table 2, is a function of the average annual pollutant load discharged by the credit user when compared to the overall total pollutant load at the credit user's point of standards application. For phosphorus and TSS this difference can be calculated using WDNR's pollutant load ratio estimation tool (PRESTO) at http://dnr.wi.gov/topic/surfacewater/presto.html.

Table 2. Downstream Trading Factor

Credit User's Load as a Percentage of Total In-Stream Load	Downstream Trading Factor
<25%	0.1
<50%	0.2
<75%	0.4
≥75%	0.8

Greater Geographic Flexibility in TMDL Watersheds

Downstream trading is limited to trading partners within the same HUC-12 subwatershed; however, downstream trading may be allowed beyond local reach boundaries when TMDL limits are driven by a point of standards application located downstream of the discharge point. For example, a facility discharges to a stream that then flows into a reservoir. The reservoir has more stringent water quality criterion than the stream, requiring a lower effluent limit at the facility. In this case, the trading area is expanded to the entire contributing drainage of the reservoir. A portion of the pollutant reduction may still need to occur locally (within the drainage of the stream) as the stream itself also needs to meet water quality criterion. This concept is covered in greater detail in appendices of TMDL documents.

Equivalency Factor

The equivalency factor accounts for trading partners discharging different forms of the pollutant that is being traded. An equivalency factor is appropriate when water quality criteria are established for different forms of a pollutant or a TMDL differentiates between various forms of a pollutant. Equivalency factors are provided in Table 3. As such, equivalency factors will vary based on the pollutant, as discussed below:

Total Phosphorus: An equivalency factor is not necessary (i.e., equals 0) for trading of TP credits. Chapters NR 102 and NR 217, Wis. Adm. Code, establish water quality criteria and WQBELs for TP and do not differentiate between forms of phosphorus. While soluble and sediment bound phosphorus have different transport capacities, these differences are accounted for in the calculation of the delivery factor.

Total Suspended Solids (TSS): Unless explicitly stated in a TMDL report, an equivalency factor is not necessary (i.e., equals 0) for trading TSS credits. To date, water quality standards and approved TMDLs for sediment, solids, or TSS have not differentiated between sedimentation and TSS but rather has lumped them together as one parameter. Once explicit water quality criteria have been established for TSS, an equivalency factor may be needed to translate between point source TSS and sources of TSS and sediment from agricultural and urban runoff.

Nitrogen: If numeric water quality criteria are developed for nitrogen, equivalency factors may be warranted for nitrogen trades given the speciation of nitrogen and the identification of the different forms in effluent limits.

Table 3. Default Equivalency Factors

Pollutant Parameter	Equivalency Factor
Total Phosphorus	0
Total Suspended Solids (TSS)	0
Thermal	Not Applicable

Contact local or statewide trading coordinators for help when determining the equivalency factor for pollutants other than TP or TSS.

Uncertainty Factor

The uncertainty factor compensates for the multiple sources of uncertainty that occur in the generation of nonpoint credits. Uncertainties originate from climatic and weather variability, potential inaccuracies in field testing or modeling of the amount of pollutant controlled by a management practice, inability to always synchronize credit generation and use and the episodic nature of nonpoint pollution, and the reliability of a management practice to perform under different hydrologic conditions.

Point Source Credit Generator Uncertainty Factor: When a point source generates credits, such as in a trade between two wastewater treatment plants, the uncertainty factor for the trade is set equal to 1 when the credit generator performs effluent monitoring in accordance with the terms of its WPDES discharge permit.
Due to the nature of stormwater discharges, nonpoint source uncertainty factors are applied to credits generated by a permitted MS4.

Nonpoint Source Credit Generator Uncertainty Factor: This uncertainty factor addresses trades where credits are generated by a nonpoint source, MS4s, and other permitted storm water sources accounting for pollutant source that are often diffuse, episodic, and dependent on climatic and weather factors.

Generally, the nonpoint source uncertainty factor will be calculated based on the effectiveness of management practices employed over various flow or precipitation regimes, the general effectiveness of the practice, and the ease of verification that the management practice is in place and operating effectively. Individual practices that are effective over a wider range of flow regimes and management practices that can be accurately modeled have lower uncertainty factors. As concluded by the Wisconsin Buffer Initiative (http:/faculty.nelson.wisc.edu/nowak/), a systems-based approach involving complementary management practices addressing the application of nutrients, detachment of sediment and nutrients, and transport of sediment and nutrients affords the best reduction in the delivery to receiving waters. In cases where management practices address pollutant loads through the full range of hydrologic conditions and effectively mitigate the main mechanisms of pollutant delivery the uncertainty factor can be set to 1. Practices include whole field management, companion crops, and conservation easements. In these cases, the overall trade ratio generally simplifies to 1.2:1, assuming the credit user is downstream of the credit generator in the same HUC 12 watershed. For practices that are implemented without supporting practices the uncertainty factor is set at 2 and those practices that have limited success in reducing pollutant loads or quantification limitations have higher uncertainty factors of 3 or 4. This approach allows the use of such practices but appropriately sets credits at an equal level with more reliable and sound management approaches.

Appendix H - Management Practices and Associated Information provides a list of nonpoint source management practices with default uncertainty factors that may be used to translate pollutant reductions to credits for trading. However, credit generators are not restricted to the management practices listed and may request site-specific uncertainty factors. Requests to use uncertainty factors other than the default values or to use practices currently not listed in Appendix H should be made in writing to local or state trading coordinators. Requestors should explain why alternative uncertainty factors or new practices are warranted and why the proposed ratios provide adequate levels of protection. The WDNR will determine the adequacy of the trade ratios and if new practices are applicable and update guidance materials as appropriate. This process, including the data to be submitted, is consistent with the process outlined in ch. NR 151, Subchapter V, Wis. Adm. Code.

Aquatic Habitat Adjustment

Many of Wisconsin's listed surface waters are impaired due to a combination of chemical, biological, and aquatic habitat impairments. In many cases, habitat restoration may be necessary for the listed surface water to achieve its full designated use. Therefore, activities that generate credits and include an aquatic habitat restoration element may qualify for an aquatic habitat adjustment to the trade ratio. To qualify, the surface water must exceed the applicable criterion for the traded pollutant and the management measure or practice must address the impacts of the traded pollutant. Habitat restoration efforts are expected to meet applicable WDNR and NRCS standards. Suggested adjustments to the uncertainty factor are provided in Appendix H.

In-stream Habitat Adjustment

Streambank stabilization projects may employ in-stream habitat measures to help mitigate the impacts of excess phosphorus and sediment in the system. By implementing a habitat adjustment, the uncertainty factor may be reduced from 3 to 2.

Plans for habitat projects should be submitted as part of the trading plan. Eligible habitat structures are found in the Stream Habitat General Permit and should conform to the NRCS 395 technical standard. Habitat projects should result in a substantial gain in habitat elements that have been compromised by the pollutant at hand. For example, a stream habitat project may focus on adding structure such as woody debris to a stream segment. In the water quality trading plan, an assessment of the stream reach should indicate a deficiency in woody structure. These assessments should be made by qualified professionals such as WDNR fisheries biologists, county LCD staff, or other individuals with experience installing in-stream habitat. Alternative protocols for assessment are outlined in NRCS 395 technical standard.

What structures qualify as stream habitat?
The following habitat structures, authorized under the Stream Habitat General Permit, are eligible as in-stream habitat.

- Boulder or log placement
- Weirs
- Lunker structures
- Cross-logs
- Rock and rock deflectors
- Brush bundles
- Coconut fiber rolls
- Spawning material placement
- Log deflectors
- Skyhook structures
- Similar habitat structures

Minimum Trade Ratio

Section 283.84(1m)(a), Wis. Stats., requires that a trade result in water quality improvement. This guidance defines improvement in water quality to be a greater load reduction than would otherwise be achieved absent trading. To accomplish this, the final trade ratio for trades involving credits generated by a nonpoint source should never be less than 1.2:1 (1.2 pounds of load reduction generated for every pound of load reduction credit made available). Trade ratios for trades with credits generated by a point source should not be less than 1.1:1. Once a trade ratio is calculated, it should be compared to the minimum trade ratio and the greater of the two values should be used as the applicable trade ratio.

Minimum trade ratio examples are provided below:

The trade ratio equation is:

Trade Ratio = (Delivery + Downstream + Equivalency + Uncertainty):1

Point Source Example: A credit user is working with an upstream WPDES permit holder within the same HUC-12 subwatershed to trade TP. Both the credit user and credit generator are subject to non-TMDL WQBELs derived from s. NR 217.13, Wis. Adm. Code. Given this, the trade ratio equation simplifies to:

Trade Ratio= (Uncertainty):1

With an uncertainty factor of 1 for point to point trades (see Appendix H - Management Practices and Associated Information, p. 148), the calculated trade ratio equals 1:1, which is less than the minimum trade ratio of 1.1:1. Therefore, the applicable trade ratio for the example trade is set equal to the minimum trade ratio.

Nonpoint Source Example: Why does the trade ratio simplify?

- Delivery Factor equals 0 because delivery factors were not used in the TMDL.
- Downstream Trading Factor equals 0 because trades are upstream of the point of discharge.
- Equivalency Factor equals 0 because the trade is for TSS.

Point Source Example: Why does the trade ratio simplify?

- Delivery Factor equals 0 because trade is within same HUC-12.
- Downstream Trading Factor equals 0 because trades are upstream of the point of discharge.
- Equivalency Factor equals 0 because the trade is for TP.

Nonpoint Source Example: A credit user is working with an upstream nonpoint source credit generator to trade for TSS. No delivery factors were used in the TMDL upon which the TSS WQBELs are based. The credit generator is using a no-till management practice to generate credits. Given this information, the trade ratio equation simplifies to:

Trade Ratio= (Uncertainty):1

With an uncertainty factor equal to 2 (see Appendix H, p. 148), the calculated trade ratio equals 2:1. Since it is greater than the minimum trade ratio of 1.2:1, the calculated trade ratio is applicable for this example trade.

3.4. Timing of Credits

Timing of Pollutant Reduction Credit Generation

Credits are not available for use before they are generated. For point source credit generators, wastewater treatment, production process modifications or other controls necessary to generate the credits must be in place and reductions in pollutant loads must be measurable before credits are available for trading. That is, the point source credit generator must first comply with the more restrictive WPDES limits that it accepts as part of the water quality trade (see Section 3.1, p. 15). Modification of the credit generator's WPDES permit will likely be required to incorporate the lower limits. Please contact DNR to discuss timing of permit modifications.

For nonpoint source credit generators, the management practice must be in place and effective before credits become available for trading. All structural measures must be installed and functioning prior to generating credits. Practices that generate credits through the conversion of land (i.e., wetland restoration) or involve the establishment of vegetation (i.e., riparian buffer strips) must be installed, established, and functioning (meeting any applicable technical standard) prior to generating credits. WQT plans should identify a target date for full establishment of practices. For some management practices, the reduction of pollutant load may not occur immediately after implementation of a management practice, credits may not be immediately available. In some cases, such as no-till and nutrient management, credit generation can also increase over time as the impacts of the management practices are fully realized on the landscape in subsequent years. Cropping practices (e.g., tillage, cover crops, etc.) must be implemented over the period that credits are needed, often the permit term, and can be calculated using a rotational average not to exceed the length of the permit term. Reductions that occur during the permit term can be averaged annually across the permit term; however, reductions that may be attributed to the impacts of a crop rotation that extends beyond the permit term should not be counted. For example, the impacts of years six and seven of a proposed 8-year crop rotation should not be counted when quantifying the reductions that occur within the permit term. Failure of management practices such as cover crops may require making adjustments in future years of a planned crop rotation to ensure that the rotational average used to calculate credits is met over the permit term. For example, over a 5-year permit term, a rotational average reduction in TP is achieved through the implementation of cover crops in years three and four of the permit term. In year three, the cover crop fails to germinate and provide sufficient cover requiring a modification of the rotation with the planting of a cover crop in years four and five or the implementation of other management practices to generate enough pollutant reduction and credits to offset the discharge over the permit term. See Appendix D for details on quantifying reductions that occur over a crop rotation.

When credits are generated by a point source, both the credit user and credit generator must have permit language for trading specified in their WDPES permit. Credits are not available to the credit user prior to the credit generator's permit being modified or reissued and the more restrictive effluent limit accepted by the credit generator as part of the trade becoming effective.

Credit for Past Practices

When credits are generated by a nonpoint source, only load reductions that occur after the trade agreement is reached are available to generate credits pursuant to s. 283.84(1)(b), Wis. Stats. Credit users and generators should ensure that trade agreements are in place prior to establishment of a practice that will be used for credit generation. Section 283.84(1m)(a), Wis. Stats., requires that a trade result in water quality improvement. Water quality trade proposals that maintain existing/previously installed practices, in most cases, will not improve water quality, they will only maintain current water quality, and should not be used to generate credits.

If practices require maintenance or re-establishment (e.g., edge of field filter strips, grassed waterways, prairie/permanent grassland or riparian buffers), those activities are not eligible for credits because they will only maintain, not improve, current water quality. For agricultural fields or operations that were documented in compliance prior to a WQT agreement, and then have fallen out of compliance with ch. NR 151, Wis. Adm. Code, installation and maintenance of practices needed to re-establish compliance are not eligible to generate credits.

Further, if a nonpoint source previously installed management practices through cost-share agreements funded by state cost-share dollars, for example the Targeted Runoff Management (TRM) or Notice of Discharge grant programs, credits generated through those practices should not be used for trading purposes pursuant to s. NR 153.15(2)(f), Wis. Adm. Code. Point sources should review the conditions of other cost-share grants to determine if credits may be used from practices installed using those funds.

Can I take credit for practices recently installed?
In some situations, point source discharges may be able take credit for practices that the point source has previously installed or previously funded, if expressly approved by WDNR and are part of binding written agreement at the time of practice installation. Ineligible historical practices include practices that are being used to comply with permit requirements or state performance standards or were funded through Targeted Runoff Management grants or other grants with similar restrictions. Other restrictions may also apply. Contact your local trading coordinator to discuss specific practices of interest.

Timing of Pollutant Reduction Credit Use

When credits are available, the timing of credit use will depend on the source of the credits. When a wastewater facility generates credits, only those credits generated during the compliance period of the credit user's WQBELs may be used. For example, the demonstration of compliance with a monthly average WQBEL for a specific month and year may take into consideration only those credits that are generated during that month and year. Credits generated during a given month may not be carried forward to the next month.

When a nonpoint source generates credits, it is much more difficult to establish the timing of credit generation since many of the management practices employed produce credits only during periods of runoff. Further, management practice modeling is limited in its ability to predict the periods when credit generation occurs and normally provides load reductions in annual time periods (e.g., pounds of TP per acre per year). This is because many models rely on average annual data sets rather than actual recorded daily values. Therefore, the credit

user may bank the credits generated by a nonpoint source management practice for the calendar year they are functioning and use a portion of the banked credits to demonstrate compliance with WQBELs expressed in averaging periods less than one year, at any time during that calendar year. Exceptions to the banking concept may have to be made on a case-by-case basis for seasonal discharges which would require prorating the use of credits over the entire year. For structural practices, credit availability will be based on the portion of the year for which the practice is installed and operating.

> **Example:** A streambank stabilization project will generate 80 lb./year of total phosphorus credits. The project is complete as of October 1, 2024. If the WPDES permit is reissued in 2024, there will be a total of 20 lb./year of credits available to demonstrate compliance with WQBELs in October, November, and December (25% of the credits, since it will be in place for 25% of the calendar year). The full 80 lb./year would be available during 2025, provided the practice continues functioning as designed.

Trade Duration

Pollutant reduction credits, with the exception of nonpoint source interim credits (see Section 3.3, p. 23), remain available for trading as long as the generator and user agree to continue trading credits and the measure or management practice remains effective. For nonpoint sources that generate credits, credits remain available for trading through the design life of the management practice provided the practice remains in place and is properly maintained[4]. This will require periodic maintenance or in some cases, the reinstallation of management practices. For point sources that generate credits, credits remain available if the credit generator complies with the more restrictive effluent limit that it accepted as part of the trade agreement.

The duration or term of a trade is limited by either trading partner ending the agreement, by the conclusion of the design life of the pollutant reduction measure or practice that generates the credits, or by the WDNR's withdrawal of its approval of the trade, whichever results in the shorter duration. Expiration of interim nonpoint source credits may occur during the term of a trade agreement without ending the entire agreement. Should a point source cease discharge, any credits generated by that point source are no longer available for trading. Point sources no longer requiring a permit cannot generate credits pursuant to s. 283.84(1)(a) Wis. Stat.

3.5. Water Quality Trading Agreement

Section 283.84, Wis. Stats., requires a binding, written agreement before trading may be employed. A copy of s. 283.84, Wis. Stats, is provided in Appendix A – Section 283.84, Wis. Stats., p. 61 and the five different trade agreements identified by the statute are discussed below:

Trading Between Two WPDES Permittees: Pursuant to s. 283.84(1)(a), Wis. Stats., a trade agreement is required between two permittees who wish to trade credits. One of the permittees, the credit generator, agrees to reduce their discharge of the traded pollutant below levels otherwise authorized by their WPDES discharge

[4] The amount of credit generated may change over time as additional site-specific information or new modeling tools become available and are reflected in an updated WQT plan. This guidance will be updated and/or permit conditions may change as experience is gained. These changes will be made upon permit reissuance or modification as appropriate.

permit to allow the second permittee, the credit user, to increase their discharge of the traded pollutant above levels otherwise authorized by their WPDES discharge permit.

Trading Between a WPDES Permittee and a Second Party: Pursuant to s. 283.84(1)(b), Wis. Stats., a trade agreement is required between a permittee who wishes to use credits to demonstrate compliance with their permit effluent limitations and a person who wishes to generate load reductions but is not required to obtain a WPDES discharge permit for the discharge of the traded pollutant. An example of a credit generator without a WPDES discharge permit is a nonpoint source, such as a field of row crops, where the owner/operator installs a management practice to reduce the loss of phosphorus.

Section 283.84(1)(b), Wis. Stats., also states that only load reductions generated after the trade agreement is completed are available for trading as credits.

Trades as part of an Exchange by the WDNR or Local Government Unit: When the WDNR or a local governmental unit acts as a credit exchange, a trade agreement is required between the credit user and WDNR or local governmental unit pursuant to s. 283.84(1)(c), Wis. Stats. Acting as an exchange, the WDNR or local government unit uses money paid by the credit user to reduce loadings of the traded pollutant or to provide cost-sharing for purposes of ss. 281.16(3)(e) or (4), Wis. Stats.

Trading Between WPDES Permits Held by the Same Permittee: Pursuant to s. 283.84(1)(d), Wis. Stats., a trade agreement is required between the permittee and the WDNR when the permittee holds two WPDES discharge permits and through the use of credits wishes to reduce their discharge of the traded pollutant below levels otherwise authorized in one permit and increase their discharge of the traded pollutant above levels otherwise authorized in the second permit.

Pollutant Load Reductions Implemented by the Credit User: Pursuant to s. 283.84(1)(e), Wis. Stats., a trade agreement is required between the credit user and the WDNR when the credit user constructs a project or implements a plan that results in load reductions from sources other than that covered by the credit user's WPDES permit.

When WDNR is not a partner in the agreement, the permittee/credit user may either submit the entire trade agreement, submit part of the agreement (e.g., financial terms excluded), or certify that a trade agreement has been reached. Should permittees not wish to submit trade agreements to WDNR, the trading plan must have sufficient information to make permitting decisions including determining compliance. The trading plan will be available for public comment and review.

Consequently, WDNR staff will not review individual trade agreements in most cases, however will review all trading plans. Trading plans should contain sufficient information to ensure that trade agreements have been completed, and that trade agreements conform to the regulatory requirements and this guidance for trading. Review of the trading plan and checklist is discussed in Section 3.1.5.

Suggested trade agreement content is provided in Figure 8 and an example trade agreement can be found in Appendix I – Example Trade Agreements

Suggested Content for All Trade Agreements

- Identify credit user and credit generator
- Identify the pollutant being traded
- The amount of the pollutant load reduction that the credit generator agrees to provide
- The start date and, if necessary, the end date of the availability of pollutant reduction credits
- The types and frequency of verification needed as well as the parties responsible for monitoring
- Financial conditions of the trade
- Liability conditions of the trade
- Procedures for terminating the trade
- Duration of the agreement
- Reporting requirements for the credit generator of any anticipated circumstances when pollutant reduction credits would not be available
- Signature and date by authorized representatives of the credit user and credit generator

+ *Additonal content for point to point trades (other than MS4)*

- Identification and location of the point source where pollutant load reductions will occur

+ *Additonal content for point to nonpoint trades (including MS4)*

- Installation/construction schedule of each management practice
- The date when credits become available for each management practice
- The amount of pollutant reduction credits available from each location
- Conditions under which the practice may be inspected by the credit user and dnr
- Reporting requirements for the credit generator should the management practice fail

+ *Additonal content for trades with a credit exchange*

- Identification and location of the point source where pollutant load reductions will occur

Figure 8. Suggested Content of Trade Agreements

Chapter 4 – Implementation of WQT in Permits

Last Revised: May 2020

This section of the guidance document addresses the roles and responsibilities of WDNR staff as well as WPDES Permittees and their agents with respect to implementing trading.

Generally, the permittee who wishes to use credits is responsible for:

- Evaluating trading as a compliance option;
- Submitting a trading plan;
- Finding trading partners and completing one or more trade agreements pursuant to s. 283.84, Wis. Stats.;
- Applying for permit reissuance or modification to allow trading; and
- Complying with WQBELs for the traded pollutant.

The WDNR is responsible for:

- Providing the permittee with WQBELs;
- Aiding the permittee in evaluating trading as a compliance option;
- Reviewing the trading plan;
- Issuing, reissuing or modifying the WPDES permit to allow trading;
- Evaluating compliance with WQBELs;
- Track the use of credits;
- Address noncompliance; and
- On occasion, inspect sites that generate credits and audit third parties - such as counties - that serve as site inspectors.

The guidance in this section is intended to apply in most situations, but there may be circumstances where deviation from the guidance may be necessary. Decisions inconsistent with the guidance should be discussed with local and statewide trading coordinators. This section of the guidance will be updated as the WDNR gains experience in trading implementation and permit drafting. Any changes to this guidance are subject to Department guidance procedures which include a public comment period. Contact information for statewide and local trading coordinators is available on the WDNR website searching “water quality trading tools” or by visiting the following link: https://dnr.wi.gov/topic/SurfaceWater/documents/phosphorus/coordinatorList.pdf

4.1 Selecting Trading as a Compliance Option

Compliance options should be reviewed prior to permit renewal to allow enough time to make informed compliance decisions. WDNR anticipates that it could take a permittee 3-5 years to find credit generators, develop contracts, select and implement management practices, and begin generating credits with those practices. While time to consider options may be granted in the permit through a compliance schedule it may be insufficient to develop and implement an entire trading strategy (Figure 9).

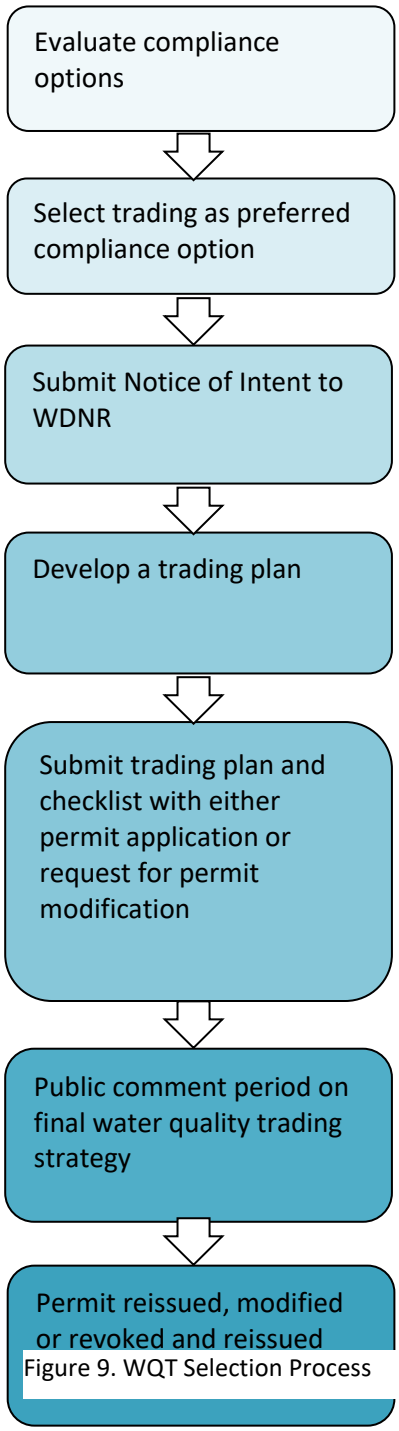


Figure 9. WQT Selection Process

Compliance options that are evaluated generally include treatment optimization, traditional facility upgrades, adaptive management, and trading. A permittee should review these options to determine which will achieve compliance in the most economically efficient way possible. See Section 3 of the Adaptive Management Handbook for a more detailed comparison between trading and adaptive management: http://dnr.wi.gov/topic/surfacewater/adaptivemanagement.html.

Chapter 2 of this guidance is designed to help a permittee evaluate the water quality trading option and determine its feasibility. Once a facility chooses trading as its preferred compliance option, the permittee should submit a Notice of Intent (see Section 4.3, p. 42) to the local WDNR wastewater engineer, specialist, or trading coordinator. Submittal of the Notice of Intent to Conduct Water Quality Trading (Form 3400-206) (NOI) serves as notification to the WDNR that trading is being pursued.

Upon submittal of the NOI, a permittee should begin developing a trading plan (see Section 4.2, p. 39 for more details on developing and implementing a trading plan). The completed plan should be submitted to WDNR for review and approval along with a checklist summarizing the plan (see Section 4.3, p. 42). The plan and checklist should be submitted to WDNR with the permit application, or with the Final Compliance Alternative Plan step in the phosphorus compliance schedule, if a compliance schedule extending beyond the term of the permit is granted. A permit modification request must also be submitted with the plan, if a permittee was granted a traditional compliance schedule (less than 5 years). Permit modification is required in this scenario to allow for public notice and comment opportunities on the trading plan and to incorporate trading conditions into the permit.

Some permittees may be granted an extended compliance schedule (5 years or more) for phosphorus. In these scenarios, the permittee is not required to submit a permit modification request. Rather, WDNR will use the

permit reissuance process to allow public comment on the trading plan and incorporate trading requirements into the reissued permit (permit term 2).

Public notification of the trading plan will occur along with and part of the package for permit reissuance/modification. Public noticed permits can be found on the WDNR website and searching "public notice permits." Additional information regarding public notification of trading plans can be found in Section 4.4, p. 48.

Trading for Lagoons and Other Small Discharges

Municipal and industrial dischargers, no matter their size, should review all applicable compliance options, including trading, to determine which compliance option is best for them. There are no special eligibility requirements for small discharges like municipal lagoon systems. These dischargers must meet the same requirements and expectations as other discharges. Given this, trading may or may not be a viable compliance option for all discharges. For some, the costs associated with trading may not be economically feasible. For others, credit generators may not be available within their watershed.

In many cases, however, trading may be the preferable compliance option given the small amount of mass discharged from these facilities, and the small amount of credit that needs to be generated to offset this amount. To make trading more economically desirable, facilities should try to avoid trades that require high trade ratios.

If all available compliance options, including trading and adaptive management, are economically infeasible, the permittee may request a water quality standards variance. Requests for water quality standards variances are generally addressed in ss. 283.15 or 283.16 Wis. Stats., and Subchapter III in ch. NR 200, Wis. Adm. Code. Lagoon discharges are also eligible for the streamlined phosphorus variance request process pursuant to Section NR 217.19, Wis. Adm. Code. See Section 3.03 of the Phosphorus Implementation Guidance for details: http://dnr.wi.gov/topic/surfacewater/phosphorus.html.

4.2 Initial Development

"Initial development and implementation" refers to the period beginning with the permittee considering trading as a compliance option and ending just prior to WPDES permit reissuance or modification to allow trading. Two or more years may be needed for the permittee to evaluate the trading option and develop a trading strategy. Figure 10, p. 41 provides an example timeline and process flow diagram for the permittee as the credit user and for WDNR staff.

There are several documents that the permittee should prepare and, in most cases, submit to the WDNR before beginning trading: "Notice of Intent to Conduct Water Quality Trading" (notice of intent), trade agreement, trading plan and "Water Quality Trading Checklist" (trading checklist), and "Water Quality Trading Management Practice Registration." Table 4, p. 42 briefly describes the purposes of these trading forms. These forms are available on the WDNR website, search "water quality trading."

Providing WQBELs to the Permittee

To allow a permittee adequate time to evaluate trading as a method for complying with WQBELs and to locate sources of credits, WDNR staff should provide the permittee with WQBELs well in advance of the limits becoming effective. For permittees that have not yet submitted applications for permit reissuance, the WQBELs may be included in the cover letter for the application or by a separate letter that predates the application cover letter. If the permittee wishes to receive limits prior to permit application or reissuance, permittees are being advised to request them from their local wastewater engineer/specialist.

If a compliance schedule for WQBELs is not made available in the reissued permit, the WQBELs should be provided to the permittee three or more years prior to permit expiration, if possible. During the period prior to the expiration of the permit, WDNR staff should occasionally contact the permittee to encourage the permittee to address the WQBELs and to respond to any questions they may have.

Aid Permittee in Evaluating Water Quality Trading

WDNR staff are available to help answer technical trading questions as they arise and provide feedback and information on potential trading areas as well as input on trade ratios; however, WDNR staff are not responsible for seeking out credits, establishing practices, or verifying practices.

Overall, permittee questions on trading should be addressed by the local wastewater engineer/specialist and local trading coordinator. These staff are primarily responsible for answering general trading questions.

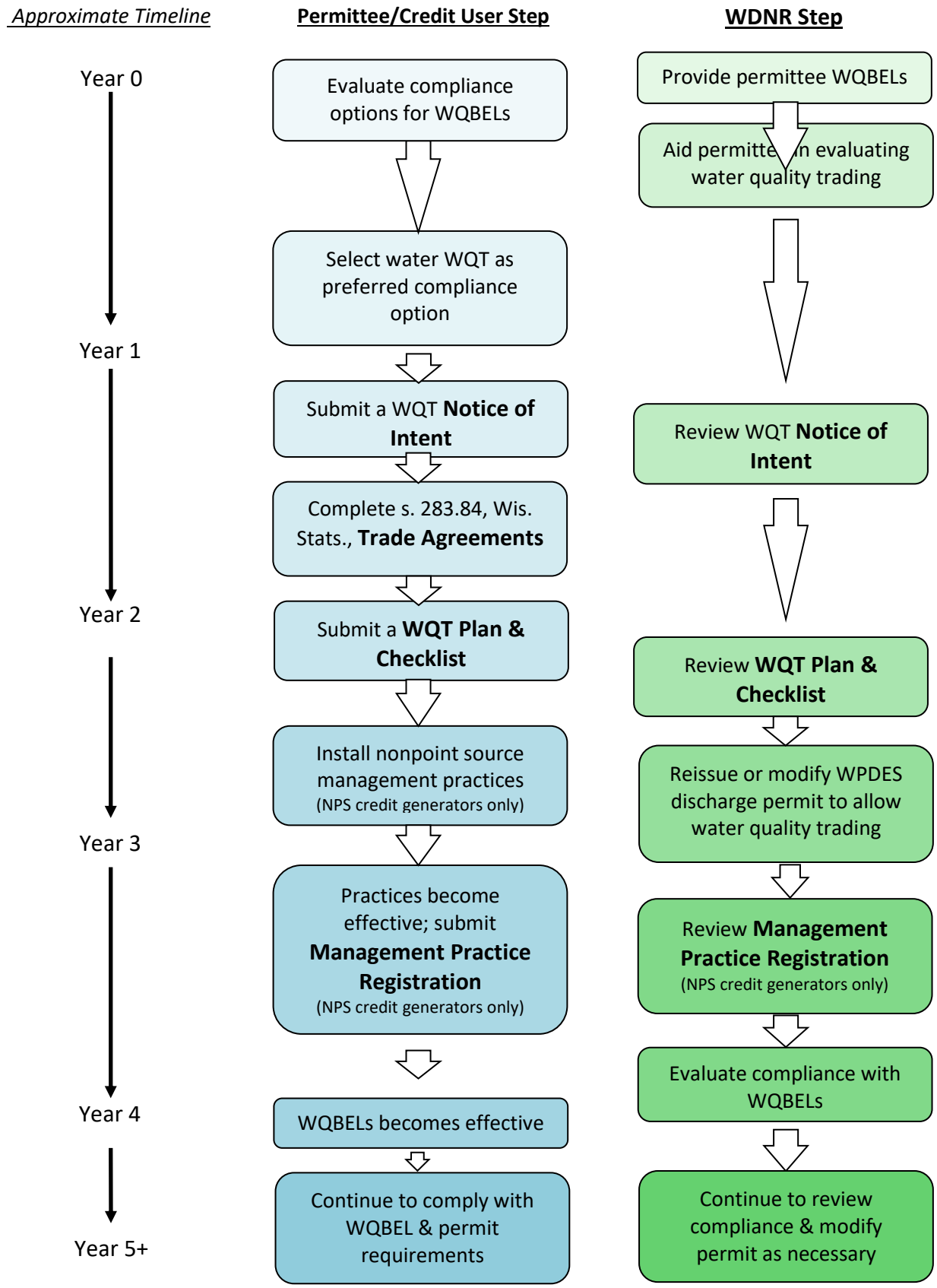


Figure 10. WQT Development and Implementation Timeline

4.3 Documentation and Appropriate Forms

Included in Table 4. WQT Documentation is a list and explanation of the applicable trading forms and documents. Forms can be found on the WDNR website searching "water quality trading implementation." The following section provides additional guidance on the content and purpose for the various forms and documents.

Table 4. WQT Documentation

Trading Document	Purpose	Parties Involved
Notice of Intent Form #: 3400-206	• Credit user submits to WDNR for review and approval • Allows permittee to confirm trading eligibility prior to plan development • Typically submitted no later than the preliminary facility plan step of the compliance schedule for TP WQBELs or at least 24 months prior to permit expiration[2]	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator
Trade Agreement	• Document required of permittee/credit user by s. 283.84, Wis. Stats. to formalize the trade • Typically completed prior to submittal of the WQT plan or at least 9 months prior to permit expiration[2]	• Permittee/credit user • Credit generator • WDNR or local governmental unit (if applicable)
WQT Checklist & Plan Form #: 3400-208	• Credit user submits to WDNR for review and approval • Documents will be public noticed with permit reissuance • Outlines the content of the WQT strategy • Typically submitted with the final facility plan step of the compliance schedule or with the permit application for reissuance at least 6 months prior to permit reissuance[2]	• Permittee/credit user • WDNR basin engineer/local trading coordinator • Statewide trading coordinator, if necessary
Management Practice Registration[1] Form #: 3400-207	• Submitted to WDNR to verify that the management practice has been properly installed in accordance with the WQT plan, or, if a management practice is adopted prior to submittal of trading plan, to document intent to be used within a trading plan • WDNR reviews and tracks registration using docket numbering system • Information can be reviewed later for trade verification and auditing	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator • Statewide trading coordinator, if necessary
Annual Report Summary[1]	• Submitted to WDNR to verify management practices identified in the WQT plan are maintained • Informs WDNR of any changes made to the Trade Agreement or WQT plan • WDNR reviews, tracks, and modifies permit as necessary	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator • Statewide trading coordinator
Notice of Termination[1] Form #: 3400-209	• Submitted to WDNR prior to practice termination or as soon as the permittee becomes aware of the failure of a practice • Should be submitted no later than the annual report submittal date	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator

[1]-Only required if the credit generator is a nonpoint source.

[2]- Assumes that the permit contains a compliance schedule that is consistent with the P implementation guidance and is longer than five years.

Notice of Intent

As stated in Section 4.1, p. 38, a "Notification that Water Quality Trading Will Be Used to Comply with WQBELs" form (also called "Notice of Intent") should be submitted prior to developing the full trading plan. Such a submittal notifies WDNR staff of the intent to trade and will allow WDNR to confirm trading eligibility, suggest possible sources of pollutant reduction credits, and provide preliminary feedback in the drafting of the final plan submittal. The WDNR recommends that the credit user include the following information in the WQT Notice of Intent:

- An indication whether WQT will be used exclusively or in conjunction with other methods to comply with WQBELs for the traded pollutant;
- PRESTO results verifying nonpoint source loading to the receiving water when trading with nonpoint source credit generators is contemplated;
- A general identification of area(s) where pollutant load reductions may be implemented to generate credits;
- Likely management practice(s) to be used to generate credits; and
- The identification of any broker(s), credit exchanges or other third parties likely to be involved in establishing the trade.

To maximize the effective use of this document, the notice of intent should be submitted prior to trading plan development. If the permittee holds a permit with a five-year plus compliance schedule for TP WQBELs as outlined in the phosphorus implementation guidance, the notice of intent should be submitted no later than the due date for Preliminary Compliance Alternative Plan, 48 months prior to WQBELs becoming effective.

Section 283.84, Wis. Stat., Trade Agreement

Before a permittee may use trading to help demonstrate compliance with WQBELs, s. 283.84(1), Wis. Stats., requires the permittee to enter into a written trade agreement with the credit generator, WDNR, or local governmental unit, depending on the source of credits (see Section 3.5, p. 34). This guidance document identifies the written agreement as the trade agreement.

The WDNR may be a partner to a trade agreement if it uses money paid by the permittee to reduce pollutant loads or provide cost-sharing, or the permittee is serving as both the credit user and generator.

When the WDNR is not a partner in the agreement, the permittee/credit user may either submit the entire trade agreement, submit part of the agreement (e.g. financial terms excluded), or certify that a trade agreement has been reached. Should permittees not wish to submit trade agreements to the WDNR, the trading plan must have sufficient information to make permitting decisions including determining compliance. The trading plan will be available for public comment and review.

Consequently, WDNR staff will not review individual trade agreements in most cases but will review all trading plans. Trading plans should contain sufficient information to ensure that trade agreements have been completed, and that trade agreements conform to the regulatory requirements and this guidance for trading.

Review of the trading plan and checklist is discussed below. Suggested content of trade agreements is provided in Figure 8, p. 36.

Suggested Roles and Responsibilities for WDNR Staff: If the permittee submits a trade agreement, the wastewater engineer/specialist should copy the agreement to SWAMP and inform the local trading coordinator. The local trading coordinator is responsible to review these documents to ensure that they meet the protocols for trading and that information contained in the agreement supports the water quality trading plan. When WDNR is a party on the agreement, local trading coordinators should work with the statewide trading coordinator to obtain WDNR Bureau of Legal Services review and approval prior to any party signing the agreement.

Water Quality Trading Plan and Checklist

Before the WDNR can modify or reissue a WPDES permit that allows trading, the permittee must submit a trading plan and checklist for review and approval. The information in the trading plan will serve as the basis for permitting decisions. The plan must contain sufficient detail to allow WDNR to conclude that proposed trading will comply with s. 283.84, Wis. Stats., that credits are generated in an acceptable manner and correctly calculated; and that the permittee will comply with their WQBELs. The trading checklist provides an outline for the plan's content to guide the permittee and streamlines the WDNR's review. The trading plan should be submitted to the Department no later than the permit reissuance application due date. Ideally, the WQT plan would be submitted with the final compliance alternatives plan to allow adequate time for Department review and approval.

Suggested content for the trading plan is provided in Table 5. The trading checklist is available online. As part of the trading plan, the permittee must either submit the trade agreement (all or parts of it) as required by s. 283.84 (1), Wis. Stats., or provide written documentation that such an agreement has been reached, as discussed in Section 3.5, p. 34.

Table 5. Content of a Water Quality Trading Plan.

Credit Source					Content of Water Quality Trading Plan
(a)	(b)	(c)	(d)	(e)	
✓	✓	✓	✓	✓	Permittee's/credit user's WPDES permit number
✓	✓	✓	✓	✓	Permittee's/credit user's contact information
✓	✓	✓	✓	✓	Pollutant(s) for which credits will be generated
✓	✓	✓	✓	✓	Amount of credits available from each location/management practice/local governmental unit when acting as a broker
✓	✓	✓	✓	✓	Certification that the content of the trading application is accurate and correct
✓	✓	✓	✓	✓	Signature and date of signature of permittee's/credit user's authorized representative
✓	✓		✓	✓	Location(s) where credits will be generated (e.g., map of field or site where management practice will be applied including major drainage way(s) from the project)
✓	✓		✓	✓	Identification of method(s) including management practice(s) that will be used to generate credits at each location
✓	✓		✓	✓	Duration of agreement (e.g., the design life of the management practice) with each credit generator
	✓		✓	✓	Schedule for installation/construction of each management practice
	✓		✓	✓	Operation, maintenance, and inspection plan for each management practice used to generate credits
✓	✓	✓			Verification either by certification or submittal that a trade agreement has been completed
	✓		✓	✓	Date when credits become available for each management practice (i.e., when practice is established and effective)
	✓		✓	✓	Model(s) used to derive the amount of credits and verification of correct modeling inputs.
	✓			✓	The applicable trade ratio for each management practice including supporting technical basis.
✓					Identification of credit generator(s)
✓					Signature and date of signature of credit generator's authorized representative
		✓			Identification of the local government unit when acting as the a credit broker
		✓			Signature and date of signature of an authorized representative for the local governmental unit when acting as a credit broker

(a) Credits are generated by a WPDES permittee other than the credit user or a permitted MS4.
(b) Credits are generated by a person who isn't required to obtain a WPDES permit and isn't an urban nonpoint source.
(c) Credits are obtained from either the Wisconsin DNR or a local governmental unit acting as a credit broker.
(d) Credits are obtained from a second point source with a WPDES permit, other than a permitted MS4, that is held by the credit user.
(e) Credits are obtained from a constructed project or implementation of a plan undertaken by the credit user for sources other than that covered by the credit user's WPDES permit.

Management Practice Registration

The purpose of the "Water Quality Trading Management Practice Registration" form (registration form) is to report to WDNR that a management practice identified in the trading plan has been properly installed and is established and effective or, if the management practice was adopted prior to submittal of trading plan, to document intent of its use within a trading plan. This information will be used to track implementation progress, verify compliance, and perform audits, as necessary. A registration form should be submitted for every management practice that has been identified in the trading plan. This documentation is only required for point to nonpoint trades; point to point trades will be demonstrated via effluent monitoring and have documentation and effective date requirements specified in WPDES permits. If multiple practices are installed on one parcel of land, a single practice registration form may contain multiple records reflecting multiple practices.

If management practices are established prior to trading plan submittal, registration forms need to be submitted to WDNR at time of adoption to demonstrate clear intent for using the management practices within a trading plan. Failure to submit registration form for practices established prior to trading plan submittal may result in WDNR rejecting use of those management practices within the trading plan. See the past practices discussion in Section 3.4, p. 32. When completing the management practice registration form prior to developing a water quality trading plan, some information, such as the quantity of credits generated, will be a preliminary estimate. The water quality trading plan will contain the formal credit value used for permitting purposes.

Registration forms for management practices can also be submitted with the trading plan when the management practice is adopted during the same year the trading plan is submitted. Otherwise, registration forms should be submitted during the permit term as management practices become effective or with the annual report.

Reviewing Management Practice Registration Forms

As described above the purpose of management practice registration is to let the WDNR know that a management practice identified in the trading plan has been properly installed and is established and effective or, if a management practice is adopted prior to submittal of trading plan, to document intent to be used within a trading plan. Registration forms may be submitted throughout the permit term, so long as they are submitted before the credits generated by that practice are used to determine compliance with a WQBEL. If significant changes are made to the management practices identified in the trading plan, registration forms should be submitted to cover these new practices.

Banking Practices Over Time

There are a number of timing approaches that may be employed by a permittee seeking compliance via water quality trading. A management practice may be installed prior to trading plan development. A credit user may use this practice for future WQT compliance, provided appropriate paperwork has been submitted to the Department. The paperwork to be submitted should be a NOI (Form 3400-206) and a Water Quality Trading Management Practice Registration Form (Form 3400-207). The practice should have a valid trade agreement and maintenance plan to ensure the pollutant reduction is continued throughout the next permit term. Documentation of preexisting conditions is a critical step and is still a required component of a trading plan, even if the practices are installed before trade plan development. Only practices can be banked overtime, not

credits. Annual reductions do not "roll-over" from year to year if they are unused. Additionally, as stated in Section 3.3, p. 23, the duration of interim credits is measured from the date of practice establishment and not from when a credit user begins using the credits for compliance.

Third Party Verification

The permittee may designate a qualified third party to conduct inspections and provide documentation that a management practice is functioning and maintained as outlined in the trading plan. County LCD staff, crop consultants, or other qualified individuals may conduct site inspections. The details surrounding inspections are management practice-specific and should be agreed to ahead of time. The applicable NRCS technical standard may provide guidelines or parameters for inspections to verify. Photographic documentation should be, in most cases, a component of inspection and reporting. Regardless of who is designated to make these inspections, it is the permittee's responsibility to ensure that inspections occur, and that proper reporting protocol is adhered too.

Annual Report

Permittees will need to submit annual reports as part of their permit requirements. The purpose of the annual report is to inform WDNR of the status of management practices, provide WDNR with an update of the trading project overall, and submit any needed changes to the plan to WDNR. Practice registration forms and Notices of termination should be submitted to WDNR prior to or with the annual report submittal. The following should be included in the annual report:

- Verification that site inspections occurred;
- Summary of site inspection findings;
- Identification of noncompliance or failure to implement any terms or conditions of the permit or trading plan that have not been reported in discharge monitoring reports;
- Any applicable notices of termination or practice registration;
- Amount of credit used each month over the calendar year; and
- Other requirements as stated in the WPDES permit.

When identifying noncompliance in the annual report, the permittee should describe the noncompliance and its cause; identify the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, specify the anticipated time that compliance will be attained, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

When credits are reduced or eliminated for any reason, the permittee is still required to meet their WQBELs. To prevent noncompliance with WQBELs, changes to trading plans including changes in management practices, changes in trade agreements, and even changes in the location of management practice application must be addressed before credits are lost. Modifying the permit/trading plan will require at least 90 days.

Termination of a Water Quality Trade Agreement

If a trade agreement or the trading plan needs to be terminated during the permit term, the permittee should submit a notice of termination to the wastewater engineer/specialist to inform the WDNR of the termination.

WDNR staff should use this information to determine if a permit modification is required due to the termination, the termination will result in non-compliance, or other permit actions are required due to the termination. When credits are reduced or eliminated for any reason, the permittee is still required to meet their WQBELs without any grace period.

Termination of a Water Quality Trade Agreement by the Permittee: A permittee who wishes to use an alternative compliance option and chooses to discontinue trading should submit a "Notification of Trade Agreement Termination" form (notice of termination) to the WDNR with their application for permit reissuance or as part of a permit modification request. A reissued or modified permit will reflect the new compliance option requested by the permittee.

If WQBELs for the traded parameter are already in effect; however, the effluent limits will remain in effect, the permittee is required to remain in compliance with the limits, and a compliance schedule to implement alternative compliance options will not be available. If WQBELs for the traded parameter are not yet in effect, the WDNR will not be able to extend the compliance schedule beyond the maximum period allowed by Wisconsin Administrative Code.

Termination of a Water Quality Trading Plan by the WDNR: The WDNR will evaluate the appropriateness for the permittee to continue trading upon permit reissuance. If the WDNR determines that the permittee has failed to comply with the actions specified in the trading plan or WPDES permit, then the permittee is in violation of their WPDES permit, and the permit may not be reissued until this violation has been resolved. To address this violation, a permittee may need to select an alternative compliance option other than trading. The WDNR may also modify the requirements of trading upon permit reissuance to reflect new information and to assure compliance with water quality standards and trading requirements.

The WDNR may terminate a trading plan based on any of the following reasons:

- The permittee's failure to implement the trading plan as approved; or
- New information becomes available that changes the WDNR's determinations that trading is an acceptable option.

4.4 Incorporation of WQT in WPDES Permits

Sections 283.84 (3r) and (4), Wis. Stats., require terms and conditions related to the trade agreement to be included in a WPDES permit. Therefore, the credit user's WPDES discharge permit and, in point to point trades, the credit generator's WPDES discharge permit must be issued, reissued or modified to include trading terms and conditions before the credit user may use credits to demonstrate compliance with their WQBELs.

Subsequent revisions to the trading plan require a public notice of the WDNR's decision but not a permit modification unless a permit term or condition is changed. For example, an increase or decrease in the number of credits listed in the permit (e.g., TP credits are reduced from 1,200 lbs./year to 1,000 lbs./year and TSS credits are increased from 30,000 lbs./year to 35,000 lbs./year) requires a permit modification.

Selecting a Minimum Control Level

When trading is to be used to demonstrate compliance with a WQBEL, the permit will need to include a limit that prevents backsliding and maintains a level of effluent quality that is at least as good as that which has been achieved historically.

If already present in the permit, an effluent limitation for the pollutant being traded should be retained once trading is allowed, in order to prevent a lowering of effluent quality. The effluent limitation could be a TBEL, a limit based on current or anticipated effluent quality, or set equal to an interim limit required by s. NR 217.17 (3)(c), Wis. Adm. Code, when a compliance schedule for TP WQBELs is included in a permit.

If an effluent limit is not already present in the permit, the permit should specify the maximum amount of pollutant discharge that may be offset by the trade. When specifying the maximum offset, recall that a permittee should optimize existing wastewater treatment for the traded pollutant prior to using credits (see Section 2.4, p. 9).

WPDES Compliance Schedules

This section provides guidance on accommodating trading in a compliance schedule for TP WQBELs since it is likely that most trades, especially in the near future, will be for this pollutant. Similar steps may be appropriate for compliance schedules for other pollutants as well. This guidance supplements but does not replace earlier guidance on compliance schedules for total TP WQBELs. All compliance schedules must be developed on a case-by-case basis and result in compliance with the WQBELs as soon as practicable (40 CFR s. 122.47).

Compliance schedules and permit language for stringent TP WQBELs address trading in the Preliminary Compliance Alternatives Plan and Final Compliance Alternative Plan submittal requirements. A simple statement by the permittee that trading will be pursued as a compliance option is adequate for the Preliminary Compliance Alternatives Plan submittal. WDNR staff should encourage the permittee to include the NOI as part of the Preliminary Compliance Alternative Plan submittal.

The permittee should complete all trade agreements and submit a trading plan and checklist at least six months prior to permit expiration. WDNR staff should encourage the permittee to include the WQT Plan and Checklist as part of the Final Compliance Alternative Plan submittal. The permittee's submittal allows the WDNR to adjust that part of the compliance schedule that extends beyond the permit's term during permit reissuance. For permits issued without a compliance schedule for stringent TP WQBELs, the trading checklist and plan submittal requirement will have to be made part of the permit reissuance application.

Upon approval of the trading plan, WDNR staff should adjust the compliance schedule as part of the proposed permit reissuance to allow adequate time for nonpoint source management practices, when applicable, to be installed and become established and effective. For example, the compliance schedule could allow one growing season for the installation of practices and a second growing season for the practices to become effective before WQBELs take effect. Figure 11, p. 53 illustrates such a timeline.

Maximum Compliance Schedule Length

While the effective date of TP WQBELs may be adjusted in the proposed permit reissuance, the effective date cannot be extended beyond the maximum period specified in s. NR 217.17 (2), Wis. Adm. Code. If trading is used exclusively or in conjunction with a treatment system upgrade that does not include filtration or a similar process, the entire compliance schedule cannot exceed seven years from the date the permit was first modified or reissued to include TP WQBELs. A compliance schedule up to nine years is allowed only when trading is used in conjunction with a treatment system upgrade that includes filtration or a similar process.

Unless the permittee submits a trading plan and checklist at least six months prior to permit reissuance, permits should continue to be drafted with compliance schedules consistent with the phosphorus implementation guidance. If, however, the permittee makes a timely and complete submittal for trading, the compliance schedule in the reissued permit should be developed on a case-by-case basis. It is unlikely, however, that a compliance schedule longer than three years will be necessary when trading will be used exclusively to comply with WQBELs. If the trade is point to nonpoint and management practices are installed and effective, a very brief or no compliance schedule is warranted. If the trade is point to point, a compliance schedule to accommodate the modification of the credit generator's permit may be necessary.

Fact Sheet

Permit drafters and wastewater engineers/specialists are responsible for explaining trading details in the fact sheet. Suggested fact sheet content includes:

- A statement that the permit authorizes the use of trading as a tool to demonstrate compliance with WQBELs;
- Identification of the WQBELs for which trading may be used to demonstrate compliance;
- A brief description of the practices being implemented as part of the trade;
- Identification of all approved trading plans;
- The total credits available, after application of trade ratios, from the approved trading plan;
- Identification of interim and long-term credits with expiration dates for interim credits; and
- For the credit user's permit, the minimum control level and its basis (see Section 4.4, p. 48);

If any of the fact sheet content listed above is provided in the WQBELs recommendation memo, it need not be repeated in the fact sheet.

USEPA Review

USEPA's Region 5 requests that the WDNR provide for review of public noticed WDPES permits that include conditions for trading. In addition to the draft permit, the statewide trading coordinator should submit the trading plan to USEPA Region 5.

Public Notice of Water Quality Trading Plans

The initial implementation of trading in a WPDES permit should be part of a permit issuance, reissuance or modification to allow public participation and input. The WDNR will state in the public notice that it will finalize

its review of the trading plan upon consideration of comments received during the 30-day public comment period. Final WQT Plan approval occurs with the reissuance of the WPDES permit.

Once a WPDES permit implementing trading is issued, any future changes to the trading plan require public notice of the WDNR's decision. Permit modification will be necessary if proposed changes affect permit terms or conditions such as a change in the number of credits.

Permit drafters are responsible for preparing the public notice for permits that include conditions allowing trading, for permits including reduced limits for a point source credit generator, and for changes to the trading plan.

Continuation of Water Quality Trading through Multiple Permit Terms

Water quality trading plans are approved for a single five year permit term. The process through which plans are reapproved takes into account updated modeling methods, TMDL requirements, and any changes to applicable WQBELs. It is possible that the trade plan for years 6 – 10 of a trade looks very similar to years 1 – 5.

Due to a potential mix of interim and long-term credits when the credit generator is a nonpoint source covered by an approved TMDL, the availability of credits may change during the term of a permit. For example, since interim credits are available for only ten years, the credits could expire during the permit term if the credits became available prior to the term of the previous permit. Also, long-term credits could expire at the end of the design life of the management practices that were installed to generate the credits.

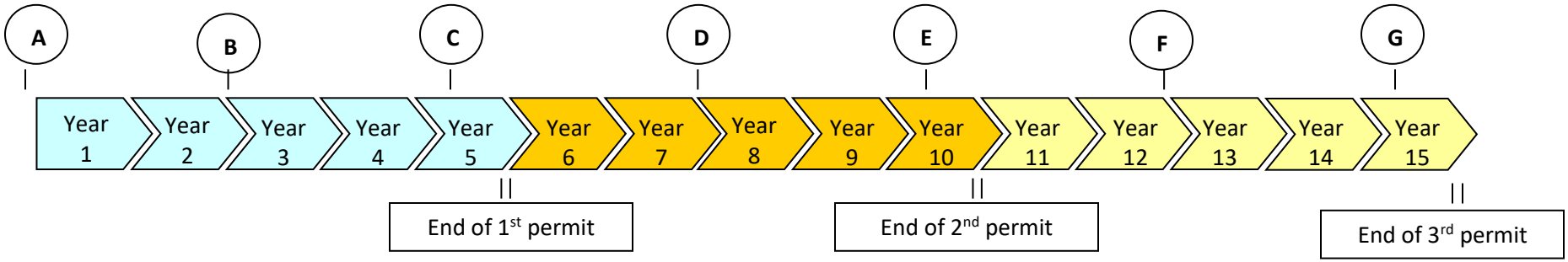
For example, Figure 11, p. 53 provides a timeline that depicts the use of trading over three terms of a hypothetical WPDES discharge permit. Assumptions used to construct the timeline include:

- The first permit term depicted in the figure contains a two-year compliance schedule for TP WQBELs. The compliance schedule represents, with some modifications, the last two years of the seven-year compliance schedule that was included in the previous permit. Modifications were made to the compliance schedule during the permit reissuance process to accommodate the use of nonpoint source management practices to generate credits.
- The first permit term depicted in the timeline contains a TP WQBEL with an effective date two years after issuance of the permit. The TP WQBEL remains unchanged over the three terms of the permit depicted in the timeline.
- The permittee will undertake a treatment system upgrade in addition to implementing trading to comply with the TP WQBELs.
- The first permit term depicted contains terms and conditions for trading since the permittee submitted a trading plan and checklist prior to issuance of the permit. The public notice for the permit indicates that the permittee will use trading to help meet the TP WQBEL and that the WDNR will consider public comments prior to reissuing the permit.
- The first trading plan and checklist, as submitted by the permittee prior to permit issuance, identifies management practices to generate phosphorus load reductions that have design lives of ten years.

NOTE: The examples depicted by Figure 10 *and Figure 11 pp. 41 and 53 are different. Figure 11 is not a continuation of Figure 10.*

From Figure 11 it can be seen that new sources of credits will be needed each permit term to replace interim and, eventually, long-term credits.

Figure 11. WPDES Permit Timeline



Key:

Prior to Issuance of First Permit:

A In anticipation of TP WQBELs becoming effective, the permittee submits a trading plan and checklist. The public notice for the first permit term depicted in the figure includes a statement that the WDNR will consider public comments prior to reissuing a permit that contains water quality trading provisions.

First Permit Term (years 1 through 5):

B When the schedule of compliance ends, the TP WQBELs become effective. The permittee may use credits including interim credits as addressed by the initial trading plan to demonstrate compliance with the WQBELs. Since credits are being generated by a nonpoint source, management practices must be in place and effective before traded credits may be used to demonstrate compliance with WQBELs. A management practice registration form should be submitted to register management practices with WDNR.

C Approximately six months prior to permit expiration, the permittee submits a permit reissuance application. The permittee must include a new trading plan and checklist to replace any interim credits from the first trading plan that expire during the term of the second permit. Expiration of interim credits from the first trading plan occurs ten years after practices are installed. The second trading plan and checklist may also include new interim credits. The public notice for permit reissuance includes a statement that the WDNR will consider public comments prior reissuing the second permit that utilizes trading.

Second Permit Term (years 6 through 10):

D Interim credits from the first trading plan expire ten years following practice installation. The expired credits are replaced with those from the second trading plan.

E Approximately six months prior to permit expiration, the permittee submits a permit reissuance application. The permittee must include a new trading plan and checklist, the third plan, for replacement of interim credits from the second trading plan for interim credits that expire during the permit term (i.e., ten years after the practices were installed) and for long-term credits from the first trading plan that are no longer available after the management practice's ten-year design life. The third trading plan may also include new interim credits. The public notice for permit reissuance includes a statement that the WDNR will consider public comments prior to approving the third trading permit.

Third Permit Term (years 11 through 15):

F Interim credits from the second trading plan expire. The expired credits are replaced with those from the third trading plan.

G Approximately six months prior to permit expiration, the permittee submits a permit reissuance application. The permittee must include a new trading plan and checklist, the fourth plan, for replacement of interim credits from the third trading plan that expire during the permit term and long-term credits from the second trading plan that are no longer available after management practice's ten-year design life. The fourth trading plan may also include new interim credits.

4.5 Water Quality Trading Implementation

As part of trading implementation once WQBELs become effective, WDNR staff should track the use of credits, enforce when noncompliance occurs, and, on occasion, inspect sites that generate credits. The permittee will be responsible for submitting annual reports, management practice registration forms, and notices of termination to WDNR to aid in these decisions, as described in Section 4.3, p. 42. Additional guidance will be developed as more experience is gained with trading implementation.

Management Practice Failure and Enforcement

There are several factors the WDNR should consider when determining the appropriateness of trading enforcement actions, such as:

- Cause of the violation;
- Number of times that the discharger has not complied with permit requirements;
- Number of instances that the management practice in question has been damaged/ineffective;
- Whether the violation was self-reported;
- The significance of the violation (e.g., a violation that results in a 75% loss of credits is more significant than one the results in a 25% loss); and
- Time necessary to regain compliance

Compliance Inspections and Water Quality Trading Auditing

WDNR staff may request an audit of the trading program when performing a compliance inspection. Site visits may occur to ensure approved nonpoint source management practices are constructed as planned and fully functioning.

Tracking Water Quality Trading

WDNR will track the location of all installed practices in order to prevent duplication of credit use, to ensure that the capacity of a subwatershed to generate credits is not exceeded by the number of credits being used within the watershed, and to gauge the progress of TMDL implementation.

Maintaining List of Management Practices

The list of acceptable management practices, found in Appendix H - Management Practices and Associated Information may be updated with additional items as more approaches are identified for trading and the generation of credits through management measures and practices.

Glossary

Bioaccumulative Chemical of Concern (BCC): Any substance that has the potential to cause adverse effects which, upon entering the surface waters, accumulates in aquatic organisms by a human health or wildlife bioaccumulation factor greater than 1000, as defined by s. NR 105.03 (9), Wis. Adm. Code.

Calendar Year: The time period from January 1 through December 31 inclusive for a given year.

Certification: An authorized representative of the permittee has attested in writing that a statement is true.

Concentrated Animal Feeding Operation (CAFO): An animal feeding operation to which any of the following apply: the operation has 1,000 animal units or more at any time and stores manure or process wastewater in a below or at grade level storage structure or land applies manure or process wastewater; the operation has 300 to 999 animal units and has a Category I unacceptable practice under s. NR 243.24 (1) (a), Wis. Adm. Code; or under s. NR 243.26 (2), Wis., Adm. Code, the operation is designated by the WDNR as having a significant discharge of pollutants to navigable waters or has caused the fecal contamination of water in a well.

Credit Generator: The person generating pollutant reduction credits. This can either be a permittee that agrees to reduce their discharge of the traded pollutant below levels otherwise authorized by their WPDES discharge permit, or a person who is not required to obtain a WPDES discharge permit but wishes to reduce their loadings of the traded pollutant.

Credit Threshold: The pollutant loading level below which reductions must be made to generate pollutant reduction credits.

Credit User: A permittee who wishes to use pollutant reduction credits to allow a discharge of the traded pollutant above levels otherwise authorized by their WPDES discharge permit.

Current Pollutant Load: For nonpoint sources, the pollutant load existing at the time that the trade agreement is reached pursuant to s. 283.84, Wis. Stats.

Cross-pollutant Trading: The use of discharge or load reductions generated for one pollutant to be used to compensate for an increase in the discharge or loading of a different pollutant.

Hydrologic Unit Code (HUC): A national standard hierarchical system based on surface hydrologic features to delineate s in the United States by the U.S. Geological Survey. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the six levels of classification. For example, a 12-digit HUC represents the sixth-level (subwatershed) of classification.

Impaired Water: A water body that the WDNR has identified to EPA under 33 USC 1313 (d)(1)(A).

Local Governmental Unit: A political subdivision of this state, a special purpose district in this state, an instrumentality or corporation of such a political subdivision or special purpose district, a combination or subunit of any of the foregoing or an instrumentality of the state and any of the foregoing as defined by s. 16.97 (7), Wis. Stats.

Load Allocation (LA): The portion of a receiving water's loading capacity that is allocated to a nonpoint source or group of nonpoint sources under a TMDL.

Management Practices: Structural or non-structural measures, practices, techniques or devices employed to avoid or minimize soil, sediment or pollutants carried in runoff to waters of the state, as defined by s. NR 151.002 (4), Wis. Adm. Code.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all the following criteria: Owned or operated by a municipality; designed or used for collecting or conveying storm water; which is not a combined sewer conveying both sanitary and storm water; and which is not part of a publicly owned wastewater treatment works that provides secondary or more stringent treatment; as defined in s. NR 216.002 (17), Wis. Adm. Code.

Nonpoint Source (NPS): A land management activity which contributes to runoff, seepage or percolation which adversely affects or threatens the quality of waters of this state and which is not a point source as defined under s. 283.01 (12) Wis. Stats. as defined in s. 281.65(2)(b), Wis. Stats.

Nonpoint Source Implementers: Persons with experience and relationships with agricultural producers and landowners necessary to implement nonpoint source control measures. These persons may include: 1) county land conservation department (LCD) staff who work to control nonpoint source pollution; 2) non-governmental organizations and 3) private consultants.

Performance Standard: A narrative or measurable number specifying the minimum acceptable outcome for a facility or practice, as defined by s. NR 151.002 (33), Wis. Adm. Code.

Phosphorus Impaired Water: A surface water listed on the 303 (d) list that is impaired for phosphorus, nutrients, or diurnal swings of dissolved oxygen, as defined in s. NR 217.11 (4), Wis. Adm. Code.

Phosphorus Index (PI): Wisconsin's agricultural land management planning tool for assessing the potential of a cropped or grazed field to contribute phosphorus to the surface water, as defined by s. NR 151.015 (15s), Wis. Adm. Code.

Point Source (PS): A discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel or tunnel from which pollutants may be discharged into waters of the State. A discernible, confined and discrete conveyance of stormwater for which a permit is required under s. 283.33 (1), Wis. Stats., is also defined as a point source.

Pollutant Load Reduction: The amount (mass) of a given pollutant over a specified period (day, month, year) that is made available by a credit generator for a trade. When divided by the trade ratio, the pollutant load reduction becomes the pollutant reduction credit.

Pollutant Reduction Credit or **Credit:** The amount (mass) of a given pollutant over a specified period (day, month or year) that is available to the credit user in a trade. The pollutant reduction credit equals the pollutant load reduction divided by the trade ratio.

Surface Waters: All natural and artificial named and unnamed lakes and all naturally flowing streams within the boundaries of the state, but not including cooling lakes, farm ponds and facilities constructed for the treatment of wastewaters.

Technology-based Effluent Limitation(s) (**TBEL):** An effluent limitation or limitations established pursuant to ss. 283.13 (1) through (4), Wis. Stats., and, with respect to total phosphorus, effluent limitations established pursuant to Subchapter II of ch. NR 217, Wis. Adm. Code.

Total Maximum Daily Load (TMDL): The maximum amount of a pollutant a waterbody can receive and still meet applicable water quality standards. In this guidance document, TMDL is also used when referring not only to the derivation of the total assimilative capacity of a waterbody, but also to the allocation of capacity to point and nonpoint sources. Only TMDLs that have been approved by USEPA and are included in an areawide water quality management plan may be used to derive WPDES permit effluent limits.

Wasteload Allocation (WLA): Pollutant-specific allocation for an individual point source, which ensures that the level of water quality to be achieved by the point source complies with all applicable water quality standards.

Water Quality-based Effluent Limitation(s) (WQBEL): An effluent limitation or limitations determined by using applicable water quality criteria (e.g., aquatic life, human health, wildlife, translation of narrative criteria) for a specific point source to a specific receiving water for a given pollutant or based on the facility's wasteload allocation from a TMDL.

Water Quality Standards: Standards established by the WDNR pursuant to s. 281.15, Wis. Stats., for the physical, chemical and biological characteristics of a water which must be maintained to make it suitable for specified uses. Water quality standards consist of the designated uses of the waters or portions thereof and the water quality criteria for those waters based upon the designated use.

Watershed Adaptive Management Option: A strategy to achieve the total phosphorus water quality criteria in s. NR 102.06, Wis. Adm. Code, in the most economically efficient manner, and as soon as possible, taking into consideration the contributions of phosphorus from point and nonpoint sources in a watershed as specified by s. NR 217.18, Wis. Adm. Code.

Watershed: An area of the land that drains to a common lake, pond, river, stream, or other surface waters of the State that is delineated for the purpose of instituting water quality management activities.

WPDES Permit: A Wisconsin Pollution Discharge Elimination System discharge permit issued under ch. 283, Wis. Stats.

References

USEPA (U.S. Environmental Protection Agency). 1991. *Technical Support Document for Water Quality-based Toxics Control.* EPA/505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. http://www.epa.gov/npdes/pubs/owm0264.pdf

USEPA (U.S. Environmental Protection Agency). 2003. *Water Quality Trading Policy*. U.S. Environmental Protection Agency, Office of Water. Washington, DC. www.epa.gov/owow//trading/finalpolicy2003.pdf.

USEPA (U.S. Environmental Protection Agency). 2004. *Water Quality Trading Assessment Handbook.* EPA-841-B-4-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. www.epa.gov/owow//trading/handbook/.

USEPA (U.S. Environmental Protection Agency). 2005. An *Examination of Key Elements and Conditions for Establishing a Water Quality Trading Bank – White Paper.* Contract 68-W-99-042. U.S. Environmental Protection Agency, Office of Policy, Economics, and Innovation, and Office of Water, Washington, DC. http://www.eli.org/pdf/wqtforum/SiemAhlLand05.pdf .

USEPA (U.S. Environmental Protection Agency). 2007. *Water Quality Trading Toolkit for Permit Writers.* EPA 833-R-07-004. U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division, Washington, DC. http://water.epa.gov/type/s/trading/ Toolkit.cfm .

UW-Madison (University of Wisconsin-Madison). 2005. *Wisconsin Buffer Initiative; A Report to the Natural Resources Board of the Wisconsin Department of Natural Resources by the College of Agricultural and Life Sciences*. University of Wisconsin, College of Agricultural and Life Sciences, Madison, WI. http://www.nelson.wisc.edu/people/nowak/wbi/reports/nrbFinalReport.pdf .

WDNR (Wisconsin Department of Natural Resources). 2011. *A Water Quality Trading Framework for Wisconsin.* Wisconsin Department of Natural Resources, Madison, WI. http://dnr.wi.gov/topic/surfacewater/documents/wqt-framework-final.pdf.

USEPA (U.S. Environmental Protection Agency). 2019. Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality. U.S. Environmental Protection Agency, Office of Wastewater Management, Water Permits Division, Washington, DC

Appendix A – Section 283.84, Wis. Stats.

Last Revised: April 2019

Trading of water pollution credits. (1) The department shall administer a program for the trading of water pollution credits that is consistent with the federal Water Pollution Control Act, 33 USC 1251 to 1387. Subject to sub. (1m), under the program the department may authorize a person required to obtain a permit to increase the discharge of pollutants above levels that would otherwise be authorized in the permit if the person does one of the following:

(a) Reaches a binding, written agreement with another person who is required to obtain a permit under which the other person agrees to reduce the discharge of pollutants below the levels that would otherwise be authorized in the other person's permit.

(b) Reaches a binding, written agreement with another person who is not required to obtain a permit under which the other person agrees to reduce the amount of water pollution that it causes below the levels of water pollution that it causes when the agreement is reached.

(c) Reaches a binding, written agreement with the department or a local governmental unit, as defined in s. 16.97 (7), under which the person pays money to the department or local governmental unit and the department or local governmental unit uses the money to reduce water pollution or to provide cost−sharing, for the purposes of s. 281.16 (3) (e) or (4), for projects to reduce water pollution.

(d) Reaches a binding, written agreement with the department under which the person reduces the discharge of pollutants under another permit that the person holds below the levels that would otherwise be authorized in the other permit.

(e) Reaches a binding, written agreement with the department under which the person constructs a project or implements a plan that results in reducing the amount of water pollution from sources other than the source covered by the permit.

(1m) Under the program, the department may authorize a person to increase a discharge of pollutants above levels that would otherwise be authorized in the permit only if all of the following apply:

(a) The agreement under sub. (1) results in an improvement in water quality.

(b) The increase in pollutants and the reduction in pollutants provided for in the agreement under sub. (1) involve the same pollutant or the same water quality standard.

(d) [sic] The increase in pollutants and the reduction in pollutants occur within the same basin or portion of a basin, as determined by the department.

(3m) A person engaged in mining, as defined in s. 293.01 (9), prospecting, as defined in s. 293.01 (18), or nonmetallic mining, as defined in s. 295.11 (3), may not enter into an agreement under sub. (1).

(3r) The department shall include terms and conditions related to agreements under sub. (1) in new and reissued permits.

(4) The department shall modify the permits of persons entering into agreements under sub. (1) to enable the agreements to be implemented and to include terms and conditions related to the agreements.

(6) [sic]The department may promulgate rules for the administration of this section.

History: 1997 a. 27; 2001 a. 16; 2003 a. 33; 2011 a. 151.

Appendix B – Eight Easy Steps to Finding Your 12-Digit HUC

Last Revised: April 2019

Water quality trading should be fully contained within the 12-digit Hydrologic Unit Code (HUC) where the discharger is located whenever possible. Permittees should work with their local WDNR wastewater engineer, specialist, or trading coordinator, if an adjacent HUC 12 or larger scale HUC is desired. The Surface Water Data Viewer is an effective tool to identify your HUC 12, and can provide you with other data such as surface water outfall locations in your watershed. This Appendix briefly orients you to this tool by identifying an example HUC 12 watershed in Wisconsin (the Spring Creek watershed).

Step 1: To locate your HUC 12 click on the link below, which will take you to WDNR's Surface Water Data Viewer Home Page: http://dnr.wi.gov/topic/surfacewater/swdv/.

Step 2: Launch the Surface Water Data Viewer Mapping Application.

Step 3: Zoom to your area of interest by clicking on an area of the map and dragging your mouse over the area you wish to zoom to.

Step 4: Click on the "layers" icon at the top of page.

Step 5: Click on the "Federal Hydrologic Units (HUCs)" folder and select the "12-digit HUCs" layer. *Note: you may also be interested in the "Surface Water Outfalls" layer in the "Permits and Relate Data" Folder. This layer shows you all of the point source discharges in your HUC 12 watershed.*

Step 6: Activate the 12-digit HUCs layer by clicking on the mouse icon next to the layer name. This will make the layer turn blue.

Step 7: Highlight the HUC 12 you are interested in by clicking anywhere within the HUC 12 of interest and select "new" in the left hand panel.

Step 8: From here, you can download an excel file with the details on your selected HUC 12. You may also want to download a shape file of the layer to quantify the area of your HUC 12 within each county.

The surface water data viewer has lots of other data that can be useful for water quality trading. These data can include surface water outfall locations in your watershed and Wisconsin's wetland inventory, among other things. These data are available in the "layers" tab. The image below illustrates the surface water outfall layer location as an example.

Appendix C – Nonpoint Source (NPS) Implementation

Last Revised: April 2019

Introduction

This appendix addresses nonpoint source implementation for both water quality trading (WQT) and adaptive management (AM) compliance options. It is critical to the success of local AM or WQT programs that WPDES permittees coordinate with or hire people that have agricultural NPS implementation skills. A skilled NPS implementer should have the experience and relationships with agricultural producers and landowners necessary to implement nonpoint source control measures. In addition, a good understanding of best management practices (BMPs) and engineering design would also be among the skills necessary for implementation.

In Wisconsin, there are: 1) county land conservation department (LCD) staff working at a county and watershed level to control nonpoint source pollution; 2) non-governmental organizations and 3) private consultants, who can serve this role. Throughout this appendix, these potential implementation entities will be referred to as "NPS implementers".

This appendix outlines the roles that NPS implementers should play in the AM/WQT programs and the skills necessary for AM/WQT programs to be effective and successful in agricultural areas. Entities or parties, who are considering serving this role, are encouraged to read through this appendix and carefully evaluate their skills against the skills necessary to do the agricultural NPS implementation work in local AM/WQT programs. The *potential* workload for NPS implementers participating in AM/WQT programs includes the following, which are detailed more fully in subsequent sections of this appendix:

- Assisting the WPDES permit holder in evaluating compliance options – AM vs. WQT
- Developing AM or WQT plans,
- Working with landowners to implement management measures,
- Tracking where management measures are implemented, and
- Reporting on progress in the AM/WQT areas.

The purpose of this appendix is to:

- Supplement the existing AM/WQT guidance with information for the **agricultural** "nonpoint source (NPS) implementers" that may be assisting WPDES permittees to meet the requirements of the AM/WQT compliance options,
- Define and clarify roles related to NPS implementation of watershed-based pollutant reduction,
- Reduce uncertainties related to NPS pollutant reduction's role in meeting WPDES permit requirements, and
- Outline what "NPS implementers" can do to make WQT and AM successful.

Role of Nonpoint Source Implementers in AM & WQT

The AM and WQT guidance documents each recommend that permittees evaluate their compliance options before the WPDES permit is up for renewal. Permittees are encouraged to contact NPS implementers about potential AM and WQT projects because they generally have the necessary expertise and information to understand the NPS pollution control needs in a watershed. Thus, NPS implementers may be asked by permittees to assist in the evaluation and feasibility of AM and WQT in a particular watershed or action area.

Evaluating WPDES Permit Compliance Options

Evaluating a watershed to determine if there are eligible nonpoint source pollutants for AM or WQT is the first step a permittee will need to do to select a WPDES permit compliance option. In many cases, permittees may approach NPS implementers to assist in this evaluation step. Table 1 outlines some of the information that a NPS implementer may be asked to provide.

Table 1: Investigating AM and WQT Information

Activity	AM	WQT
Assist in determining sources of NPS pollutant loading in a watershed	X	X
Gather and provide inventory of historic and current BMP project data to establish if there is landowner participation and willingness to work collaboratively and manage NPS pollution in a watershed.	X	X
Provide existing inventory data or gather additional data to confirm the potential for pursuing additional management measures and quantify the potential reduction	X	X
Provide guidance in identifying and selecting critical areas to target for NPS reductions.	X	
Provide guidance in identifying and selecting potential credit generators.		X

Given these factors, NPS implementers should consider the following:

- Does the NPS implementer have the technical capacity and infrastructure – appropriate technical expertise, data systems, screening tools, modeling expertise, etc. – to meet the data and information needs of the permittee?
    - If no, is the NPS implementer willing to review related materials prepared by another entity regarding project feasibility?

- Does the NPS implementer have sufficient staff resources to devote time to the investigatory phase of an AM or WQT project?
    - If yes, will the NPS implementer participate as a partner, free-of-charge, or will a fee for services be necessary?

- If no, will it be necessary to require a fee for services to provide adequate staff resources for the AM or WQT project?

- Is there a need to develop a memorandum of understanding (MOU) or contract between the NPS implementer(s) and WPDES permittee to provide information and/or services during the investigatory phase of an AM or WQT project?

Regardless of the funding and contractual issues, NPS implementers, again, serve as a bridge between the WPDES permittees and the critical information they need about the agricultural land use in a watershed. However, there is no requirement on the NPS implementer's part to participate in an AM or WQT plan. Local priorities, resources, and goals should be considered when approached by a permittee to assist in implementation of these programs. Keep in mind that participating in the implementation process may assist in accomplishing other local programmatic goals and priorities.

Assisting with Plan Development

An AM or WQT plan is developed in much the same way as a County Land and Water Resource Management Plan, a Priority Watershed Plan, a Lake Management Plan, a TMDL Implementation Plan, or other watershed-based plans. Figure 2 outlines the major tasks that need to be addressed when developing an AM or WQT plan. The permittee may seek assistance with some or all of these tasks, which can be categorized in two phases: data collection and assessment.

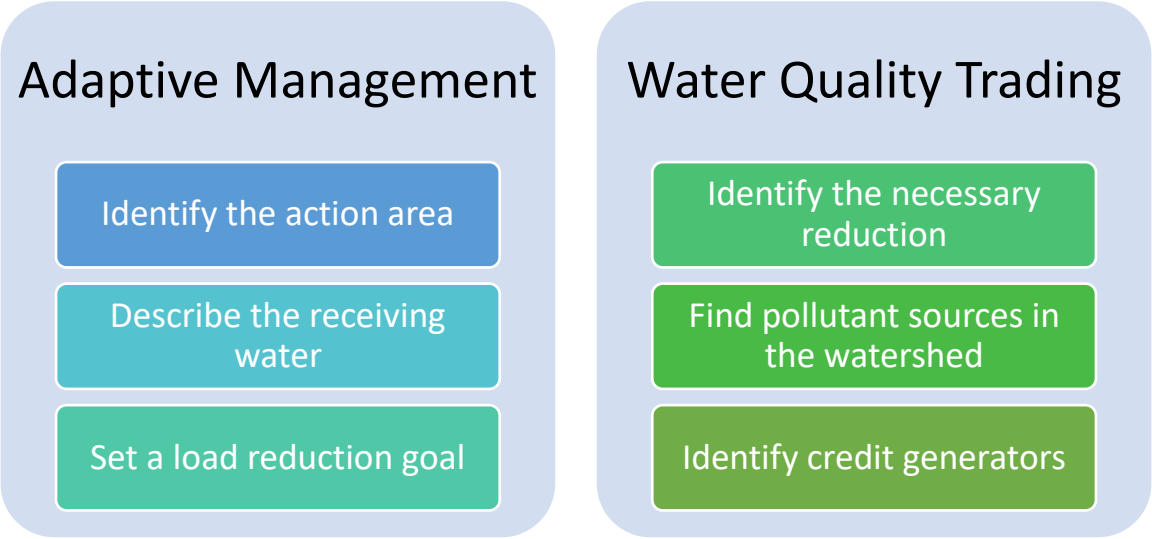


Figure 2: Tasks for Developing AM and WQT Plans

The data collection phase includes tasks related to identifying a project area, calculating potential load reductions, and identifying critical source areas. Table 2 outlines the steps included in this phase.

Table 2: Data Collection Phase[5]

Data Collection Phase	Step 1	Step 2
Goal	**Conduct an Inventory (Identify sources of pollution)**	**Identify Potential Loading (Locate critical areas or credit generators)**
Tasks	Identify 12-digit HUCs	Identify existing agricultural practices
	Collect information on physical features in watershed	Rank areas by pollutant generating capability from high to low
	Collect current and historic BMP information	Rank areas by delivery potential from high to low
	Project potential future BMP information	Identify critical areas or potential credit generators as high in load and delivery (see Figure 3)

Sample templates of data collection tables and maps for an example watershed are provided in Section 5 of the *Adaptive Management Technical Handbook*. The level of detail needed in the data collection phase will depend on the ability of the permittee to commit resources to the project and whether a cursory feasibility analysis is requested or a more sophisticated analysis to lay out the final groundwork for AM or WQT plan development.

In some cases, NPS implementers may want to run typical cropping practices and soil conditions through available models, such as SnapPlus, to evaluate the feasibility for pollutant reductions on a field, within a watershed and/or to identify critical source areas. In other cases, approximating pollutant source and delivery factors may be sufficient to help with these tasks. Source factors represent the amount of phosphorus available on the land, while transport factors represent the mechanisms by which phosphorus is moved across the landscape and delivered to receiving waters as shown in Figure 3.

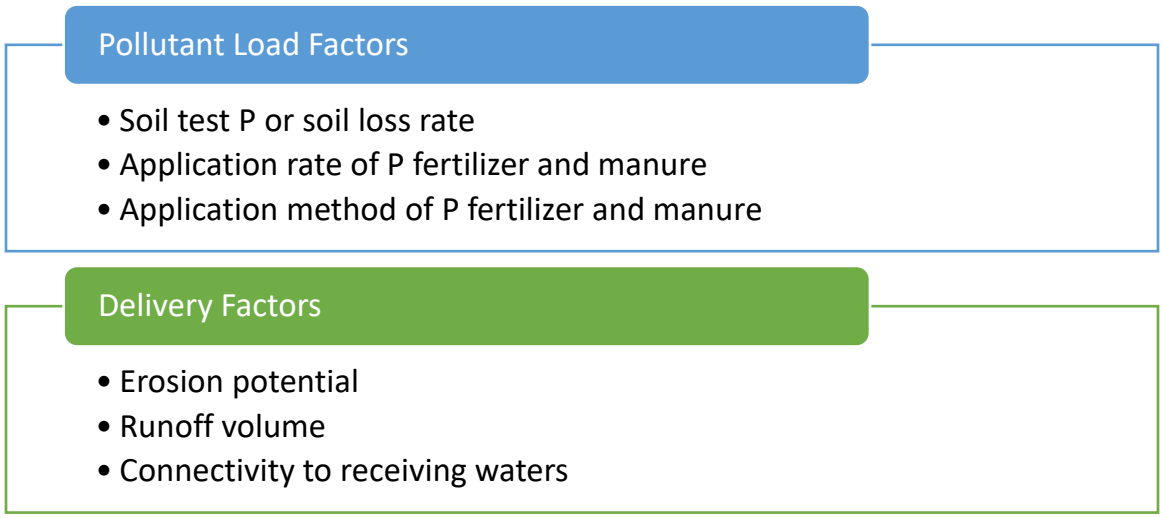


Figure 3: Source & Delivery Factors

[5] Not all elements identified in this table will need to be completed for WQT in cases where supply greatly exceeds the demand for credits.

With the completion of the data collection phase, the assessment phase is to identify practices that are cost-effective and feasible in reducing pollutant loads. Table 3 outlines the steps involved in the assessment phase.

Table 3: Assessment Phase

Assessment Phase	Step 3	Step 4
Goal	**Propose Corrective Measures**	**Estimate Pollutant Reductions**
Tasks	Utilize available technical standards	Utilize existing models, such as SnapPlus, EVAAL, etc.
	Utilize performance standards as initial benchmarks	Use quantifiable methods to estimate reductions when models are not available
	Consider location and feasibility	Identify practices for which no quantifiable method is available; consider whether these are a good fit for project
	Consider relative cost of practices	Factor in trade ratios for WQT

Once the data collection and assessment phases are complete, the information should be provided to the permittee to determine how the project fits with overall compliance goals. Certain projects may better suit different compliance strategies. Key considerations often lie in the quantification of pollutant reductions from practices. WQT relies upon model results with a high degree of certainty at time of project installation. AM offers more flexibility in quantifying reductions over time, perhaps via monitoring over a number of years.

The final phases for AM and WQT plan development vary slightly. For AM, there is the requirement to conduct in-stream water quality monitoring because the measure of success for an AM project is based upon improving in-stream water quality. In-stream monitoring is collected at the point of standards application. Other in-stream sampling points may be advantageous for the project, such as in an upstream tributary stream. Edge of field or BMP monitoring is not required. The AM plan will need to include a monitoring strategy. A NPS implementer may be interested in participating in this phase if they currently conduct or plan to conduct monitoring in the area. Table 4 highlights the tasks associated with developing a monitoring plan for AM.

Table 4: Monitoring Plan Phase for AM

Monitoring Phase	Step 5
Goal	**Establish long-term monitoring station**
Tasks	Decide where and when to monitor
	Set water quality assurance protocols
	Identify who will collect and analyze samples

In addition to the data provided in the five steps above, the AM plan will also need to identify potential implementation partners, where necessary, and develop an implementation schedule with clearly identified milestones. The information collected in steps one through five is critical to fulfill the requirements for the AM plan. It is also important to note that NPS implementers have discretion to select their level of involvement for each of these steps.

For WQT, modeling of proposed practices is used to calculate available credits. The WQT plan will identify the amount of credits necessary for the permittee to comply with the WPDES permit conditions. These credits are used to offset the WQBELs established in the WPDES permit to meet the discharge requirements for the receiving water at the point of standards application. A NPS implementer may assist in conducting the modeling for proposed practices to assist in calculating available credits. Appendix D provides information regarding how to utilize SnapPlus to quantify phosphorus credits.

Implementing an AM or WQT Plan

There are a number of factors an NPS implementer should consider when partnering with a permittee to implement an AM or WQT plan. The factors discussed in this section include: contracts, responsibility, funding, regulatory authority, marketing, implementing BMPs, water quality monitoring, and TMDLs. Over time, these factors may need to be revisited as more AM and WQT programs are implemented in Wisconsin and more experience is gained by permittees, NPS implementers and regulatory agencies.

Contracts Between NPS Implementers and Permittees

It is not required for NPS implementers to enter into a contract with permittees. However, there may be benefits for NPS implementers to enter into these contracts to clearly define the scope of work and resources that will be provided. When a NPS implementer is approached by a permittee to assist in implementing an AM or WQT plan, a number of considerations may be discussed prior to agreeing to the contract:

- What BMPs are being proposed to comply with the goals of the plan or strategy?
- What watershed(s) is/are being targeted?
- What role will the NPS implementer play in:
    - Conducting pre- and post-inventory work,
    - Contacting landowners,
    - Identifying appropriate BMPs,
    - Modeling pollutant load reductions,
    - Assisting in the development of agreements,
    - Designing of BMPs,
    - Conducting construction oversight of practices,
    - Verifying BMP installation and maintenance,
    - Tracking and reporting to the permittee, and
    - Monitoring pre/post-water quality?
- Does the NPS implementer have the appropriate staff and skills to conduct the work and still meet the other goals and priorities of the organization?
- What is the timeline for compliance under the WPDES permit compliance schedule for the current permit term, as well as future permit terms?
- Are there enough potential pollutant loading sources to meet the goals of an AM plan or WQT strategy?

- What risks, liability and responsibilities is the NPS implementer willing to accept as part of implementing a WPDES permit compliance option for a point source?

Once the terms of a contract are agreed upon by both parties, contracts may be reviewed by legal staff that represent or serve both parties, as well as committees and boards necessary to approve such contracts. Education and outreach may be necessary to bring persons ultimately approving such contracts up to speed on the advantages and disadvantages of partnering with a point source implementing AM and WQT.

Responsibility

The WPDES permit specifies dates and deadlines to meet certain components of an AM or WQT plan. NPS implementers will need to be aware of these compliance dates when planning projects; however, the permittee retains the responsibility of meeting the permit conditions as the permit holder. Many factors can delay or prevent a practice from being installed in a timely manner; availability of equipment and supplies, soil conditions, weather, design delays, permit approvals, etc. Thus, it is recommended that NPS implementers work with permittees in advance of applicable permit deadlines to avoid these timing conflicts.

In WQT, the responsibility associated with permit conditions rests solely with the permittee. The shift of permit requirements from the permittee to another entity is not allowed under the legal framework of the Clean Water Act or US EPA's Water Quality Trading Policy. This means permit violations resulting from failure to generate adequate nonpoint credits cannot be shifted from the credit user to the credit generator. Both WDNR and EPA enforcement resides solely with the credit user or permittee. Contractual remedies such as financial penalties for failure to generate credits are allowed; however, such remedies need to reside in contracts between the credit buyer and credit generator and are not subject to WDNR or EPA review, nor factored into enforcement remedies for failure to comply with permit requirements.

WDNR has attempted to mitigate the risk associated with WQT by establishing procedures for what occurs if a practice fails, by requiring use of applicable NRCS technical standards for design and accepted modeling techniques to quantify credits and recommending that practices be fully paid for only after being installed. Uncertainty associated with WQT is also addressed through trade ratios.

For AM, minimum P reductions and applicable NRCS technical standards help mitigate risk. Results from in-stream monitoring are the primary compliance mechanism for determining whether applicable water quality standards are being achieved. Similar to WQT, the responsibility associated with the permit conditions rests solely with the permittee. However, the installation and maintenance of more practices than the minimum requirement will help offset these risks.

Funding

With the selection of AM or WQT as their compliance option, the primary responsibility lies with permittees to fund the associated watershed projects. As a party to implementation of an AM/WQT

plan, a NPS implementer may be asked to assist the permittee with locating supplemental funding options. NPS implementers can consult with NPS-related funding programs to determine if funding may be used for AM and/or WQT. Some grant programs have restrictions on the use of funding for WPDES permit compliance. For example, federal funding under s. 319 of the Clean Water Act has the following restrictions that would make a project or practice ineligible for s. 319 funding or state match of s. 319 funding:

1. If a project is specifically listed in an AM plan consistent with s. NR 217.18.
2. If a practice will be credited toward the achievement of a WPDES permit performance goal.
3. If a practice is not consistent with the goals of the State's *Nonpoint Source Program Management Plan*.

Further information on these restrictions are available in the section on *Implementing BMPs*.

Regulatory Authority

In many cases, there are local, state, or federal authorities that impact the development and implementation of any NPS pollution control project. These authorities need to be considered when implementing an AM/WQT plan. It is important for agricultural producers and landowners to understand the difference between participating in a voluntary effort, such as these point source compliance options, versus complying with local, state, and federal NPS regulatory requirements. Non-governmental organizations and private consultants acting as NPS implementers may need to work with local or state authorities to ensure the landowners are operating in compliance with applicable local and state regulations and programs. This may require these groups to work closely with a local or state governmental agency to address regulatory requirements as part of implementing the plans.

Local Authority: Local authorities may include town, village, city or county ordinances, involving zoning, livestock siting, animal waste, manure storage, shoreland zoning, storm water construction, building codes, etc. These ordinances are administered at the local level. When implementing an AM or WQT plan, any projects conducted within a local jurisdiction are expected to comply with local ordinances and applicable permitting requirements. For example, if a proposed project involves the construction of manure storage, all applicable building setbacks and permitting requirements would be required to be met as part of the project. If there are questions related to local authority and implementation of AM and WQT plans, permittees should consult with legal counsel and review local authorities, authorizations, and jurisdictions to determine appropriate courses of action. As a NPS implementer, permittees may ask for assistance in identifying what local authorities apply to proposed projects.

Agricultural Performance Standards & Prohibitions (ch. NR 151, Wis. Adm. Code): When working with nonpoint sources, it is expected that management measures implemented through a WQT or AM plan will ultimately result in compliance with applicable ch. NR 151 performance standards. The WDNR realizes that in some cases, it may take multiple years to implement management measures to meet applicable performance standards. If management measures installed do not ultimately result in compliance with applicable performance standards, higher trade ratios may be required as outlined in *Appendix H of Guidance for Implementing Water Quality Trading in WPDES Permits*. During the

development of the WQT or AM plan, contact the WDNR if management measures will not result in compliance with applicable performance standards.

For WQT, credits cannot be generated from compliance with the manure management prohibitions contained in ss. NR 151.08(2), NR 151.08(3), and NR 151.08(5) Wis. Adm. Code. Credits can be generated from management measures implemented to address s. NR 151.08(4) Wis. Adm. Code; runoff from a feedlot into the waters of the state (refer to Figure 4 for manure management prohibitions). For cropland or a livestock facility meeting a performance standard through the implementation of WQT or AM, the requirements of ss. NR 151.09(3)(b) and NR 151.095(4)(b) Wis. Adm. Code apply respectively. The landowner or operator will be notified of the compliance determination by the WDNR or county LCD in accordance with the requirements stipulated in ss. NR 151.09(5) and (6) or NR 151.095(6) and (7) Wis. Adm. Code respectively.

Table 5 provides an overview of the agricultural performance standards and the "Implementation Strategy for NR 151 – Agricultural Nonpoint Performance Standards and Prohibitions" which is utilized by the WDNR and county LCDs in Wisconsin is available at: https://dnr.wi.gov/topic/nonpoint/documents/strategy151.pdf. NOTE: At the time this guidance document was adopted, the NR 151 guidance document referenced above was not finalized. It may be updated or revised prior to adoption under the guidance procedures in Wis. Stat. s. 227.112.

Manure Management Prohibitions	NR 151.08(2): No overflow of manure storage facilities.
	NR 151.08(3): No unconfined manure piles in water quality management areas.
	NR 151.08(4): No direct runoff from feedlots or stored manure from waters of the state.
	NR 151.08(5): Limit access or otherwise manage livestock from waters of the state to maintain vegetative cover and prevent erosion.

Figure 4: Manure Management Prohibitions

Table 5: Agricultural Performance Standards

Sheet, Rill and Wind Erosion Performance Standard, NR 151.02 • Meet tolerable soil loss ("T") on all cropped fields and pastures.
Tillage Setback Performance Standard, NR 151.03 • Avoid tilling within 5 feet of the edge of the bank of surface waters.

- This setback may be extended up to 20 feet to ensure bank integrity and prevent soil deposition.

Phosphorus Index Performance Standard, NR 151.04

- Use the phosphorus index (PI) standard to ensure that a nutrient management plan adequately controls phosphorus runoff over the accounting period.

Manure Storage Facilities Performance Standard, NR 151.05

- Maintain structures to prevent overflow and maintain contents at or below the specified margin of safety.
- Repair or upgrade any failing or leaking structures to prevent negative impacts to public health, aquatic life and groundwater.
- Close idle structures according to accepted standards.
- Meet technical standards for newly constructed or significantly altered structures.

Process Wastewater Handling Performance Standard, NR 151.055

- Prevent significant discharges of process wastewater (i.e. milkhouse waste, feed leachate, etc.) into waters of the state.

Clean Water Diversion Performance Standard, NR 151.06

- Divert clean water away from feedlots, manure storage areas and barnyards located within water quality management areas.

Nutrient Management, NR 151.07

- Annually develop and follow a nutrient management plan designed to keep nutrient and sediment from entering waters of the state.

Animal Feeding Operations (ch. NR 243, Wis. Adm. Code): Large livestock operations in Wisconsin, otherwise known as CAFOs, are considered point sources are required to obtain a WPDES permit for discharges to waters of the state. WPDES permit conditions for CAFOs do not allow discharge of pollutants from the production area except in very limited circumstances. Therefore, for the production area of a CAFO, there will be no opportunities to implement practices for AM or WQT plan as the WPDES permit conditions require limits that do not allow for regular discharges of pollutants. However, the cropland associated with a CAFO is generally classified as a nonpoint source. In these cases, there may be limited opportunities for these operations to participate in AM or WQT programs. In order to participate, the permitted livestock operation would need to maintain compliance with their WPDES permit conditions for land application sites. Proposed measures which go beyond the existing WPDES permit requirements or could be related to something not regulated by the WPDES permit. If the AM or WQT plan proposes to work with WPDES permitted livestock operations, it is recommended the permittee or NPS implementer work with the WDNR specialist covering the livestock operation's permit to determine any overlap in permit compliance requirements.

In addition, some livestock operations are identified as posing an imminent threat to public health or fish and aquatic life by having direct discharges to waters of the state without coverage under a WPDES permit. This program is typically called the Notice of Discharge (NOD) Program. These sites typically require immediate actions to be taken which may not fit into the timelines identified in an AM or WQT plan. If a site is selected to participate in an AM or WQT program and is posing an imminent threat, it is recommended the permittee or NPS implementer work with the appropriate WDNR NPS staff to address

the issues. While these sites are not prohibited from participating in an AM or WQT program, the timelines for corrective measures may not be conducive for participation; however, they will be evaluated on a case-by-case basis.

Other State Programs: Other state regulations and programs may also add a level of complexity to implementing agricultural practices in an AM or WQT plan. DATCP has a series of administrative codes which may overlap with implementation such as: Farmland Preservation Program, Agriculture Enterprise Areas, Livestock Siting regulations, Soil and Water Resource Management programs (i.e. land and water resource management plans, offers of cost-share funding from alternative sources of funding, manure storage ordinances, etc.). These programs are typically implemented by county LCDs. It is important for NPS implementers to work with DATCP and local county LCDs to ensure adherence to DATCP program guidelines and policies.

Federal Regulations & Programs: Federal programs may also have limitations or considerations to be aware of when implementing a watershed-based point source compliance program. A producer may be involved in federal programs that may have eligibility requirements that could limit their participation in an adaptive management or water quality trading program. In addition, many producers participating in federal programs are covered under the Privacy Act (1974) and need to provide special releases to have their involvement with federal programs reported to other entities.

Marketing AM and WQT

Marketing AM and WQT is very similar to marketing existing conservation programs. The BMPs, pollutant load reduction expectations, and longevity of compliance are similar under AM and WQT as they are under existing, established programs. The primary difference is the source of funding for the proposed practices.

Obtaining buy-in from stakeholders including landowners, producers, agronomists, consultants, co-op staff, local agricultural coalitions, environmental groups, tax payers, elected officials and staff can be daunting. However, targeting the appropriate audience is key to successfully marketing conservation programs. NPS implementers should understand the audiences necessary to successfully implement NPS pollution control activities. The tools to reach these audiences may vary. Examples of these tools are identified in Figure 5. Social marketing and civic engagement are other methods to explore when working toward changing social behaviors. These methods would translate well to other NPS implementation efforts such as AM and WQT. In addition, WDNR adaptive management and trading coordinators may be useful resources to aid in the development of materials and outreach to these targeted audiences.

Figure 5: Example Outreach Tools

Implementing BMPs

Currently, county LCDs play a major role in identifying, contracting, designing and implementing practices as part of implementing existing local and state conservation programs and cost-share programs. Figure 6 describes the general steps involved in implementing BMPs. Since inventory work

was completed during plan development, critical source areas should have already been identified in the AM or WQT plan for the targeted watershed.

Meet with Willing Participants

- Involves one-on-one conversations and farm walk-overs with landowners, producers, or renters along with their consultants (i.e. agronomists, co-op representatives, etc.) discussing practices needed on the farm to address water quality standards and conservation goals.

Identify Eligible BMPs

- Once a landowner opts to participate in the program, practices need to be identified specific to the farm that are also eligible under the approved AM or WQT plan.
- Only practices approved under the plan can be addressed under the program.
- Practices not identified in the plan, but are still necessary for compliance with other state or local programs ,would remain eligible for implementation under more traditional conservation programs.
- Ensure the appropriate entities are available to conduct design work within the necessary time constraints.

Develop Agreement

- An agreement may be developed specific to the needs and goals of the AM or WQT plan.
- Both DATCP and DNR have example cost-share agreements available which are associated with existing state cost-sharing programs.
- These agreements can be modified to address the conditions necessary for an agreement under the AM or WQT programs.
- NPS implementers can work with the permittee to develop new agreements that meet the needs of the AM or WQT plan. It is recommended to have legal review of draft agreements.
- Consider including operation and maintenance language in agreements.

Design & Install BMP

- The BMPs will need to be designed by professionals with the appropriate training and design certifications.
- Construction oversite also needs to be completed by appropriately trained individuals.
- As part of the design phase, modeling will need to be conducted to quantify the existing conditions in order to either estimate load reductions under an AM plan or calculate credits for WQT.

Post-Implementation Verification

- Once the BMP is installed, the modeling will need to be updated in order to quantify the load reduction and trading credits based on post-installation conditions.
- NPS implementers need to verify the practice was installed in accordance with the plans and specifications.

Tracking & Reporting

- Once practices are installed and the modeling is completed, this information needs to be tracked in a database and tied to a common tracking denominator.
- The most common database used for tracking NPS efforts are geographic information systems (GIS).
- The most common tracking component used to tie practices to the landscape is the parcel IDs.
- All of this information will need to be summarized and provided to the permittee at some regular interval as identified in the contract in order for the point source to take credit for the work completed and the reductions in pollutant loading.

Figure 6: Steps for Implementing BMPs

There are no AM- or WQT-specific requirements that prohibit a point source from using a variety of funding sources (point source, federal, nonprofit, etc.) to implement and install BMPs in AM or WQT areas. However, any funding source may stipulate project eligibility on its own terms. NPS implementers should check with funding sources to ensure funds can be used for point source compliance activities. WQT requires that a point source reach an agreement with the applicable landowners where the BMPs are implemented at the time of installation. If there is no agreement with the landowner, it is unlikely that the point source will be able to claim those BMPs for credit generation. If outside funds were brought in to a watershed to pay for BMPs and those BMPs were not claimed by the point source (via a WQT Management Practice Registration, WDNR Form #3400-207), the pollutant reduction is not eligible to generate credits pursuant to s. 283.84(1)(b) Wis. Stats.

In AM project areas, multiple funding sources may be contributing to the implementation of BMPs, resulting in water quality improvement in the applicable stream, river, or lake. Regardless of the funding sources or who is bringing the funding into the AM project area, the point source will benefit from any positive response in water quality, as it will help them comply with their WPDES permit requirements for AM. As mentioned earlier, federal funding under s. 319 of the Clean Water Act has restrictions that would make a project or practice ineligible for s. 319 funding or state match of s. 319 funding. To address each of these restrictions, it is critical that the AM plan under s. NR 217.18 clearly identify what the point source is responsible for and which practices they are interested in pursuing. Practices identified in the AM plan will not be eligible for s. 319 funding or state funding used as match for s. 319 funding. Practices not in the AM plan may be eligible for s. 319 funding and state NPS funding. All such practices if recognized as a BMP in ch. NR 154 are consistent with the goals of the State's *Nonpoint Source Program Management Plan*.

Water Quality Monitoring

For AM, in-stream monitoring is necessary to show improvements in water quality for compliance with the permit. Permittees may contract for services to implement water quality monitoring plans. As part of the approved AM plan, a monitoring plan should have been included, discussing which parameters will be measured, sampling locations, and timing of sample collection. The monitoring may be conducted by NPS implementers, volunteers, or a third party contractor, provided that the party has the skills and resources to carry out the monitoring plan and applicable quality assurance protocols. Again, this monitoring data will need to be collected, analyzed, tracked, and reported in order for the WDNR to determine the permittee's compliance under the permit conditions.

Total Maximum Daily Loads (TMDLs)

When implementing an AM or WQT plan in a TMDL area, the goals and conditions of the TMDL, which included associated load reductions for nonpoint sources, should be considered. In some of the state's TMDLs, the load allocations for nonpoint sources were set assuming that, at a minimum, all agricultural nonpoint sources were meeting the statewide agricultural performance standards and prohibitions in NR 151. In some TMDLs, complying with the statewide standards may be enough to meet the goals of the TMDL. However, other TMDLs may require load reductions that go beyond what is needed to meet

the statewide NR 151 standards. In these cases, creative solutions and funding options may be explored to go above and beyond the statewide performance standards.

Post-Implementation Activities

Once an AM or WQT plan has been developed and implementation has occurred, projects move into a post-implementation phase. During this phase of the project, NPS implementers may be asked to assist the permittee in verifying that practices are being maintained as designed, tracking long-term implementation needs and compiling information for reporting purposes.

Verification

Regardless of the program, the permittee may ask a NPS implementer to conduct long-term verification of practices installed as part of compliance with WPDES permit conditions. Verification may involve regular compliance checks to ensure the installed practice is being operated, maintained, and functioning as designed, in accordance with the operation/maintenance program. Depending on the practice, there is the potential the permittee may provide funding for long-term maintenance costs. In these situations, the NPS implementer may need to manage funding and work associated with BMP maintenance or on-going incentive payments. In addition, modeling of pollutant loads may need to be recalculated depending on the compliance status of the site and BMP life expectancy.

The verification process is similar to existing programs NPS implementers are already familiar with, such as local ordinances, agricultural performance standards and manure prohibitions, or Working Lands Initiative. Verification may be completed through onsite inspections, windshield or drive-by inspections, meetings with landowners, or file reviews. These verification steps should be documented in a tracking system including: compliance determination documentation, compliance schedule information for implementation issues, photographic or other documentation where appropriate, payments, satisfaction of compliance determinations, and any other information necessary for tracking purposes. Permittees and NPS implementers should discuss what steps need to be taken regarding landowner compliance with contracts issued under an AM or WQT plan and include those procedures in BMP verification procedures. In addition, the frequency and timing of verification work should be discussed; will verification procedures need to be completed on an annual basis, life of the BMP, permit term, etc.? An example of a BMP verification process is included in Figure 7.

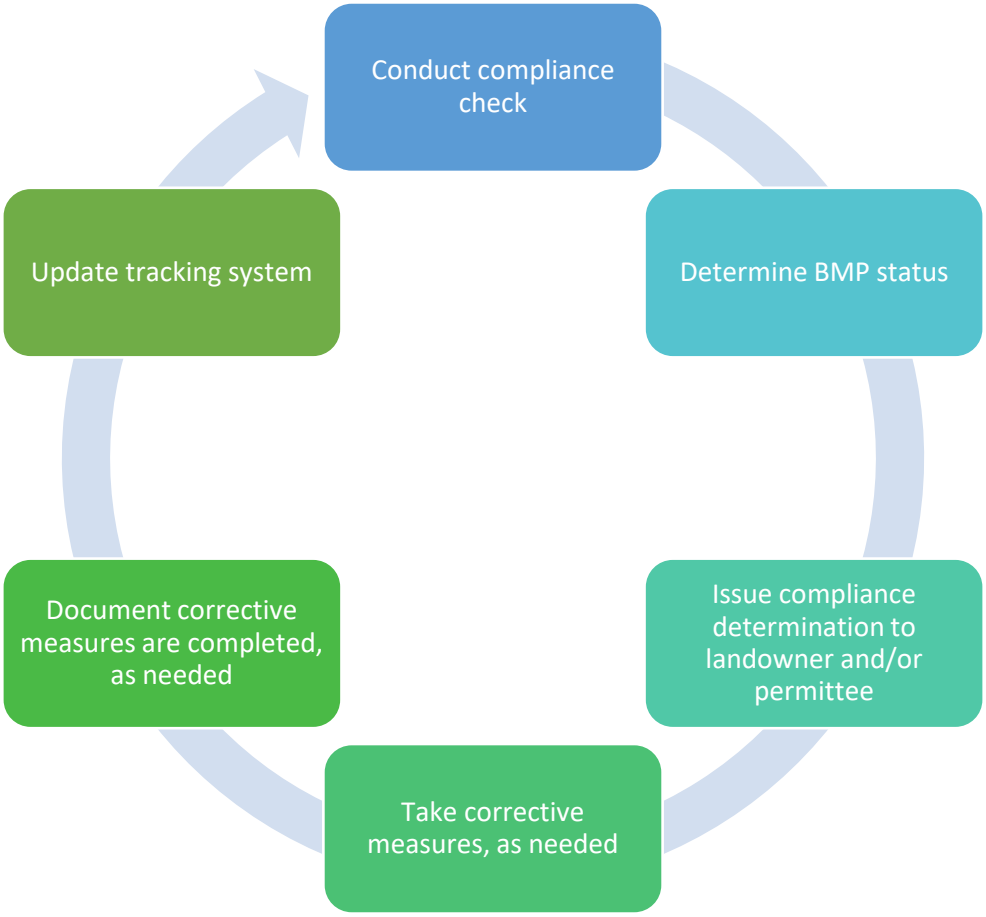


Figure 7: Example BMP Verification Process

Tracking

In order to adequately track and report on implementation of AM or WQT programs, NPS implementers should ensure staff have the appropriate tools, resources, training, and knowledge to accurately report implementation progress. Existing tracking systems utilized by the NPS implementer may work well for AM and WQT programs. Spatially-based databases, such as GIS, will likely be the most popular tool used to track implementation. Parcel ID numbers or codes are recommended as the common unit for tracking practices, regardless of implementation program (i.e. adaptive management, water quality trading, NR 151 implementation, FPP, county ordinances, TMDL implementation, etc.) Apart from the tracking system used, BMPs may need to be tracked on a regular basis from installation through a BMP's lifespan in order to report progress for compliance under a WPDES permit. Figure 8 displays some example categories that may be included in a tracking system.

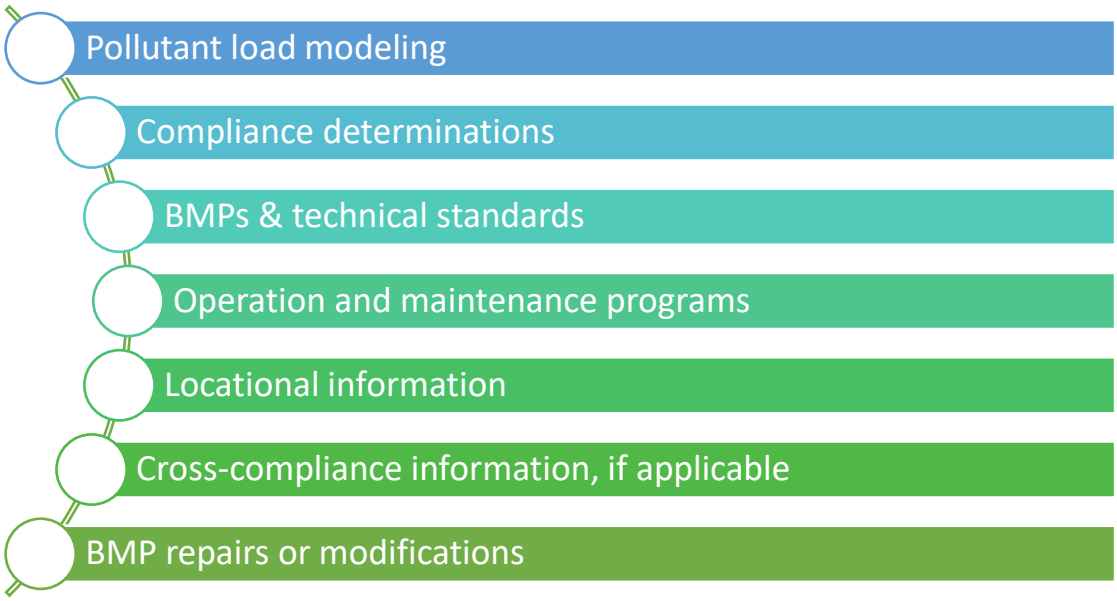


Figure 8: Elements for Tracking Systems

Reporting

Under AM or WQT programs, point sources are required to submit regular status and verification reports to the WDNR as part of the permit compliance schedule, ensuring compliance with permit conditions. The main report is an annual report which will include a variety of information related to the implementation of the approved plan. The compilation work associated with developing this report may be contracted by the point source to a NPS implementer. However, the submittal responsibility and compliance liability of the report lies with the permit holder. Figure 9 briefly outlines the major elements that should be included in an annual report for AM and WQT programs.

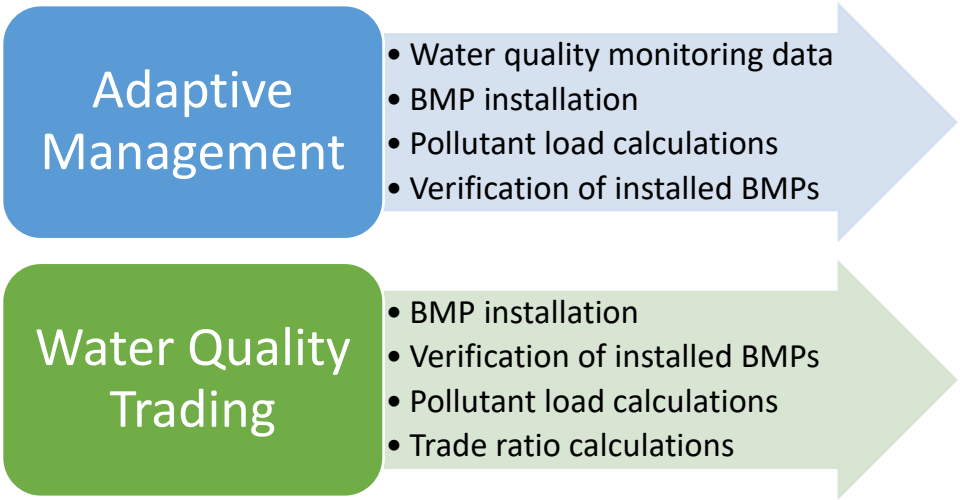


Figure 9: Annual Reporting for AM and WQT[6]

[6] Complete reporting requirements for permittees is discussed in other guidance documents, as referenced in the Introduction section of this appendix, as well as the WPDES permit.

Summary

AM and WQT programs are compliance options that WPDES permitted dischargers can select in Wisconsin that provide opportunities to work in an identified watershed to reduce pollutant loads and improve water quality. These programs present an opportunity to bring point source and nonpoint source entities together to address local water quality issues holistically. NPS implementers should be aware of their skills, knowledge and abilities and how they can be beneficial for implementation of successful AM and WQT programs. Consideration of all of the elements that go into implementing a successful AM or WQT plan is key to making these programs work for Wisconsin and improve water quality.

References & Resources

The following is a list of references and resources available to NPS implementers.

Watershed Adaptive Management Request, Form 3200-139
http://dnr.wi.gov/topic/surfacewater/documents/AM_Request_Form.pdf

Notice of Intent to Conduct Water Quality Trading, Form 3400-206
http://dnr.wi.gov/topic/surfacewater/documents/NOI_WQT.pdf

Water Quality Trading Checklist, Form 3400-208
http://dnr.wi.gov/topic/surfacewater/documents/Checklist_WQT.pdf

Water Quality Trading Management Practice Registration, Form 3400-207
http://dnr.wi.gov/topic/surfacewater/documents/PracticeReg_WQT.pdf

Pollutant Load Ratio Estimation Tool (PRESTO)
http://dnr.wi.gov/topic/surfacewater/PRESTO.html

Water Quality Trading Tools Table (2014)
http://dnr.wi.gov/topic/surfacewater/documents/wqtradingtoolstable_2014.pdf

Erosion Vulnerability Assessment for Agricultural Lands (EVAAL)
http://dnr.wi.gov/topic/nonpoint/evaal.html

Wisconsin's Runoff Rules: What farmers need to know (2013)
http://dnr.wi.gov/topic/Nonpoint/documents/farmersneed.pdf

Cost-Share Agreement, Form 3400-069
http://dnr.wi.gov/files/PDF/forms/3400/3400-069.pdf

SnapPlus - Wisconsin's Nutrient Management Planning Software
https://snapplus.wisc.edu/

Appendix D – Using SnapPlus to Quantify Phosphorus Trading Credits

Last Revised: November 2019

Purpose

The purpose of this document is to provide technical assistance for using the "P Trade" report in SnapPlus to quantify phosphorus trading credits. This document does not detail data needs for SnapPlus or how to use the SnapPlus tool. It is recommended that individuals interested in using the SnapPlus tool review the SnapPlus user manual, available at http://snapplus.wisc.edu/users-manual , and attend a SnapPlus training session to gain additional information about data needs and using this tool. This document also refers to WDNR's water quality trading program available at: http://dnr.wi.gov/topic/SurfaceWater/WaterQualityTrading.html.

Background on SnapPlus

SnapPlus (Soil Nutrient Application Planner) is a widely used software program to prepare NRCS 590 standard compliant nutrient management plans. The program helps farmers make the best use of their on-farm nutrients allowing informed and justified commercial fertilizer purchases. Two critical features of this program related to water quality are its ability to generate, by field, a phosphorus index (PI) value and capability to calculate soil erosion, based on the revised universal soil loss equation (RUSLE2). By calculating potential soil and phosphorus runoff losses on a field-by-field basis while assisting in the economic planning of manure and fertilizer applications, SnapPlus provides Wisconsin farmers with a tool for protecting soil and water quality. SnapPlus is supported by UW-Madison Department of Soil Science, DATCP, NRCS, UW-Extension, and WDNR, and is available for download at http://snapplus.wisc.edu/.

SnapPlus was recently augmented to quantify phosphorus reductions for trading and adaptive management projects. SnapPlus, which has been calibrated using edge of field monitoring, is the preferred tool for trading and adaptive management because it can quantify the amount of phosphorus delivered from a farm field to the nearest surface water both with and without management practices installed. Management practices that can be quantified include whole field management, cover crops, conservation easements, and nutrient management and supporting practices, among other things.

Model Assumptions

When using SnapPlus to quantify phosphorus pollutant reductions resulting from changes in agricultural practices, it is important to understand there are several basic limitations of this model. Certain field elements will not be appropriate for quantification with SnapPlus. Fields that contain incompatible elements, when modeled in SnapPlus, may result in under or over-estimating phosphorus loss and may not be appropriate for a water quality trade. Please consult with WDNR staff when using SnapPlus to model pollutant reductions from agricultural practices.

A critical assumption of SnapPlus phosphorus loss calculations is that farm fields do not have ongoing gullies or concentrated flow channel erosion. If fields have gullies or concentrated flow erosional features, the P Trade report phosphorus loss calculation is underestimated and, accordingly, DNR may not accept P Trade reports that contain these fields.

SnapPlus also does not account for tile drains and associated phosphorus loss to surface waters from them. With that said, SnapPlus can still be used for tile drained fields; however, the uncertainty factor for a tile drained field will need to be increased to account for the additional uncertainty associated with the tile drainage. In addition, the application of manure, biosolids or industrial waste on tile drained fields may further increase the uncertainty associated with modeled pollutant reductions occurring on those fields. Uncertainty factors are discussed in greater detail below.

Data Inputs

The P Trade Report is designed to aggregate data in SnapPlus to quantify the annual amount of phosphorus that is delivered to the nearest receiving water from specific farm fields under modeled management practices. For water quality trades that rely upon cropping practices, all fields owned and operated by the farm should be included in the farm SnapPlus database. For water quality trades that rely upon structural practices, only the fields with structural practices should be included in the farm SnapPlus database. Figure 1 provides examples of structural and cropping practices.

Figure 1 – Examples of Structural and Cropping Practices

Structural Practices	Cropping Practices
Riparian Buffers + Conservation Easements	Nutrient Management
Riparian Filter Strip + Field Border	Tillage + Residue Management
Grassed Waterway Wetland Restoration Sediment Control Basin Heavy Use Area Protection	Cover Crops + Crop Rotation (e.g., increase perennial crops) Contour Farming + Contour Strips Edge of Field Filter Strip Manure Applications – timing, rates, amounts, methods, and manure types Prescribed Grazing Conversion to Prairie

When using cropping practices for water quality trading, include all fields owned or rented by the producer to demonstrate existing phosphorus losses are not 'shifted' to other fields ensuring an overall net reduction in phosphorus load.

Once the farm database has been created to reflect structural or cropping practices, it is important to verify that all field information is included in the "Fields" tab, particularly the predominant soil type information. The P Trade Report uses the predominant soil type (i.e., the largest soil unit within the field) to quantify the phosphorus loss in lieu of the critical soil type used for calculation of the Wisconsin P-Index. Other tabs in SnapPlus, including "Soil Tests" and "Nutrients", should be filled out the same as they would be when using SnapPlus to calculate a P-Index value.

Predominant soil type information is available from:

- Wisconsin 590 Interactive maps - http://www.manureadvisorysystem.wi.gov/app/interactive
- Web Soil Survey - http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

A minimum of two years of historical data are needed in order to generate the P Trade Report. Historic nutrient management plans and soil test values can be used to create the historic record and identify current rotations and management practices for all fields in the farm database. Although a two-year historic record is required for the P Trade Report, it is recommended the historic data for the full crop rotation be used whenever available. If nutrient management plans are used in water quality trading, they need to be updated after each crop year to reflect real, rather than planned, management. If historic nutrient management plans are not available:

- Interview the farmer, agronomist, or County LCD staff familiar with the field(s) to gather additional information and help determine what reasonable assumptions for fields included in the P Trade report
- Use USDS-NASS Cropscape tool to estimate historical crop patterns - https://nassgeodata.gmu.edu/CropScape/
- Use County average cropping yield information. NOTE: Using county yield data with caution; it may over or under-estimate field P losses based upon management
- Soil test all fields (routine agricultural soil test included soil test P and organic matter %) and apply the current data to the historical recordSoil testing protocol should be consistent with the 2013 Sampling Soils for Testing (A2100) publication - https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A2100.pdf.
    - For WQ Trades, soil sampling depth should be consistent for all samples and be at least six inches deep. Sample locations within the field should be documented using GPS coordinates. It is important to take soilsamples from the same locations in the field to exactly the same depth when comparing soil sample results from a field over time.

WDNR will verify SnapPlus inputs for consistency with water quality trade plans and agreements, as well as available baseline data. The most efficient way to share SnapPlus inputs with WDNR is by including the SnapPlus database files used to generate P Trade reports when submitting water quality trade materials.

Running the P Trade Report

Once the historic record/cropping practices have been entered into SnapPlus database, run the P Trade report, absent the new practices that will be installed to reduce phosphorus. This report provides field specific annual phosphorus losses from the farm and will serve as the "baseline" for future comparisons. Table 1 is an example "baseline" P Trade Report generated from SnapPlus.

Table 1 - Baseline P Trade Report **Current cropland practices**

Farm	Field	Acres	PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	80 1	21.0	50	18	18	14	35	175	170
Farm A	80 2	10.0	13	12	7	33	58	59	19
Farm A	80 3	12.0	10	7	5	36	59	66	19

Farm A	80 4	20.0	23	131	89	31	22	18	14
Farm A	80 6	12.0	13	9	7	45	99	78	23
Farm A	HOME 1	22.0	158	41	20	19	14	34	168
Farm A	HOME 2	12.0	19	68	67	25	16	13	10
Farm A	HOME 3	10.0	49	6	26	35	8	6	4
Farm A	HOME 4	9.0	9	43	147	161	44	17	16
Farm A	HOME 5	7.0	20	66	75	23	13	13	10
Farm A	MART 1	2.0	9	3	3	3	2	3	11
Farm A	MART 2	23.0	15	18	14	22	44	80	20
Farm A	MART 3	4.0	1	1	1	1	1	1	1
Farm A	PASTURE East	3.0	45	46	46	47	47	48	48
Farm A	PASTURE West	13.0	16	14	16	21	21	21	21
Farm A	TILLIES 1	13.0	215	51	16	15	10	39	183
Farm A	TILLIES 2	11.0	5	18	66	94	21	10	9
Farm A	TILLIES 3	10.0	81	16	13	14	5	14	76
Farm A	TILLIES 4	16.0	16	15	17	36	114	141	33
Farm A	TILLIES 5	11.0	17	86	92	18	11	8	5
Farm A	TILLIES 6	10.0	5	3	13	48	82	16	7
Total		**251**	**788**	**671**	**757**	**741**	**726**	**859**	**867**

PTP = Potentially Tradeable Phosphorus

Next, make a copy of the database, rename it to indicate it will include management changes, and open the copied database in SnapPlus. Modify the Cropping inputs for each field to reflect management practices that will be installed or used as part of the water quality trade for the trade contract years. Run the P Trade report again to create a "reduction" report. Table 2 is an example "reduction" P Trade Report generated from SnapPlus. P reduction practices are planned for installation beginning in year 2016.

Table 2 - Reduction P Trade Report

Years P reduction practices installed

Farm	Field	Acres	PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	80 1	21.0	50	18	18	14	24	154	145
Farm A	80 2	10.0	13	12	7	31	71	57	19
Farm A	80 3	12.0	10	7	5	33	87	64	20
Farm A	80 4	20.0	23	131	89	31	22	18	14
Farm A	80 6	12.0	13	9	7	42	106	76	23
Farm A	HOME 1	22.0	158	41	20	19	14	24	148
Farm A	HOME 2	12.0	19	68	61	24	12	12	10
Farm A	HOME 3	10.0	49	6	25	34	4	4	3
Farm A	HOME 4	9.0	9	43	129	139	42	17	16
Farm A	HOME 5	7.0	20	66	69	23	13	13	10
Farm A	MART 1	2.0	3	2	2	2	2	2	5
Farm A	MART 2	23.0	13	14	12	16	27	54	14
Farm A	MART 3	4.0	1	1	1	1	1	1	1
Farm A	PASTURE East	3.0	45	46	26	23	23	23	23

Farm A	PASTURE West	13.0	16	17	21	21	21	22	22
Farm A	TILLIES 1	13.0	215	51	16	15	10	24	151
Farm A	TILLIES 2	11.0	5	18	60	82	20	10	9
Farm A	TILLIES 3	10.0	81	16	13	14	5	9	65
Farm A	TILLIES 4	16.0	16	15	17	26	90	122	31
Farm A	TILLIES 5	11.0	17	86	84	18	11	8	5
Farm A	TILLIES 6	10.0	5	3	9	40	71	15	7
Total		**251**	**780**	**669**	**691**	**649**	**679**	**729**	**741**

PTP = Potentially Tradeable Phosphorus

In order to determine the total phosphorus reduction for each year, subtract the total phosphorus load calculated in the "reduction" report from the total phosphorus load calculated in the "baseline" report for each field.

The P Trade Report function is found under the "Reports" menu of the SnapPlus user interface. For additional convenience, SnapPlus allows users to create reports using Adobe pdf, MS Excel spreadsheet or other applications. Using MS Excel to create P Trade Reports can help make a field specific comparison between baseline and reduction loads to calculate the resulting P savings. Table 3 provides a comparison example using SnapPlus MS Excel spreadsheet:

Years P reduction practices installed

Table 3 - Comparison of Baseline and Reduction Reports

Farm	Field	Acres		PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	80 1	21.0	Baseline	50	18	18	14	35	175	170
Farm A	80 1	21.0	Reduction	50	18	18	14	24	154	145
Farm A	**80 1**	**21.0**	**Savings**	**0**	**0**	**0**	**0**	**11**	**21**	**25**
Farm A	80 2	21.0	Baseline	13	12	7	33	58	59	19
Farm A	80 2	21.0	Reduction	13	12	7	31	71	57	19
Farm A	**80 2**	**21.0**	**Savings**	**0**	**0**	**0**	**0**	**-23**	**2**	**0**
Farm A	80 3	12.0	Baseline	10	7	5	36	59	66	19
Farm A	80 3	12.0	Reduction	10	7	5	33	87	64	20
Farm A	**80 3**	**12.0**	**Savings**	**0**	**0**	**0**	**3**	**-28**	**2**	**-1**
Farm A	TILLIES 1	13.0	Baseline	215	51	16	15	10	39	183
Farm A	TILLIES 1	13.0	Reduction	215	51	16	15	10	24	151
Farm A	**TILLIES 1**	**13.0**	**Savings**	**0**	**0**	**0**	**0**	**0**	**15**	**32**
Farm A	TILLIES 2	11.0	Baseline	5	18	66	94	21	10	9
Farm A	TILLIES 2	11.0	Reduction	5	18	60	82	20	10	9
Farm A	**TILLIES 2**	**11.0**	**Savings**	**0**	**0**	**6**	**12**	**1**	**0**	**0**
Farm A	TILLIES 3	10.0	Baseline	81	16	13	14	5	14	76
Farm A	TILLIES 3	10.0	Reduction	81	16	13	14	5	9	65
Farm A	**TILLIES 3**	**10.0**	**Savings**	**0**	**0**	**0**	**0**	**0**	**5**	**10**
Farm A	TILLIES 4	16.0	Baseline	16	15	17	36	114	141	33

Farm A	TILLIES 4	16.0	Reduction	16	15	17	26	90	122	31
Farm A	**TILLIES 4**	**16.0**	**Savings**	**0**	**0**	**0**	**10**	**24**	**19**	**2**
Farm A	TILLIES 5	11.0	Baseline	17	86	92	18	11	8	5
Farm A	TILLIES 5	11.0	Reduction	17	86	84	18	11	8	5
Farm A	**TILLIES 5**	**11.0**	**Savings**	**0**	**0**	**8**	**0**	**0**	**0**	**0**
Farm A	TILLIES 6	10.0	Baseline	5	3	13	48	82	16	7
Farm A	TILLIES 6	10.0	Reduction	5	3	9	40	71	15	7
Farm A	**TILLIES 6**	**10.0**	**Savings**	**0**	**0**	**4**	**8**	**11**	**1**	**0**

Reminder: A water quality trading plan should be submitted to WDNR before installation of practices. Alternatively, the management practice registration form may also be used.

Converting PTP to Credit

Apply trade ratios to the calculated total P reduction to convert pounds per year into phosphorus credits. As described in the *Guidance for Implementing Water Quality Trading in WPDES Permits*, trade ratios are designed to account for the uncertainties associated with water quality trading.

Table 7. Types of uncertainty associated with trading and credit generation.

Delivery	• Accounts for the distance between the credit generator and the credit user, and the impact that this distance can have on fate and transport of the pollutant.
Downstream	• Adjusts for local water quality impacts if the credit user is upstream of the credit generator.
Equivalency[1]	• Accounts for situations where trading partners discharge different forms of the traded pollutant. Example: Total Nitrogen vs. Nitrate-Nitrogen
Uncertainty	• Accounts for modeling inaccuracies used to quantify load reductions, ease of verification of the practice, and the reliability of the practice to reduce loads.

1- *Equivalency is not applicable for phosphorus or TSS trades at this time.*

Each component of the trade ratio can be determined if you:

A. <u>Know the practices</u> that are generating the phosphorus reductions (i.e. the ones you added in the "reduction" report), and

B. Know the location of the farm, or credit generator, in relation to the credit user. See *Guidance for Implementing Water Quality Trading in WPDES Permits* for a description of downstream and delivery factors.

Know the practices

The key component of the trade ratio that directly relates to the phosphorus-reducing practices themselves is the uncertainty factor. See Appendix H - Management Practices and Associated Information of the *Guidance for Implementing Water Quality Trading in WPDES Permits for specific values*. The following categories convey the amount of uncertainty associated with various agricultural and other pollutant reduction practices:

Very High-certainty Practices

Multiple systems of agricultural best management practices have been shown to perform better at reducing nutrient and sediment losses from agricultural fields under a wide variety of climactic conditions. A system of agricultural practices that address both the source and delivery component of nonpoint source pollution help to better reduce or prevent nutrient-laden runoff during extreme weather events, snowmelt, and other runoff generating conditions.

High-certainty Practices

One or more practices that generally function well to limit either the source and/or delivery component of nonpoint source pollution but may be susceptible to localized failure during extreme weather, are assigned an uncertainty factor of 2. There may be more flexibility for types of practices under different scenarios within this category.

Moderate-certainty Practices

Single practices that address only one aspect of nonpoint source pollution (source or delivery) are assigned an uncertainty factor of 3. These practices may be more attainable for certain producers or may be implemented at lower cost across larger areas. SnapPlus results have greater variability associated with a single practice under average annual rainfall and climatic conditions. For example, a field with heavy tillage, nutrient applications, and steep slopes may be greatly benefitted by establishment of a vegetative buffer around the riparian down-slope field margins. Under most conditions, the buffer may intercept sediment and nutrients in runoff. However, without addressing the source of the runoff, the buffer may become saturated or overwhelmed to reduce runoff during repeated high rainfall or during extreme weather events. Risks include concentrated flow, gully formation, vegetation damage, and excessive sedimentation. For a higher-certainty pollutant reduction, practices that address soil loss on the field, such a conservation tillage and farming on the contour, could be established.

Example Calculation using one practice:

Assume that the credit generator is a 240-acre farm and plans to generate phosphorus credits for 2014 by installing edge of field filter strips on five fields. Edge of field filter strips has an uncertainty factor of 2:1. The total phosphorus reduction calculated using SnapPlus P Trade report for the five fields is 114 lbs. in 2014. Therefore, the final phosphorus credit for 2014 is:

Final Credit= 114 lbs. / 2 = 57 lbs. of TP credit in 2014

Example Calculation using multiple practices:

Some trades may utilize a variety of phosphorus-reducing practices to generate phosphorus credits. In these instances, a variety of uncertainty factors may apply. Applying a trade ratio to each field is recommended to calculate field-specific credits.

$$Field\ Weighted\ Trade\ Ratio = \frac{\sum\ (Practice\ specific\ trade\ ratio * \#of\ acres/practice)}{\sum\ (acres\ with\ trading\ practices\ )}$$

For example, let's assume that the same 240-acre farm generates credits by:

- Installing of edge of field filter strip serving a 20-acre field and the filter strip is 0.25 acres in size;
- Planting cover crops on a 15-acre field;
- Implementing conservation tillage (no till) practice within the same 20 and 15-acre fields

Because the nonpoint source fields are upstream and within the same watershed as the point source, and trading for phosphorus, the trade ratio is equal to the uncertainty factor for the specific practices. According to Appendix H of the *Guidance for Implementing Water Quality Trading in WPDES Permits*, (http://dnr.wi.gov/topic/SurfaceWater/WaterQualityTrading.html) the uncertainty factor for filter strips, cover crops and conservation tillage is 2:1, provided the fields are under an approved Nutrient Management Plan. Applying a field specific trade ratio for each field results in the following:

20-acre field with conservation tillage and filter strip (0.25 acres) = 2:1 Trade Ratio
15-acre field with conservation tillage and cover crops = 2:1 Trade Ratio

Final credits are calculated by applying the field weighted trade ratio to the field specific total phosphorus reduction created from the SnapPlus P Trade Report.
Note: Contact your local AM/WQT regional coordinator if you would like to pursue an alternative method for deriving a trade ratio in a multiple practice scenario.

Reminder: The minimum trade ratio for point source to nonpoint source trades in 1.2:1.

Using a Rotational Average Pollutant Reduction

Nutrient management efforts for agricultural fields are often captured over a crop rotation framework. Yield goals, cropping practices, and nutrient applications are planned over a crop rotation, and changes that occur based on a water quality trade will very likely impact the entire future cropping rotation. When establishing baseline (pre-trade) conditions for agricultural fields in SnapPlus, multiple years of historic records will reflect a pattern commensurate with the cropping rotation (for example: corn-alfalfa-corn-alfalfa). When a historical baseline has been established and modeled through the water quality trading plan duration, it may be appropriate to average the annual phosphorus and sediment

loss values across the duration of the water quality trading plan. Furthermore, when a SnapPlus model shows new or additional cropping practices as part of a water quality trading effort, the future projected phosphorus losses from SnapPlus may also be averaged. The resulting baseline and future rotational averages may then be compared to arrive at a single rotational average pollutant reduction value. Rotational averaging SnapPlus results should not extend beyond a five year permit term in a given average. Water quality trading plans and agreements must ensure all practices modeled are implemented to be consistent with rotational averaged values. In other words, a SnapPlus model may not include practices in a rotational average that are not supported by a water quality trading plan or agreement. Table 7 shows SnapPlus P Trade report annual results and then the rotational average applied to a corn-soybean rotation converted to perennial vegetation beginning in 2020.

Table 7 – Example Rotational Average

Value Type	Field	Acres	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025
Baseline Crop	32A	39.8	Corn	Soy	Corn	Soy	Corn	Soy	Corn	Soy
Baseline PTP	32A	39.8	160	120	160	120	160	120	160	120
Trade Crop	32A	39.8	Corn	Soy	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Trade PTP	32A	39.8	160	120	20	20	20	20	20	20
P Reduction	32A	39.8	n/a	n/a	140	100	140	100	140	100

PTP = Potentially Tradeable Phosphorus

Average PTP from Corn-Soybean Rotation = (160+120)/2
Average PTP from Corn-Soybean Rotation = 140

Average PTP from Perennial Vegetation Established for 2020 = 20

Pollutant Reduction = 140 – 20

PTP Available each year 2020 through 2025 = 120

Using the P Trade Report within Approved TMDL Watersheds

Using the P Trade Report within approved TMDL watersheds requires an additional step (from the process described above) to determine final water quality trading credits. This step requires identifying the credit threshold for a TMDL watershed, applying the threshold to SnapPlus P Trade report results and then using applicable trade ratios.

According to WDNR's *Guidance for Implementing Water Quality Trading in WPDES Permits*, a credit threshold refers to the amount of pollutant reduction that needs to be achieved before credits are generated. In watersheds with an approved TMDL, the credit threshold is set equal to the TMDL load allocation. Approved TMDL load allocations are determined by calculating how much reduction below baseline load conditions is needed so an impaired waterbody can meet water quality standards. If a credit user works with a nonpoint source credit generator to comply with a TMDL load allocation,

"interim" credit is generated, meaning the point source will receive credit for these reductions for up to ten years. The interim credit value is based upon the difference between pre-trade conditions and the load allocation. "Long Term" credit is given for reductions that reduce pollutant loading to levels below the load allocation in approved TMDL areas. In lieu of achieving the load allocation, trades in certain TMDL watersheds may employ an interim floor value that represents a systems-based target for preventing nutrient losses to surface water. While the interim floor defines a minimum control level that must be achieved before credits are generated, it does not distinguish between interim and long-term credits. For more information, see Section 3.3, page 23, of the *Guidance for Implementing Water Quality Trading in WPDES Permit*

When using the P Trade Report within approved TMDL watersheds, implement the following:

STEP 1 - Run P Trade Baseline and Reduction reports to determine farm total and field specific P reductions as shown in figures 2 and 3 below

Years P reduction practices installed

Figure 2 – Total P reductions for all farm fields

Farm		Acres	PTP 2014	PTP 2015	PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	**Baseline**	**251**	**788**	**671**	**757**	**741**	**726**	**859**	**867**
	Reduction	**251**	**780**	**669**	**691**	**649**	**679**	**729**	**741**
	Savings	**251**	**8**	**2**	**66**	**92**	**47**	**130**	**126**

PTP = Potentially Tradeable Phosphorus

Figure 3 – Field specific P savings

Farm	Field	Acres		PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020
Farm A	1	21.0	Baseline	18	14	35	40	48
Farm A	1	21.0	Reduction	18	14	24	34	39
Farm A	**1**	**21.0**	**Savings**	**0**	**0**	**11**	**6**	**8**
Farm A	2	20.0	Baseline	7	33	38	57	47
Farm A	2	20.0	Reduction	7	31	32	34	31
Farm A	**2**	**20.0**	**Savings**	**0**	**2**	**6**	**21**	**16**
Farm A	TILL 1	13.0	Baseline	16	15	28	37	42
Farm A	TILL 1	13.0	Reduction	16	15	12	18	20
Farm A	**TILL 1**	**13.0**	**Savings**	**0**	**0**	**14**	**19**	**22**
Farm A	TILL 2	21.0	Baseline	66	94	21	22	29
Farm A	TILL 2	21.0	Reduction	39	46	11	10	15
Farm A	**TILL 2**	**21.0**	**Savings**	**10**	**12**	**10**	**12**	**14**

PTP = Potentially Tradeable Phosphorus

STEP 2 - For each field with P savings, complete the following as shown in figure 4:

a. Obtain TMDL Credit Threshold* (lbs/ac/yr) from DNR for the field location(s) and insert into P

Trade Report for comparison

b. Convert Baseline and Reduction annual P loss to lbs/ac/yr ratio by dividing annual P loss by field total acres

c. Subtract Reduction (lbs/ac/yr) from either Baseline or TMDL credit threshold values; if Baseline (lbs/ac) for field is greater than TMDL credit threshold (lbs/ac), use the TMDL Credit Threshold – see columns with green and yellow below in figure 4

d. Multiply difference values (lbs/ac/yr) by acres on field to get P savings for year (lbs)

e. Convert P savings into Final Credits using appropriate trade ratio(s)

** = The TMDL credit threshold may vary by field location within a watershed. Please consult with DNR to determine TMDL credit threshold for fields in approved TMDL watersheds.*

Figure 4 – Compare Field Baseline and Reduction PTP (lbs/ac/yr) to TMDL credit threshold (lbs/ac/yr)

Farm	Field	Acres		PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020	
Farm A	1	21.0	Baseline	18	14	35	40	48	
Farm A	1	21.0	Reduction	18	14	24	34	39	
Farm A	**1**	**21.0**	**Savings**	**0**	**0**	**11**	**6**	**9**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		0.9	0.7	1.7	1.9	2.3	
Step 2.b	Reduction	lbs/ac		0.9	0.7	1.1	1.6	1.9	
Step 2.c	Difference	lbs/ac		0	0	0.6	0.3	0.1	
Step 2.d	Difference x field acres	lbs		0	0	11.8	6.3	2.1	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**0**	**0**	**5.9**	**3.1**	**1.1**	
Farm A	2	20.0	Baseline	7	33	38	57	47	
Farm A	2	20.0	Baseline	7	33	38	57	47	
Farm A	2	20.0	Reduction	7	31	32	34	31	
Farm A	**2**	**20.0**	**Savings**	**0**	**2**	**6**	**21**	**16**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		0.4	1.7	1.9	2.9	2.3	
Step 2.b	Reduction	lbs/ac		0.4	1.6	1.6	1.7	1.6	
Step 2.c	Difference	lbs/ac		0	0.1	0.3	0.3	0.4	
Step 2.d	Difference x field acres	lbs		0	2	6	6	8	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**0**	**1**	**3**	**3**	**4**	

PTP = Potentially Tradeable Phosphorus

Figure 4 - continued

Farm	Field	Acres		PTP 2016	PTP 2017	PTP 2018	PTP 2019	PTP 2020	
Farm A	TILL 1	13.0	Baseline	16	15	28	37	42	
Farm A	TILL 1	13.0	Reduction	16	15	12	18	20	
Farm A	**TILL 1**	**13.0**	**Savings**	**0**	**0**	**14**	**19**	**22**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		1.2	1.2	2.2	2.8	3.2	
Step 2.b	Reduction	lbs/ac		1.2	1.2	0.9	1.4	1.5	
Step 2.c	Difference	lbs/ac		0	0	1.1	0.6	0.5	
Step 2.d	Difference x field acres	lbs		0	0	14.3	7.8	6.5	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**0**	**1**	**7.1**	**3.9**	**3.3**	
Farm A	TILL 2	21.0	Baseline	66	94	21	22	29	
Farm A	TILL 2	21.0	Reduction	39	46	11	10	15	
Farm A	**TILL 2**	**21.0**	**Savings**	**10**	**12**	**10**	**12**	**14**	
Step 2.a	TMDL credit Threshold	lbs/ac		2.0	2.0	2.0	2.0	2.0	
Step 2.b	Baseline	lbs/ac		3.1	4.5	1.0	1.0	1.4	
Step 2.b	Reduction	lbs/ac		1.9	2.2	0.5	0.5	0.7	
Step 2.c	Difference	lbs/ac		0.1	-0.2	0.5	0.6	0.7	
Step 2.d	Difference x field acres	lbs		2.1	0	10.5	7.8	14.7	
Step 2.e			Trade Ratio	2:1	2:1	2:1	2:1	2:1	
			Final Credit	**1**	**0**	**5.3**	**3.9**	**7.4**	

PTP = Potentially Tradeable Phosphorus

Narrative Example

Using the P Trade report, a farm has two fields with a baseline P loss of 4 lb/ac/yr under current management practices. The farm's fields are all located within a TMDL approved watershed and the TMDL load allocation/credit threshold for agriculture in the watershed is 2 lb/ac/yr.

In order to sell credits to a point source discharge, the farm implements additional conservation practices on the two fields to reduce their annual P loss from a 4 to 1 lb/acre/year. Because the TMDL load allocation is 2 lb/ac/yr for the field's location, there is 1 lb/ac/yr available for trading as long-term

credit. Because the practices reduce annual P loss below the TMDL load allocation, the 3 lb/ac/yr reduction is also available for trading, but only for the first ten years and as an interim credit. P credits are determined by applying applicable trade ratios on a field-specific basis to the corresponding P reductions calculated using the P Trade report.

Appendix E – TMDL Credit Threshold and Interim Floor Values

For most TMDLs, the watershed modeling was conducted using the SWAT model. The DNR translated the load allocations derived using the SWAT watershed modeling into edge of field targets and credit thresholds for water quality trading consistent with the SnapPlus nutrient management modeling software. This analysis has been conducted for the Upper Fox-Wolf Basin TMDL, the Lower Fox Basin TMDL, and the Wisconsin River Basin TMDL. Details on the analysis and results can be found in Appendices N and O of the Wisconsin River Basin TMDL and Appendices J and K of the Upper Fox -Wolf Basin TMDL. Due to how watershed modeling was conducted in other TMDLs, such as the Rock River Basin TMDL and Milwaukee River Basin TMDLs, the DNR has not been able to complete this translations analysis; however, steps are being pursued to attempt and produce similar work products for these TMDLs. As information becomes available for other TMDLs, updates will be made to Appendix E.

> *Note: The main challenge is that the Milwaukee River Basin TMDL was developed using a different modeling platform that does not integrate with SnapPlus. The Rock River TMDL can continue to apply the percent reduction to a 6 pound/acre/year to calculate the credit threshold.*

Overview of Soil Conservation Practices selected by DNR within SnapPlus to establish interim floor values with TMDL areas (i.e., Lower Fox, Upper Fox/Wolf and Wisconsin River Basins)

The DNR examined the feasibility attaining of the credit threshold by examining two conservation scenarios. In cases where the credit threshold was difficult to reach, an interim floor has been established to make the generation of water quality trading credits more feasible. This was only done for TP because the TSS Credit Threshold can more easily be reached. To calculate the interim floor, the DNR examined the three most typical crop rotations: Dairy, Cash Grain, and Potato/Vegetable. These crop rotations were analyzed under a combination of different tillage and nutrient application sources, including timing, rates, and methods. The results from this analysis was compared to the baseline TMDL assumptions and resulting credit threshold to set the interim floor.

Table 1 summarizes the categories that were examined under the three scenarios:

> Baseline TMDL Scenario: This corresponds to the baseline agricultural assumptions used to develop the TMDL. Specific details about individual baselines can be found in the respective TMDLs.
>
> Conservation Scenario 1: This scenario implements the management measures listed in Table 1.
>
> Conservation Scenario 2: This scenario implements the management practices of Scenario1 with the additional establishment and maintenance of a grass filter strip / buffer strip.

Other combinations of management practices maybe sufficient to meet the credit threshold or interim floor. The analysis performed by the DNR and the practices listed in Table 1 are not meant to be an all-inclusive examination of potential management practices.

Table 1. Summary of Baseline and Conservation Scenarios

Category	Baseline TMDL practice	Conservation Scenario 1	Conservation Scenario 2
Tillage	Moldboard, chisel + disc, disc, strip or no-till	Dairy and Cash Grain: No till used on all years of crop rotation. Potato and Vegetable include spring cultivation.	Same as #1
Cover Crops	None	Dairy rotation: Winter Rye after corn silage - 2 out of 3 yrs. Cash Grain: small grain cover crop after harvest - 3 out of 6 yrs. Potato/Vegetable: small grain after potato harvest - 1 out of 2 yrs.	Same as #1 Same as #1 Same as #1
Contour Farming	None	Field farmed on contour	Same as #1
Fertilizer Application	Spring or In-Season application	Same as baseline	Same as baseline
Solid Manure Application: method, rate, and timing	Spring or Fall+ Winter application; surface applied or incorporated	No winter application; same baseline timing and rate. No manure incorporation, only surface applied	Same as #1
Liquid Manure Application: method, rate, and timing	Spring or Fall + Winter application; surface applied or incorporated	No winter application; same baseline timing and rate; all liquid manure injected, no surface or incorporation	Same as #1
Dairy Rotation - Forage	Alfalfa: Spring seeding + 3 more alfalfa yrs.	Alfalfa-Grass - Fall or Spring seeding + 3 more alfalfa-grass yrs.	Same as #1
Edge of Field Filter Strip	None	None	Edge of Field Filter Strip established and maintained over crop rotation

The results of the analysis examining the conservation scenarios and the calculation of rounded credit thresholds and interim floors are summarized in the following tables:

Table 2. Lower Fox River Basin TMDL TP Summarized by TMDL Subbasin
Table 3. Lower Fox River Basin TMDL TSS Summarized by TMDL Subbasin
Table 4. Upper Fox and Wolf Basin TMDL TP Summarized by TMDL Subbasin
Table 5. Upper Fox and Wolf Basin TMDL TSS Summarized by TMDL Subbasin
Table 6. Wisconsin River Basin TMDL TP Summarized by TMDL Subbasin

Table 7: Lower Fox River TMDL TP Summarized by Model Subwatershed
Table 8: Upper Fox and Wolf Basin TMDL TP Summarized by Model Subwatershed

For both the Lower Fox River Basin TMDL and the Upper Fox and Wolf River Basin TMDL, values were also able to be calculated at a finer resolution. As shown in Figure 1, the TMDL Subbasins are divided into smaller spatial units called Model Subwatersheds. This was able to be accomplished because of the scale and structure of the SWAT watershed model used in these two TMDLs. When examining water quality trading opportunities, either the values found in the tables summarized by TMDL Subbasin or Model Subwatershed can be utilized. In some cases, the values summarized by TMDL Model Subwatershed may afford greater flexibility. The values listed in the tables by TMDL Subbasin represent an area weighted average of the Model Subwatershed values.

Figure 1. Relationship Between TMDL Subbasin and Model Subwatershed

The column headings for the tables are defined below:
TMDL Subbasin or Model Subwatershed: Is either the numeric identification or name of the TMDL subbasin or model subwatershed. Mapping for the subbasins and subwatersheds can be found in the TMDL reports and the Watershed Restoration Viewer.
https://dnr.wi.gov/topic/SurfaceWater/RestorationViewer/
Baseline TP Loss: Is the TMDL baseline scenario for total phosphorus expressed as a field target consistent with the SnapPlus model. This is accomplished through a translation of the SWAT watershed model inputs into SnapPlus. This corresponds to the baseline agricultural assumptions used to develop the TMDL. Specific details about individual baselines can be found in the respective TMDLs.
Baseline TSS Loss: Is the TMDL baseline scenario for TSS/sediment expressed as an edge of field target consistent with the SnapPlus and RUSLE2 models. This is accomplished through a translation of the SWAT watershed model inputs into SnapPlus and RUSLE2. This corresponds to the baseline agricultural assumptions used to develop the TMDL. Specific details about individual baselines can be found in the respective TMDLs.

TMDL % Reduction: Is the percent reduction calculated by the TMDL analysis for the agricultural nonpoint sources.

TP Credit Threshold: Is calculated by applying the *TMDL % Reduction* to the *Baseline TP Loss*. This represents a translation of the watershed scale load allocation to an edge of field target consistent with SnapPlus.
TSS Credit Threshold: Is calculated by applying the *TMDL % Reduction* to the *Baseline TSS Loss*. This represents a translation of the watershed scale load allocation to an edge of field target consistent with SnapPlus and RUSLE2.
Rounded TP Credit Threshold: Is calculated by rounding the TMDL Agricultural TP Target to the nearest half pound as follows (both expressed in lb./ac/yr.):

TMDL Agricultural TP Target		Rounded TP Credit Threshold
0.01 to 0.59	=	0.5
0.60 to 1.09	=	1.0
1.10 to 1.59	=	1.5
Greater than 1.59	=	(No Rounding)

When selecting the credit threshold to use, the highest value between either *Rounded TP Credit* Threshold or the *TP Credit Threshold* can be used. Reductions obtained at or above the *TP Credit Threshold* or *Rounded TP Credit Threshold*, whichever is selected, are interim credits.
Conservation Scenario 1: This represents a typical base level of conservation effort. See Table 1 for specific parameters. In wastewater jargon, this represents the equivalent of a technology based standard.
Interim Floor: If Conservation Scenario 1 is unable to reach the Credit Thresholds listed, the Interim Floor is set equal to Conservation Scenario 1 and represents the level that must be reached to generate interim credits. Reductions achieved between the existing conditions and the Interim floor are eligible for interim credits. A label of "NA" signifies that the Credit Threshold is high enough that practices installed consistent with Conservation Scenario 1 will be sufficient to generate interim and, in some cases, long-term credits.
Conservation Scenario 2: This represents a typical base level of conservation effort with the addition of an edge of field filter strip or buffer strip. See Table 1 for specific parameters. This scenario is meant to evaluate the potential and feasibility for long-term credits; however, it is not meant to be an exhaustive evaluation of options. If Conservation Scenario 2 is not below the credit threshold, addition and other combinations of management practices will need to be evaluated and implemented to generate long-term credits.

Table 2. Lower Fox River Basin TMDL TP Summarized by TMDL Subbasin

Lower Fox TMDL TP Parameters and Rounded Credit Threshold							Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin		Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
4	Apple Creek	2.99	78.6%	0.64	1.00		0.63	NA		0.33
5	Ashwaubenon Creek	2.34	74.0%	0.61	1.00		0.51	NA		0.29
2	Baird Creek	3.48	80.4%	0.68	1.00		0.68	NA		0.32
3	Bower Creek	3.63	83.2%	0.61	1.00		0.69	NA		0.32
11	Duck Creek	3.15	76.9%	0.73	1.00		0.65	NA		0.30
6	Dutchman Creek	2.89	76.4%	0.68	1.00		0.61	NA		0.31
1	East River	3.3	83.9%	0.53	0.50		0.62	0.62		0.29
9	Garners Creek	2.96	63.1%	1.09	1.00		0.68	NA		0.37
8	Kankapot Creek	2.92	81.8%	0.53	0.50		0.65	0.68		0.34
14	Lower Fox River (main stem)	2.99	74.2%	0.77	1.00		0.64	NA		0.33
15	Lower Green Bay	3.01	60.7%	1.18	1.50		0.59	NA		0.28
10	Mud Creek	2.95	39.0%	1.80	1.80		0.59	NA		0.28
13	Neenah Slough	3.12	66.7%	1.04	1.00		0.74	NA		0.41
7	Plum Creek	3.21	86.0%	0.45	0.50		0.66	NA		0.33
12	Trout Creek	2.23	54.9%	1.01	1.00		0.55	NA		0.30

Table 3. Lower Fox River Basin TMDL TSS Summarized by TMDL Subbasin

Lower Fox TMDL TSS Parameters and Credit Threshold						Feasibility Analysis	
TMDL Subbasin		Baseline TSS Loss ton/ac/yr	TMDL % Reduction	TSS Credit Threshold ton/ac/yr		Conservation Scenario 1 ton/ac/yr	Conservation Scenario 2 ton/ac/yr
4	Apple Creek	2.26	56.1%	0.99		0.53	0.11
5	Ashwaubenon Creek	1.61	39.7%	0.97		0.42	0.09
2	Baird Creek	2.74	30.4%	1.91		0.67	0.14
3	Bower Creek	3	67.3%	0.98		0.7	0.14
11	Duck Creek	2.49	58.6%	1.03		0.58	0.11
6	Dutchman Creek	2.03	35.8%	1.30		0.51	0.11
1	East River	2.75	70.6%	0.81		0.69	0.14
9	Garners Creek	2.42	32.4%	1.64		0.49	0.09
8	Kankapot Creek	2.16	67.4%	0.70		0.54	0.11
14	Lower Fox River (main stem)	2.51	61.9%	0.96		0.54	0.1
15	Lower Green Bay	2.52	47.1%	1.33		0.57	0.11
10	Mud Creek	2.54	8.8%	2.32		0.5	0.09
13	Neenah Slough	2.45	43.2%	1.39		0.53	0.1
7	Plum Creek	2.49	74.6%	0.63		0.62	0.12
12	Trout Creek	1.74	12.3%	1.53		0.38	0.07

Table 4. Upper Fox and Wolf Basin TMDL TP Summarized by TMDL Subbasin

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
1	1.68	88%	0.20	0.50		0.56	0.56		0.30
2	2.74	79%	0.57	0.50		0.82	0.82		0.37
3	3.41	79%	0.71	1.00		1.01	1.01		0.47
4	2.1	88%	0.25	0.50		0.64	0.64		0.40
5	3.14	74%	0.83	1.00		1.06	1.06		0.51
6	2.31	88%	0.27	0.50		0.78	0.78		0.38
7	2.14	88%	0.25	0.50		0.77	0.77		0.44
8	2.14	83%	0.37	0.50		0.61	0.61		0.29
9	1.9	88%	0.22	0.50		0.56	0.56		0.34
10	1.85	83%	0.32	0.50		0.48	NA		0.23
11	4.29	72%	1.19	1.50		1.30	NA		0.46
12	3.94	83%	0.68	1.00		1.28	1.28		0.57
13	3.24	83%	0.56	0.50		1.10	1.10		0.57
14	2.44	83%	0.42	0.50		0.73	0.73		0.39
15	2.13	83%	0.36	0.50		0.63	0.63		0.39
16	2.26	83%	0.39	0.50		0.65	0.65		0.38
17	4.12	68%	1.31	1.50		1.31	NA		0.63
18	4.24	59%	1.75	1.75		1.28	NA		0.61
19	2.97	45%	1.62	1.62		0.93	NA		0.49
20	3.66	0%	3.66	3.66		1.16	NA		0.54
21	1.21	83%	0.21	0.50		0.34	NA		0.19
22	0.85	83%	0.14	0.50		0.24	NA		0.15
23	1.16	83%	0.20	0.50		0.33	NA		0.21
24	1.51	83%	0.26	0.50		0.47	NA		0.30
25	1.98	83%	0.34	0.50		0.67	0.67		0.39

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
26	1.75	83%	0.30	0.50		0.62	0.62		0.38
27	2.69	83%	0.46	0.50		0.88	0.88		0.50
28	1.6	83%	0.27	0.50		0.66	0.66		0.48
29	1.91	83%	0.33	0.50		0.87	0.87		0.47
30	2.3	83%	0.39	0.50		0.90	0.90		0.50
31	2.07	83%	0.35	0.50		0.85	0.85		0.46
32	2.63	83%	0.45	0.50		1.01	1.01		0.61
33	2.49	83%	0.42	0.50		1.01	1.01		0.63
34	2.62	83%	0.45	0.50		1.11	1.11		0.68
35	2.84	83%	0.48	0.50		0.92	0.92		0.44
36	3.09	83%	0.53	0.50		0.91	0.91		0.51
37	2.74	85%	0.41	0.50		0.94	0.94		0.61
38	2.61	83%	0.45	0.50		0.92	0.92		0.46
39	2.87	83%	0.49	0.50		0.98	0.98		0.45
40	3.64	83%	0.62	1.00		1.13	1.13		0.67
41	3.47	83%	0.59	0.50		1.08	1.08		0.70
42	2.48	83%	0.42	0.50		1.02	1.02		0.74
43	2.85	83%	0.49	0.50		1.12	1.12		0.69
44	3.24	83%	0.55	0.50		1.08	1.08		0.55
45	1.4	83%	0.24	0.50		0.55	0.55		0.40
46	2.36	83%	0.40	0.50		0.89	0.89		0.53
47	1.49	83%	0.25	0.50		0.57	0.57		0.38
48	1.72	83%	0.29	0.50		0.76	0.76		0.55
49	2.6	83%	0.44	0.50		0.73	0.73		0.53
50	2.08	83%	0.35	0.50		0.68	0.68		0.45
51	1.86	83%	0.32	0.50		0.71	0.71		0.43

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
52	2.5	83%	0.43	0.50		0.66	0.66		0.43
53	1.71	83%	0.29	0.50		0.55	0.55		0.42
54	1.92	31%	1.33	1.50		0.70	NA		0.58
55	3.1	83%	0.53	0.50		0.81	0.81		0.49
56	1.78	20%	1.42	1.50		0.56	NA		0.44
57	1.55	32%	1.05	1.00		0.53	NA		0.40
58	2.52	83%	0.43	0.50		0.60	0.60		0.44
59	1.65	83%	0.28	0.50		0.44	NA		0.33
60	2.06	83%	0.35	0.50		0.71	0.71		0.48
61	1.96	83%	0.33	0.50		0.83	0.83		0.59
62	2.2	25%	1.66	1.66		0.88	NA		0.61
63	2.28	83%	0.39	0.50		0.68	0.68		0.39
64	1.8	83%	0.31	0.50		0.80	0.80		0.59
65	1.99	38%	1.23	1.50		0.65	NA		0.24
66	2.06	83%	0.35	0.50		0.54	0.54		0.25
67	1.52	83%	0.26	0.50		0.52	0.52		0.41
68	1.89	83%	0.32	0.50		0.70	0.70		0.50
69	2.11	83%	0.36	0.50		0.69	0.69		0.54
70	1.85	83%	0.31	0.50		0.63	0.63		0.43
71	1.62	83%	0.28	0.50		0.65	0.65		0.47
72	1.55	83%	0.26	0.50		0.71	0.71		0.51
73	2.19	83%	0.37	0.50		0.87	0.87		0.49
74	3.3	83%	0.56	0.50		0.95	0.95		0.51
75	2.59	83%	0.44	0.50		1.02	1.02		0.62
76	-	-	-	-		-	-		-
77	3.13	34%	2.07	2.07		0.76	NA		0.58

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
78	1.85	34%	1.23	1.50		0.57	NA		0.48
79	4.3	80%	0.84	1.00		1.36	1.36		0.64
80	2.77	83%	0.47	0.50		0.69	0.69		0.48
81	2.11	83%	0.36	0.50		0.69	0.69		0.43
82	3.09	69%	0.96	1.00		0.87	NA		0.63
83	4.3	34%	2.83	2.83		1.36	NA		0.64
84	3.24	54%	1.49	1.50		1.10	NA		0.57
85	2	90%	0.20	0.50		0.56	0.56		0.21
86	2.36	55%	1.06	1.00		0.60	NA		0.23
87	3.95	76%	0.94	1.00		1.27	1.27		0.58
88	2.68	83%	0.46	0.50		1.11	1.11		0.87
89	1.97	83%	0.33	0.50		0.68	0.68		0.51

Table 5. Upper Fox and Wolf Basin TMDL TSS Summarized by TMDL Subbasin

UFW TMDL TSS Parameters and Credit Threshold					Feasibility Analysis	
TMDL Subbasin	Baseline TSS Loss ton/ac/yr	TMDL % Reduction	TSS Credit Threshold ton/ac/yr		Conservation Scenario 1 ton/ac/yr	Conservation Scenario 2 ton/ac/yr
1	1.71	47%	0.91		0.43	0.07
2	2.72	47%	1.45		0.69	0.11
3	3.29	79%	0.69		0.84	0.13
4	1.80	47%	0.96		0.36	0.06
5	2.64	64%	0.96		0.71	0.10
6	2.33	47%	1.24		0.63	0.09
7	2.16	47%	1.15		0.52	0.08
8	2.30	47%	1.22		0.55	0.09
9	1.94	47%	1.03		0.35	0.06
10	1.96	47%	1.04		0.43	0.07
11	2.92	54%	1.36		0.81	0.10
12	2.56	86%	0.36		0.71	0.10
13	2.32	77%	0.53		0.59	0.09
14	1.97	47%	1.05		0.42	0.07
15	1.87	47%	1.00		0.36	0.06
16	1.78	47%	0.95		0.35	0.05
17	2.73	87%	0.36		0.68	0.10
18	2.83	82%	0.51		0.67	0.10
19	2.15	72%	0.61		0.48	0.08
20	2.44	41%	1.44		0.60	0.09
21	1.29	47%	0.69		0.24	0.04
22	0.92	41%	0.54		0.17	0.03
23	1.20	41%	0.71		0.20	0.03
24	1.53	47%	0.82		0.27	0.05
25	1.82	41%	1.07		0.42	0.07

UFW TMDL TSS Parameters and Credit Threshold					Feasibility Analysis	
TMDL Subbasin	Baseline TSS Loss ton/ac/yr	TMDL % Reduction	TSS Credit Threshold ton/ac/yr		Conservation Scenario 1 ton/ac/yr	Conservation Scenario 2 ton/ac/yr
26	1.52	41%	0.89		0.37	0.06
27	2.00	58%	0.84		0.52	0.09
28	1.19	41%	0.70		0.24	0.05
29	1.52	30%	1.07		0.61	0.10
30	1.78	48%	0.92		0.55	0.09
31	1.54	55%	0.69		0.55	0.09
32	1.73	51%	0.84		0.52	0.10
33	1.54	44%	0.86		0.47	0.09
34	1.41	16%	1.19		0.45	0.08
35	2.08	77%	0.47		0.57	0.09
36	2.26	85%	0.35		0.49	0.08
37	1.82	82%	0.32		0.41	0.08
38	1.92	24%	1.45		0.65	0.11
39	2.34	65%	0.81		0.78	0.13
40	2.63	47%	1.39		0.60	0.11
41	2.41	74%	0.62		0.51	0.11
42	1.15	17%	0.95		0.29	0.06
43	1.44	43%	0.81		0.45	0.08
44	2.35	70%	0.70		0.64	0.10
45	0.96	0%	0.96		0.19	0.04
46	1.89	85%	0.29		0.52	0.09
47	1.17	0%	1.17		0.25	0.05
48	1.02	0%	1.02		0.23	0.05
49	2.31	71%	0.68		0.32	0.06
50	1.68	0%	1.68		0.29	0.06
51	1.42	66%	0.48		0.40	0.07

UFW TMDL TSS Parameters and Credit Threshold					Feasibility Analysis	
TMDL Subbasin	Baseline TSS Loss ton/ac/yr	TMDL % Reduction	TSS Credit Threshold ton/ac/yr		Conservation Scenario 1 ton/ac/yr	Conservation Scenario 2 ton/ac/yr
52	2.23	80%	0.45		0.32	0.06
53	1.43	35%	0.93		0.18	0.04
54	1.63	35%	1.05		0.18	0.05
55	2.16	35%	1.39		0.32	0.05
56	1.69	35%	1.10		0.18	0.04
57	1.37	35%	0.89		0.18	0.04
58	1.80	35%	1.17		0.19	0.04
59	1.48	35%	0.96		0.16	0.04
60	1.60	42%	0.93		0.31	0.06
61	1.42	89%	0.16		0.35	0.06
62	1.77	52%	0.86		0.44	0.08
63	1.54	35%	0.99		0.30	0.04
64	1.13	35%	0.73		0.26	0.05
65	1.77	35%	1.14		0.50	0.04
66	2.02	35%	1.30		0.43	0.06
67	1.30	35%	0.84		0.17	0.04
68	1.35	35%	0.87		0.23	0.04
69	1.67	35%	1.08		0.21	0.04
70	1.39	74%	0.37		0.26	0.04
71	1.13	35%	0.73		0.24	0.05
72	0.95	0%	0.95		0.25	0.05
73	1.76	0%	1.76		0.54	0.09
74	2.84	0%	2.84		0.62	0.10
75	1.88	0%	1.88		0.52	0.09
76	-	-	-		-	-
77	1.94	35%	1.26		0.20	0.05

UFW TMDL TSS Parameters and Credit Threshold					Feasibility Analysis	
TMDL Subbasin	Baseline TSS Loss ton/ac/yr	TMDL % Reduction	TSS Credit Threshold ton/ac/yr		Conservation Scenario 1 ton/ac/yr	Conservation Scenario 2 ton/ac/yr
78	1.41	35%	0.92		0.13	0.04
79	2.84	78%	0.61		0.71	0.10
80	1.98	35%	1.28		0.24	0.04
81	1.50	47%	0.80		0.32	0.05
82	2.53	81%	0.48		0.31	0.06
83	2.84	79%	0.60		0.71	0.10
84	2.32	75%	0.58		0.59	0.09
85	1.79	35%	1.16		0.44	0.05
86	2.38	36%	1.52		0.54	0.08
87	2.65	66%	0.91		0.69	0.09
88	1.38	0%	1.38		0.26	0.06
89	1.64	35%	1.06		0.23	0.05

Table 6. Wisconsin River Basin TMDL TP Summarized by TMDL Subbasin

WI River TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
1	3.30	63%	1.19	1.50		0.99	NA		0.59
2	3.10	63%	1.14	1.50		0.80	NA		0.54
3	1.20	63%	0.45	0.50		0.37	NA		0.30
4	2.80	63%	1.02	1.00		0.96	NA		0.71
5	1.60	63%	0.58	0.50		0.72	0.72		0.50
6	3.10	63%	1.14	1.50		1.29	1.29		0.85
7	4.50	75%	1.10	1.50		1.32	1.32		0.81
8	1.90	63%	0.68	1.00		0.90	0.90		0.58
9	3.20	75%	0.81	1.00		1.36	1.36		0.85
10	5.20	77%	1.18	1.50		1.56	1.56		0.92
11	3.50	63%	1.28	1.50		1.28	1.28		0.85
12	3.90	78%	0.85	1.00		1.28	1.28		0.83
13	4.30	86%	0.61	1.00		1.53	1.53		0.96
14	3.30	66%	1.12	1.50		1.31	1.31		0.86
15	3.70	86%	0.52	0.50		1.17	1.17		0.77
16	2.90	86%	0.40	0.50		0.81	0.81		0.51
17	3.60	63%	1.32	1.50		0.91	NA		0.55
18	4.70	72%	1.32	1.50		1.61	1.61		0.95
19	3.50	68%	1.10	1.50		0.78	0.00		0.50
20	4.10	78%	0.92	1.00		1.01	1.01		0.54
21	7.80	82%	1.44	1.50		1.32	NA		0.65
22	8.80	64%	3.11	3.11		1.65	NA		0.63

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
23	4.80	63%	1.77	1.77	0.93	NA	0.53
24	7.20	70%	2.14	2.14	1.35	NA	0.60
25	5.70	87%	0.76	1.00	1.04	1.04	0.59
26	4.30	63%	1.56	1.56	0.90	NA	0.53
27	4.70	63%	1.72	1.72	0.93	NA	0.54
28	5.10	64%	1.83	1.83	0.91	NA	0.57
29	-	63%	-	-	-	-	-
30	1.60	69%	0.50	0.50	0.71	0.71	0.49
31	0.70	69%	0.21	0.50	0.39	0.39	0.30
32	1.40	69%	0.45	0.50	0.66	0.66	0.45
33	2.30	69%	0.74	1.00	0.66	NA	0.46
34	1.00	63%	0.36	0.50	0.44	0.44	0.28
35	1.00	63%	0.37	0.50	0.42	0.42	0.25
36	0.60	63%	0.24	0.50	0.24	0.24	0.17
37	1.60	75%	0.41	0.50	0.62	0.62	0.37
38	1.00	63%	0.37	0.50	0.46	0.46	0.36
39	1.50	63%	0.55	0.50	0.64	0.64	0.40
40	1.30	73%	0.36	0.50	0.64	0.64	0.39
41	2.00	90%	0.21	0.50	0.60	0.60	0.36
42	2.80	80%	0.55	0.50	0.63	0.63	0.41
43	2.40	63%	0.88	1.00	0.62	NA	0.34
44	3.50	77%	0.81	1.00	0.75	NA	0.47
45	1.40	63%	0.50	0.50	0.42	NA	0.27
46	1.50	75%	0.37	0.50	0.57	0.57	0.39
47	1.10	71%	0.31	0.50	0.42	0.42	0.31

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
48	1.60	63%	0.59	0.50	0.51	NA	0.34
49	3.90	73%	1.05	1.00	0.73	NA	0.55
50	4.10	72%	1.14	1.50	0.69	NA	0.62
51	2.80	93%	0.20	0.50	0.66	0.66	0.45
52	0.70	63%	0.26	0.50	0.28	0.28	0.21
53	0.60	63%	0.21	0.50	0.27	0.27	0.22
54	1.60	83%	0.28	0.50	0.43	0.43	0.34
55	3.30	75%	0.82	1.00	0.65	NA	0.53
56	3.40	63%	1.25	1.50	0.71	NA	0.42
57	4.10	83%	0.71	1.00	0.80	0.80	0.56
58	3.10	75%	0.77	1.00	0.63	NA	0.44
59	0.70	63%	0.24	0.50	0.22	NA	0.16
60	0.30	63%	0.11	0.50	0.14	0.14	0.12
61	0.20	63%	0.08	0.50	0.12	0.12	0.10
62	1.80	63%	0.65	1.00	0.66	0.66	0.45
63	2.30	63%	0.83	1.00	0.71	NA	0.49
64	1.70	79%	0.35	0.50	0.64	0.64	0.45
65	1.90	90%	0.19	0.50	0.69	0.69	0.49
66	1.90	89%	0.22	0.50	0.68	0.68	0.55
67	1.70	88%	0.21	0.50	0.64	0.64	0.46
68	2.10	84%	0.33	0.50	0.72	0.72	0.56
69	2.50	85%	0.36	0.50	0.77	0.77	0.55
70	2.40	85%	0.35	0.50	0.77	0.77	0.56
71	3.50	70%	1.04	1.00	0.91	NA	0.55
72	1.80	93%	0.13	0.50	0.67	0.67	0.52

WI River TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
73	0.40	63%	0.15	0.50		0.11	NA		0.08
74	0.50	63%	0.18	0.50		0.15	NA		0.11
75	0.80	63%	0.30	0.50		0.21	NA		0.14
76	0.80	63%	0.30	0.50		0.19	NA		0.10
77	1.30	63%	0.47	0.50		0.41	NA		0.28
78	1.60	63%	0.58	0.50		0.71	0.71		0.63
79	2.00	63%	0.74	1.00		0.62	NA		0.42
80	1.80	63%	0.65	1.00		0.65	NA		0.52
81	1.30	63%	0.48	0.50		0.39	NA		0.29
82	1.80	75%	0.46	0.50		0.66	0.66		0.51
83	3.40	71%	0.99	1.00		0.83	NA		0.51
84	2.60	77%	0.59	0.50		0.75	0.75		0.53
85	2.80	75%	0.68	1.00		0.79	0.79		0.56
86	2.00	63%	0.74	1.00		0.47	NA		0.26
87	3.40	84%	0.56	0.50		0.74	0.74		0.45
88	3.60	84%	0.58	0.50		0.79	0.79		0.47
89	3.80	84%	0.61	1.00		0.82	0.82		0.46
90	3.10	84%	0.51	0.50		0.80	0.80		0.56
91	3.30	84%	0.54	0.50		0.82	0.82		0.53
92	3.30	84%	0.54	0.50		0.83	0.83		0.60
93	3.00	84%	0.48	0.50		0.82	0.82		0.64
94	3.00	84%	0.49	0.50		0.80	0.80		0.59
95	2.80	86%	0.38	0.50		0.84	0.84		0.71
96	2.90	84%	0.47	0.50		0.79	0.79		0.55
97	2.80	84%	0.45	0.50		0.79	0.79		0.57

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
98	2.40	84%	0.39	0.50	0.66	0.66	0.48
99	2.70	84%	0.45	0.50	0.76	0.76	0.55
100	2.00	84%	0.33	0.50	0.53	0.53	0.35
101	3.10	63%	1.12	1.50	0.74	NA	0.47
102	3.40	67%	1.10	1.50	0.83	NA	0.59
103	3.10	67%	1.00	1.00	0.80	NA	0.61
104	2.60	63%	0.95	1.00	0.71	NA	0.49
105	3.20	68%	1.03	1.00	0.81	NA	0.59
106	3.40	63%	1.24	1.50	0.82	NA	0.55
107	2.50	63%	0.91	1.00	0.71	NA	0.50
108	2.80	63%	1.03	1.00	1.10	1.10	0.97
109	2.10	63%	0.78	1.00	0.52	NA	0.49
110	2.00	63%	0.75	1.00	0.52	NA	0.50
111	2.20	63%	0.79	1.00	0.48	NA	0.38
112	-	63%	-	-	-	-	-
113	5.60	63%	2.04	2.04	1.19	NA	0.76
114	2.80	63%	1.03	1.00	0.89	NA	0.81
115	-	63%	-	-	-	-	-
116	2.50	63%	0.91	1.00	0.78	NA	0.76
117	2.20	63%	0.79	1.00	0.86	0.86	0.84
118	2.40	63%	0.87	1.00	0.87	NA	0.84
119	-	63%	-	-	-	-	-
120	-	63%	-	-	-	-	-
121	-	63%	-	-	-	-	-
122	1.80	63%	0.64	1.00	0.44	NA	0.43

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
123	-	63%	-	-	-	-	-
124	1.90	63%	0.71	1.00	0.38	NA	0.24
125	2.40	63%	0.88	1.00	0.85	NA	0.74
126	0.60	63%	0.22	0.50	0.14	NA	0.13
127	0.30	63%	0.11	0.50	0.13	0.13	0.13
128	-	63%	-	-	-	-	-
129	-	63%	-	-	-	-	-
130	1.80	63%	0.65	1.00	0.17	NA	0.15
131	-	63%	-	-	-	-	-
132	-	63%	-	-	-	-	-
133	-	56%	-	-	-	-	-
134	-	56%	-	-	-	-	-
135	-	56%	-	-	-	-	-
136	-	63%	-	-	-	-	-
137	1.40	63%	0.52	0.50	0.78	0.78	0.52
138	8.30	81%	1.57	1.57	1.51	NA	0.66
139	-	63%	-	-	-	-	-
140	0.10	63%	0.04	0.50	0.03	NA	0.02
141	1.10	63%	0.42	0.50	0.31	NA	0.19
142	1.10	63%	0.42	0.50	0.32	NA	0.21
143	0.30	63%	0.10	0.50	0.10	NA	0.08
144	0.80	63%	0.28	0.50	0.23	NA	0.15
145	0.70	63%	0.25	0.50	0.22	NA	0.17
146	1.80	63%	0.64	1.00	0.69	0.69	0.60
147	2.00	76%	0.47	0.50	0.73	0.73	0.55

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
148	0.70	63%	0.25	0.50	0.21	NA	0.17
149	1.30	63%	0.47	0.50	0.35	NA	0.26
150	2.50	69%	0.76	1.00	0.72	NA	0.50
151	3.70	84%	0.61	1.00	0.83	0.83	0.50
152	3.00	84%	0.48	0.50	0.81	0.81	0.61
153	1.60	63%	0.60	1.00	0.45	NA	0.32
154	3.30	63%	1.21	1.50	0.72	NA	0.45
155	2.70	63%	0.99	1.00	0.67	NA	0.50
156	3.20	63%	1.16	1.50	0.68	NA	0.49
157	3.50	63%	1.30	1.50	0.82	NA	0.53
158	2.90	63%	1.08	1.00	0.60	NA	0.38
159	2.80	63%	1.02	1.00	0.53	NA	0.33
160	1.80	63%	0.66	1.00	0.27	NA	0.14
161	1.50	64%	0.53	0.50	0.28	NA	0.19
162	3.40	63%	1.24	1.50	0.63	NA	0.57
163	2.80	63%	1.02	1.00	0.39	NA	0.18
164	0.90	63%	0.31	0.50	0.14	NA	0.11
165	3.50	63%	1.27	1.50	0.96	NA	0.81
166	1.70	63%	0.61	1.00	0.70	0.70	0.69
167	1.80	63%	0.66	1.00	0.33	NA	0.19
168	-	56%	-	-	-	-	-
169	0.23	63%	0.09	0.50	0.13	0.13	0.12
170	3.49	63%	1.28	1.50	1.18	NA	0.73
171	3.89	63%	1.42	1.50	1.04	NA	0.60
172	3.43	63%	1.26	1.50	0.90	NA	0.57

WI River TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
173	2.77	63%	1.02	1.00		0.75	NA		0.48
174	2.54	63%	0.93	1.00		0.68	NA		0.45
175	4.65	63%	1.70	1.70		1.12	NA		0.62
176	4.92	63%	1.80	1.80		1.12	NA		0.68
177	3.60	63%	1.32	1.50		0.84	NA		0.59
178	4.58	63%	1.68	1.68		1.02	NA		0.64
179	2.40	63%	0.88	1.00		1.07	1.07		0.65
180	2.87	63%	1.05	1.00		1.05	NA		0.65
181	3.91	80%	0.80	1.00		1.26	1.26		0.82
182	2.58	79%	0.54	0.50		0.90	0.90		0.66
183	2.00	83%	0.33	0.50		0.77	0.77		0.64
184	2.64	63%	0.96	1.00		0.94	NA		0.61
185	3.47	63%	1.27	1.50		1.07	NA		0.68
186	2.79	63%	1.02	1.00		1.18	1.18		0.73
187	3.53	63%	1.29	1.50		0.85	NA		0.49
188	8.20	77%	1.86	1.86		1.87	1.87		0.65
189	4.22	75%	1.05	1.00		0.78	NA		0.60
190	1.29	63%	0.47	0.50		0.63	0.63		0.46
191	1.01	63%	0.37	0.50		0.32	NA		0.21
192	1.17	63%	0.43	0.50		0.32	NA		0.20
193	0.99	63%	0.36	0.50		0.25	NA		0.15
194	2.62	63%	0.96	1.00		0.65	NA		0.33
195	1.03	63%	0.38	0.50		0.39	0.39		0.25
196	2.12	85%	0.33	0.50		0.61	0.61		0.46
197	1.31	63%	0.48	0.50		0.39	NA		0.26

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
198	0.77	63%	0.28	0.50	0.15	NA	0.15
199	0.68	63%	0.25	0.50	0.26	0.26	0.21
200	1.66	91%	0.15	0.50	0.65	0.65	0.51
201	1.67	81%	0.31	0.50	0.67	0.67	0.50
202	0.43	63%	0.16	0.50	0.17	0.17	0.15
203	0.14	63%	0.05	0.50	0.05	0.00	0.04
204	0.47	63%	0.17	0.50	0.23	0.23	0.22
205	-	63%	-	-	-	-	-
206	0.69	63%	0.25	0.50	0.19	NA	0.11
207	1.82	63%	0.66	1.00	0.69	0.69	0.50
208	0.83	63%	0.30	0.50	0.19	NA	0.08
209	-	63%	-	-	-	-	-
210	0.56	63%	0.21	0.50	0.11	NA	0.11
211	1.75	79%	0.37	0.50	0.71	0.71	0.49
212	2.64	82%	0.47	0.50	0.78	0.78	0.58
213	2.70	89%	0.31	0.50	0.83	0.83	0.69
214	3.80	63%	1.39	1.50	0.81	NA	0.47
215	3.17	63%	1.16	1.50	0.84	NA	0.60
216	2.37	63%	0.87	1.00	0.88	0.88	0.67
217	2.77	63%	1.01	1.00	0.65	NA	0.48
218	7.10	63%	2.60	2.60	1.50	NA	0.62
219	2.64	63%	0.97	1.00	0.49	NA	0.30
220	2.55	63%	0.93	1.00	0.54	NA	0.35
221	1.72	63%	0.63	1.00	0.43	NA	0.36
222	3.04	63%	1.11	1.50	0.83	NA	0.80

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
223	2.10	63%	0.77	1.00	0.88	0.88	0.87
224	0.42	63%	0.15	0.50	0.15	NA	0.14
225	-	63%	-	-	-	-	-
226	-	59%	-	-	-	-	-
227	3.97	63%	1.45	1.50	1.07	NA	0.70
228	1.18	72%	0.33	0.50	0.55	0.55	0.44
229	1.62	63%	0.59	0.50	0.95	0.95	0.59
230	1.60	63%	0.58	0.50	0.89	0.89	0.61
231	2.24	63%	0.82	1.00	0.84	0.84	0.54
232	2.86	63%	1.05	1.00	0.79	NA	0.48
233	3.57	63%	1.31	1.50	1.00	NA	0.62
234	1.43	63%	0.52	0.50	0.70	0.70	0.53
235	3.64	63%	1.33	1.50	0.93	NA	0.55
236	4.03	63%	1.48	1.50	0.92	NA	0.58
237	2.86	63%	1.05	1.00	0.83	NA	0.48
238	4.08	63%	1.49	1.50	1.14	NA	0.70
239	2.72	63%	0.99	1.00	0.67	NA	0.39
240	2.88	63%	1.06	1.00	0.83	NA	0.53
241	1.79	63%	0.66	1.00	0.54	NA	0.38
242	1.59	63%	0.58	0.50	0.60	0.60	0.47
243	1.60	63%	0.59	0.50	0.51	NA	0.36
244	1.59	63%	0.58	0.50	0.56	NA	0.36
245	1.20	63%	0.44	0.50	0.44	0.44	0.29
246	2.00	76%	0.48	0.50	0.58	0.58	0.34
247	0.60	63%	0.22	0.50	0.18	NA	0.12

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
248	1.11	63%	0.41	0.50	0.25	NA	0.14
249	0.43	63%	0.16	0.50	0.16	0.16	0.11
250	0.64	63%	0.23	0.50	0.23	NA	0.17
251	0.72	63%	0.26	0.50	0.19	NA	0.12
252	0.36	63%	0.13	0.50	0.16	0.16	0.14
253	0.45	63%	0.17	0.50	0.20	0.20	0.16
254	0.87	63%	0.32	0.50	0.30	NA	0.22
255	1.21	63%	0.44	0.50	0.25	NA	0.11
256	1.53	63%	0.56	0.50	0.64	0.64	0.50
257	1.38	63%	0.51	0.50	0.39	NA	0.27
258	1.67	63%	0.61	1.00	0.68	0.68	0.55
259	1.55	63%	0.57	0.50	0.66	0.66	0.47
260	1.05	63%	0.38	0.50	0.28	NA	0.15
261	1.30	63%	0.48	0.50	0.53	0.53	0.44
262	2.39	63%	0.88	1.00	0.53	NA	0.31
263	2.21	63%	0.81	1.00	0.46	NA	0.27
264	3.87	63%	1.42	1.50	0.82	NA	0.48
265	2.86	63%	1.05	1.00	0.68	NA	0.45
266	2.98	63%	1.09	1.00	0.83	NA	0.63
267	2.93	63%	1.07	1.00	0.64	NA	0.45
268	3.70	63%	1.36	1.50	1.03	NA	0.77
269	2.77	63%	1.01	1.00	0.54	NA	0.34
270	2.85	63%	1.05	1.00	0.51	NA	0.33
271	3.04	63%	1.11	1.50	0.45	NA	0.23
272	1.98	63%	0.73	1.00	0.36	NA	0.23

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
273	3.03	63%	1.11	1.50	0.97	NA	0.90
274	4.19	66%	1.42	1.50	0.92	NA	0.51
275	2.74	73%	0.74	1.00	0.81	0.81	0.54
276	3.25	63%	1.19	1.50	0.82	NA	0.48
277	1.07	63%	0.39	0.50	0.47	0.47	0.46
278	-	63%	-	-	-	-	-
279	-	63%	-	-	-	-	-
280	0.58	63%	0.21	0.50	0.13	NA	0.13
281	2.18	63%	0.80	1.00	0.73	NA	0.64
282	1.84	63%	0.67	1.00	0.70	0.70	0.69
283	1.33	63%	0.49	0.50	0.45	NA	0.43
284	1.18	63%	0.43	0.50	0.49	0.49	0.48
285	1.84	63%	0.67	1.00	0.76	0.76	0.72
286	1.87	63%	0.68	1.00	0.65	NA	0.63
287	3.23	63%	1.18	1.50	1.00	NA	0.75
288	3.04	63%	1.11	1.50	1.00	NA	0.77
289	2.79	63%	1.02	1.00	0.63	NA	0.44
290	5.13	63%	1.88	2.00	0.81	NA	0.41
291	3.45	63%	1.26	1.50	0.74	NA	0.45
292	3.64	63%	1.33	1.50	0.81	NA	0.52
293	2.69	63%	0.98	1.00	0.58	NA	0.38
294	2.45	63%	0.90	1.00	0.48	NA	0.31
295	2.58	63%	0.95	1.00	0.53	NA	0.33
296	2.40	63%	0.88	1.00	0.81	NA	0.61
297	2.90	63%	1.06	1.00	1.25	1.25	1.13

WI River TMDL TP Parameters and Rounded Credit Threshold					Interim Floor Calculations		Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr	Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr	Conservation Scenario 2 lb/ac/yr
298	2.77	63%	1.01	1.00	0.95	NA	0.72
299	3.38	63%	1.24	1.50	0.95	NA	0.68
300	0.51	63%	0.19	0.50	0.23	0.23	0.23
301	4.65	71%	1.37	1.50	1.44	1.44	0.84
302	0.39	63%	0.14	0.50	0.15	0.15	0.15
303	2.31	77%	0.52	0.50	0.53	0.53	0.36
304	0.97	64%	0.35	0.50	0.36	0.36	0.26
305	1.27	63%	0.46	0.50	0.36	NA	0.28
306	0.61	63%	0.22	0.50	0.26	0.26	0.20
307	1.98	78%	0.44	0.50	0.70	0.70	0.49
308	2.03	63%	0.74	1.00	0.43	NA	0.29
309	3.37	63%	1.23	1.50	0.87	NA	0.84
310	4.85	74%	1.25	1.50	1.36	1.36	0.78
311	0.87	63%	0.32	0.50	0.22	NA	0.13
312	2.06	63%	0.76	1.00	0.53	NA	0.35
313	2.06	64%	0.74	1.00	0.72	NA	0.53
314	1.85	72%	0.51	0.50	0.73	0.73	0.52
315	-	63%	-	-	-	-	-
316	1.57	63%	0.57	0.50	0.70	0.70	0.69
317	-	63%	-	-	-	-	-
318	-	63%	-	-	-	-	-
319	-	63%	-	-	-	-	-
320	1.79	63%	0.66	1.00	0.62	NA	0.60
321	2.85	63%	1.04	1.00	0.55	NA	0.34
322	3.43	63%	1.26	1.50	0.83	NA	0.54

WI River TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
TMDL Subbasin	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
323	3.13	84%	0.51	0.50		0.82	0.82		0.61
324	3.22	84%	0.52	0.50		0.82	0.82		0.61
325	3.24	84%	0.53	0.50		0.79	0.79		0.52
326	3.28	84%	0.53	0.50		0.74	0.74		0.49
327	3.11	84%	0.51	0.50		0.78	0.78		0.54
328	2.53	87%	0.32	0.50		0.76	0.76		0.59
329	1.24	63%	0.45	0.50		0.44	NA		0.35
330	1.34	63%	0.49	0.50		0.33	NA		0.20
331	1.87	76%	0.44	0.50		0.71	0.71		0.54
332	1.80	63%	0.66	1.00		0.73	0.73		0.59
333	0.59	63%	0.22	0.50		0.18	NA		0.12
334	-	63%	-	-		-	-		-
335	-	63%	-	-		-	-		-
336	1.12	63%	0.41	0.50		0.11	NA		0.09
337	0.73	63%	0.27	0.50		0.12	NA		0.11

Table 7: Lower Fox River TMDL TP Summarized by Model Subwatershed

Lower Fox TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
LF010100	3.35	84%	0.54	0.50		0.62	0.62		0.28
LF010200	4.37	84%	0.70	1.00		0.80	NA		0.34
LF010300	2.67	84%	0.43	0.50		0.52	0.52		0.27
LF010400	3.85	84%	0.62	1.00		0.71	NA		0.31
LF010500	3.32	84%	0.53	0.50		0.63	0.63		0.28
LF010600	3.02	84%	0.49	0.50		0.58	0.58		0.28
LF010700	3.01	84%	0.48	0.50		0.59	0.59		0.27
LF010800	3.79	84%	0.61	1.00		0.69	NA		0.29
LF010900	1.91	84%	0.31	0.50		0.44	NA		0.25
LF011000	1.04	74%	0.27	0.50		0.25	NA		0.14
LF011100	3.79	80%	0.74	1.00		0.72	NA		0.33
LF011200	3.43	80%	0.67	1.00		0.67	NA		0.32
LF011300	3.50	83%	0.59	0.50		0.67	0.67		0.31
LF011400	3.44	83%	0.58	0.50		0.67	0.67		0.32
LF011500	3.86	83%	0.65	1.00		0.73	NA		0.33
LF011600	4.18	84%	0.67	1.00		0.76	NA		0.31
LF011700	2.47	84%	0.40	0.50		0.53	0.53		0.28
LF020100	2.47	79%	0.53	0.50		0.55	0.55		0.30
LF020200	2.92	79%	0.63	1.00		0.64	NA		0.35
LF020300	2.86	79%	0.61	1.00		0.62	NA		0.33
LF020400	3.38	79%	0.72	1.00		0.68	NA		0.32
LF020500	2.61	74%	0.68	1.00		0.54	NA		0.28
LF020600	2.27	74%	0.59	0.50		0.51	0.51		0.29

Lower Fox TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
LF020700	2.35	76%	0.55	0.50		0.50	0.50		0.26
LF020800	2.92	76%	0.69	1.00		0.58	NA		0.29
LF020900	2.92	76%	0.69	1.00		0.63	NA		0.33
LF030100	3.89	86%	0.54	0.50		0.72	0.72		0.32
LF030200	3.43	86%	0.48	0.50		0.68	0.68		0.33
LF030300	3.16	86%	0.44	0.50		0.65	0.65		0.32
LF030400	2.70	86%	0.38	0.50		0.62	0.62		0.34
LF030500	2.56	82%	0.47	0.50		0.58	0.58		0.34
LF030600	2.89	82%	0.53	0.50		0.65	0.65		0.34
LF030700	3.03	82%	0.55	0.50		0.64	0.64		0.32
LF030800	2.96	63%	1.09	1.00		0.68	NA		0.37
LF030900	8.74	74%	2.26	2.26		1.92	NA		0.64
LF031000	2.78	74%	0.72	1.00		0.65	NA		0.36
LF040100	2.95	39%	1.80	1.80		0.59	NA		0.28
LF040200	3.61	74%	0.93	1.00		0.75	NA		0.37
LF040300	2.68	74%	0.69	1.00		0.59	NA		0.31
LF040400	2.30	74%	0.59	0.50		0.62	0.62		0.37
LF050100	1.74	77%	0.40	0.50		0.33	NA		0.15
LF050200	1.89	77%	0.44	0.50		0.40	NA		0.21
LF050300	2.02	77%	0.47	0.50		0.39	NA		0.18
LF050400	2.27	55%	1.02	1.00		0.47	NA		0.23
LF050500	3.00	77%	0.69	1.00		0.55	NA		0.23
LF050600	2.23	55%	1.01	1.00		0.55	NA		0.30
LF050700	3.86	77%	0.89	1.00		0.72	NA		0.29

Lower Fox TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
LF050800	2.80	77%	0.65	1.00		0.55	NA		0.26
LF050900	2.51	77%	0.58	0.50		0.59	0.59		0.31
LF051000	2.93	77%	0.68	1.00		0.64	NA		0.32
LF051100	2.14	77%	0.50	0.50		0.58	0.58		0.34
LF051200	3.06	77%	0.71	1.00		0.63	NA		0.29
LF051300	3.59	77%	0.83	1.00		0.71	NA		0.31
LF051400	3.54	77%	0.82	1.00		0.72	NA		0.33
LF051500	1.78	77%	0.41	0.50		0.40	NA		0.22
LF051600	3.47	77%	0.80	1.00		0.72	NA		0.34
LF060100	3.31	67%	1.10	1.50		0.72	NA		0.37
LF060200	2.92	67%	0.97	1.00		0.69	NA		0.39
LF060300	3.12	67%	1.04	1.00		0.74	NA		0.41
LF060400	2.30	67%	2.30	2.30		0.60	NA		0.37
LFM10100	2.53	74%	0.65	1.00		0.52	NA		0.28
LFM10200	2.41	74%	0.62	1.00		0.51	NA		0.28
LFM10300	2.31	74%	0.60	0.50		0.52	0.52		0.29
LFM10400	3.05	74%	0.79	1.00		0.55	NA		0.26
LFM10500	2.48	74%	0.64	1.00		0.46	NA		0.21
LFS70100	3.51	61%	1.38	1.50		0.68	NA		0.32
LFS70200	3.80	61%	1.49	1.50		0.70	NA		0.31
LFS70300	3.15	61%	1.24	1.50		0.62	NA		0.30
LFS80100	1.18	61%	0.46	0.50		0.23	NA		0.11

Table 8: Upper Fox and Wolf Basin TMDL TP Summarized by Model Subwatershed

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
1	1.85	34%	1.23	1.50		0.57	NA		0.48
2	2.95	83%	0.50	0.50		0.75	0.75		0.50
3	3.13	34%	2.07	2.07		0.76	NA		0.58
4	2.10	83%	0.36	0.50		0.52	0.52		0.26
5	1.69	83%	0.29	0.50		0.44	NA		0.22
7	1.35	83%	0.23	0.50		0.45	NA		0.37
9	4.20	83%	0.72	1.00		1.06	1.06		0.80
10	3.80	83%	0.65	1.00		0.90	NA		0.70
12	3.00	83%	0.51	0.50		0.96	0.96		0.76
13	3.01	83%	0.51	0.50		0.77	0.77		0.58
14	2.23	83%	0.38	0.50		0.68	0.68		0.54
15	3.25	83%	0.55	0.50		0.93	0.93		0.75
17	4.61	83%	0.78	1.00		1.11	1.11		0.72
18	4.39	83%	0.74	1.00		1.19	1.19		0.66
20	3.01	83%	0.51	0.50		0.52	0.52		0.37
21	6.25	83%	1.06	1.00		1.11	1.11		0.62
22	6.00	83%	1.02	1.00		1.04	1.04		0.67
23	5.58	83%	0.95	1.00		1.96	1.96		0.81
24	1.89	83%	0.32	0.50		0.29	NA		0.16
25	3.31	83%	0.56	0.50		0.59	0.59		0.38
26	3.82	83%	0.65	1.00		0.57	NA		0.33
28	5.23	83%	0.89	1.00		1.90	1.90		0.80
29	4.01	83%	0.68	1.00		1.39	1.39		0.59
31	2.50	83%	0.43	0.50		0.61	0.61		0.45

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
32	2.44	83%	0.42	0.50		0.62	0.62		0.47
33	1.11	83%	0.19	0.50		0.26	NA		0.19
34	1.22	83%	0.21	0.50		0.26	NA		0.20
35	1.33	83%	0.23	0.50		0.39	NA		0.29
36	2.27	83%	0.39	0.50		0.56	NA		0.40
37	0.91	83%	0.15	0.50		0.27	NA		0.21
38	1.31	83%	0.22	0.50		0.40	NA		0.31
39	1.92	31%	1.33	1.50		0.70	NA		0.58
40	1.24	83%	0.21	0.50		0.39	NA		0.32
41	1.78	83%	0.30	0.50		0.56	0.56		0.44
42	1.94	83%	0.33	0.50		0.47	NA		0.36
43	2.06	83%	0.35	0.50		0.57	0.57		0.44
44	1.51	83%	0.26	0.50		0.41	NA		0.30
45	1.58	83%	0.27	0.50		0.43	NA		0.33
46	1.07	83%	0.18	0.50		0.32	NA		0.26
47	2.29	83%	0.39	0.50		0.53	0.53		0.41
48	2.74	83%	0.47	0.50		0.68	0.68		0.46
49	1.55	32%	1.05	1.00		0.53	NA		0.40
50	2.28	83%	0.39	0.50		0.68	0.68		0.39
51	2.05	83%	0.35	0.50		0.62	0.62		0.41
52	2.22	83%	0.38	0.50		0.71	0.71		0.48
53	1.91	83%	0.33	0.50		0.79	0.79		0.55
54	1.49	83%	0.25	0.50		0.56	0.56		0.40
56	2.35	83%	0.40	0.50		0.65	0.65		0.41
57	2.24	83%	0.38	0.50		0.65	0.65		0.38

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
58	1.97	83%	0.34	0.50		0.58	0.58		0.30
59	2.55	83%	0.43	0.50		0.71	0.71		0.32
60	1.99	38%	1.23	1.50		0.65	NA		0.24
61	1.76	83%	0.30	0.50		0.61	0.61		0.49
62	1.73	83%	0.30	0.50		0.64	0.64		0.52
63	2.13	83%	0.36	0.50		0.72	0.72		0.44
64	1.66	83%	0.28	0.50		0.56	0.56		0.33
65	2.20	25%	1.66	1.66		0.88	NA		0.61
66	1.80	83%	0.31	0.50		0.80	0.80		0.59
67	1.84	83%	0.31	0.50		0.81	0.81		0.57
68	1.88	83%	0.32	0.50		0.73	0.73		0.47
69	1.81	83%	0.31	0.50		0.55	0.55		0.40
70	1.97	83%	0.33	0.50		0.68	0.68		0.51
71	2.08	83%	0.36	0.50		0.82	0.82		0.57
72	1.77	83%	0.30	0.50		0.64	0.64		0.42
73	0.93	83%	0.16	0.50		0.38	NA		0.26
74	1.45	83%	0.25	0.50		0.49	NA		0.37
75	1.09	83%	0.19	0.50		0.40	NA		0.27
76	1.79	83%	0.30	0.50		0.65	0.65		0.45
77	2.27	83%	0.39	0.50		0.67	0.67		0.37
78	1.98	83%	0.34	0.50		0.77	0.77		0.50
79	1.96	83%	0.33	0.50		0.67	0.67		0.49
80	2.58	83%	0.44	0.50		0.64	0.64		0.24
81	2.46	83%	0.42	0.50		0.76	0.76		0.39
82	2.36	83%	0.40	0.50		0.58	0.58		0.22

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
83	1.72	83%	0.29	0.50		0.73	0.73		0.70
84	2.05	83%	0.35	0.50		0.88	0.88		0.63
85	1.94	83%	0.33	0.50		0.83	0.83		0.57
86	1.67	83%	0.28	0.50		0.72	0.72		0.52
87	2.37	83%	0.40	0.50		0.65	0.65		0.37
88	1.96	83%	0.33	0.50		0.58	0.58		0.33
89	1.80	83%	0.31	0.50		0.65	0.65		0.44
91	2.36	83%	0.40	0.50		0.60	0.60		0.23
92	2.05	83%	0.35	0.50		0.77	0.77		0.55
93	1.97	83%	0.34	0.50		0.83	0.83		0.60
94	2.09	83%	0.36	0.50		0.73	0.73		0.57
95	1.71	83%	0.29	0.50		0.65	0.65		0.50
96	2.50	83%	0.43	0.50		0.66	0.66		0.43
97	2.36	83%	0.40	0.50		0.66	0.66		0.50
98	1.87	83%	0.32	0.50		0.68	0.68		0.55
99	2.04	83%	0.35	0.50		0.49	NA		0.15
100	1.46	83%	0.25	0.50		0.67	0.67		0.51
101	2.71	83%	0.46	0.50		0.74	0.74		0.35
102	1.33	83%	0.23	0.50		0.35	NA		0.17
103	2.09	83%	0.36	0.50		0.69	0.69		0.50
104	3.09	69%	0.96	1.00		0.87	NA		0.63
105	1.73	83%	0.29	0.50		0.69	0.69		0.47
106	2.00	83%	0.34	0.50		0.56	0.56		0.21
107	1.60	83%	0.27	0.50		0.37	NA		0.12
108	1.60	83%	0.27	0.50		0.38	NA		0.14

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
109	1.39	83%	0.24	0.50		0.52	0.52		0.35
110	1.81	83%	0.31	0.50		0.80	0.80		0.60
111	1.20	83%	0.20	0.50		0.32	NA		0.12
112	1.66	83%	0.28	0.50		0.63	0.63		0.43
113	1.66	83%	0.28	0.50		0.59	0.59		0.42
114	2.60	83%	0.44	0.50		0.73	0.73		0.53
115	2.59	83%	0.44	0.50		0.99	0.99		0.56
116	2.08	83%	0.35	0.50		0.68	0.68		0.45
117	1.42	83%	0.24	0.50		0.67	0.67		0.53
118	1.45	83%	0.25	0.50		0.70	0.70		0.51
119	1.40	83%	0.24	0.50		0.55	0.55		0.40
120	1.86	83%	0.32	0.50		0.71	0.71		0.43
121	1.49	83%	0.25	0.50		0.57	0.57		0.38
122	1.55	83%	0.26	0.50		0.72	0.72		0.51
123	1.72	83%	0.29	0.50		0.76	0.76		0.55
124	1.91	83%	0.33	0.50		0.87	0.87		0.47
125	2.36	83%	0.40	0.50		0.89	0.89		0.53
126	2.07	83%	0.35	0.50		0.85	0.85		0.46
127	2.19	83%	0.37	0.50		0.81	0.81		0.47
128	1.34	83%	0.23	0.50		0.82	0.82		0.46
129	1.73	83%	0.29	0.50		0.75	0.75		0.43
130	1.68	83%	0.29	0.50		0.78	0.78		0.55
131	2.15	83%	0.37	0.50		0.83	0.83		0.50
132	2.30	83%	0.39	0.50		0.88	0.88		0.49
133	3.30	83%	0.56	0.50		1.01	1.01		0.52

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
135	1.01	83%	0.17	0.50		0.53	0.53		0.41
136	0.85	83%	0.14	0.50		0.24	NA		0.15
137	0.91	83%	0.16	0.50		0.29	NA		0.20
138	2.48	83%	0.42	0.50		0.91	0.91		0.49
139	1.59	83%	0.27	0.50		0.51	0.51		0.39
140	2.96	83%	0.50	0.50		0.99	0.99		0.45
141	1.75	83%	0.30	0.50		0.62	0.62		0.38
142	1.12	83%	0.19	0.50		0.33	NA		0.18
143	1.21	83%	0.21	0.50		0.55	0.55		0.41
144	0.81	83%	0.14	0.50		0.25	NA		0.14
145	1.28	83%	0.22	0.50		0.33	NA		0.16
146	1.00	83%	0.17	0.50		0.30	NA		0.15
147	1.41	83%	0.24	0.50		0.36	NA		0.21
148	1.15	83%	0.20	0.50		0.42	NA		0.30
149	1.01	83%	0.17	0.50		0.47	NA		0.44
150	1.31	83%	0.22	0.50		0.37	NA		0.25
151	1.71	83%	0.29	0.50		0.83	0.83		0.71
152	1.52	83%	0.26	0.50		0.72	0.72		0.62
153	1.64	83%	0.28	0.50		0.86	0.86		0.68
154	1.41	83%	0.24	0.50		0.51	0.51		0.36
155	2.63	83%	0.45	0.50		1.01	1.01		0.61
156	1.96	83%	0.33	0.50		0.64	0.64		0.38
157	2.45	83%	0.42	0.50		0.81	0.81		0.45
158	1.93	83%	0.33	0.50		0.44	NA		0.19
159	1.38	83%	0.23	0.50		0.42	NA		0.26

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
160	2.14	83%	0.37	0.50		0.61	0.61		0.29
161	1.69	83%	0.29	0.50		0.50	0.50		0.32
162	3.95	76%	0.94	1.00		1.27	1.27		0.58
163	2.28	83%	0.39	0.50		0.71	0.71		0.41
164	1.58	83%	0.27	0.50		0.47	NA		0.29
165	1.56	83%	0.27	0.50		0.39	NA		0.16
166	1.98	83%	0.34	0.50		0.65	0.65		0.35
167	2.97	45%	1.62	1.62		0.93	NA		0.49
168	2.78	0%	2.78	2.78		0.79	NA		0.45
169	4.10	0%	4.10	4.10		1.26	NA		0.53
170	2.84	83%	0.48	0.50		0.92	0.92		0.44
171	2.49	83%	0.42	0.50		1.01	1.01		0.63
172	1.74	83%	0.30	0.50		0.43	NA		0.21
173	1.52	83%	0.26	0.50		0.45	NA		0.28
174	4.30	80%	0.84	1.00		1.36	1.36		0.64
175	2.62	83%	0.45	0.50		1.11	1.11		0.68
176	1.51	83%	0.26	0.50		0.42	NA		0.25
177	2.68	83%	0.46	0.50		1.11	1.11		0.77
178	4.39	0%	4.39	4.39		1.43	NA		0.64
179	2.55	83%	0.43	0.50		1.12	1.12		0.96
180	1.58	83%	0.27	0.50		0.46	NA		0.25
181	1.90	88%	0.22	0.50		0.56	0.56		0.34
182	2.90	83%	0.49	0.50		1.21	1.21		0.81
183	2.51	83%	0.43	0.50		0.80	0.80		0.43
184	3.24	83%	0.55	0.50		1.08	1.08		0.55

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
185	4.12	68%	1.31	1.50		1.31	NA		0.63
186	4.24	59%	1.75	1.75		1.28	NA		0.61
187	1.42	83%	0.24	0.50		0.50	0.50		0.34
188	2.87	83%	0.49	0.50		0.98	0.98		0.45
189	1.77	83%	0.30	0.50		0.56	0.56		0.36
190	4.29	72%	1.19	1.50		1.30	NA		0.46
191	2.51	83%	0.43	0.50		1.03	1.03		0.73
192	1.81	88%	0.21	0.50		0.58	0.58		0.36
193	1.61	83%	0.28	0.50		0.49	NA		0.32
194	2.37	83%	0.41	0.50		0.83	0.83		0.50
195	2.44	83%	0.42	0.50		0.73	0.73		0.39
196	3.09	83%	0.53	0.50		0.91	0.91		0.51
197	2.77	83%	0.47	0.50		1.01	1.01		0.63
198	2.61	83%	0.45	0.50		0.92	0.92		0.46
199	2.36	83%	0.40	0.50		1.01	1.01		0.74
200	3.64	83%	0.62	1.00		1.13	1.13		0.67
201	3.94	83%	0.68	1.00		1.28	1.28		0.57
202	2.74	79%	0.57	0.50		0.82	0.82		0.37
203	2.74	85%	0.41	0.50		0.94	0.94		0.61
204	3.47	83%	0.59	0.50		1.08	1.08		0.70
205	2.81	88%	0.33	0.50		0.86	0.86		0.42
206	1.68	88%	0.20	0.50		0.56	0.56		0.30
207	3.24	83%	0.56	0.50		1.10	1.10		0.57
208	3.41	79%	0.71	1.00		1.01	1.01		0.47
209	1.99	88%	0.24	0.50		0.58	0.58		0.32

UFW TMDL TP Parameters and Rounded Credit Threshold						Interim Floor Calculations			Feasibility Analysis
Model Subwatershed	Baseline TP loss lb/ac/yr	TMDL % Reduction	TP Credit Threshold lb/ac/yr	Rounded TP Credit Threshold lb/ac/yr		Conservation Scenario 1 lb/ac/yr	Interim Floor lb/ac/yr		Conservation Scenario 2 lb/ac/yr
210	1.43	88%	0.17	0.50		0.43	0.00		0.37
211	1.57	88%	0.19	0.50		0.63	0.63		0.41
212	1.78	88%	0.21	0.50		0.81	0.81		0.53
213	1.95	88%	0.23	0.50		0.93	0.93		0.59
214	1.39	88%	0.16	0.50		0.55	0.55		0.37
215	2.25	88%	0.27	0.50		0.79	0.79		0.42
216	2.45	88%	0.29	0.50		0.79	0.79		0.40
217	3.14	74%	0.83	1.00		1.06	1.06		0.51
218	2.31	88%	0.27	0.50		0.78	0.78		0.38

Appendix F – Utilizing Streambank Stabilization in Water Quality Trading

Last Revised: April 2019

Introduction

WDNR offers watershed-based alternatives for meeting requirements associated with effluent limits in WPDES permits. These programs include Adaptive Management (AM), Water Quality Trading (WQT) and the statewide Multi-discharger Variance (MDV). This document details the necessary steps for quantifying pollutant reductions achieved from streambank stabilization projects implemented for the above programs. While the steps and examples are specific to WQT projects, similar methods should be used for AM and MDV projects.

Section 283.84(1m)(a), Wis. Stats. requires trades to result in water quality improvement. For WDNR to assert that this requirement has been met, pollutant reductions must be properly quantified, assigned a trade ratio, and be accompanied by supporting documentation.

Streambank erosion has long been identified as having negative impacts to water quality. The U.S. Environmental Protection Agency lists excessive sediments as a leading problem in our nation's rivers and streams. Unnatural quantities of sediment entering streams can degrade aquatic habitat and alter physical and chemical characteristics of the water. Nutrients associated with soil particles enter the stream and become available to aquatic plants and algae, ultimately contributing to eutrophication of local and downstream waters.

Erosion of streambanks is a naturally occurring process for many waterways, but human impacts can exacerbate erosion. Removal of vegetation, foot or vehicle traffic, and channel modifications can contribute to erosion. Hydrologic alteration of a stream's watershed (such as tiling or paving) can also result in streambank erosion. When planning a streambank stabilization project, treatments should aim to correct the cause of erosion. Stabilization projects that do not address the cause of erosion are generally less sustainable and have a higher risk of failure.

Considerations for Project Selection

When planning streambank stabilization projects for credit generation, the following factors should be considered early in the process:

- Existing Information: Have erosion issues already been identified in your area? Consider contacting your County Land and Water Conservation Department (LCD). Other organizations or documents such as watershed plans may have already identified erosion and offer resources or partnership for certain projects.
- Magnitude of pollutant offset: For compliance-driven projects, the number of credits required may guide the scope of the project.
- General location of the project, relative to the pollutant discharge: Project eligibility, as well as trade ratio, is influenced by location. The most effective locations for pollutant offsets are generally located upstream from the permitted discharge within the same HUC 12 watershed.

- Land access: Landowner support may dictate what areas can be considered. In addition to granting access for preliminary surveying and eventual implementation, the landowner should be willing to enter into a binding agreement to inspect and maintain the practice and/or allow 3rd party inspections and maintenance.

Numerous techniques exist for stabilizing eroding streambanks. A common approach is to regrade a steep bank to a more gradual slope, thereby providing stability and dispersing the energy of high flows. However, regrading alone will leave soil particles exposed and vulnerable to erosion. Additional practices should be implemented to avoid erosion of the disturbed area:

- Immediate seeding with a native seed mix suitable to the conditions of the site
- Plantings of native riparian vegetation
- Use of erosion breaks and or structures such as coir (coconut fiber) logs
- Erosion matting or webbing
- Surface hardening, such as rock rip rap

The use of surface hardening can be detrimental to a stream. Hardened streambanks may channel the energy of high flows to downstream banks, exacerbating erosion there. Unnatural quantities of rock in riparian areas may impede vegetation growth and decrease the aesthetic and habitat values of a stream corridor. Projects that employ excessive hardening may need to be modified prior to approval. The criteria outlined in Natural Resource Conservation Service (NRCS) Code 580: Streambank and Shoreline Protection should be adhered to.

Measuring the Baseline

By implementing a project that stabilizes an eroding streambank, soil particles that would have entered the waterway now remain on land. A series of measurements and calculations can quantify the mass of pollutants kept out of the waterway. Values are often reported in pounds per year. These reductions equate to pollutant credits, generated annually for the life of the practice.

Several key steps are needed to properly quantify pollutant reductions:

- Delineation of erosion areas
- Measurement of individual erosion sites (length, height, recession rate)
- Soil sampling and lab analysis
- Calculations, using the above information

Identifying Erosion Areas

Erosion sites are most commonly identified by a lack of vegetation. This condition indicates that erosion is likely occurring. However, streambanks lacking vegetation may not be eroding, or may be eroding very slowly. Other observations can help verify the presence of erosion.

Other symptoms of erosion include:

- Banks with steep or vertical slopes, often with loose soil
- Overhanging vegetation or recently fallen trees
- Deformations in the shape of the bank, relative to other banks
- Soil fracture lines, slumping, or sliding
- Exposed plant roots
- Buried cultural features are now exposed (fence posts, footings, foundations, etc.)

A comprehensive erosion survey will provide the baseline data needed to plan a project. Walking a section of stream and completing a standardized streambank erosion survey form can provide a structured approach. Beyond site-specific measurements (discussed next), data collected should include: a unique site ID, centerpoint GPS coordinates, bank designation (right or left, facing downstream), apparent cause of erosion, and vegetative condition on and above the bank.

Site Delineation

On certain streams, erosion may be concentrated in localized "pockets", with stable bank conditions found between sites. Other streams may exhibit a continual stretch of eroding bank. A degree of variability along an eroding bank is expected, which should be addressed by averaging all measurements for a site. However, large scale averaging across a highly variable bank does not properly quantify the site's baseline. When deciding where to "split or lump", consider bank height, recession rate, soil texture, and cause of erosion. If any of these observations substantially change, it is best to split the bank into two or more individual sites, with specific measurements for each site. Photographs of the site should be taken. Photographic coverage of the entire site should be included in the project plan to support measurements and calculations.

Measuring Bank Height and Length

Basic measurements required for quantifying pollutant reductions include bank height and length. As discussed previously, reasonable averaging across a site can occur, but large-scale averaging should be avoided, as it does not properly quantify pollutant reductions. The height of a bank should include the entire eroding slope. Length measurements are dictated by the linear distance downstream where erosion is shown. Detailed survey measurements may satisfy documentation requirements in lieu of photographs.

Bank Height:

Bank Length:

Measuring Lateral Recession Rate

Lateral recession rate, or depth of bank loss, has a large influence on the amount of soil estimated to be entering the stream from a given site. Lateral recession rate is most commonly measured in feet per year, and ranges from 0 ft/year (no erosion occurring) to 1+ ft/year (very severe erosion). This value should be a long-term average, since high-water events will intermittently cause greater amounts of erosion, with less erosion occurring during low flows. Various methods exist for measuring recession rate. These involve taking a baseline reading with survey equipment at two points in time and calculating bank surface differences between before and after surveys. Bank pins or stakes (multiple, arranged to represent the entire bank) may also be used as a benchmark for comparison of current and future conditions.

If it is not feasible to measure lateral recession rate, it may be estimated through other observations. Vegetative indicators are moderately useful. A lack of vegetation does not guarantee that erosion is occurring, so additional methods should be used to quantify recession rate. The following points should be observed and compared to the NRCS erosion severity chart below.

- Exposed Roots
- Physical deformation of the bank surface including gullies, rills, or slumping

- Bank grade steeper than what is sustainable
- Channel shape indicates active cutting

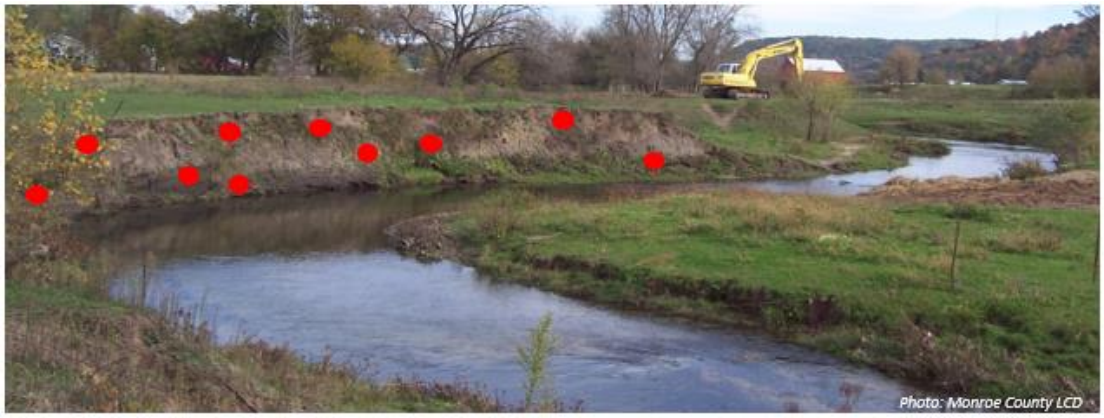
Lateral Recession Rate (ft/yr)	Category	Description
0.01-0.05	Slight	Some bare bank but active erosion not readily apparent. Some rills but no vegetative overhang. No exposed tree roots.
0.06-0.2	Moderate	Bank is predominantly bare with some rills and vegetative overhang. Some exposed tree roots but no slumps or slips.
0.3-0.5	Severe	Bank is bare with rills and severe vegetative overhang. Many exposed tree roots and some fallen trees and slumps or slips. Some changes in cultural features such as fence corners missing and realignment of roads or trails. Channel cross section becomes U-shaped as opposed to V-shaped.
0.5+	Very Severe	Bank is bare with gullies and severe vegetative overhang. Many fallen trees, drains and culverts eroding out and changes in cultural features as above. Massive slips or washouts common. Channel cross section is U-shaped and stream course may be meandering.

Soil Sampling Protocol

By measuring length, width, and lateral recession rate of an erosion site, the amount of soil entering a stream can be determined. Once the phosphorus concentration of the soil is known, the amount of phosphorus entering a stream can be calculated.

Composite soil samples must be taken to represent an average phosphorus concentration for each site. Sub-samples should be taken from each soil horizon, ensuring that variability in soil texture is captured, then combined into one composite sample per site. Mix, bag, and transport samples in accordance with lab procedures. Samples must be analyzed for total phosphorus. This is also known as total leachable P or P_2O_5. The Bray-1 soil or other soil phosphorus tests are inappropriate for this purpose and will underestimate total phosphorus contributions resulting from erosion. Samples should be analyzed at a certified laboratory.

● = soil subsample locations used to form one composite sample



A simple, mass-based equation is used to calculate phosphorus reductions from streambank stabilization:

$$\text{P Yield (lbs./year)} = L\ x\ H\ x\ R\ x\ bD\ x\ \%P$$

Where:
L = Bank Length (ft)

H = Bank Height (ft)

R = Lateral Recession Rate (ft/year)

bD= Soil Bulk Density (lbs./ft^3)

%P = Total Phosphorus Concentration (%)

NRCS Erosion Tool

The Natural Resources Conservation Service (NRCS) has created a spreadsheet that estimates soil loss at an erosion site using all components of the phosphorus yield equation, with the exception of soil total phosphorus (%). Standardized soil bulk densities are pre-programmed into the spreadsheet, and are applied once a site soil texture is selected. The NRCS spreadsheet can be found here: https://dnr.wi.gov/topic/surfacewater/documents/ModelingTools/gully-ephemeral_-streambank_-irrig_ditch_erosion.xlsm

NRCS Streambank and Irrigation Ditch Erosion Estimator (Direct Volume Method) — Clear Form

Farmer / Cooperator Name:	Farmer John	Evaluated By:	DNR
Tract Number:	1	Evaluation Date:	July 20, 2020

Field Number	Eroding Strmbnk Reach #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Strmbank or Ditch (FT^2)	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT^3) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT^3	Estimated Soil Loss (Tons/Year)
N/A	Site 1A	50.0	2.0	100	0.05	5.0	Organic	22	0.1
	Site 1B	85.0	2.5	213	0.10	21.3	Loamy Sand	100	1.1
	Site 1C	20.0	5.0	100	0.50	50.0	Fine Sandy Loam	100	2.5
				Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):					3.6

Once soil loss is calculated in the spreadsheet, it can be multiplied by soil total phosphorus (%) results from the lab. This final result represents the pounds per year of phosphorus reduction. Reductions are subject to trade ratios and TMDL credit threshold when calculating credits generated.

Habitat Adjustment to the Uncertainty Factor

Many of Wisconsin's waters are impaired due to a combination of chemical, biological, and aquatic habitat impairments. In many cases, habitat restoration may be necessary for the listed surface water to achieve its full designated use. Therefore, streambank stabilization projects that include habitat restoration features may qualify for an aquatic habitat adjustment to the uncertainty factor (reduced from 3 to 2).

- To qualify, the stream in which the habitat is placed must be impaired for the traded pollutant.

- The habitat feature(s) must help alleviate the impacts of the traded pollutant.
- The habitat features(s) must provide substantial gains in aquatic habitat, appropriate for the stream in which they are installed.
- Follow criteria outlined in NRCS 395 Technical Standard

A chapter 30 waterways permit may be needed to conduct in-stream work.

Refer to Waterway Protection - Fish and Wildlife Habitat Structures for more information. It is recommended that this permitting process be initiated as soon as possible. Habitat structure types must fall under the stream habitat general permit or an individual permit to be eligible for the habitat adjustment.

Two options exist for demonstrating proposed features are appropriate and substantial:

- Consult with your regional WDNR fisheries biologist when planning habitat projects. The biologist may provide recommendations on appropriate habitat types and quantities. Your county LCD or other professional experienced with stream habitat work may facilitate this conversation.
- Submit habitat installment details as part of the water quality trade plan. This includes proposed structure types, quantities, and locations relative to bank stabilization sites. This should be accompanied by a completed stream assessment outlined in NRCS 395 Technical Standard. Elements 12 and 13 of the Stream Visual Assessment Protocol Version 2 will be suitable for qualified projects.

Operation and Maintenance (O & M) Plans

As a component of the trade plan, an O&M plan should be developed to outline necessary actions that ensure adequate performance and long life of the practice. An O&M plan should be developed for each set of similar features. The plan should be consistent with NRCS code 580.

Consider the following content for O&M plans:

- Define who is responsible for implementing the O&M plan
- The practice(s) should be inspected at set intervals, and after every flood event
- Remove debris that are channeling flow towards the banks, threatening damage
- Establish and maintain vegetative cover, control invasive species as needed
- Repair any damage or further erosion and revegetate as soon as possible. Define a timeline for responding to damages.

Waterways Permit and Written Agreements

- A Chapter 30 Waterways permit may be required for streambank stabilization projects. Refer to Waterway Protection – Stream Bank Erosion Control for more information. This permitting process should be started as soon as possible to ensure permits are in place prior to the desired project start date.

- Pursuant to s. 283.84 (1) Wis. Stats., a trade agreement is required between two parties engaging in a water quality trade. A common approach is to establish the agreement between the land owner and permittee, with the O&M plan requirements included in the agreement as a responsibility of the landowner. If the permittee directly implements measures on its own land, then the agreement will be between the WDNR and permittee. Refer to WQT Guidance (section 3.6) for general agreement information.
- Streambank stabilization has the potential to be a component of many WQT, AM, or MDV plans. Permittees and consultants are encouraged to seek site-specific advice by contacting WDNR when considering this option.

Appendix G – SPARROW How-To Guide

Last Revised: April 2019

Introduction

The SPARROW (Spatially Referenced Regressions On Watershed Attributes) Model, created by the United States Geological Survey, provides estimates of phosphorus (P), nitrogen (N), and total suspended solids (TSS) transport between upstream and downstream waterbodies. One component of the model, delivery fraction, is used to calculate the delivery factor in trade ratios when pollutant reductions occur upstream from a credit user's location

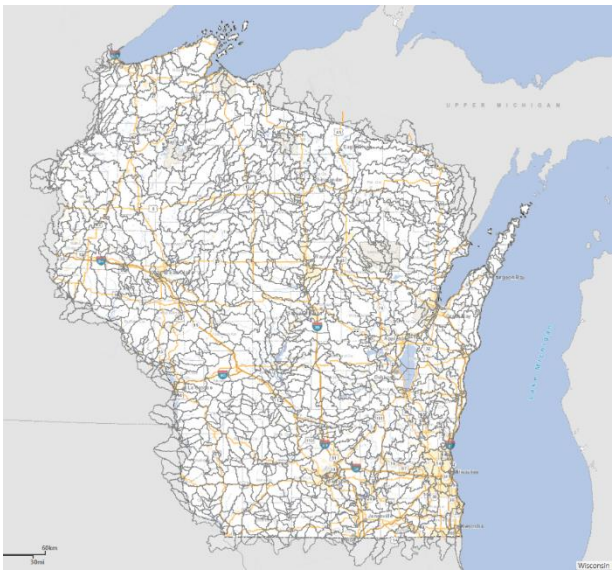
Why use delivery fractions?

Delivery fractions account for the mass of pollutant removed by natural attenuation processes within rivers, lakes, and reservoirs. By using delivery fractions in trade ratios, permittees ensure their trades offset a sufficient amount of pollutant required to protect water quality at the downstream reach or outfall.

SPARROW informational webpage (USGS): https://water.usgs.gov/nawqa/sparrow/#

SPARROW Basics

SPARROW is a catchment-based model. The land's surface is divided into watersheds, and all SPARROW values apply to the waterbodies contained within a given catchment. There are 1378 SPARROW catchments fully or partially within the borders of Wisconsin. Each one has a specific delivery fraction, calculated using regression equations from monitoring data.



All delivery fractions are based upon downstream connectivity to a final target. In Wisconsin, downstream targets are either Lake Superior, Lake Michigan, or the Upper Mississippi River. When a credit user does not directly discharge to one of these targets, the relative difference between the credit user and credit generator watershed determines the delivery factor. Using specific delivery fractions for credit generator and credit user locations, as explained later, provides a value tailored to unique project locations.

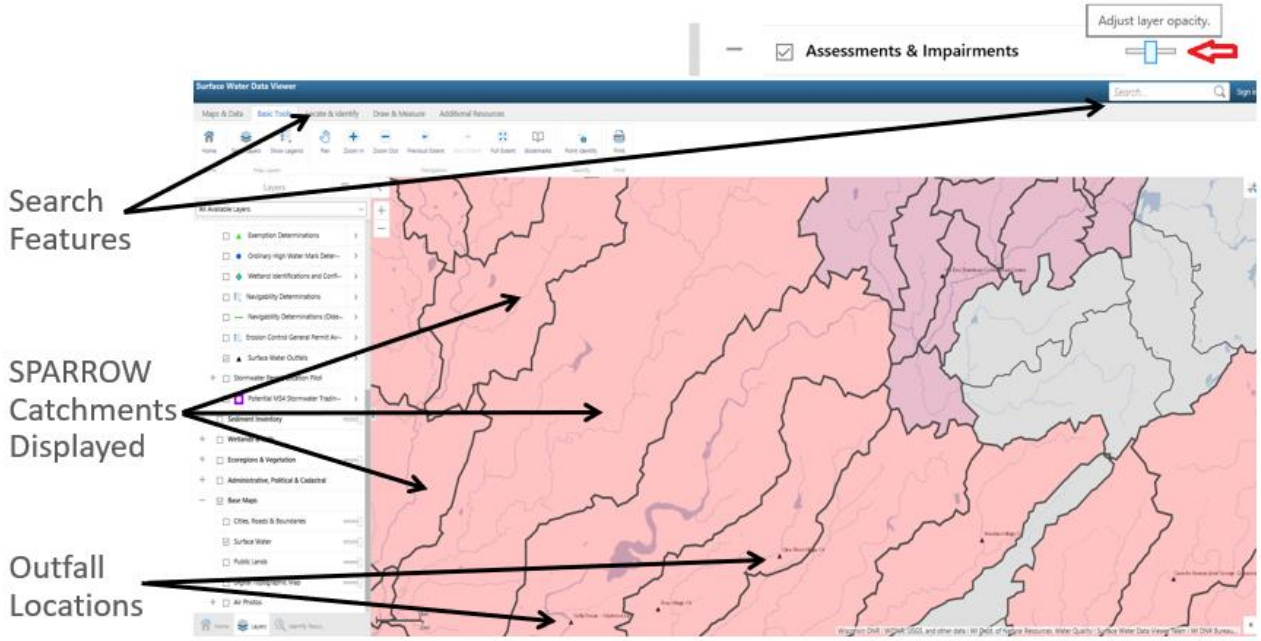
Using SPARROW for your Water Quality Trading Project

SPARROW data can be accessed at two locations:

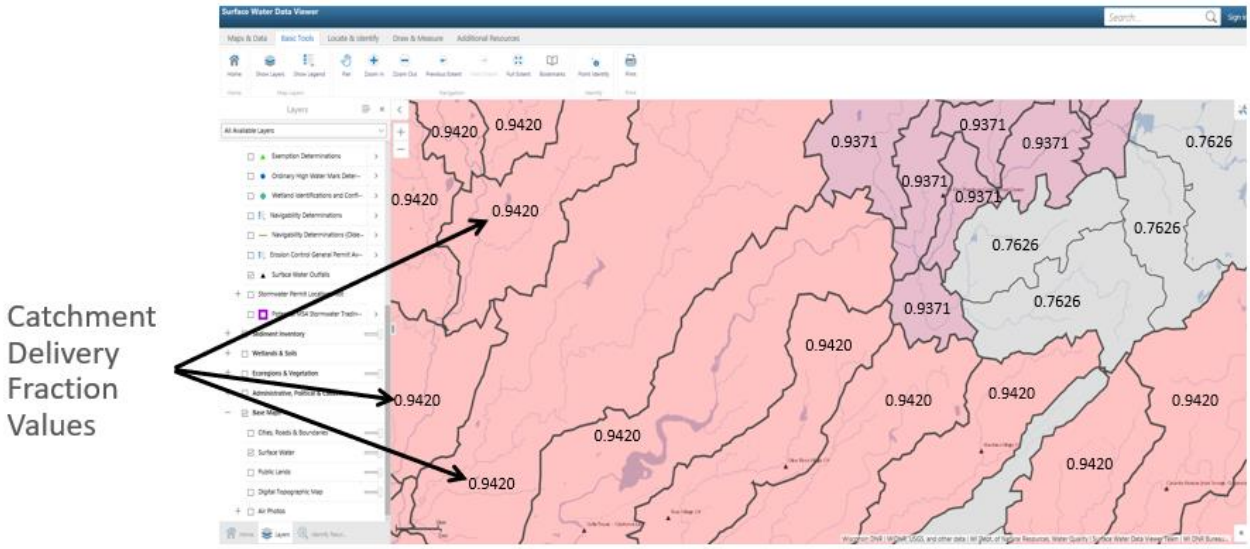
WDNR Surface Water Data Viewer: Quickly find your facility, credit generation location, and respective SPARROW delivery fractions at: WDNR Surface Water Viewer – SPARROW Theme

Shapefile Download (for use with ESRI ArcMap or other GIS program): Users with GIS capabilities may wish to import the SPARROW catchment shapefile, available at: https://dnr.wi.gov/topic/surfacewater/documents/AmWqt/SPARROW_Output.zip

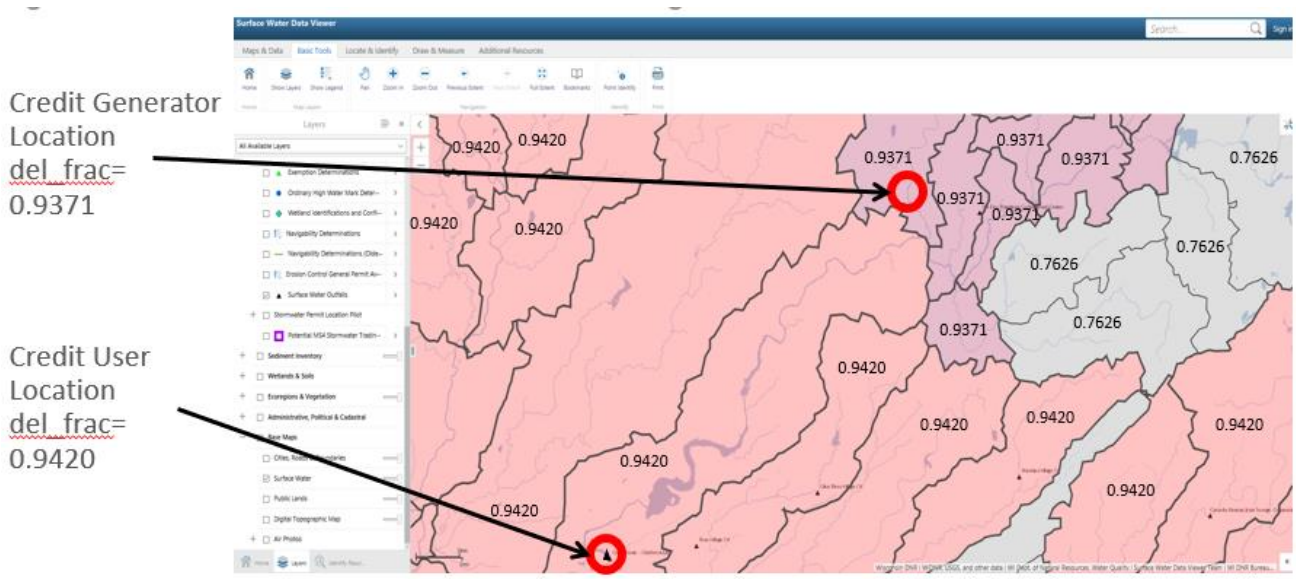
Once SPARROW catchments are displayed (either in Surface Water Data Viewer or other GIS program), navigate to the location where credits will be used. Surface Water Data Viewer has functions that aid locating WPDES facilities and other relevant features. The user may wish to adjust the opacity settings for Assessments & Impairments on the layers toolbar.



Each SPARROW catchment has an associated delivery fraction, labeled on the Surface Water Data Viewer map. For users who imported the SPARROW layer into an alternative GIS, delivery fractions are found in field “del_frac”. Note the delivery fractions pertaining to the credit generator location and the credit user location.



The following example shows values derived for project locations circled in red



Once delivery fraction values have been identified for the upstream and downstream locations, use them in the following equation:

$$Delivery\ Fraction = 1 - \frac{(user\ del_frac - generator\ del_frac)}{user\ del_frac}$$

By using values derived for each catchment (0.9420 and 0.9371), delivery can be calculated using the equation:

$$Delivery\ Fraction = 1 - \frac{(0.9420 - 0.9371)}{0.9420} = 0.994$$

A delivery fraction of 0.994 means that 99.4% of pollutants (TSS, N, or P) entering waterways in the credit generator's catchment will be delivered to the credit user's catchment. Incorporating this fraction into the trade ratio ensures that natural attenuation of pollutants is accounted for, thereby protecting downstream water quality when trading. The delivery fraction must first be converted to a delivery factor, as shown on the next page.

To obtain the Delivery Factor (used in the trade ratio), use the following equation :

$$Delivery\ Factor = \frac{1}{Delivery\ Fraction} - 1$$

$$Delivery\ Factor = \frac{1}{0.994} - 1 \quad = 0.\ 006$$

$$Delivery\ Factor = 0.006$$

<u>Important points to remember:</u>

- Delivery fractions are tied to a specific catchment, encompassing all waterbodies in that catchment, regardless of stream order.
- Delivery factors calculated by SPARROW are 0 if credit generation and use occurs within the same catchment.
- Raw SPARROW delivery fraction values estimate delivery percentage through a stream's entire flow path to a Great Lake or the Mississippi River. Using specific generator and user delivery fractions, as explained here, provide a value tailored to a specific project location.
- SPARROW is a valuable tool for estimating delivery across large spatial scales. Fine-scale factors such as small lakes, impoundments, or other connectivity issues may influence delivery and will need to be accounted for separately from the model.

Appendix H - Management Practices and Associated Information

Last Revised: May 2020

Below is a list of nonpoint source management practices that may be used to generate credits for trading. The list specifies an uncertainty factor for each practice. The uncertainty factor accounts for the multiple types of uncertainty that normally occur in the generation of pollutant reduction credits, especially when credits are generated by a nonpoint source. Uncertainties originate from climatic variability, potential inaccuracies in field testing or modeling of the amount of pollutant controlled by a management practice, and the reliability of the management practice to perform. Generators of pollutant reduction credits are not restricted to the management practices covered by the following list, but if not present in the list a proposed management practice will likely require an evaluation by the WDNR before credits generated by the practice are approved for use by a second source to demonstrated compliance with permit limits.

Management Practice	Uncertainty Factor[1]	Applicable Technical Standard	Method for Calculating Pollutant Load Reductions	Notes
Agricultural Practices				
Whole Field Management: Requires an approved nutrient management plan, filter strips/buffer strips[3], grassed waterways[4], conservation or no till[5], and cover crops. Additional practices as deemed by NRCS or county conservationist may be required to protect against mobilization and delivery of pollutants.	1	NRCS 590, 393, 332, 412, 345 329, 340 and 330	SnapPlus or equivalent model results compared to baseline	Requires an approved NRCS 590 nutrient management plan (NMP) that meets both the soil test-P and PI requirements. Requires a draw down strategy for nutrient concentrations that are above University of Wisconsin-Extension soil fertility recommendations. No application of manure, biosolids, or industrial wastes on snow covered or frozen ground or on fields with high groundwater or tile drainage. A crop or livestock producer engaged in a trade agreement must have all fields under an approved NMP, not just fields engaged in the trade.
Companion Crops (perennial vegetation)	1	NRCS 340	SnapPlus or equivalent model results compared to baseline Model as perennial cover	Companion crops must be established to provide continuous protection to soil surface and placed in support of Nutrient Management and supporting practices outlined below.
Conservation Easement	1	NRCS 327	SnapPlus or equivalent model results compared to baseline	Land in perennial vegetation.

Management Practice	Uncertainty Factor[1]	Applicable Technical Standard	Method for Calculating Pollutant Load Reductions	Notes
Nutrient Management and supporting practices:	2 (3)	NRCS 590	SnapPlus or equivalent model results compared to baseline	An approved NMP is required with any of the listed supporting practices. All supporting practices receive the same uncertainty factor as the NMP. To receive an uncertainty factor of 2, a crop or livestock producer engaged in a trade agreement must have all fields under an approved NMP, not just fields engaged in the trade. An uncertainty factor of 2, instead of (3), may be used when documentation can be provided through historic cropping records **or** soil testing that nutrient levels are stable or dropping, an indication of adherence to the NMP. An uncertainty factor of (3) is required if fields are not brought into compliance with ss. NR 151.02 and NR 151.04, Wis. Adm. Code. An uncertainty factor of (3) is required if fields are managed without a NMP or with a NMP that does not meet the NRCS 590 standard. Current and historic field and farm information/cropping records must be described and captured within SnapPlus to allow DNR to verify phosphorus loss calculations are accurate and phosphorus loss is not shifted to other fields. No application of manure, biosolids or industrial wastes allowed on snow-covered or frozen ground or on fields with high groundwater or tile drainage. Establishing **grassed waterways** on fields in support of nutrient management and other supporting practices lowers the uncertainty factor to 1.5.
Tillage Options[5]				
Mulch Till	2 (3)	NRCS 345		
No Till	2 (3)			
		NRCS 329		
Riparian Filter Strip (edge of field)	2 (3)	NRCS 393		
Grassed Waterway	See Notes	NRCS 412		
Cover Crop	2 (3)	NRCS 340		
Other practices simulated in SnapPlus	2 (3)			
CAFO and Barnyard Production Area Practices			University of Wisconsin Barnyard Tool APLE or equivalent modeling method	
Diversion	2	NRCS 362		
Roof Runoff Structure	2	NRCS 558		
Vegetated Treatment System	4	NRCS 635		
Constructed Wetland	4	NRCS 656		
Sediment Control Basin	2	NRCS 350	RUSLE2	For agricultural runoff control.

Management Practice	Uncertainty Factor[1]	Applicable Technical Standard	Method for Calculating Pollutant Load Reductions	Notes
Streambank Stabilization and Shoreline Protection			Appropriate methods include NRCS recession calculation. See Appendix F for detailed methods.	For livestock producers, streambank stabilization must be accompanied by riparian fencing or other controls to prevent destruction of streambanks.
Without aquatic habitat adjustment	3	NRCS 580 NRCS 382		
With aquatic habitat adjustment	2	NRCS 580 NRCS 395		

Dredging, Lake Treatment and Wetland Restoration				
Lakes and Reservoirs			Load reductions calculated by determining seasonal flux rate.	Dredging must remove sediment to the original or native layer. Seasonal flux rate should be calculated based on a calibrated model and monitoring data. Annual load reductions are generated based on the calculated seasonal flux rate.
Dredging and removal of in-situ sediment and nutrients or treatment (i.e., alum)	3	NRCS 395		
Dredging and removal of in-situ sediment and nutrients or treatment accompanied by aquatic habitat restoration.	2			
Rivers or Streams				Load reductions are generated on a prorated annual basis until the flux rate returns to pre-dredging flux rate conditions. Contact WDNR when developing monitoring plan.
Dredging with stable stream banks, installation of appropriately wide buffer strips and supporting upland practices addressing pollutants of concern	2	NRCS 580		
Dredging without stabilized stream banks or without supporting upland practices	3			
Wetland Restoration	1	NRCS 657 NRCS 658	SnapPlus or equivalent model results compared to baseline	Load Reductions are generated for land placed out of production such as the conversion of agricultural land back to wetland. Credits may not be generated by using wetlands to treat runoff. See Appendix J – Wetland Restoration for more information.

Management Practice	Uncertainty Factor[1]	Applicable Technical Standard	Method for Calculating Pollutant Load Reductions	Notes
Urban Practices				
Bioretention for Infiltration	2	DNR 1004	SLAMM, P8, or Recarga	Urban practices are not to be installed in wetlands, as they will be ineffective in hydric soils with a high water table.
Infiltration Basin	2	DNR 1003	SLAMM, P8, or Recarga	
Infiltration Trench	2	DNR 1007	SLAMM, P8, or Recarga	
Proprietary Storm Water Sedimentation Devices	2	DNR 1006	SLAMM	
Vegetated Infiltration Swales	2	DNR 1005	SLAMM or P8	
Wet Detention Pond	2	DNR 1001	SLAMM or P8	

[1] Uncertainty factors provided in this table are applicable to TP and TSS only.

[2] When using SnapPlus or an equivalent model to calculate load reductions, use the same soil type and field slope when calculating pollutant loads prior to and after installation of the management practice.

[3] Filter strips / buffer strips required adjacent to concentrated flow areas, intermittent or perennial.

[4] Grassed waterways required for concentrated flow areas.

[5] No till shall conform to NRCS 329 Standard; Conservation till shall conform to NRCS 345 Standard with a calculated STIR value of 35 or less.

Appendix I – Example Trade Agreements

Last Revised: April 2019

Example Trade Agreement for Point to Point Source Trades

Notice

This is an example agreement and should be amended to meet the needs and conditions of the specific agreement. The Department does not require final trade agreements to be submitted with the trading plan. However, these documents must be presented upon request by the Department.

Credit User Information

Credit User Name (Permittee)	Credit User Permit Number **WI-**	Trade Agreement Number

Credit User Address	City	State	ZIP Code

Project Name

Credit User Receiving Water Name	HUC 12

Project Name

Credit Generator Information

Credit Generator Name (Permittee)	Credit User Permit Number **WI-**

Street Address	City	State	ZIP Code

Credit Generator Receiving Water Name	HUC 12

Method for Generating Credit

Pollutant Trade Agreement

The property described above is enrolled in a Water Quality Trade Agreement. Funds are provided to the credit generator in return for pollution credit generated from the installation, operation and maintenance of treatment technology. This agreement commits the credit generator to agree to, and comply with, more restrictive permit requirements so that credits are available for trading.

Credit Generator's applicable limit (TBEL, WQBEL, or TMDL-derived limit) prior to trade:

applicable limit post trade:

Credit Generator's applicable limit (TBEL, WQBEL, or TMDL-derived limit) prior to trade:

applicable limit post trade:

Pollutant	Quantity being Traded	Cost per Unit (including O & M)	Estimated Total Cost	Total Financial Reimbursement	Estimated Date Credits will be Available

Section A – General Requirements
Example:
A 1. This agreement may be amended by mutual agreement of either party, so long as the agreement has not yet expired.
A 2. This agreement is effective from the date signed by all parties through the end date of the permit terms.

Section B – Credit Generator Shall:
Example:
B 1. Design, install, operate and maintain treatment to comply with permit requirements consistent with this trade agreement.
B 2. Report treatment failures in a timely matter to WDNR and the credit user.

Section C – Grantee Shall:
Example:
C 1. Provide cost sharing to the credit generator consistent with this agreement.
C 2. Make cost-share payments to the credit generator upon permit reissuance once the credit generator's permit has been modified to reflect the trade.

TA Number	Typed Name of Credit Generator	Initials of Credit Generator	Date

Signed this _____ day of _____, 20 _____.

_____
Signature of Authorized Representative of Credit Generator

_____
Typed Name of Authorized Representative of Credit Generator

STATE OF WISCONSIN
_____ County

))) ss.))

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

_____
Signature of Notary Public

_____
Typed Name of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Credit User

Signed this _____ day of _____, 20 _____.

_____
Signature of Authorized Representative of Credit User

_____
Typed Name of Authorized Representative of Credit User

STATE OF WISCONSIN
_____ County

))) ss.))

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

_____
Signature of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Other Signer- Specify title or relationship: _____

Signed this _____ day of _____, 20 _____.

_____
Signature

_____
Signature

_____
Typed Name

_____
Typed Name

STATE OF WISCONSIN
_____ County

))) ss.))

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

_____

Example Trade Agreement for Point to Nonpoint Source Trades

Notice

This is an example agreement and should be amended to meet the needs and conditions of the specific agreement. The Department does not require final trade agreements to be submitted with the trading plan. However, these documents must be presented upon request by the Department.

Permittee Information

Credit User Name (Permittee)	Permit Number

Credit User Address

Permittee/Broker/Exchange Name (if applicable)	Trade Agreement Number

Permittee/Broker/Exchange Address (if applicable)

Street Address	City	State	ZIP Code

Project Name

Name of Credit Generator (Landowner/Operator) (Last, First, M.I.)

Street Address	City	State	ZIP Code

Property Information

Name of Landowner(s) (if not Operator) (Last, First, M.I.)

Street Address	City	State	ZIP Code

Legal Description of Property - Contiguous sites under the same ownership: (add additional sheets if necessary)

Parcel ID(s):

Site Locator for Construction Projects

County	Township	Range E / W	Section	Quarter/Quarter (e.g., NW ¼ of the NE ¼)
	N			
	N			
	N			
	N			

Agreement

The property described above is enrolled in a Water Quality Trade Agreement. Funds are provided to the landowner/ operator in return for the installation, operation and maintenance of best management practices (BMPs) designed to enhance water quality. This agreement commits the landowner/operator, their heirs, successors and assigns to fulfill the trade agreement until a satisfaction or release is filed by the grantee.

Addenda which describe the BMPs, costs, installation schedule, and conditions are hereby incorporated into this agreement and are on file with the grantee and may be given to Wisconsin DNR upon request by the Department.

Landowner/Operator

Signed this _____ day of _____, 20 _____.

Signature of Landowner/Operator

Signature of Landowner/Operator

Typed Name of Landowner/Operator

Typed Name of Landowner/Operator

STATE OF WISCONSIN)
_____ County) ss.
)
)

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public

Typed Name of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Landowners (if not operator)

If the landowner section is not completed, check (X) one or both of the following that apply

☐ Landowner is also operator

☐ Trade agreement contains only high residue management, nutrient management, pesticide management, cropland protection cover (green manure)

Signed this _____ day of _____, 20 _____.

Signature of Landowner (if not operator)

Signature of Landowner (if not operator)

Typed Name of Landowner (if not operator)

Typed Name of Landowner (if not operator)

STATE OF WISCONSIN)
_____ County) ss.
)
)

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public

Typed Name of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Credit user/broker/exchange

Signed this _____ day of _____, 20 _____.

Signature of credit user/broker/exchange

Typed Name of credit user/broker/exchange

STATE OF WISCONSIN)
_____ County) ss.
)
)

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Other Signer- Specify title or relationship: _____

Signed this _____ day of _____, 20 _____.

Signature | Signature

Typed Name | Typed Name

STATE OF WISCONSIN)
_____ County) ss.
)
)

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public | Typed Name of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Other Signer- Specify title or relationship: _____

Signed this _____ day of _____, 20 _____.

Signature | Signature

Typed Name | Typed Name

STATE OF WISCONSIN)
_____ County) ss.
)
)

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public | Typed Name of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

Other Signer- Specify title or relationship: _____

Signed this _____ day of _____, 20 _____.

Signature | Signature

Typed Name | Typed Name

STATE OF WISCONSIN)
_____ County) ss.
)
)

Personally came before me this _____ day of _____, 20 _____.

The above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledge the same.

Signature of Notary Public | Typed Name of Notary Public

Notary Public _____ County, Wisconsin

My commission (is permanent) (expires _____).

☐ Check this box if this page is purposely left blank.

Section A – General Requirements
Example:
A 1. This agreement may be amended by mutual agreement of either party, so long as the agreement has not yet expired.
A 2. If a significant archeological or historical site is found, construction is to cease immediately and the BMP will be relocated, redesigned, or deleted to prevent damage to the archeological or historical site. The BMP may be deleted only if approved in writing by the Department of Natural Resources.

Section B – Landowner/Operator Shall:
Example:
B 1. Design, install, operate and maintain BMPs listed in Addendum 2 of this agreement.
B 2. Allow access to the installed BMP by the grantee, or an authorized representative of the grantee for site inspection of the BMP for installation, operation and maintenance.
B 3. Allow access to the installed BMP by employee(s) of the department of natural resources for site inspection of the BMP for installation, operation and maintenance.

Section C – Grantee Shall:
Example:
C 1. Provide cost sharing to the landowner/operator consistent with Addendum 2.
C 2. Make cost-share payments to the landowner/operator after payment is requested and evidence of contractor payment by the landowner/operator has been received, and the grantee verifies proper BMP installation.

TA Number	Typed Name of Landowner/Operator	Initials of Landowner/Operator	Date

The cost-share recipient shall implement and maintain all best management practices listed in this Addendum, unless otherwise amended in accordance with this agreement.							Installation Period			
							From (MM/YY)		To (MM/YY)	
Field #	DNR BMP Code	Practice Name	Quantity	Unit	Unit Cost	Estimated Total Cost	Reimburs-ement Rate (%)	Estimated Cost-Share Amt.	Cost-Share Amt. From Other Programs*	Estimated Year to be Installed
* Identify Program Names: _____					**TOTALS**					

CSA Number	Typed Name of Landowner/Operator	Initials of Landowner/Operator	Date

Appendix J – Wetland Restoration

Last Revised: March 2020

The restoration of wetlands is an option available for generating water quality credits. Reductions are calculated by comparing the previous loading, typically under an agricultural land use setting, with a permanently vegetated scenario. Research indicates that overtime, wetlands can become sources of phosphorus and may seasonally alter between being a nutrient sink and nutrient source as vegetation dies back in the late fall and early spring. Steps such as reducing agricultural runoff entering wetlands, harvesting vegetation, and drawing down in-situ soil phosphorus levels are methods that can mitigate phosphorus export. In addition, design considerations such as slope, residence time, hydraulic loading rate, presence of carbon, soil pH, microbial activity, wetland shape, and water depth are all factors that influence the ability of a wetland to more efficiently retain phosphorus.

Due to a combination of both Federal and U.S. Army Corps of Engineers' requirements, wetland acres enrolled in the wetland mitigation bank are unable to generate water quality trading credits and vice-versa. However, a wetland restoration project can potentially generate both types of credits provided documentation clearly indicates which specific acres of restored wetland are destined for mitigation credits and which are being used for water quality trading credits. For example, wetlands restored for mitigation purposes are required to have a protective buffer around them and this buffer, along with other potential areas of a site not suitable for wetland mitigation, could be used to generate water quality trading credits.

When examining a potential site for wetland restoration and mitigation, consideration should be given to the quality and type of wetland restoration, the location, current land use(s) and nutrient load, adjacent/upgradient land-use(s) that contribute nutrients, via runoff, to the proposed wetland restoration site and the demand for mitigation credits or water quality trading credits. A wetland restoration plan that is utilizing both mitigation and water quality credits needs to clearly specify which restoration acres are being used for which program. Please see the WDNR website (https://dnr.wi.gov/topic/Wetlands/Mitigation/) for contact information and additional resources on wetland restoration and mitigation.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
NOTICE OF FINAL GUIDANCE & CERTIFICATION

Pursuant to ch. 227, Wis. Stats., the Wisconsin Department of Natural Resources has finalized and hereby certifies the following guidance document.

DOCUMENT ID

WY-20-0010

DOCUMENT TITLE

Guidance for Implementing Water Quality Trading in WPDES Permits

PROGRAM/BUREAU

Water Quality

STATUTORY AUTHORITY OR LEGAL CITATION

Section 283.84, Wis. Stats.

DATE SENT TO LEGISLATIVE REFERENCE BUREAU (FOR PUBLIC COMMENTS)

01/20/2020

DATE FINALIZED

06/01/2020

DNR CERTIFICATION

I have reviewed this guidance document or proposed guidance document and I certify that it complies with sections 227.10 and 227.11 of the Wisconsin Statutes. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is not explicitly required or explicitly permitted by a statute or a rule that has been lawfully promulgated. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is more restrictive than a standard, requirement, or threshold contained in the Wisconsin Statutes.

Adrian Stocks *6/18/2020*

Signature Date