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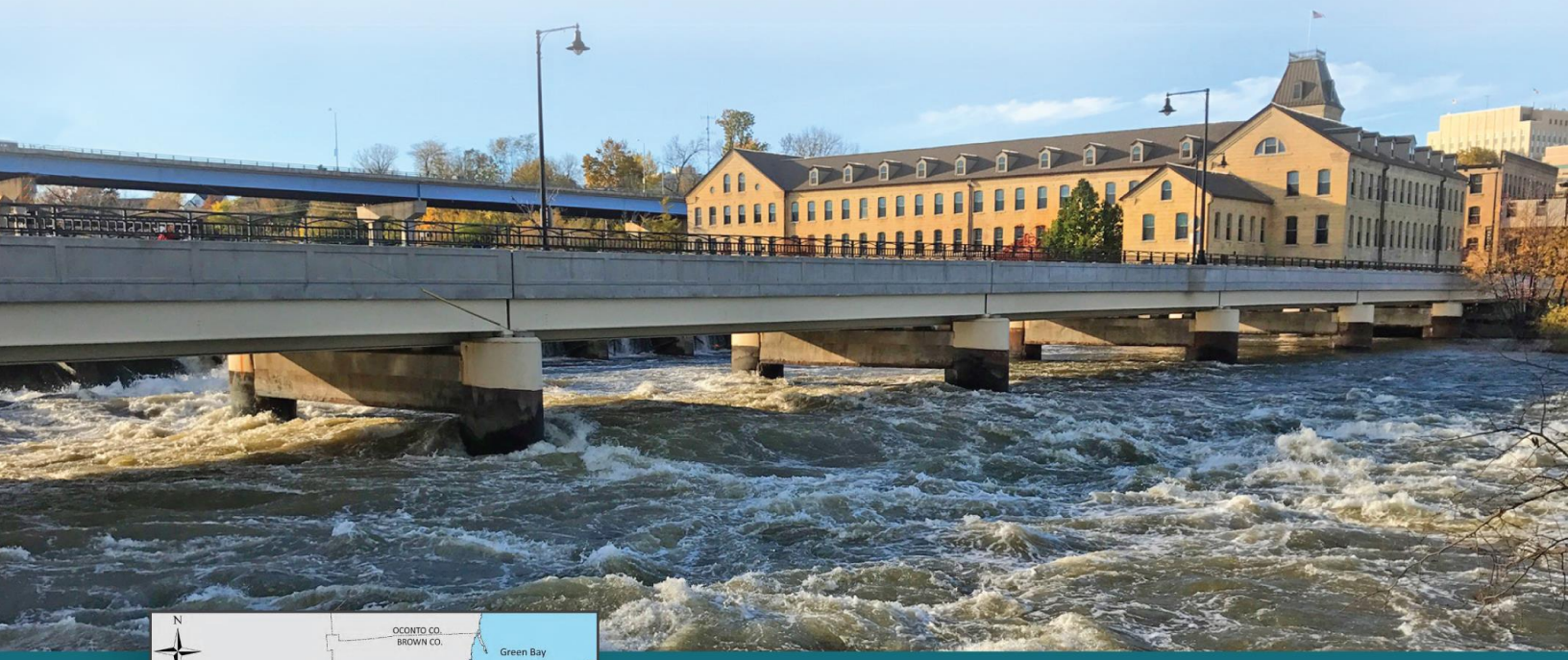

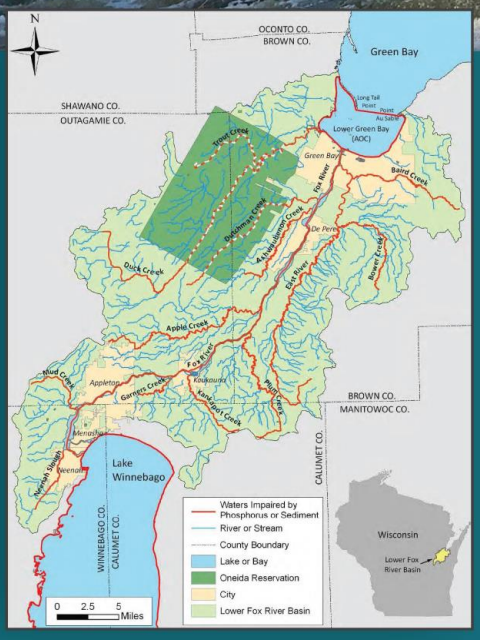

Water Quality Trading for Phosphorus in the Lower Fox River Watershed: **A Handbook**

Great Lakes Commission

December 2016

Acknowledgments

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GLOSSARY

Aggregator*: A third party that collects pollutant reduction credits from several producers to sell in bulk to permitted industrial and municipal facilities.

Bilateral market or brokered, bilateral market: The type of market structure allows two parties (a Buyer and a Seller) to negotiate a water quality trade directly or with the assistance of a broker.

Broker: A third party that assists parties interested in buying and/or selling pollution reduction credits by facilitating negotiations, certifying credit generation, and assisting in necessary documentation.

Buyer* (in Wisconsin DNR Guidance, a "credit user"): Buyers of credits include any public or private entity that invests in water quality credits. Buyers typically buy credits to meet a regulatory obligation.

Credit: A measured or estimated unit of pollutant reduction adjusted by trading ratios that can be sold or purchased in a water quality trading market.

Credit Certification Report (CCR): A spreadsheet tool designed by the Great Lakes Commission as part of the Fox P Trade project to organize, present, and certify the validity of proposed credit generating practices on agricultural cropland and resulting credits for sale.

Credit Reserve Pool*: A collection or bank of unused credits that is available to compensate for unanticipated shortfalls in the quantity of credits actually generated.

Crop Year: As used in the SnapPlus model, a crop year runs from November 1 through October 31.

Fox P Trade: The project initially funded through the Wisconsin Natural Resources Conservation Service and administered by the Great Lakes Commission, to test water quality trading and build the foundation for a long-term water quality trading program in the TMDL-limited Lower Fox River Watershed.

Fox-Wolf Watershed Alliance (FWWA): The local project coordinator for Fox P Trade, the FWWA will be responsible for longer-term oversight of the program, including the website www.foxptrade.org and this Handbook.

Land & Water Conservation Department (LWCD): County offices (sometimes referred to as a Land Conservation Department) skilled at working with the agricultural community to improve production practices while also acting as local stewards of natural resources.

Municipal Separate Storm Sewer System (MS4): Storm water conveyance systems, often owned by municipalities, that may be regulated as Point Source dischargers of pollutants.

Nonpoint Source (NPS): Sources of pollution that are not regulated as Point Sources and may include barnyards, cropland, construction sites, and storm sewers that do not require discharge permits.

Permit: As used in this Handbook, Permit means a Wisconsin Pollutant Discharge Elimination System (WPDES) permit.

Phosphorus or Total Phosphorus (P or TP, respectively): A vital nutrient that, when used in excess and discharged to surface waters, contributes to nuisance plant and algal growth.

Phosphorus Credits: After the application of trade ratios, reductions in phosphorus loads to surface waters are transformed to this unit of measurement used for sale in a water quality trading market.

Point Source (PS): Dischargers of pollutants that are required by state and/or federal law to obtain Wisconsin Pollutant Discharge Elimination System (WPDES) permits.

Seller (in Wisconsin DNR Guidance, a "credit generator"): Any eligible Point or Nonpoint Source generating credits for sale in a water quality trading market.

Stewardship Trades: Water quality trade agreements that are not needed for regulatory compliance.

Total Maximum Daily Load (TMDL): Established by the federal Clean Water Act, this is a "pollution diet" carefully crafted to correct water quality impairments identified by state water quality agencies.

Total Suspended Solids (TSS): Another pollutant for which credits may be traded in Wisconsin.

Trade Agreement or Water Quality Trading Contract: The binding agreement entered into by a Buyer and a Seller to memorialize the terms of a water quality trade.

Water Quality-Based Effluent Limitations (WQBEL)*: As described in 33 U.S.C. § 1312(a), a WQBEL is an effluent limitation determined by selecting the most stringent of the effluent limits calculated using all 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 waste load allocation from a TMDL.

Water Quality Trading (WQT): A market-based system for improving water quality whereby one party reduces pollution significantly so that another party may reduce less.

Water Quality Trading Packet or Packet: An assemblage of information necessary for a Buyer (that is also a WPDES permittee) to submit in order to seek WDNR approval of a proposed water quality trade.

Water Quality Trading Plan or Plan: A component of the Packet, this document largely mirrors the provisions of the Trade Agreement, but is intended only for WDNR review and understanding of a proposed water quality trade.

Wisconsin Pollutant Discharge Elimination System (WPDES): Wisconsin's system for authorizing discharges of polluting materials to surface waters of the state, under both state and federal law requirements.

*Definition from *Building a Water Quality Trading Program: Options and Considerations*, Version 1.0, a product of the National Network on Water Quality Trading. June, 2015.

I. Introduction

A. Benefits of Water Quality Trading

The Lower Fox is subject to specific restrictions on total phosphorus and total suspended solids set forth in the Lower Fox River Total Maximum Daily Load (TMDL). [1] Water Quality Trading (WQT) can provide a more cost effective compliance opportunity for WPDES[2] permit holders facing expensive upgrades while also helping to improve water quality. Water quality trading offers WPDES permit holders the opportunity to meet the TMDL limits (e.g., water quality-based effluent limits in their permit) through means other than treatment technology at their facility. This Handbook focuses largely on how investing in agricultural practices can help achieve those permit limits. Trading blends economic and environmental goals to allow permitted facilities to comply with increasingly restrictive permit limits at a reasonable cost. It also provides incentives for local agricultural producers and encourages them to reduce losses of pollutants from their operations. Additionally, trades frequently result in additional benefits such as flood retention and improved habitat and soil health while promoting cooperation and coordination between different sectors. Trading can also be used to achieve environmental improvement goals without being used for permit compliance. This type of WQT is known as a Stewardship Trade.

Trading blends economic and environmental goals to allow permitted facilities to comply with increasingly restrictive permit limits at a reasonable cost.

B. Handbook Overview

This Handbook is designed to facilitate Water Quality Trading in Wisconsin's Lower Fox River Watershed and serve, along with the website www.foxptrade.org, as a capstone for the "Fox P Trade" project, administered over three years (2013-2016) by the Great Lakes Commission through funding from the United States Department of Agriculture's Natural Resource Conservation Service for the state of Wisconsin. Trading by WDPES permittees is authorized by Wisconsin Statutes 283.84.

In 2013, the Wisconsin Department of Natural Resources (WDNR) issued two documents that provide detailed background on Water Quality Trading in Wisconsin.

- A Water Quality Trading How-To Manual, designed for general audiences, and
- Guidance for Implementing Water Quality Trading into WPDES Permits (Guidance).

While the Guidance was designed for WDNR permit writers, it also has a lot of good information for permit holders. Both of the above documents are found on the WDNR's water quality trading web site.

This Handbook builds on those two documents but differs in two ways.

[1] Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay Brown, Calumet, Outagamie, and Winnebago Counties, Wisconsin March 2012. http://dnr.wi.gov/topic/TMDLs/documents/lowerfox/LowerFoxRiverTMDLReport2012.pdf

[2] Wisconsin Pollutant Discharge Elimination System

First, it is specifically designed for trading phosphorus (P), and to a lesser extent, Total Suspended Solids (TSS), credits in the Lower Fox River Watershed (LFRW). The focus on these two pollutants arises from a suite of EPA approved total maximum daily loads (TMDLs) for LFRW that set specific pollution (load) reduction targets for P and TSS. Those TMDL load reduction targets determine the point at which water quality credits may be generated and presented an interesting opportunity to test Wisconsin's WQT process and the potential for trading as a tool for reducing nutrient pollution in the lower or inner Bay of Green Bay.

Water Quality Trading allows a permit holder/Buyer to purchase credits (representing documented reductions in pollution) from a Seller in lieu of investing in expensive process improvements to meet pollution limits in their permit.

This Handbook describes how this process works for trading Phosphorus Credits in the Lower Fox River Watershed, with particular emphasis on Sellers in the agricultural community.

Water Quality Trading allows a permit holder/Buyer to purchase credits (representing documented reductions in pollution) from a Seller in lieu of investing in expensive process improvements to meet pollution limits in their permit. This Handbook describes how this process works for trading Phosphorus Credits in the Lower Fox River Watershed, with particular emphasis on Sellers in the agricultural community.

Second, this Handbook heavily emphasizes how to conduct trades between agricultural nonpoint source Sellers and point source Buyers. Agriculture is the largest contributor of both P and TSS into the Lower Fox River and Bay of Green Bay, with significant potential for pollution reductions. However, methods for calculating load reductions and credits from agriculture are complicated due to the varied nature of agricultural conservation practices. This handbook illustrates important details for ensuring effective trades where the seller is an agricultural producer seeking to generate credits through changes to cropping practices.

This Handbook does not repeat or replace a lot of very useful background and technical information contained in the two WDNR documents listed above. Rather, it is intended to instruct water quality credit Buyers and Sellers through the step-by-step process to trade water quality credits in the LFRW. The first step in the process is to know whether your facility would be a Buyer or Seller of credits.

II. How Fox P Trading Works

This Handbook was developed throughout the three-year Fox P Trade project with input from a variety of stakeholders. Recommendations are based on the project team's rigorous testing of Wisconsin's Water Quality Trading process within the Lower Fox River Watershed, where a suite of TMDLs limit pollutant loading. Those interested in WQT do not necessarily have to follow the steps and guidelines presented in this Handbook. However, the recommended steps arising from the project team's testing may make WQT in the LFRW simpler, more transparent, and more broadly supported by all interested parties and stakeholders.

Figure 1 - How Fox P Trading Works

The infographic below (Figure 1) outlines 9 steps for WQT in the Lower Fox River Watershed. It is deliberately simple so that readers have a general sense of the process. Some of these steps require more time and effort than others. These are described in greater detail throughout this Handbook.

A. A recommended structure for trading in the Lower Fox

Through a three-step series of stakeholder engagement activities (two workshops and a survey[3]), the Fox P Trade project built consensus that a brokered, bilateral market structure is the preferred and most appropriate market structure for launching a WQT program in the LFRW. Additionally, stakeholders who supported this approach also confirmed the need for certain services to support WQT in the Lower Fox and identified entities that could

[3] Appendix A provides more details on the two workshops and survey from 2015 that resulted in this recommendation.

provide those services in the near term, and potentially, over the long term. The outcome of this stakeholder engagement was general consensus that:

1. A WQT program is desirable in the LFRW
2. The following activities are necessary for a successful WQT program in the LFRW:
    a. Brokering trades
    b. Aggregating credits
    c. Certifying credits
    d. Verifying credits
3. Two entities are well-suited to implement necessary WQT activities in the LFRW:
    a. Fox-Wolf Watershed Alliance (FWWA)
        i. Brokering trades
        ii. Certifying credits for all types of trades
    b. County Land and Water Conservation Departments (LWCDs)[4]
        i. Aggregating credits for agricultural trades
        ii. Certifying credits for agricultural trades
        iii. Verifying credits for agricultural trades

Figure 2 illustrates various entities would provide services to support a brokered, bilateral market structure in the Lower Fox. What is entailed in these roles and services and why they are needed will become clearer as you move through this Handbook.

Overall, the recommended brokered, bilateral structure builds on existing expertise and relationships in the watershed that are necessary for WQT to be a success. The recommended approach of a brokered bilateral market structure is best suited to this emerging market and leverages capabilities of two existing entities—the Fox Wolf Watershed Alliance (FWWA) and the County Land and Water Conservation Departments (LWCDs)—that are already performing some of the roles required for WQT. This existing knowledge can help reduce overall transaction costs.

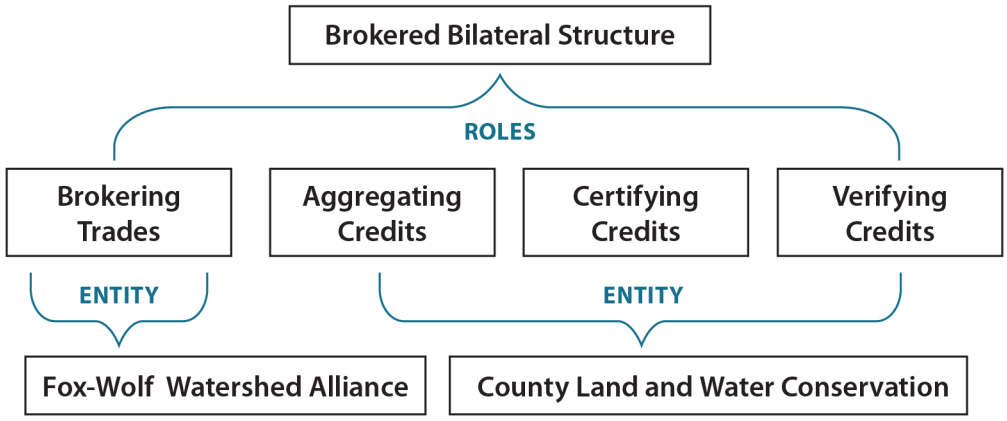

Figure 2 - A recommended WQT market structure for the LFRW

[4] In some Wisconsin counties, these departments are referred to simply as Land Conservation Departments (LCDs)

III. Am I a Buyer or a Seller?

Now that you understand the benefits of Water Quality Trading (WQT), you should decide whether you can or should consider buying or selling phosphorus (and/or TSS) Credits. Part of that will depend on what type of facility or operation you are, and part of that will depend on what you are trying to achieve with water quality trading. Those wishing to purchase water quality credits are known as "Buyers[5]" while those wishing to sell water quality credits are referred to as "Sellers[6]." Buyers will usually be WPDES permit holders that want to use WQT to help comply with their permit requirements. However, a Buyer could also wish to buy water quality credits for the environmental benefit, known as Stewardship Trades[7]. "Sellers" are entities that install additional environmental improvements that are quantified and converted into credits that are sold to Buyers. The majority of water quality credit Sellers in the Lower Fox River Watershed will fall into one of the three categories below: nonpoint source agricultural producers; municipal separate storm sewer systems (MS4s); or permitted point source facilities. This Handbook primarily focuses on the first category of nonpoint source agricultural producers. Interested Sellers in the non-agricultural categories are encouraged to contact the Fox-Wolf Watershed Alliance or WDNR for more information.

Municipal separate storm sewer system (MS4) permit holders could be either Buyers or Sellers. As MS4 permit implementation matures in the Lower Fox, some municipalities with MS4 permits may find they need help complying with their permit as credit Buyers, while others may find that they are able to implement BMPs and programs that improve stormwater beyond what is required in their permit and therefore can be credit Sellers

Figure 3 outlines the steps for Buyers and Sellers and how they interact with each other (primarily through a Trade Agreement) as well as the necessary supporting documents. Buyers are usually permittees obligated to meet the terms of their permit under the federal Clean Water Act and state law requirements. Therefore, to provide adequate information defensible under federal and state laws and regulations, Buyers have more steps to undertake to ensure effective water quality trades.

[5] The WDNR trading guidance documents also refer to Buyers as "credit users."

[6] The WDNR trading guidance documents also refer to Sellers as "credit generators."

[7] Stewardship Trades are not regulated and therefore sit outside the WDNR's trading guidance documents. These are trades that are not used by a permittee for compliance purposes.

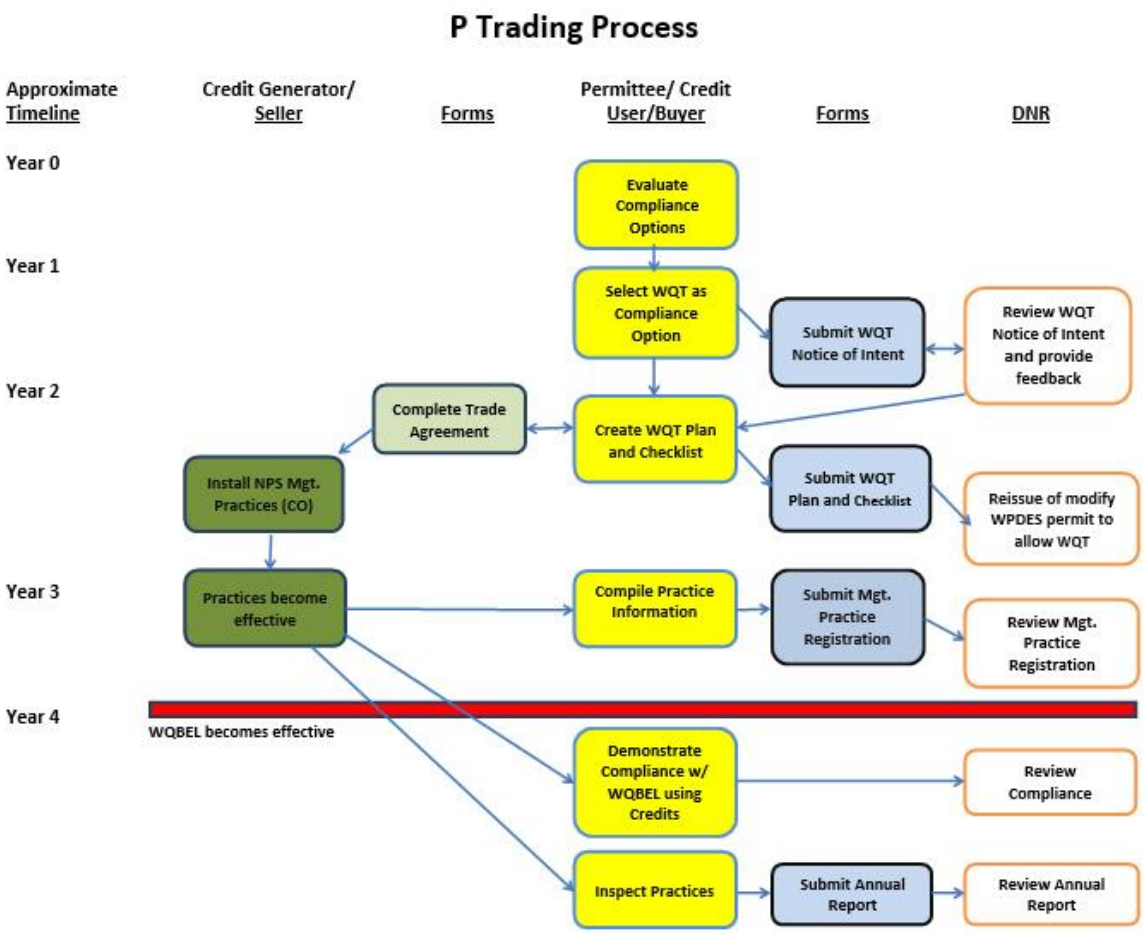

Figure 3 - Steps for Buyers and Sellers

A. Water Quality Trading for Buyers

1. Permit Compliance

A stated previously, if you are a Buyer, you are likely a WPDES permit holder (e.g., a municipal waste water treatment facility, an MS4s, or an industrial facility)[8] that wants to pursue trading as a more cost-effective means to achieve permit compliance. Water quality trading offers WPDES permit holders the opportunity to pursue an alternative to treatment technology upgrades in order to meet Water Quality-Based Effluent Limits (WQBELs)[9] in their permit. Point sources may buy credits toward achieving compliance with a WQBEL only. To determine whether water quality trading is more cost effective, Buyers must first know what their costs of compliance would be if

> To determine whether water quality trading is cost-effective, Buyers must first know what their costs would be if they pursued treatment technology upgrades.

[8] CAFO production areas are not eligible to use water quality trading to achieve WPDES permit compliance. Cropland that is part of a CAFO operation could participate in trading, but it would most likely be to sell credits.

[9] Water quality trading is not an alternative compliance option for meeting technology-based effluent limitations (TBELs) in a permit.

they pursued upgrades of the treatment plant. Then, costs can be compared to determine if trading is indeed financially attractive.

2. Environmental Stewardship

Water quality trading also offers Buyers the opportunity to contribute to environmental improvements beyond reducing a specific pollutant. This is because the pollution reducing activities that nonpoint source Sellers must undertake to generate water quality credits for phosphorus and/or TSS often produce other environmental benefits, such as flood control, habitat enhancement, or carbon sequestration. This Handbook focuses on Buyers who want to purchase water quality credits to help them comply with their permit. However, it is also possible for a Buyer to purchase water quality credits for the environmental benefits alone: these are known as Stewardship Trades. Because there is no permit involved, Stewardship Trades do not involve regulatory agencies and are theoretically simpler. This type of trading represents a largely untapped market. Land trusts, conservancies and other environmentally-oriented entities could play an important role in developing this market.

Point Source and Nonpoint Source

Buyers and Sellers can also be further categorized as "point source" or "nonpoint source." WPDES permit holders are point sources. Sources of pollution that are not regulated as point sources are then nonpoint sources. These may include barnyards, croplands, construction sites, and storm sewers that do not require discharge permits. In the vast majority of cases, nonpoint sources that participate in water quality trading will be credit Sellers.

3. I Want to Buy Credits for Phosphorus, Now What?

Figure 4 outlines the general steps that any Buyer will have to take to engage in a compliance trade in the Lower Fox.

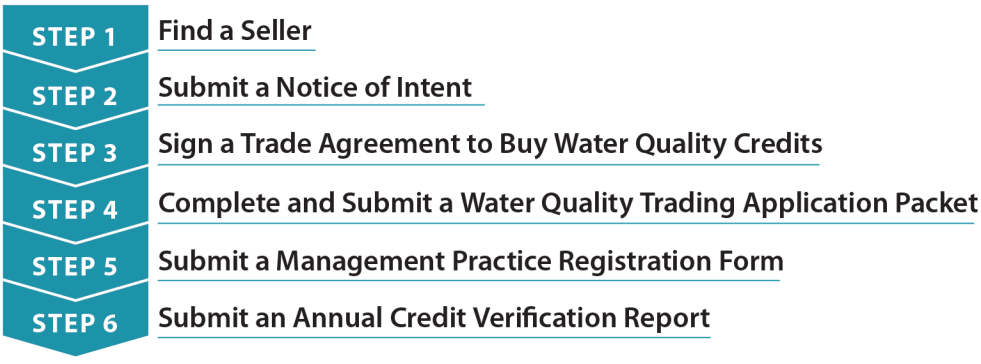

Figure 4 – Buyer Steps to Water Quality Trading[10]

Some steps may take more time than others. The details for each step depend on whether you are buying from another point source or a nonpoint source. Section V-A describes the steps to do a Point to Point Source trade, while Section V-B describes the steps for a Point to Nonpoint trade. In any case, the first step is to find a Seller.

[10] In some cases, practices may be ready for implementation before a full WQT packet can be developed. In those cases, point source Buyers should work with WDNR to submit a Management Practice Registration Form earlier in the process to ensure that credits generated from the practice in question may be used in the trade.

You have several options for finding a Seller: 1) you can contact the Fox-Wolf Watershed Alliance (FWWA) to help you find an appropriate seller and possibly act as your broker (See more on engaging a broker in Section VI); 2) you can contact the nearby County Land and Water Conservation Department (LWCD) to see if they are aware of any farmers interested in trading; 3) you can use your own network of contacts to search for possible Sellers; or 4) discuss trading with your engineering consultant. The FWWA has worked with the Fox P Trade project team in developing this Handbook and has a thorough understanding of water quality trading in the Lower Fox River. FWWA staff would be able to tell you where in the watershed you are legally able to buy the most credits and help match you with prospective point and nonpoint Sellers.

The second step is to submit a Notice of Intent to WDNR. This lets WDNR know that you are getting ready to pursue WQT as an alternative compliance option and opens the door to helpful communication as you proceed.

Third, you will negotiate a Trade Agreement to buy water quality credits from the Seller. The Trade Agreement is between the Buyer and the Seller, but includes critical information that will need to be submitted to WDNR (Step 4) for any compliance trade, specifically a Credit Certification Report (CCR) and signature page. In addition to helping match you with prospective Sellers, FWWA is also positioned to act as a trading broker to work out details of the Trade Agreement between you (the Buyer) and the Seller, help prepare the WQT Packet for WDNR review (Step 4), and ensure that the mechanics of the trade continue to run smoothly throughout the life of Trade Agreement (Steps 5 and 6).

B. Water Quality Trading for Sellers

1. Additional or More Stable Revenue for Conservation Activities

Sellers stand to benefit from the additional revenue that water quality trading can offer for conservation activities. This may be particularly appealing to those Sellers that prefer not to pursue more traditional forms of conservation assistance as administered by state and federal government.

Through a water quality trade, the Buyer pays you (the agricultural producer) for the environmental benefit that accrues from installing certain annual or structural conservation practices that reduce P or TSS runoff from your farm. For MS4 Sellers, this means that the Buyer pays you for the water quality benefit that results from installing certain BMPs that reduce P or TSS from your urban area. If you are a point source, then a Buyer pays you for specific pollution reductions in your effluent that are beyond what is required in your permit. Regardless of the type of Seller you are, trading creates a market-based incentive for reducing pollution.

2. Enhanced Environmental Quality

In addition to the financial benefit of generating and selling water quality credits, some Sellers may be interested in installing pollution-reducing practices simply to deliver environmental or quality of life benefits to their property or community. For agricultural producers, credit generating activities may further improve farm economics by improving soil health and ultimately, yields, and may also reduce fertilizer costs. As another example, a land trust or conservancy may be interested in augmenting green space because it enhances urban wildlife or recreation opportunities as well as decreasing P or TSS, purchasing water quality credits is less expensive than a conservation easement.

3. I Want to Sell Credits for Phosphorus, Now What?

Figure 5 outlines the general steps that an agricultural nonpoint source Seller will have to take to engage in water quality trading in the Lower Fox (Section IV-A of this Handbook provide valuable information for point source sellers).

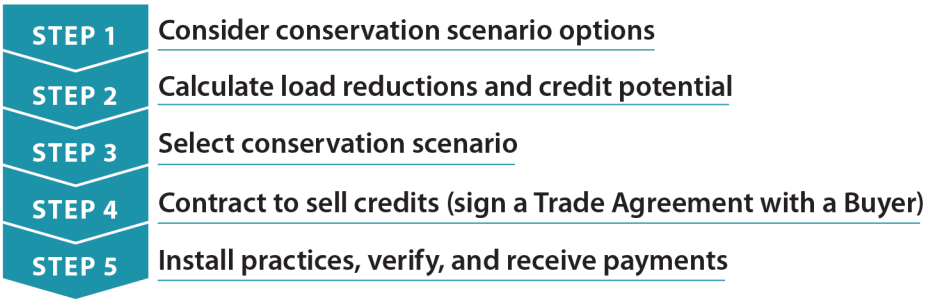

Figure 5 - Seller Steps for Water Quality Trading

Some steps may take more time than others. The first steps evaluate one or more conservation scenarios to determine whether you can reduce pollution (P or TSS) beyond required levels and by how much. Different models are used to calculate pollutant load reductions depending on the characteristics of the land where conservation practices are being considered. Sometimes multiple conservation scenarios will need to be analyzed before an opportunity for water quality trading becomes clear. More detail on how to model and document potential pollution reductions is provided in the sections below depending on the type of trade (point or nonpoint source).

Once you've selected the conservation scenario that best suits your needs (and generates credits for sale), you will want to find a Buyer and sign a Trade Agreement that sets up the terms of the trade. Your local Land and Water Conservation Department or the FWWA can help you find an appropriate Buyer. In addition to helping match you with prospective Buyers, FWWA is also positioned to act as a trading broker to work out details of the Trade Agreement between you (the Seller) and the Buyer and ensure that the mechanics of the trade continue to run smoothly throughout the life of the Trade Agreement.

IV. Calculating Load Reductions and Determining Credits to Buy or Sell

A. Point to Point Source Trades

Point sources may generate and sell credits on a pollutant specific basis (e.g. total phosphorus) when their discharge is below all Water Quality Based Effluent Limitations (WQBELs) and Technology-Based Effluent Limitations (TBELs) required in their permit for that pollutant. To undertake a trade as a Seller, the point source must accept a lower, more stringent WQBEL than what would be required without the trade.

1. Point Source Sellers[11]

a) Evaluate Existing Monitoring Results

Point sources seeking to sell credits must estimate future credit generation potential based on existing discharge monitoring results (or anticipated effluent quality if treatment system upgrades are planned) compared to the current permit requirement (or anticipated requirements, if changes are likely upon permit reissuance) for the pollutant the point source wants to sell as a credit.

To generate credits, a point source Seller must reduce a qualifying pollutant below the most stringent limitation in their permit, whether a WQBEL or TBEL. Due to the suite of TMDLs for the Lower Fox, for most point sources, the most stringent limitation will be the WQBEL developed to meet the pollution reduction targets for total phosphorus and total suspended solids established in the Lower Fox TMDL.

For the purpose of water quality trading, WDNR evaluates potential pollution reductions by examining the point source's effluent discharge monitoring results for the applicable pollutant (TP or TSS). The point source must demonstrate reductions in the applicable pollutant load below the credit threshold, which can be expressed as a monthly or six-month average. The amount reduced below the credit threshold (presented as pounds reduced) is potentially available for the point source to trade as credits.

b) Determine the Credit Threshold and Calculate Pounds Below the Threshold

Credit generation and use must be geographically appropriate within the watershed to assure that water quality benefits arising from a trade are meaningful, transparent, and defensible.

To generate credits, a point source must reduce a qualifying pollutant below the most stringent limitation in their permit. The most stringent pollution limit in the point source Seller's permit serves as the "credit threshold." In identifying the credit threshold, a point source interested in credit generation should first consult with WDNR to agree on which limitation is the most stringent, as either a concentration or load, and thus serves as the credit threshold. In the Lower Fox, the credit threshold will likely be a WQBEL derived from an approved TMDL and will be expressed as either a weekly average, monthly average, or a six-month average load (both expressed as pounds per day). For

[11] Municipal separate storm sewer systems (MS4s) are also permitted point sources, but at this time, permits do not include the WQBELs that form that basis for this discussion which is only geared toward permittees with WQBELs (for TP or TSS).

total phosphorus, when a WQBEL is less than or equal to 0.3 mg/L Total Phosphorus, the WDNR and US-EPA have agreed to include a six-month average limit in addition to a monthly average limit in the WPDES permit. As the monthly average will be set as three times the six-month average, the six-month average will likely be the most stringent limitation and thus stand as the credit threshold.

Note that the point source interested in generating (selling) credits will have to accept effluent limitations in a new or revised WPDES permit that are more restrictive than the WQBELs currently specified for their discharge. The difference between the more restrictive effluent limitations and the currently applicable WQBELs represents potential reductions that, once transformed into credits, may be available for trading. This would be a temporary reduction for the purpose of generating credits. Effluent limits may be relaxed if the trade is terminated.

Example Part 1

Industry X recently optimized its wastewater treatment facility by adding new technology that is better at removing total phosphorus. Monitoring results consistently demonstrate that the facility is reducing TP below the 0.3 mg/L limit in the current permit for the six-month average effluent limitation. Instead of using the most recent six-month periods, Industry X assembles daily discharge data for its two worst performing six-month periods within the existing permit's five-year duration to evaluate compliance capabilities. This conservative approach provides an additional margin of safety for the credit generating point source.

The evaluated data, when plotted against the 0.3 mg/L credit threshold, results in Figure 6.

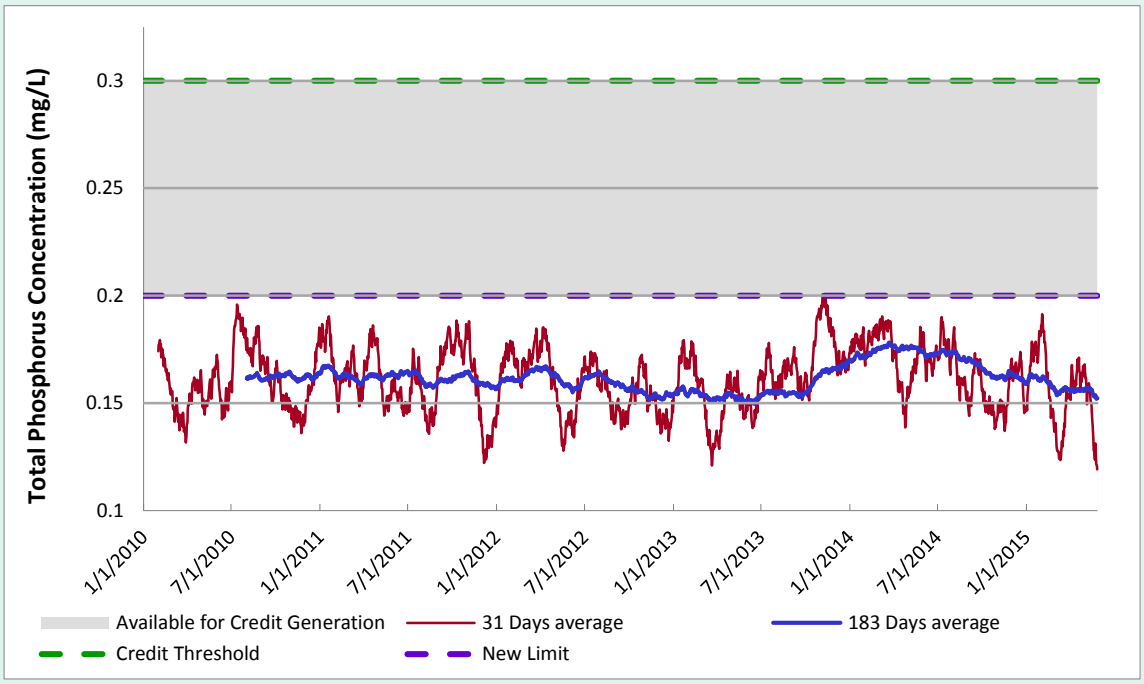

Figure 6 - New 6-month WQBEL & Concentration Available for Credit Generation

The area between the credit threshold and the monitoring data from Industry X, reflects the quantity potentially available for trading. Since the vehicle for consistently assuring a set quantity of credits generated is a commitment to an even more stringent limitation, Industry X considers a new limitation reflected as the purple line in Figure 6, above. The shaded area between the credit threshold and the new limitation is then used to calculate the amount of credits which could be generated for sale.

c) Convert Pounds to Credits: Apply Trade Ratios

Once the point source determines that it is likely to routinely discharge below the credit threshold on at least a monthly basis for the pollutant they wish to trade, they begin the formal WQT application process (beginning with the Notice of Intent), understanding that they will be required to accept a more stringent WQBEL for the traded pollutant and that they must continue to meet that WQBEL in order to continue trading. If, in the future, the point source wishes to terminate the trade, then the calculated WQBEL would be based once again the original waste load allocation for the point source/credit generator.

Example Part 2

In the example above, Industry X evaluated its credit generating potential against the credit threshold, which in this case, is concentration-based. Since credits are traded as pounds reduced, Industry X must evaluate its average flows to translate the 0.1 mg/L TP available under the new, lowered WQBEL scenario into pounds. Here again, Industry X should be conservative and consider its highest flows over two six month periods within the current permit cycle. Loading available for credits, in pounds, is calculated as maximum flow, in MGD, multiplied by concentration and by a conversion factor:

$$1.80 MGD/day * 0.1\ mg/L * 8.34 = 1.50\ lbs/day$$

This load is illustrated as the shaded area in the Figure 7 below:

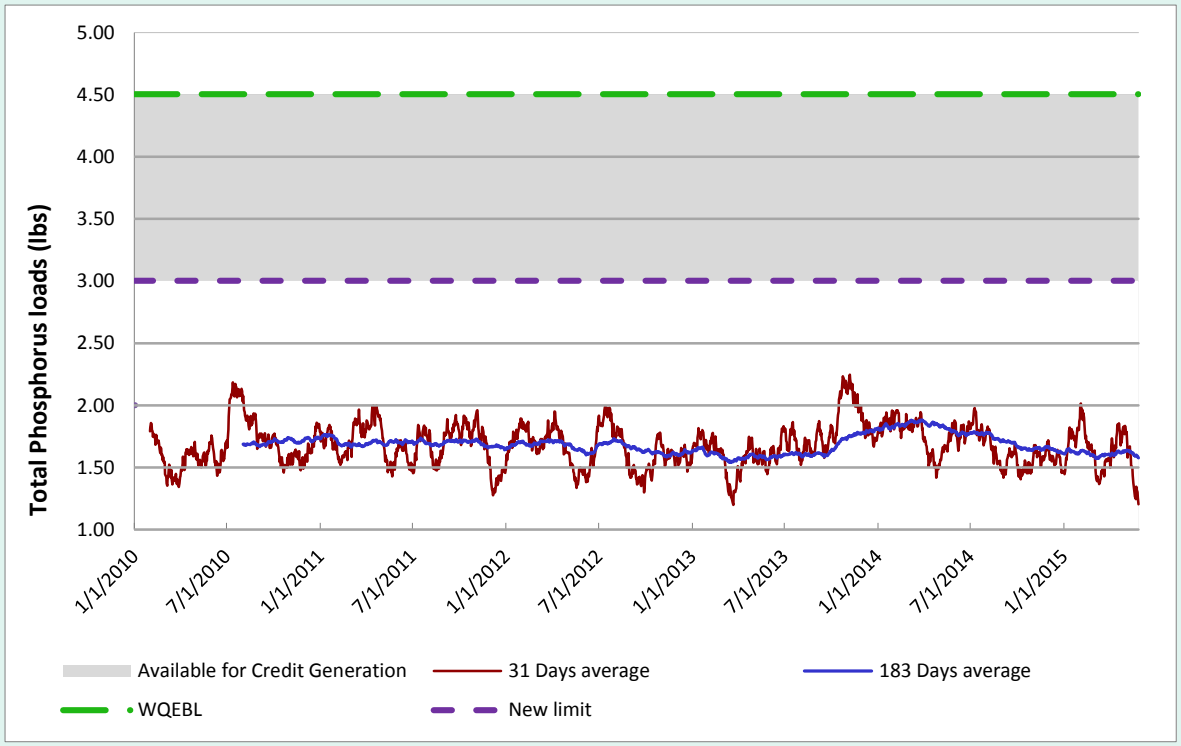

Figure 7 - Total Phosphorus Loads Available for Credit Generation

With credits marketed on an annual basis, multiplying by 365 days in the calendar year (assuming in our example that Industry X discharges daily, year round) the total pounds available annually are 547.94 pounds.

Once the reduced loading is calculated, WDNR relies upon trade ratios to buffer against uncertainty. For point source credit generators, the trade ratio is generally 1.1:1 since uncertainty is minimized by the availability of monitoring data and other factors. Applying this ratio to our example, the 547.94 pounds of phosphorus reduced by Industry X are translated to 498 credits for sale. The geography of a potential buyer in relation to Industry X may require adjustment to the trade ratio if the distance between sources reintroduces concerns over uncertainty. The difference between the pounds reduced and credits available means that some amount of the reduction is preserved to the pure benefit of improved water quality.

2. Point Source Buyers

Point source Buyers would follow the same evaluation process described above, but would identify total phosphorus credits *needed* to comply with an existing or anticipated WQBEL. For example, Industry X may have optimized and installed new technology that still didn't meet their WQBEL and left them discharging 0.2mg/l of TP above their allowed amount. Industry X can then consider buying credits generated from a nearby Seller's reductions in total phosphorus. Those reductions may stem from the efforts of another point source, or be generated by a nonpoint source as detailed in the remainder of this Section. Point sources should be sure to engage in a process for optimizing wastewater treatment capabilities before approaching the WDNR about opportunities to trade.

B. Point To Nonpoint Source Trades: Generating Credits at an Agricultural Operation[12]

1. Consider Conservation Scenario Options

Credit generation depends on the types of conservation practices installed to reduce pollution and the existing conditions on the farm or agricultural facility where those practices are to be installed. The number of credits a farm can generate (and potentially sell) varies dramatically based on the conservation practices the farm selects, where the farm chooses to install them, and previous cropping history on the farm. Local county Land and Water Conservation Departments (LWCDs) can assist agricultural operations in developing suites of proposed conservation practices (Conservation Scenarios) that deliver water quality credits consistent with the needs of both Buyers and Sellers of credits.

The following steps require the use of models and familiarity with WDNR *Water Quality Trading Guidance for Implementing Water Quality Trading in WPDES Permits* (WQT Guidance) and associated trade ratios. It is recommended that Sellers work with their LWCD to complete the technical steps below. Once accomplished, these steps let farmers know how many credits may be available for sale in the marketplace.

[12] A concentrated animal feeding operation (CAFO) is a permitted point source. While prohibited as a credit Buyer, CAFOs may generate credits so long as pollution reductions are not otherwise required by the WPDES permit and associated Nutrient Management Plan.

2. Calculate Load Reduction & Credit Generation Potential

a) Determine the Amount of Pollution That Will be Reduced

Before an agricultural producer can determine the number of "credits" that can be generated for sale, they must first determine how much pollutant loss will be reduced from individual fields on the farm. This is measured in pounds of total phosphorus or tons of TSS per year. Pollution reductions will be determined by modeling cropping scenarios that depict nutrient loading with and without conservation practices installed. An agricultural producer must model (1) a business-as-usual (or Conventional) Scenario and (2) a Conservation Scenario with enhanced installation of conservation practices. The difference between these two scenarios is then presented as pounds of total phosphorus saved for each field, per year. Modeling the outcomes of different Conservation Scenarios is the starting point for calculating credits.[13]

County LWCDs are well-equipped to conduct the proper modeling and analysis and may be available to provide support, which will save time and headaches for those unfamiliar with the pollution reduction models recommended by WDNR. The LWCDs can work with individual producers to help optimize pollutant reductions on specific fields and, after applying trade ratios, credit generation. LWCD's also may have an understanding of the credit needs of local buyers and may assist in aggregating credits from multiple farm fields across the county to meet individual Buyer needs (For more on the role of an aggregator, see Section VI of this Handbook). Crop consultants may also be experts to consider working with.

One pound of phosphorus reduced is not equal to one credit. Trade ratios must be applied to phosphorus reductions to ensure the conservation practices result in a net water quality improvement.

The specific model used to calculate pollution reductions depends on the type of farm or agricultural production facility where the pollution-reducing practices will be installed.

- For cropland, use SnapPlus to calculate annual losses of P by field, using the Phosphorus Trade Report.
- For animal feeding operations, use BARNY to calculate pollution reductions.
- For other types of nonpoint sources, contact WDNR.[14]

For SnapPlus, the modeling results will be featured in the Phosphorus Trade Report as the annual loss of pounds of total phosphorus from each field per year. This report is then used to calculate the reductions in total phosphorus losses from fields on the farm where conservation practices would be installed under a Conservation Scenario. It is important to note that a pound of pollutant reduced is not equal to a credit generated; trade ratios must be applied. Additional steps transform pounds of pollutant reduced into credits generated for sale. In order to assure that water quality trading contributes to net environmental improvements, this Handbook (and WDNR) recommends a whole farm modeling approach in addition to field-by-field comparisons to make sure pollution reductions from conservation practices on some fields are not offset by poor practices on other fields.

When evaluating load reductions from agricultural practices, a "year" refers to a crop year (November 1 to October 31 in SnapPlus), and not a calendar year.

[13] The farmers or LWCD may use edge of field monitoring in lieu of modeled results if data are available. In these situations, site-specific trade ratios will be available by contacting the WDNR.

[14] The aforementioned models are recommendations. Alterative models may be approved on a case-by-case basis. The Fox P Trade project used only SnapPlus for its testing and development of this Handbook.

b) Determine the Credit Threshold

The credit threshold is the point at long term credits can be generated. As noted earlier, the Lower Fox River Watershed is subject to a TMDL that sets pollution load reduction targets by watershed and by sector (including agriculture). The credit threshold for agriculture (a nonpoint source) is the pollution reduction target set by the TMDL's load allocation.[15] Knowing your credit threshold allows you to evaluate the interim and long term phosphorus credits generated by the selected conservation practices. Be sure to check with WDNR staff to confirm the load allocation applicable for your farm and/or fields.

By way of example, let's assume you've completed your modeling and let's say the results show that additional conservation practices (as modeled in one of your Conservation Scenarios) will reduce 800 pounds of total phosphorus each year over a 5-year period from specific fields on the farm. You will need to determine how many credits could be generated from those 800 pounds each year. To do this, you will need to determine whether or not you have already achieved your "credit threshold" as a nonpoint source.

As discussed previously, the Lower Fox River Watershed is subject to a Total Maximum Daily Load (TMDL)—a plan that sets pollution load reduction targets by watershed and by sector (e.g., traditional point sources like wastewater treatment plants, plus urban and municipal storm water, as well as nonpoint sources like many agriculture operations). In watersheds with a TMDL, the credit threshold for water quality trading is the pollution reduction target set by the TMDL's load allocation.

This process of evaluating the credit threshold against farm-specific current conditions can be a bit complicated. WDNR has developed a method that uses TMDL-watershed based values to define the credit threshold for calculating annual phosphorus reductions from specific farm fields and, after trade rations are applied, credit generation. These new values will be simpler to use and may be used in lieu of current farm conditions as the starting point for calculating reductions. Check with WDNR to see if watershed-wide, TMDL-based values are available for your watershed.

Watershed based values were not available for use during the Fox P Trade project, so we tested the process by using current conditions on a farm as the starting point for evaluating the required percent reductions under a TMDL (and corresponding credit threshold). "Current conditions" are evaluated for the whole farm and include a 2-, or preferably 3-, year lookback period to evaluate phosphorus losses pre-trade by inputting field-by-field conditions into SnapPlus. Conditions include information like soil type, soil phosphorus content, and slope.

For farm fields located in watersheds that do not yet have the TMDL-watershed based value for trading, the following example should help translate the credit threshold into a farm-specific target for generating credits:

A 200-acre farm is located in the Apple Creek watershed where the TMDL calls for a phosphorus reduction target for agriculture of 78.6%.

To tailor a credit threshold to a specific farm in that watershed, current conditions of the farm fields have to be determined. This is done by adding the amount of pounds of phosphorus runoff for each field on the farm for each year of the potential water quality trading contract, as well as at least 2 years prior, although 3 is preferable, and dividing that amount by the number of years and the total acreage (Table 1). In this example, the farm fields, under current management, are generating a total load of 12,800 pounds of phosphorus for the 8 modeled years (3 pre-trade, plus 5 for the duration of the trade).

[15] Point sources are also subject to load allocations from a TMDL; however, for many point sources, their portion of the "pollution diet" prescribed by the TMDL is already reflected within WQBELs for their permit.

Table 1 - Example of Runoff Data Needed to Determine "Current Conditions":
3 Years Before a Trade Begins Plus Trade Period

Year	Pre-Trade 3	Pre-Trade2	Pre-Trade 1	Trade Year 1	Trade Year 2	Trade Year 3	Trade Year 4	Trade Year 5
Phosphorus runoff (lbs) for the whole farm	1,910	1,522	1,728	1,467	1,591	1,374	1,413	1,795
Total for 8-year Period (lbs)	---------- 12,800 ----------							
Current Conditions Baseline Rate (lbs/year/acre)	12,800 / 8 years / 200 acres = 8 lbs of phosphorus per acre per year							

The farm-specific credit threshold rate is then determined by applying the TMDL load allocation (reduction target) to current conditions on the farm fields. In this example, applying the 78.6% reduction to the current conditions baseline rate of 8 pounds of phosphorus per acre per year found in

Table 1, creates a farm-specific credit threshold rate of 1.7 pounds of phosphorus per acre per year. Remember that this step is not necessary if TMDL-based values for Water Quality Trading have been approved by the WDNR for your specific watershed.

Figure 8 illustrates this credit threshold *rate* compared to the current conditions/Conventional Scenario and the Conservation Scenario, and further illustrates the potential for generating interim and long term credits (discussed in greater detail below). After installing conservation practices, the total loading for the 8 years (including the historic 3 pre-trade years) will be 6,760 pounds. This reduction from loading that would have occurred under the conventional scenario is the foundation for credit generation.

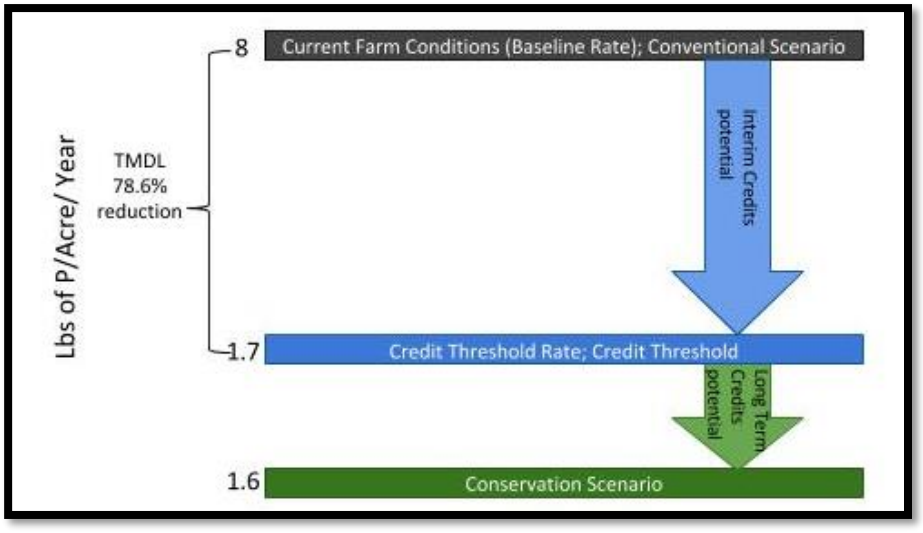

Figure 8 - Determination of the Credit Threshold and Interim and Long Term Credit Generation Potential.

c) Delineate Interim and Long-Term Load Reductions

Credit for water quality trading are generated after a specific trade ratio is applied to pounds of phosphorus reduced after installation of conservation practices (see Section d., below for more on trade ratios). After a trade ratio(s) is applied, phosphorus reductions that are below the credit threshold/TMDL target are considered *long term credits*. Credits generated before you've met the credit threshold are *interim credits.* WDNR's WQT Guidance allows nonpoint sources to generate and sell interim credits before the credit threshold is achieved for a maximum five years.

Building on the example used in Figure 8, let's say the farm has a credit threshold rate of 1.7 pounds of phosphorus per acre per year. Let's further assume that the Conservation Scenario includes cover crops applied on a farm with a nutrient management plan. Table 2 below shows the pounds of phosphorus runoff under the Conventional Scenario, before the cover crops, and under the Conservation Scenario, where cover crops are added over a three-year period. Note that units are for one 20-acre field, not the entire farm.

Table 2 - Example of Phosphorus Runoff Reduction and Credit Generation Potential from a 20-Acre Field

		Year 1	Year 2	Year 3
Phosphorus runoff (lbs of Phosphorus) and rate (lbs/acre)	Conventional Scenario	54 (2.7)	46 (2.3)	32 (1.6)
	Conservation Scenario	36 (1.8)	30 (1.5)	22 (1.1)
	Difference between Conventional and Conservation scenarios	18	16	10
Credit Threshold	Rate (lbs of phosphorus/year/acre)	1.7	1.7	1.7
	Load (lbs of Phosphorus)	34	34	34
Reductions eligible for credit generation	Reductions (lbs of P) needed for Interim credits	18	12	0
	Reductions (lbs of P) needed for Long Term credits	0	4	10

In Year 1, the field is producing 54 pounds of phosphorus runoff without cover crops, whereas with the cover crops, it only produces 36 pounds of phosphorus runoff. This field can only generate interim credits because 36 pounds is above the credit threshold load of 34 pounds (1.7 lbs/acre * 20 acres) in Year 1.
In Year 2, the field is producing 46 pounds of phosphorus runoff before, and 30 pounds of phosphorus runoff after, the cover crops. The field can be used for both interim credits and long term credits after a trade ratio is applied because the Conventional Scenario is producing 46 pounds of phosphorus runoff, which is above the credit threshold load, while the Conservation Scenario produces 30 pounds of phosphorus runoff, which is below the credit threshold load.

In Year 3, the Conventional Scenario is producing 32 pounds of phosphorus runoff, already below the credit threshold, and the Conservation Scenario is producing 22 pounds of phosphorus runoff. In that case, the difference between the two scenarios will generate long term credits because the credit threshold has been reached under both scenarios. These possibilities are further illustrated as trade ratios are applied in figures 9, 10, and 11.

d) Convert Pounds to Credits—Apply Trade Ratios

Once load reductions are calculated, pounds are converted into credits on a field-by-field and year- by-year basis through the application of trade ratios.

Wisconsin's water quality trading statute (s. 283.84(1m)(a), Wis. Stats.) requires that credit generation and use must result in an improvement in water quality. Trade ratios ensure that uncertainties in modeled pollution reductions are accounted for. A trade ratio of 2:1 means that two pounds of phosphorus reduction can generate 1 pound of phosphorus credit. In Wisconsin, the trade ratios for nonpoint source credit generating practices can never be less than 1.2:1 (1.2 pounds of pollutant reduced for 1 credit). Generally, trade ratios for nonpoint sources vary from 2:1 to 4:1. To determine the trade ratio refer to page 21 (Table 4) of the WDNR WQT Guidance. Trade Ratios must be applied on a practice- and field-specific basis and not a farm-wide average basis.

While the WDNR WQT Guidance discusses multiple factors that go into trade ratios, this Handbook describes trade ratios in their simplest form using only the uncertainty factor, making that factor the trade ratio itself. The other possible factors, which make trade ratios higher, can be avoided (thereby maximizing credit generation) by carefully choosing trading partners. The most important aspect is to ensure both parties discharge to the same impaired reach of a waterway. More information about impaired reaches can be found in the Lower Fox River TMDL.

The uncertainty factor may vary based on the conservation practice used to generate credits. The list of practices and associated uncertainty factors can be found on page 20 of the WNDR WQT Guidance, Table 4.

This Handbook describes trade ratios in their simplest form using only the uncertainty factor, making that factor the trade ratio itself.

Continuing with the example in Table 2 above, per the WDNR WQT Guidance, when a farm has a nutrient management plan, and has proven that nutrients levels are stable, cover crops will be subject to a trade ratio of 2:1 (i.e., two pounds of phosphorus reduced equals one pound of phosphorus credit).

YEAR 1: To determine the load reduction for credit generation, first ascertain whether the Conventional and Conservation Scenarios are above or below the credit threshold. In this case, as demonstrated in Figure 9, both of the scenarios are above the Credit threshold, therefore only interim credits would be generated.

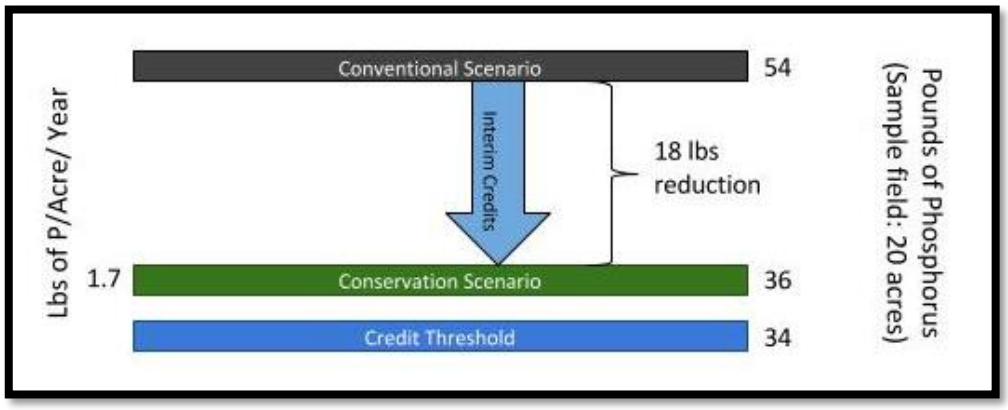

Figure 9 - Phosphorus runoff for conventional and conservation scenarios from a 20-acre Sample Field generating Interim Credits

Applying the trade ratio of 2:1 to the 18-pound reduction results in 9 credits the field can generate for sale in Year 1.

$$Load\ reduction\ (18\ lbs)\ /\ Trade\ Ratio\ (2) = 9\ Interim\ Credits$$

YEAR 2: In year two, as demonstrated in Figure 10, the Conventional Scenario is above the credit threshold, whereas the Conservation Scenario is below the credit threshold, therefore generating both interim and long term credits.

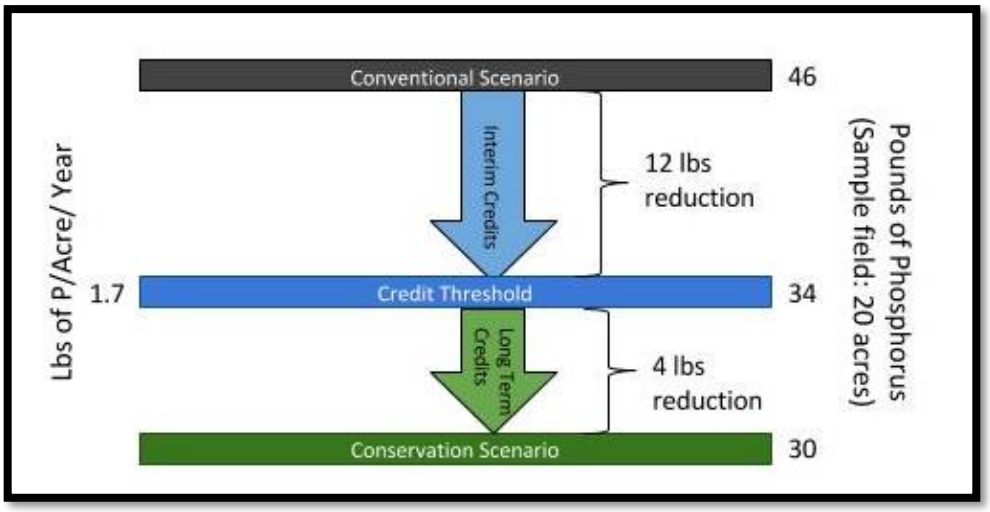

Figure 10 - Phosphorus runoff for conventional and conservation scenarios from a 20-acre Sample Field generating Interim and Long Term Credits

Applying the trade ratio to the load reduction between the Conventional Scenario and the credit threshold provides the number of interim credits the field would generate in Year 2.

$$Load\ reduction\ (12\ lbs)\ /\ Trade\ Ratio\ (2) = 6\ Interim\ Credits$$

Then, applying the trade ratio to the load reduction between the credit threshold and the Conservation Scenario provides the number of long term credits the field would generate in Year 2.

$$Load\ reduction\ (4\ lbs)\ /\ Trade\ Ratio\ (2) = 2\ Interim\ Credits$$

YEAR 3: As demonstrated in Figure 11, by year 3 both of the scenarios are below the credit threshold. Therefore, all of the pounds reduced will generate long term credits.

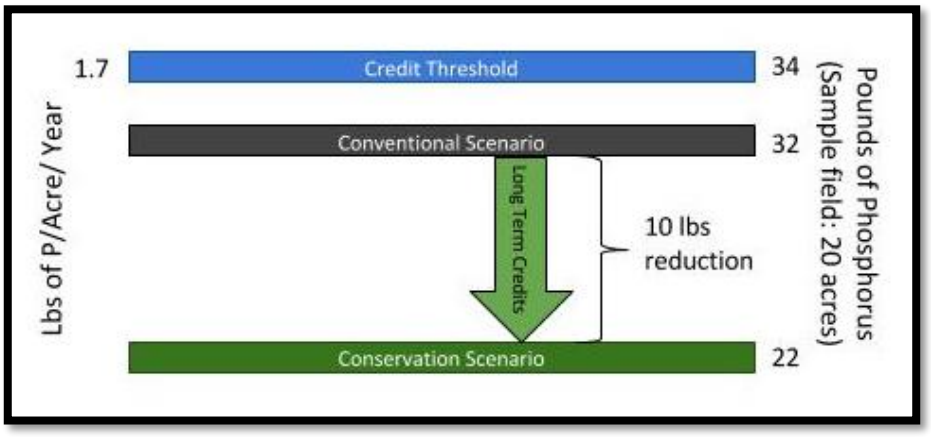

Figure 11 - Phosphorus runoff for conventional and conservation scenarios from a 20-acre Sample Field generating Long Term Credits

Applying the trade ratio to the load reduction between the Conventional Scenario and Conservation Scenario provides the number of long term credits the field would generate in Year 3.

$$Load\ reduction\ (10\ lbs)\ /\ Trade\ Ratio\ (2) = 5\ \ Long\ Term\ Credits$$

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3. Select Your Conservation Scenario and Certify Credit Generation

Once you know how many credits you can generate under the initial Conservation Scenario(s) you selected, you may want to model additional Conservation Scenarios to see whether your credit generation potential goes up or down. Examining additional scenarios will likely give you an idea of the one you wish to pursue.

For example, the type of practices and the timing of installation can change the amount of phosphorus reduced, and after trade ratios are applied, credits available for use by Buyers on a year-to-year basis. Credits generated during a given Crop Year will be available for use at the beginning of the following Crop Year, which is November 1st (provided that the installed practices have been verified).

Again, your local Land and Water Conservation Department can assist in developing the Conservation Scenario that is right for your farm. Understanding the timing of credit availability is critical for both Buyers and Sellers. For agricultural nonpoint Sellers, crop rotations generally do not align neatly with the 5-year term of WPDES permits. Buyers relying on credits for permit compliance must be assured that the planned rotation is executed and conservation practices are both implemented and verified in a manner consistent with the Trade Agreement. Understanding these obligations for a selected Conservation Scenario is a final safeguard for successful water quality trading.

You will of course also want to consider the cost of your selected Conservation Scenario in light of potential credit sale prices. If you need information on practice costs, the federal Environmental Quality Incentive Program (EQIP) cost share is a helpful guide. Contact the Fox Wolf Watershed Alliance or your local LWCD if you need assistance in assessing your costs and the potential price you may obtain for your credits. Section VIII of this Handbook provides a detailed discussion on credit pricing.

Credit Certification Report

The CCR's main purpose is to summarize the technical details of how, where, and when credits are being generated by an agricultural operation. In addition to a brief "Introduction" tab, the CCR has six additional tabs/sections:

a. Credit Breakout
b. Credits by Year
c. Location Map
d. SnapPlus Report- Original
e. SnapPlus Report-Conservation
f. Credit Calculator

The CCR is not required by WDNR. It is an Excel spreadsheet, pre-populated by the Fox P Trade project team to assist trading partners in assembling the information required by the WDNR for approval of a trade intended for permit compliance purposes.

After all this work, credits must be certified as properly modeled and reliable for both potential Buyers and WDNR reviews. The Fox P Trade Credit Certification Report (CCR) is recommended to organize this information as a component of both the Trade Agreement (Water Quality Trading Contract) between the Buyer and Seller and the Buyer's Water Quality Trading Packet submitted for WDNR approval of a trade intended for permit compliance.

The CCR's main purpose is to summarize the technical details of how, where, and when credits are being generated by an agricultural operation. This document memorializes a Seller's obligations to produce credits and documents for the WDNR how, where, and when those credits are being generated. In addition to a brief "Introduction" tab, the CCR has six additional tabs/sections:

a. Credit Breakout
b. Credits by Year
c. Location Map
d. SnapPlus Report- Original
e. SnapPlus Report-Conservation
f. Credit Calculator

a) Credit Breakout

This is the main section of the CCR. In the upper cells, input information about the credit generator that can be used to identify the location of credit generating practices. For each crop field and year, input the conservation practices to be used, and the calculations used to reach the number of credits generated. Each field should have its own series of rows highlighting the credits generated. These inputs are generated from the SnapPlus Phosphorus Trade Report.

If your calculations are complicated, then calculate the credits generated using Excel and SnapPlus on a separate spreadsheet and input the resulting calculations into the CCR, or use the credit calculator tab included with the CCR. Be sure to save your calculations and the SnapPlus reports for reference.

b) Credits by Year

In this section the credits generated are calculated by year and separated into interim and long term credits. Each field should be represented by its own row, and credits generated are displayed over the term of the contract. Also, this section is where you can calculate and display the Credit Reserve Pool. Two separate tables are needed to display interim and long term credits.

c) Location Map

Google Maps satellite images make good, readily available base map layers.

Use this section to include the required maps of credit generating fields and as well as the location of the Buyer that will be purchasing credits (and the Buyer's permitted discharge location(s)) within the watershed. The maps should clearly articulate the location of each individual field and label that field. The maps should also show the necessary water features; these water features can be displayed on the same map or a separate map.

d) SnapPlus Report- Original

Use this section to "show your work." You can directly copy and paste in the output of the SNAP Plus P Trade report. This tab is specific to the original conditions on the farm fields or Conventional Scenario from the model runs. Both the conventional and the conservation reports should be inserted to this section.

e) SnapPlus Report- Conservation

The additional SnapPlus Report tab is used to separately show your work related to the selected Conservation Scenario.

f) Credit Calculator

Finally, the Credit Calculator tab was developed by the Fox P Trade team to pull all this data together in a format that transforms the SnapPlus model outputs into marketable credits though synthesis of the credit threshold and trade ratios discussed in Section V-B. The Credit Calculator is currently set to calculate credits using the farm-specific approach presented in this Handbook and can be modified as TMDL-based values for water quality trading become available from the WDNR.

Your local LWCD is a good resource to assist you in assembling the necessary documentation. Although Sellers are not obligated to submit information to WDNR, the information contained within Section VI of this Handbook, while intended to help Buyers submit necessary information to the WDNR, may also help Sellers grasp the big picture of water quality trading.

4. Contract to Sell Credits

Before investing further in this process, a wise step will be to ensure that someone is interested in buying the farm's field-specific water quality credits. A broker is uniquely positioned to help you find a Buyer and the Fox-Wolf Watershed Alliance is well equipped to perform this activity. Additional information on brokerage services is provided in Section VII of this Handbook.

If you choose not to use a broker, you may seek out a Buyer on your own. Either way, once a Buyer is identified, agreement on the terms of the trade will need to be negotiated between you (the Seller) and the Buyer. These terms are written down in a Trade Agreement (or Water Quality Trading Contract) that is ultimately signed by both the Seller and the Buyer before any credit generating practices are installed. If the agreed-upon credits will be used by the Buyer for compliance with their WPDES permit, key information from the Trade Agreement will be duplicated in a Water Quality Trading Packet that is submitted to WDNR by the Buyer.

The Trade Agreement is a binding contract between the Buyer and Seller. It lays out the rights and obligations of each party by memorializing the number and type of credits purchased, establishing the process for verifying

credit generating conservation practices, and providing mechanisms for resolving any disputes in the event a credit generating conservation practices fails or underperforms.

5. Install, Verify, and Receive Payments

The signing of a Trade Agreement is the first step toward actually installing the modeled Conservation Scenario. If your credit Buyer is seeking WDNR approval to use the purchased credits toward compliance with their permit, your trading contract will likely have additional details allowing you to install practices only after the Buyer's approval from WDNR is received.

Generally, payment under a Trade Agreement will look a lot like federal cost share under various Conservation Title programs: the farm installs a practice and once installation is demonstrated, payments are made by the Buyer.

A "Credit Reserve Pool" is built into the Fox P Trade Credit Certification Report. These excess credits provide a margin of safety for Sellers in the event adverse weather or other conditions compromise the performance of a credit generating practice. The Credit Reserve Pool is included in the purchase price for the entire suite of practices purchased by a Buyer. The Trade Agreement should detail how the Credit Reserve Pool manages risk for both the Buyer and Seller.

Because water quality Trade Agreements span a number of years, continued checks on conservation practice performance are necessary, particularly for conservation practices that require annual installation (like cover crops or conservation tillage). These performance reviews are called "verification." Details should be included as part of your Trade Agreement and will likely include performance criteria to assure that installed practices function as designed to assure accuracy of the models used to certify load reductions (and credits).

In most instances, verification services (completed by a person with credentials in evaluating practices, known as a "Verifier") will be paid by the credit Buyer. Additional agreements may be put in place between the Buyer and their Verifier. Under the Trade Agreement's terms, the Verifier must be allowed on the property where practices are installed under the selected Conservation Scenario[16]. You should also be prepared to allow the Verifier to inspect records related to the Conservation Scenario and speak with you or your staff. The Verifier is the person you need to call in the event something goes wrong with any of your practices. If you have concerns about the Verifier selected by your credit Buyer, be sure to speak up. The key to success under your Trade Agreement is a good relationship with a trusted Verifier. Learn more about Verification in Section IX of this Handbook

[16] If your credit Buyer intends to use credits for permit compliance, then the Trade Agreement should also include provisions assuring WDNR staff access to property and records related to the credit generating practices.

V. Submitting a Water Quality Trading Packet to WDNR

A. Introduction

The Water Quality Trading Packet must be submitted to WDNR to complete a trade when credits will be used by the Buyer for permit compliance. This submittal should only occur after a Notice of Intent to trade has been provided to the WDNR. The packet should be submitted by the permit holder wishing to trade and/or the broker facilitating the trade and should be signed by the permit holder who is legally responsible for the contents of the Water Quality Trading Packet or their designee. The packet contains three key documents which are explained in this chapter: an Executive Summary, the WDNR's Checklist for submitting a packet; and the Water Quality Trading Plan (with a number of appendices, including the CCR). Templates for all these documents can be found on the Fox P Trade website at www.foxptrade.org.

What's in a Water Quality Trading Packet?

1. Executive Summary
2. WDNR Checklist
3. Water Quality Trading Plan, with CCR

1. Executive Summary

As part of its testing process, the Fox P Trade team also found it helpful to include an Executive Summary with the trading packet as a means of "telling the story" of the trade. In addition, both the CCR and signatures pages could be included with other WQT Plan appendices as streamlined means of organizing the large volume of information contained within the packet.

2. Plan

Per the WDNR Water Quality Trading WQT Guidance, permittees wishing to use WQT credits for compliance purposes must submit a WQT Plan. The template provided at www.foxptrade.org contains necessary elements of a WQT Plan required by Wisconsin DNR. Note that through its testing process, the Fox P Trade team built in number of plan appendices, which will contain information specific to an individual WQT trade. Once appendices are included, the template contains all the information pertaining to the trade that the WDNR will need to evaluate and approve a trade. Many sections and fields are the same as the template Trade Agreement. It is important to note that while the obligation to submit a Plan to the WDNR rests with the Buyer, the information required by the WDNR to approve the trade will likely require much input from the Seller. The local LWCD may be able to assist in assembling the necessary details. Use the CCR (introduced in Section V-B) as a guide to filling out the Water Quality Trading Plan. The CCR is a recommended Appendix to the Plan itself. These two components work together to ensure you do not submit a plan to WDNR which is missing necessary information.

Use the CCR as a guide to filling out the Water Quality Trading Plan.

In addition to the CCR, suggested appendices to the WQT Plan Include:

- Buyer Discharge Description - Permittees seeking WDNR approval to rely on credits to meet effluent limitations need to provide a detailed description of their discharge, treatment protocols, and efforts at optimizing treatment to demonstrate the need to engage in water quality trading.
- Credit Certification Report - Discussed in detail within Section V-B of this Handbook, the CCR is the workhorse spreadsheet devised by the Fox P Trade project team as an organized method for assembling the information necessary to support the validity of credits.
- Cropping history - Since water quality trading with an agricultural nonpoint source Seller is founded upon credits arising from improved farming practices, the farm's cropping history at fields where credit generating practices will be installed should be included. While the USDA's National Agricultural Statistics Service does have a good online tool for tracking cropping history (called CropScape), Sellers may also access this data from their local Farm Service Agency office.
- Certification on the lack of concentrated flow channels - The SnapPlus model assumes that "concentrated flow channels" or erosional gullies have been dealt with through the installation of grassed waterways. WDNR recognized that the model may not reflect real-world conditions in this regard and asked that the Fox P Trade team recommend a backstop to assure that concentrated flow channels do not exist. The team suggests obtaining a letter from the local LWCD staff familiar with the fields where credit generating practices would be installed, certifying the lack of active gully erosion.
- Nutrient Management Plan - the Seller's NMP should be included with the Plan as documentation of CCR contents.
- Soil Test Data - Reliance on the SnapPlus model means reliance on soils data contained within the model. To provide additional assurance that the data is accurate, laboratory reports relied on for the credit modeling should be provided, including test methods. The Fox P Trade team also found it helpful to include a certification from the Seller's agronomist stating that the SnapPlus data is an accurate picture of on-farm conditions.
- Verification Services Agreement - This is the agreement between the Buyer and its Verifier setting out the terms of service (including future forms which the Buyer will need to provide to the WDNR) and performance criteria further detailed in the plan discussed below.
- Operations & Maintenance Plan, PLUS Performance Verification - Credit generating practices need to be installed and maintained in accordance with applicable Natural Resource Conservation Service (NRCS) technical standards in order to assure the validity of load reductions that form the basis for credits. In testing the WDNR Guidance, the Fox P Trade team learned that additional performance criteria will likely be required to verify credits used for permit compliance. The team recommends developing a detailed plan, specific to the credit generating practices, for inclusion with both the WQT Plan as well as the Trade Agreement and Verification Agreement discussed above. This "playbook" for assuring performance is vital to the Buyer, Seller, and Verifier.
- SnapPlus Model Runs - All model runs should be provided to document the validity of the CCR's contents.
- Signatures Page(s) from the Trade Agreement - Negotiations between trading parties should begin before submitting a WQT Plan so that a signatures page may be provided to the WDNR as proof of the Trade Agreement. In recognition that some aspects of a contract may be confidential, the trading parties are only required to certify that a contract exists; they are not required to submit the entire contract. The last section of a signed contract includes notarized signatures of both the credit Buyer and Seller.

3. Checklist

Use the checklist to ensure that the WQT plan being submitted contains all of the necessary elements. Per the WDNR Guidance, complete Water Quality Trading Packets much include the WQT Checklist, a form provided by the WDNR and available at www.foxprade.org. The checklist contains all of the necessary elements of an approvable water quality trade and serves as the cover letter for the WQT Packet.

Is the assembly of a Water Quality Trading Packet feeling like a lot of work? The next section discusses options for getting help.

In addition to the WDNR's form, the Fox P Trade team also prepared a checklist for use by Plan preparers in "checking their work" when using Fox P Trade templates. The checklist may be particularly helpful in understanding the required documentation that the Fox P Trade team suggests including as WQT Plan appendices.

If all goes well and the WDNR approves the Packet, then a Buyer will shift its attention to working closely with their selected Verifier to begin documenting the installation of credit generating practices by the Seller and verifying the success of those practices. Documentation required by WDNR is available directly from the agency website or at www.foxptrade.org. Additional requirements may arise from the Buyer's WPDES permit conditions after WQT is approved[17], so be sure to communicate with your WDNR staff to be sure the right forms are used at the right time.

[17] It is also important to note that permit modifications or renewals can take time, in particular as public notice and comment opportunities allow individuals to acquaint themselves with the proposal to trade.

VI. Engaging a Broker

Buyers and Sellers may wish to engage the services of a broker. A broker is a third-party that facilitates bilaterally negotiated water quality trades between Buyers and Sellers (or their agents) from beginning to end, including preparation of the Trade Agreement between the Buyer and Seller and coordinating the many supporting documents and forms required by WDNR if the trade is used for permit compliance. A "third party" refers to an entity that is neither the Buyer nor the Seller in a water quality trade. The various roles of a broker are outlined in Figure 12. Discussions during the Fox P Trade project (through workshops and a survey) strongly supported a third party role for a broker. The broker, as used in this Handbook, performs a role similar to a real estate broker, assisting the Buyer and the Seller in negotiating an agreement, but does not directly enter into the financial transaction.

Roles of a Broker

Prepare for the Trade

- Aggregate Sellers
- Find Buyers/Sellers
- Match Buyers and Sellers
- Certify Credits
- Prepare Water Quality Trading Application Packet

Broker the Trade

- Broker Trade Agreement
- Negotiate Fair Price
- Interface with Regulatory Agency
- Interface with Public
- Broker Verification Services Agreement
- Ensure Consistent Annual Credits for Permit and Oversee Credit Reserve Pools

Manage Trade over Duration of Trade Agreement

- Ongoing Risk Management
- Registration and Tracking

Figure 12 - Roles of a Broker

A. Benefits of a Broker

1. Market Awareness

Water quality trading is premised on using market demand and supply to drive the trades. An effective water quality trading broker should have awareness of the regional market: in this case, the Lower Fox River Watershed. This includes where there is or might be demand for buying water quality credits, as well as ample interest in generating water quality credits for sale.

2. Risk Management/Reduction

A broker engages in a variety of activities that reduce the risk and uncertainty associated with WQT. Proper preparation of trading documents reduces risk at multiple levels. Environmental risk is reduced when a broker reviews plans and supporting documentation about exactly how Seller conservation practices are reducing pollution and generating credits. Transactional risks are reduced when brokers prepare documentation about all aspects of the trade that go into the Trading Plan that is submitted to WNDR as well as the Trading Contract/Agreement—the legally binding agreement—between the Buyer and Seller. The documentation process for getting a WDNR-approved trade can be confusing and the documentation requirements can be considerable. A broker can ease that process by making sure all appropriate documents are compiled with the necessary detail and that they are provided to the appropriate parties in a timely manner. This activity ensures that the trade is "certifiable," i.e., trades are set up in a way that comports with WDNR policy and that pollution reduction practices can be verified by appropriate parties at appropriate intervals. Brokers also reduce transactional risks by helping to negotiate the provisions in the Trade Agreement along with other supporting

documents and/or processes that address the various "what if?" questions from both the Buyer and the Seller perspectives.

3. Transparency

A broker can also help build trust and confidence in water quality trading—whether that is through individual trades or a larger-scale trading program. Although water quality trading has been around North America for decades, it is often not well understood. A broker should be able to draw from experience from other trades or other trading programs to help inform interested stakeholders that are not experienced in the water quality trading process.

B. Who is a Broker in the Lower Fox?

Discussions over the course of the Fox P Trade project (2013-2016) indicate that the WDNR does not wish to play the role of broker. However, multiple other organizations could facilitate WQT in the Lower Fox River Watershed. The Fox P Trade project team believes that in the initial years of water quality trading, a not-for-profit, nongovernmental organization or county LWCD may be utilized to keep administrative costs as low as possible.

Costs associated with services a broker provides would most likely be built into the price of credits within individual trades (see Section VIII on credit pricing). As a trading marketplace becomes more robust, broker services could be covered by a seed grant, such as through the Great Lakes Restoration Initiative or private foundations. It is also possible that a coalition of permittees may underwrite brokerage services.

An effective broker should have awareness of where might be interest in buying and selling water quality credits in the watershed.

Fox P Trade project stakeholders, through surveys and workshops, supported the Fox-Wolf Watershed Alliance, a local non-profit organization, as being well-positioned to serve the broker role in a bilateral WQT market structure in the Lower Fox River Watershed. Stakeholders valued the organization's long-standing presence in the watershed and its dedication to working with multiple stakeholders to improve water quality. They also recognized that FWWA was relatively advanced in its knowledge of state WQT Guidance and related policies, and has been active in reaching out to potential Buyer and Seller communities about the opportunities associated with WQT. Land trusts are another type of third party that, with proper training, could perform the broker role. However, land trusts and conservancies that are interested in buying or selling water quality credits would no longer be a "third party" and would not be good candidates for brokering trades due to potential conflicts of interest.

NOTE: *In some other trading programs a broker may also engage in buying, packaging (aggregating credits from multiple sellers) and selling credits. This enhanced broker/aggregator/banker role is not envisioned or recommended for the Lower Fox at this time in part due to the thin demand market and state statutory provisions which appear to restrict this role.*[18] *The Fox P Trade project team recommends that Wisconsin DNR or*

[18] Despite the potential advantages of a broker/banker that is also engaged in the financial transactions of trading WDNR WQT Guidance state statutory provisions appear to limit this role. Wisconsin State Statutes, section 283.84(1)(c) allows the Wisconsin Department of Natural Resources (WDNR) or a local governmental unit to receive money from a permittee and using that money to reduce water pollution as part of water quality trading. The statutory language does not specify which party initiates the process. Thus, it would allow WDNR or a local governmental unit to purchase, package and sell credits to awaiting permittees. The Wisconsin statute is silent on whether an entity that is not the WDNR or a local unit of government can engage in the financial transactions. Because the statute specifically identified WDNR and local units of government as having authority to receive money transferred as part of water quality trading, and is silent on the role of other third parties, it could be interpreted that other third parties may not serve the role as banker. It could also mean that non-governmental entities wishing to serve as bankers need to appeal to WDNR for formal approval to serve this role. (For example,

the Wisconsin legislature clarify state policy to specifically allow non-local units of governmental entities, such as watershed groups and land trusts, to act as credit brokers with a banker function that can facilitate the financial transaction part of a trade as well as creating and managing a credit reserve pool.

a non-profit organization, the Willamette Partnership, is authorized by the Oregon Department of Environmental Quality to serve the role of a third-party certifier of water quality credits.) A legislative amendment might also be needed to clarify whether or other third parties (e.g., not non-profit entities) can be engaged in the financial transaction element of water quality trading in Wisconsin.

VII. Credit Pricing

The price of a credit is determined by the sum of all of the cost inputs that go into generating a credit. These include the costs of: best management practices, credit generator incentives, broker fees, aggregator fees, certifier fees and the verifier fee. (Figure 13.)

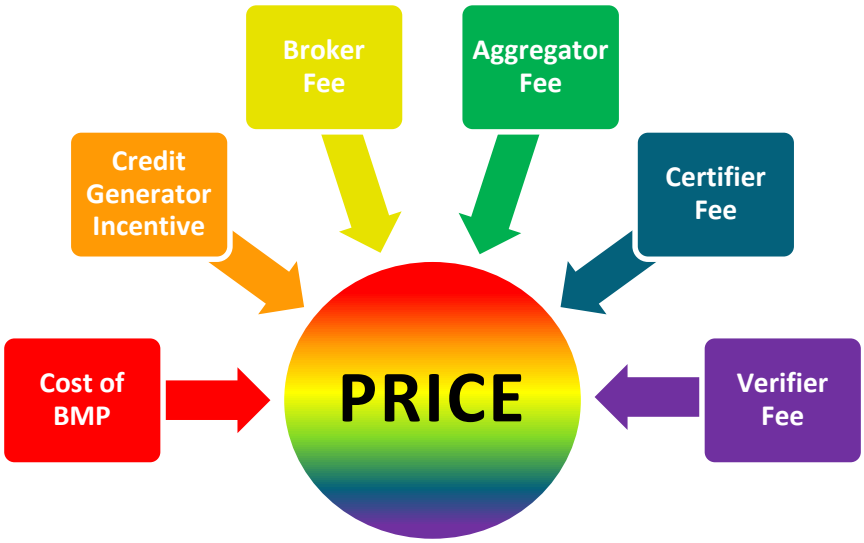


Figure 13 - Price of Credit = Total Price/# of credits

If a point source pays for 100% of the credit generating practices and associated fees for water quality trading, the formula in Figure 1 can be followed to determine the price of the credit. Figure 14 provides an example where all costs are rolled into the price of the credit and all credits are available to the Buyer.

However, in instances where public funds are helping to support credit generating practices, it may be desirable to price credits based on the investment made by the Buyer. This is called "proportional crediting" and it can impact the price of a credit. Separating all costs of a credit in Figure 1 into "direct" and "indirect" costs can help apply the concept of proportional crediting in a way that is clear. Proportional crediting allows the use of public funds in conjunction with funding from credit buyers to install conservation practices while

Credit Pricing Example: Point Source Funds 100%

An agricultural producer is able to generate 100 credits.

Cost of BMP	$5,500
Credit Generator Incentive	$500
Broker Fee	$150
Aggregator Fee	$150
Certifier Fee	$150
Verifier Fee	$300
Total Cost	**$6,750**

Point source pays $6,750 OR 100% of all credit generation costs and is eligible to purchase 100% of the credits, or 100 credits.

Price for point source will be:
$6,750 / 100 credits = $67.50/Credit

Figure 14 - Credit Pricing Example 1 - Point Source Pays 100% of Credit Costs

ensuring the buyer receives a portion of the credits that could be generated resulting in a net environmental benefit through "retired" credits.

A. Pricing Credits Based on Proportional Crediting

If public funds are used in addition to the Buyer's contribution toward practice installation and maintenance, additional work will be needed to determine the number of credits available to the Buyer and the price of those credits.

1. Direct Costs

The first step is to determine the *direct costs* of conservation practices that will generate the water quality trading credits. Direct costs are generally associated with installing, maintaining, and operating conservation practices (public funding sources vary in whether and how they can be used to support water quality trading: if advancing a water quality trade utilizing the proportional crediting system, be sure to seek clarification from the funder).

For the purposes of the Fox P Trade program, *direct costs* in a Proportional Crediting System are costs that are allowed under a public funding source's program. Generally, direct costs are costs associated with *installing, maintaining, and operating conservation practices.*

Figure 15 provides an example of costs that will be treated as direct costs in a proportionally-credited trade.

In a proportional crediting system, the number of credits a buyer is able to purchase is based on the proportion of the buyer's investment in the direct costs associated with installing, maintaining and operating conservation practices.

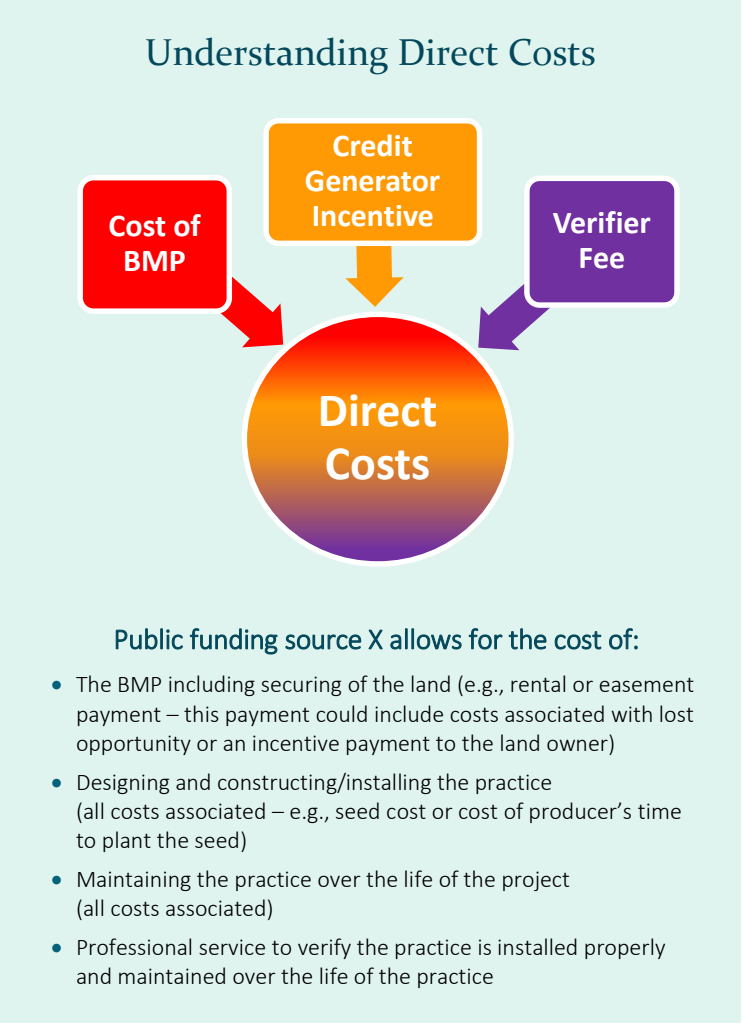


Figure 15 - Understanding Direct Costs

In other words, projects partially funded by public conservation funds would have saleable credits in proportion to the Buyer's direct cost investment. By way of example, consider a public conservation funding source that contributes 30% of the direct costs and a Waste Water Treatment Plant Buyer that contributes 30% of the direct costs to install conservation practices that are used to generate water quality credits. Under a proportional crediting system, the Waste Water Treatment Plant would be entitled to 30% of the credits generated. The remaining credits (essentially, those generated by public conservation funds) would be retired.

2. Indirect Costs

Next, determine the *indirect costs* of generating the water quality trading credits. For the purposes of the Fox P Trade program, indirect costs are costs that are typically paid for services associated with credit calculation, certification, and verification. Indirect costs also include program administration and are generally not associated with direct installation, operation, or maintenance of a conservation practice.

For the purposes of the Fox P Trade program, *indirect costs* in the Proportional Crediting System *are costs that fall outside of the allowable costs of the public funding source's program.*

Figure 16 provides an example of indirect costs in a proportionally-credited trade.

While indirect costs may be real costs associated with the generation of water quality credits, they would not be incurred through conservation activities alone (e.g., absent the water quality trade). As such, in a water quality trade these indirect costs are paid 100% by the credit Buyer.

Figure 17 provides an example of how proportional credits can be calculated using Direct Costs and how total cost is calculated in a proportional crediting system for a point source who purchases credits generated using public conservation funds.

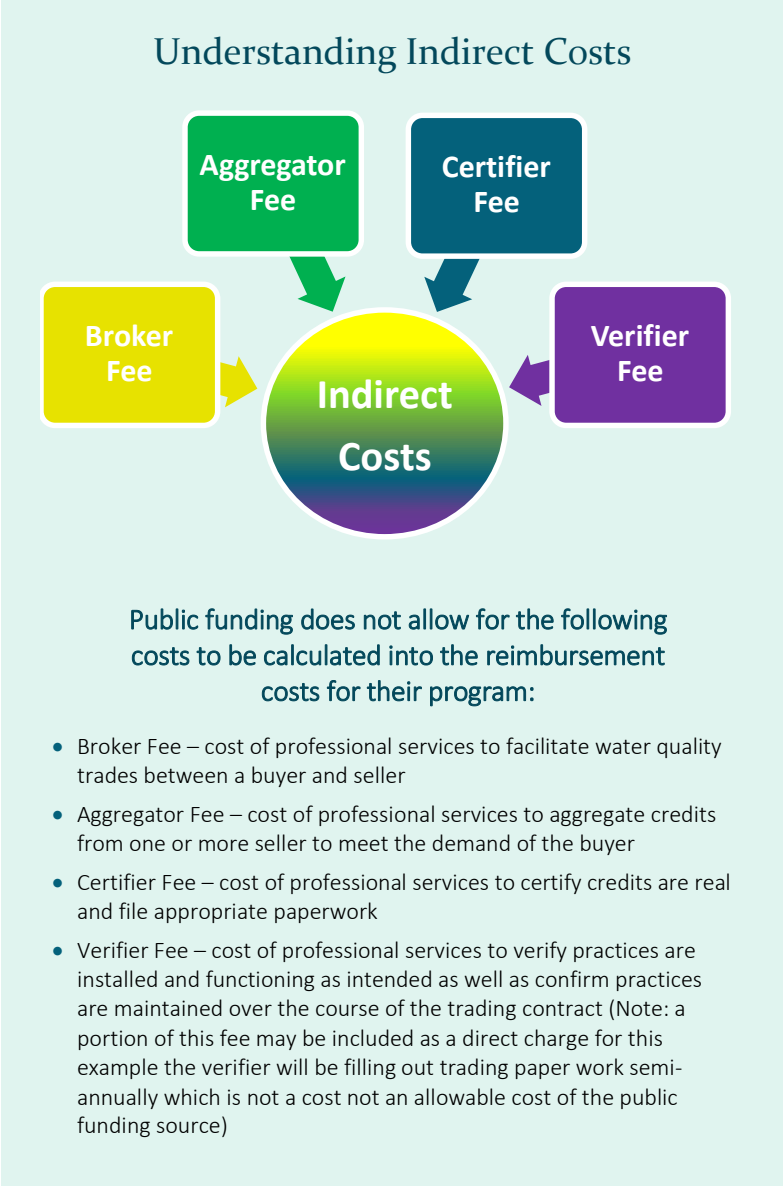


Figure 16 - Understanding Indirect Costs

B. Credit Price and Cost Summary

In sum, the total price of a credit is likely to include both direct costs (to install, operate and maintain conservation practices) and indirect costs (to bring those conservation practices to the water quality trading market as saleable credits). Breaking down water quality trading costs into direct and indirect costs provides Buyers and Sellers with a clear understanding of all funds that go into a water quality trade. It delivers credits to

the market based on the Buyer's investment in credit generating activities while allowing any additional credits generated through public conservation funds to be retired, ensuring a net water quality benefit.

Credit Pricing Example: Credit Pricing Based on Proportional Crediting

An agricultural producer is able to generate 100 credits.

Direct Costs (Costs allowed under Hypothetical Public Funding Source X's program)	
Cost of BMP	$5,500
Credit Generator Incentive	$500
Verifier Fee	$100
Total Direct Costs	**$6,100**

Hypothetical Public Funding Source X's program funds 70% of Direct Costs

Public Funding Source X's Contribution	$4,270 (70%)
Point Source Buyer's Contribution	$1,830 (30%)

Hypothetical Point Source Buyer funds 30% of the Direct Costs and is eligible to receive 30% of the available credits.

Indirect Costs (Costs incurred to generate the credit or administer a trading program that are not allowed under Hypothetical Public Funding Source X's program)	
Broker Fee	$150
Aggregator Fee	$150
Certifier Fee	$150
Verifier Fee	$200
Total Indirect Costs	**$650**

Buyer's Direct Costs	$1,830
Buyer's Indirect Costs	$650
Buyer's Total Cost	**$2,480**

Point Source is eligible to purchase 30% of the credits OR 30 credits.

Price for point source will be:
$2,480 / 30 credits = $82.67/Credit

Figure 17 - Credit Pricing Based on Proportional Crediting

The Use of Public Funds in Water Quality Trading

WQT programs across America have different provisions on whether and how public funds dedicated to conservation can be used to generate credits for sale in a water quality trading market. Federal and state policies also treat this subject differently. USDA-NRCS policy - specifically, the Environmental Quality Incentives Program manual (Title 440-Programs, Part 515, Subpart K) - allows public funding of marketable credits. By contrast, The Wisconsin Department of Natural Resources (WDNR) restricts the use of state funds to be used in conjunction with funding from private entities to generate water quality trading credits. Some WQT programs restrict the use of public funds to ensure that the environmental benefit secured through the sale of the credit is in addition to what would have occurred without it.

Fox P Trade convened stakeholders in the Lower Fox River Watershed though a stakeholder workshop and a technical advisory group (TAG) to explore three options:

- Option A – Never allow public funds to be used for credit-generating projects
- Option B – Allow project partially funded by public funds to generate credits in proportion to the private investment
- Option C – Allow public funding to generate credits

Stakeholders in the Lower Fox River Watershed felt that an approach which allowed credits to be sold in proportion only to the private investment would ultimately receive broader support from the diverse group of stakeholders in the Lower Fox. Specifically, stakeholders in the Lower Fox were concerned that allowing public conservation funds to be able to generate sellable credits would increase the likelihood of litigation due to a concern over allowing farmers to generate credits and associated revenue from activities that are required by law. On the other hand, stakeholders recognized that prohibiting projects that received any public funds from generating credits may lead to a lesser amount of conservation installed on the landscape due to the cost share burden that falls on the landowner. While ultimately water quality trades in Wisconsin can legally be structured using any of the three options (so long as they comply with Wisconsin statues), and federal NRCS policy clearly prefers that all public conservation funds be allowed to generate credits, stakeholders felt that the option to allow partial credits in proportion to private investment would ultimately lead to the highest likelihood of the development of a robust market in the Lower Fox.

VIII. After the Agreement: Credit Verification

So a Trade Agreement has been signed and Water Quality Trading Packet submitted by the Buyer to the WDNR for review. Now what? For trades intended for permit compliance, it is generally best to wait for the Buyer to receive approval from the WDNR and associated permit language prior to installing credit generating conservation practices. This is why it's very important to plan ahead and allow time for the WDNR review of the Packet.

With so much detail developed for both the Trade Agreement and Packet, both the Buyer and the Seller should be on firm footing to actually execute the trade. This involves verification that credit generating practices have been installed consistent with the Trade Agreement. The Verifier will document this by filling out a Management Practice Registration Form, which the Buyer then needs to submit to the WDNR.

Additional verification inspections will occur over the life of the credit generating practice as set forth in the Trade Agreement and the specific plans for verification. An Operations & Maintenance, PLUS Performance Verification Plan is an important document to capture both NRCS practice standard O & M, along with additional performance criteria necessary to assure continue validity of modeled credits. A plan of this type is critical for the Buyer, Seller, and Verifier to understand the performance criteria and work together to document success, and any difficult issues that arise, through completion of an Annual Credit Verification Report. While these reports may occur more frequently, depending on the terms set out in the Trade Agreement and Verification Services Agreement, the annual report will allow the Buyer to meet its annual reporting obligations under the WPDES permit.

Forms are also available for the Verifier in the event a credit generating practices underperforms or fails. Should this unfortunate situation arise, the best course of action is an open line of communication between the Buyer, Seller, Verifier, and WDNR. Working together, this water quality trading team can address problems, maintaining both the success of the trade and integrity of Wisconsin's water quality trading program.

Appendix A

A Recommended Structure for Trading in the Lower Fox

The Fox P Trade project built consensus on a preferred market structure for water quality trading (WQT) in the Lower Fox River Watershed (LFRW) through a three-step series of stakeholder engagement activities (two workshops and a survey), as summarized below and depicted graphically in Figure A. The outcome was a general consensus that:

1. A WQT program is desirable in the LFRW.
2. A brokered bilateral market structure is appropriate for launching a WQT program in the LFRW.
3. The following roles are necessary to a successful WQT program in the LFRW:
    a. Brokering trades
    b. Aggregating credits
    c. Certifying credits
    d. Verifying credits
4. Two entities are well-suited to serve roles in a WQT program in the LFRW:
    a. Fox-Wolf Watershed Alliance (FWWA)
        i. Brokering trades
    b. County Land and Water Conservation Departments (LWCDs)[19]
        i. Aggregating credits
        ii. Certifying credits
        iii. Verifying credits

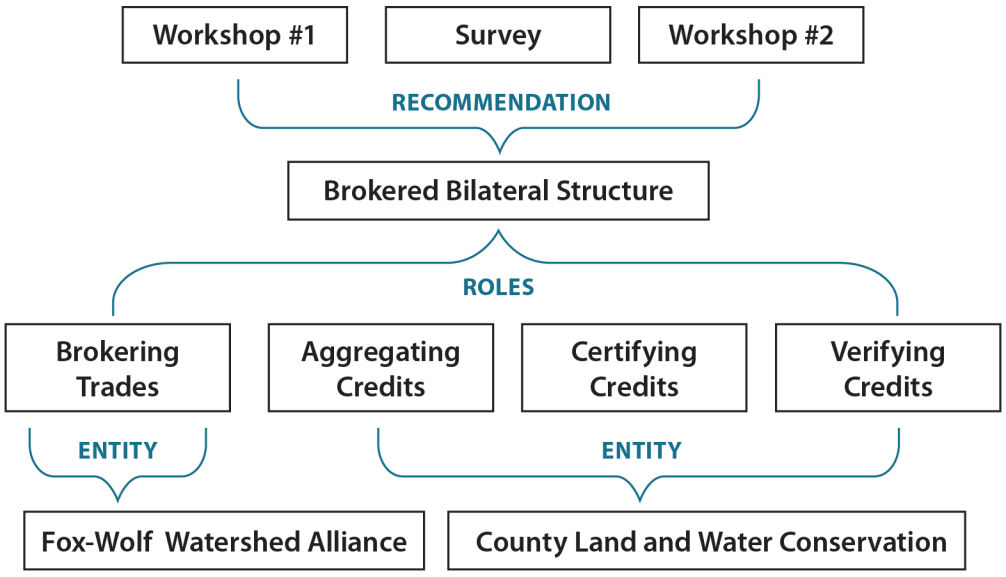


Figure A - A summary of the Fox P Trade stakeholder engagement and consensus-building process leading to a recommended WQT market structure for the LFRW.

[19] In some Wisconsin counties, these departments are referred to simply as Land Conservation Departments (LCDs)

Stakeholders agreed that FWWA was best-positioned among organizations in the LFRW to serve the brokering role in a bilateral WQT market structure in the LFRW. Stakeholders valued the organization's long-standing presence in the watershed and its dedication to working with multiple stakeholders to improve water quality. They also recognized that FWWA was relatively advanced in its knowledge of state WQT guidance and related policies, and it has been active in reaching out to potential buyer and seller communities about the opportunities associated with WQT. While FWWA has developed growing expertise in the field of WQT, the organization has not been engaged in brokering trades. Accordingly, it was recognized that FWWA would need to augment their capacity and enhance their technical capabilities to support these functions. Overall, the value of existing knowledge, longevity, and stakeholder relations gave LFRW stakeholders confidence that FWWA could develop the relevant expertise to successfully broker trades in the watershed.

Similarly, stakeholders agreed that the County LWCDs had the requisite experience and skills to serve as the aggregator, certifier, and/or verifier because they already perform some of these duties while administering other programs that require on-the-ground installation of conservation practices (e.g., USDA-NRCS EQIP program). Moreover, stakeholders agreed that the County LWCDs would be the best-suited entity to serve *all three* roles. Having a single entity perform all three roles has potential to reduce overall transaction costs associated with WQT. In the case of the County LWCDs, stakeholders recognized that the county LWCDs already know the farmers in their county and have a sense of which ones could install credit-generating conservation practices. They are uniquely positioned to identify opportunities to engage multiple farmers to provide credits for a single buyer, an activity called credit aggregation. Further, County LWCDs have staff with agronomic and technical expertise to conduct the requisite analysis of potential load reductions (e.g., use of SnapPlus) necessary to calculate tradable credits necessary to prepare the credit certification forms. Finally, County LWCDs are already trusted by the farmers to go onto their private lands to examine their farming and associated conservation practices. They have technical knowledge of the range of conservation practices that would be installed and how they perform, which readily enables them to evaluate conservation practice performance, an activity called credit verification. In addition to their technical skills, LWCDs in the LFRW are well-respected by both producers and WDNR. Their combination of expertise and reputation make them strong candidates to serve the roles of aggregating, certifying, and verifying credits in a WQT program in the LFRW. That said, stakeholders also recognized that, due to LWCD familiarity and often personal relationships with farmers, verification by county LWCDs alone would need to be spot-checked periodically by WDNR to provide an additional level of surety that practices are installed and performing as intended. It was suggested that other entities (e.g., a qualified independent contractor or crop consultant) could perform the verification role as well, provided that they had formally demonstrated their ability to do such verification. A mechanism by which such entities could register or get official recognition for their ability to perform this role would need to be developed either by WDNR, or in close cooperation with the agency.

In sum, the recommended brokered bilateral structure builds on existing expertise and relationships in the watershed that are necessary for WQT to be a success. While brokered bilateral trades are often associated with higher transaction and administrative costs as compared to other types of market structures (see below), the recommended approach of having FWWA take on the role of trading broker, and the county LWCDs as the aggregators, certifiers, and verifiers leverages two existing entities that already perform some of the roles required for trading offers promise for reducing overall transaction costs.

Summary of Activities Taken to Build Consensus on a Recommended WQT Structure for the LFRW

WDNR has accepted WQT as a legitimate means for WPDES permit holders to achieve WQBEL compliance in Wisconsin. However, the actual process of conducting a WQT can be daunting for both the permittee and the credit generator.

Under Task 6d of the Workplan, the Fox P Trade project set out to evaluate, present, and build consensus around a preliminary WQT market structure that would streamline and enhance the potential for WQT success in the LFRW. Three major steps were taken to this effect:

1. Market Structures Workshop #1 (January, 2015)
    a. Presented four potential WQT market structures
    b. Learned lessons for successful WQT from a panel of experts
2. Market Structures Survey (February, 2015)
    a. Confirmed stakeholder feedback from Market Structures Workshop #1
    b. Identified important roles for WQT participants in the LFRW (e.g., brokering, aggregating, certifying, verifying)
    c. Identified essential attributes for entities to serve each role
3. Market Structures Workshop #2 (March, 2015)
    a. Presented the results of the Market Structures Survey
    b. Built consensus on important roles, and entities to serve those roles, for WQT in the LFRW

Market Structures Workshop #1

The first market structures workshop was open to the entire Fox P Trade Advisory Group and was held at the Fox-Wolf Watershed Alliance Offices in Appleton, Wisconsin on January 28, 2015. There were 52 attendees. The goals of the workshop were to (1) present four potential market structures for WQT in the LFRW and (2) learn from a panel of experts on what it takes to have a successful WQT program.

The GLC gave a presentation describing four market structures that could be used to establish a WQT program in the LFRW: bilateral negotiations (brokered and unbrokered); clearinghouses; exchanges; and auction platforms. The presentation was augmented by a short background report prepared by the GLC and disseminated to the Advisory Group titled *Water Quality Trading Market Structures*.

After the presentation, the Advisory Group heard from a panel of WQT experts. These experts were involved with establishing or managing a WQT program within their respective jurisdictions. The experts represented the Ohio River Basin Water Quality Trading Project (Jessica Fox, EPRI); the Pennsylvania (Chesapeake Bay) Nutrient Credit Trading Program (Jay Braund, Pennsylvania Department of Environmental Protection); the Southern Minnesota Beet Sugar Cooperative and Rahr Malting trading programs (Bruce Henningsgaard, Minnesota Pollution Control Agency); and the Red Cedar River Nutrient Trading Pilot Program (Kevin Kirsch, WDNR; and Tyler Gruetzmacher, Barron County, WI). Each panelist spoke about their experience with WQT and described the challenges and successes of establishing and managing a WQT program.

The GLC then led a facilitated discussion with the Advisory Group to discuss the strengths and weaknesses of each potential WQT market structure. It seemed that the Advisory Group favored a brokered bilateral

negotiation structure (Figure B) as the best approach for launching a WQT program in the LFRW. Brokered bilateral negotiations are one-to-one negotiations between Buyers and Sellers (or their agents) that are facilitated from beginning to end by a third-party intermediary (broker). One criticism of brokered bilateral trades is the potential for relatively high transaction costs which could make WQT economically unattractive or infeasible. Transaction costs accrue through the negotiating, brokering, aggregating, certifying, and verifying processes. All of these transaction costs are rolled into the price of a credit. These transaction costs can be minimized by reducing the number of entities involved with the trade. Although there are many roles to be played in a brokered bilateral trade market structure, multiple roles can be played by the same entity, reducing transaction costs. To validate the apparent consensus on using a brokered bilateral market structure, and to help validate and identify important WQT roles and entities to serve those roles, a survey was designed based on input from the Advisory Group during the first market structures workshop, as discussed next.

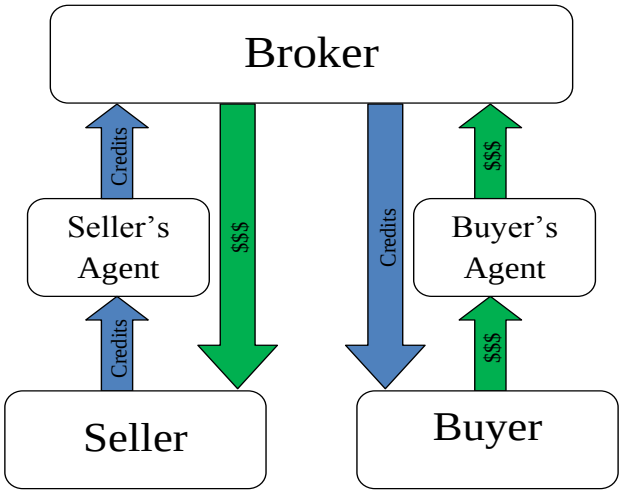


Figure B: A brokered bilateral WQT market structure.

Market Structures Survey

The GLC and the PMT collaborated to develop a market structures survey. This survey was distributed to the Fox P Trade Advisory group between the first and second market structures workshops. This survey was designed to help identify the preferred market structure for launching a WQT program in the LFRW. There were 22 survey respondents, representing a wide range of stakeholders.

Generally, results suggested that a WQT program is desirable in the LFRW (96% agree or somewhat agree) and that a brokered bilateral trade was the preferred market structure (59% agree/somewhat agree; 32% neutral; 9% somewhat disagree). These results are shown in Figure C. Respondents also generally agreed that having an entity (or entities) serve the roles of broker, aggregator, certifier, and verifier was important to ensure a successful WQT program. Importantly, the results suggested that one entity could serve more than one role in a WQT program (e.g., an entity could be both the aggregator and the certifier). Having one entity serve multiple roles simplifies the trading process and has the potential to substantially reduce the transaction costs associated with WQT.

The results of the market structures survey were disseminated to the Fox P Trade Advisory group via email and presented to the Advisory Group at the second market structures workshop in Appleton on March 17, 2015.

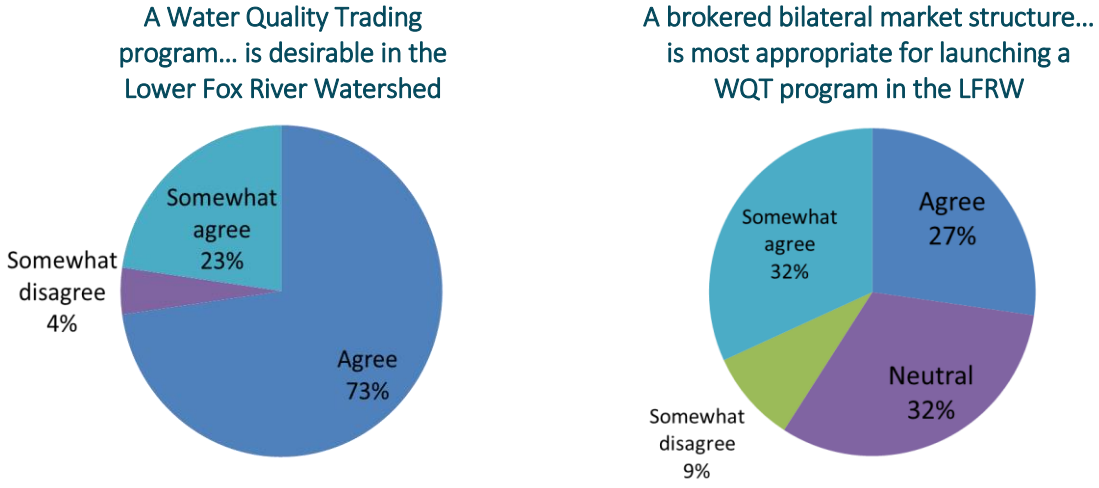


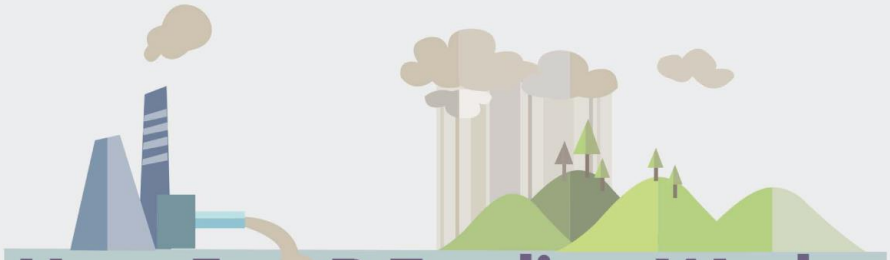
Figure C: Sample results from the market structures survey.

Market Structures Workshop #2

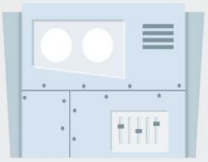
The second market structures workshop was open to the entire Fox P Trade Advisory Group and was held at the Fox Wolf Watershed Alliance Offices in Appleton on March 17, 2015. There were 25 attendees. The goals of the workshop were to (1) present the results of the market structures survey; (2) identify the experience and skills that an entity should possess to serve in each role (broker, aggregator, certifier, verifier); and (3) discuss the potential (and desirability) of one entity serving multiple roles.

After the GLC presented the survey results, two breakout sessions were held. During the first breakout session the attendees were divided into two groups. Each group had a facilitated discussion focusing on the experience and skills that an entity should possess to perform a brokering or aggregating role. Potential entities to perform those roles were identified. The second breakout session was structured the same as the first, but focused on the certifying and verifying roles.

The findings of both breakout session groups were remarkably similar. Each group suggested that the FWWA had the requisite experience and skills to serve as a broker for WQT in the LFRW; further, each group identified the FWWA as the best-suited entity to serve the brokering role. Similarly, both groups suggested that the County LWCDs had the requisite experience and skills to serve as the aggregator, certifier, and/or verifier. Moreover, both groups suggested that the County LWCDs would be the best-suited entity to serve *all three* roles. However, one group suggested that while the County LWCDs could perform conservation practice installation verification, the WDNR should perform occasional spot checks (or "audits") to ensure that conservation practices were indeed installed and continue to be operated and maintained in accordance with NRCS technical standards. It was also suggested that other entities, besides County LWCDs, could perform the verification role, provided they are qualified (e.g., a qualified independent contractor or crop consultant). The WDNR would still perform occasional spot checks. The outcomes of the breakout sessions largely validated the market structures survey results.



How Fox P Trading Works



Permitted facility (buyer) assesses compliance needs per WPDES permit WQBEL

Buyer decides it is **cost effective to purchase credits.**

Buyer contacts broker or an agent to **inquire about credit purchasing opportunities.**

buyer and seller **negotiate a trading contract.**

seller contacts county land conservation or agronomist **to calculate pollutant load reduction** and credit generation.

A farmer (seller) seeks **long term funding** for conservation practices.

Seller installs new conservation practices; pollution in the watershed is reduced.

Pollution reduction generated on farm is reflected in buyer's permit; **compliance is achieved.**

Watersheds are **cleaner,** farmers gain a **new revenue source** and utilities enjoy **lower compliance costs.**