

To: Victoria Pebbles
Great Lakes Commission

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From: Kieser & Associates, LLC

cc: Project File
PMT, TAG

RE: Final Cross-cut Analysis of WQT Programs for WLEB Trading Considerations

1. Introduction

This memorandum provides a review of relevant state and provincial programs in the form of a cross-cut analysis to compare water quality trading (WQT) program components among participating jurisdictions (Indiana, Ohio, Michigan, and Ontario) that contribute phosphorus loads to the Western Lake Erie Basin (WLEB). This effort is part of a USDA Conservation Innovation Grant (CIG) led by the Great Lakes Commission (GLC) to facilitate the development of a WQT program for this portion of the Lake Erie basin. This project is presently referred to as the “Erie P Market”.

The cross-cut analysis draws from Great Lakes WQT experiences in Ohio, Michigan, Indiana and Ontario, other regionally applicable state programs from Pennsylvania¹ and Wisconsin, as well as watershed-based pilot efforts in the Great Miami River of southern Ohio and the Ohio River Basin (including Ohio, Indiana, and Kentucky). A tabular summary captures relevant program information of existing trading program applications for WLEB WQT framework considerations.

The cross-cut analysis targets those trading program components specified in U.S. EPA 2003 WQT Policy² and other functional elements determined by the Project Team. The purpose of this effort is to identify commonalities and differences across applications. Strengths and weaknesses are also discussed for purposes of applying various components from other programs to the Erie P Market. The deliverable for this task is the tabular summary of program/policy elements and recommendations to support a WLEB WQT framework as provided herein. Learning from these examples will help ensure the program developed in this project will apply a defensible, cost-effective structure to help reduce phosphorus loading to the WLEB. Presently, this WLEB

¹ The WQT Program in the Commonwealth of Pennsylvania applies only to waters draining to the Chesapeake Bay but not waters of the Commonwealth draining to Lake Erie.

² U.S.EPA Office of Water, Water Quality Trading Policy, January 13, 2003.

program is envisioned as a point source to non-point source trading effort between municipal wastewater treatment plants and agriculture.

2. Trading Program Characteristics

Specific characteristics of a WQT program influence how trading occurs. The trading program framework will determine the type of credit transactions, entities involved, basic eligibility requirements for participants, and methods for credit calculation. In addition, all U.S. trading programs must reflect EPA's 2003 WQT Policy which was crafted to align trading programs with the Clean Water Act (CWA). As such, WQT programs in the U.S. must address several basic CWA requirements. For instance, trading programs must prevent discharges from causing or contributing to water resource impairment (e.g., creating or contributing to a local "hot spot"). Programs also must comply with anti-degradation requirements of the CWA. Additionally, programs must align with approved Total Maximum Daily Loads (TMDLs) in the receiving waterbody of concern, as well as stream reaches between buyers and sellers. Such provisions are structured to protect beneficial uses of water resources. The CWA includes permit provisions for anti-backsliding that require maintaining treatment levels for existing effluent limits where the effluent limits have previously been attained. Trading programs must similarly recognize such limits.

EPA's 2003 Policy also addresses several other general components that should be included in WQT programs. These general components include, for example: identifying the legal basis for trading; designing a program structure; setting baselines for generating trading credits; assigning trade ratios to ensure equivalent pollutant reduction exchanges; certifying program operations; verifying credit generation; and implementing a tracking and reporting system of program activities. During the design and implementation of trading programs, these core components are refined based on the specific circumstances and conditions of a given state or watershed. These refinements embody a much longer list of considerations than originally identified in the 2003 WQT policy. Similar WQT-related programs in Ontario largely address elements of the EPA policy, as will be demonstrated within this analysis.

Based on diverse WQT experiences throughout the U.S. and Ontario, the cross-cut analysis for WLEB identifies eighteen programmatic conditions considered necessary for successful WQT programs. Table 1 denotes these conditions and justification for inclusion in the analysis. Specific to the cross-cut summary are the representative descriptors that may apply to the various programs examined.

Table 1. Programmatic Considerations for the WLEB Program Cross-cut Analysis and Associated Options
(Refer to Table 3 for use of these options.)

Programmatic Considerations in WQT Programs	Associated Program Options
Legal Basis for Trading: Mechanism necessary for implementing a WQT program.	<i>Rule; Guidance; or Plan (plans may address stand-alone pilot programs, or are responding to other regulatory mechanisms)</i>
Trading Drivers: The rationale for pursuing WQT, often motivated by financial or regulatory constraints.	<i>TMDL; Pre-TMDL; WQS/WQBELs; and/or Growth offsets</i>
Eligible Trades: The types of eligible transactions in a WQT program.	<i>PS-PS; PS-NPS; NPS-NPS (e.g., urban stormwater and agriculture)</i>
Market Structure: The format or framework by which trades are transacted within a program. (Transactions in any of these structures may be aided by the use of brokers or aggregators. These entities can lower transaction costs and risk to buyers and sellers)	<i>Clearinghouse; Bilateral trades; or Exchange market</i>
Eligible Entities: Program may limit specific point and nonpoint source groups from participating in trading, or the extent to which they can trade.	<i>Agriculture; NPDES permittees (WWTPs, and/or Stormwater)</i>
Pollutants Traded: Eligible pollutants for trading.	<i>TP, TN, TSS, other non-bioaccumulative pollutants, and/or cross-pollutant trading</i>
Program Restrictions/Restricted Waters: Programs may place restrictions on where credits can be generated for sale in the watershed and the portion of loading that trading may offset.	<i>Upstream credits only; Downstream credits with discount factor; and/or Limited amount of credit use</i>
Use of Public Money: Considerations for using public money designated for water quality related programs to generate credits. Public monies are sometimes used to achieve baseline conditions.	<i>No restriction on use; Partial restrictions; or All use restricted</i>
Baselines: Minimum practices or site-specific pollutant reduction performance that must be achieved before a source can generate WQT credits. A producer may, in some cases, achieve reductions prior to the development of a final baseline condition. Some programs may allow for the generation these pre-baseline, ‘interim’ reductions.	<i>Current conditions (loading); Regulatory requirements/TMDL allocations; Interim milestones</i>
WQT Credits: Credits are the monetized unit of exchange that expresses load reductions on a ‘mass per unit of time’ basis. Programs must determine when credits can be used relative to when the load reduction occurred. (Trade ratios may affect the quantity of credits that can be used in a trade.)	<i>Seasonal; Annual; or Contemporaneous with permit.</i>
Credit Calculation Methods: Scientifically-defensible methods to calculate estimated load reductions per time (e.g., pounds of phosphorus/year) after credit-generating practices are implemented.	<i>EPA Region V Model (more specifically, STEP L or MDEQ pollutants controlled calculations); State-specific; Other</i>

<p>Trade Ratios: A numeric value used to convert estimated load reductions (e.g., pounds of phosphorus) into tradable water quality credits. These ratios ensure a trade results in an equivalent load reduction that would have occurred absent the trade. The trade ratio may be used to adjust available credits from a seller or credit obligations of a buyer based on various considerations including uncertainty and equivalency of load reductions.</p>	<p style="text-align: center;"><i>Variable</i></p>
<p>Net Water Quality Benefit: A portion of the trade ratio or calculated portion of credits that may be set aside or retired to ensure that water quality is improved with each trade.</p>	<p><i>Implicit in the trade ratio; Explicitly stated; or Not stated</i></p>
<p>Risk Assurances: Mechanisms that can account for credit default to protect trading participants.</p>	<p><i>Reserve credit pool; Reasonable replacement (true-up) period (or “grace period”); Corrective action/contractual or Not stated in rules</i></p>
<p>Program Tracking: Documentation of WQT activities, including participants and credit transactions. A trading program generally houses this information in some form of registry that may be accessible for public inquiry. Public access to information promotes program transparency and accountability.</p>	<p><i>Public access vs. non-public access; and State maintained registry vs. non-state maintained registry</i></p>
<p>Monitoring and Evaluation Protocols: A program may implement regular monitoring of water quality in areas under a trading framework. Program evaluation may also take place to measure and track program successes and shortcomings.</p>	<p><i>Ambient monitoring; Site-specific water quality monitoring; and Program evaluation conducted by state or program administrator (Yes/No?)</i></p>
<p>Certification and Verification Protocols: Credit certification is the final administrative review and approval to ensure all applicable criteria for generating a credit are satisfied. Verification involves the physical, field inspection to confirm BMPs are installed as designed.</p>	<p><i>Certification by state or non-state entity to ensure credit proposals meet program requirements; and Verification of practice implementation by state or non-state entity</i></p>
<p>Compliance and Enforcement: Mechanisms available to regulatory agencies to ensure water quality standards are being met and enforced within trades. States have CWA authority delegated from U.S. EPA and trading programs must support federal standards. A state may delegate WQT program authority to a separate entity to manage and ensure program compliance (with the state retaining ultimate authority).</p>	<p><i>State-delegated CWA authority (Yes/No?); and/or a WQT program administrator</i></p>

3. Cross-cut Analysis

This cross-cut analysis assesses various considerations in Table 1 from state-based water quality trading programs and/or watershed-based programs relevant to the WLEB. The findings from this analysis are summarized in Section 4 of this memorandum. These will assist the project management team (PMT) with understanding the current status of WQT programs and provide crucial insight on formulating a structure for the Erie P Market.

WQT Programs Reviewed

Water quality trading programs exist throughout the U.S. and Canada, each offering unique approaches for addressing relevant water quality concerns. U.S. programs are based on EPA policy, but can vary substantially in how they are implemented and/or administered. The cross-cut analysis therefore includes a select number of WQT programs relevant to the Great Lakes/WLEB setting. These include three current state programs (Ohio, Pennsylvania, and Wisconsin), a rescinded state program (Michigan), two watershed-based pilot programs (Great Miami River and Ohio River Basin Interstate Trading Project), and two Provincial programs (South Nation and the proposed Lake Simcoe Phosphorus Offset Program). Table 2 presents rationale for considering each of these programs. The corresponding attachments noted in Table 2 provide detailed information on each of these WQT programs.

Table 2. WQT Programs Examined in the Erie P Market Cross-cut Analysis.
(Detailed summaries are provided in attachments as noted.)

Program Category	Rationale for Inclusion in Cross-cut	Attachment
State Programs		
<i>Ohio</i>	Well-defined state WQT rules that were originally established in 2006 and successfully revised in 2012. Ohio agencies are partners on this CIG.	A
<i>Michigan</i>	Michigan developed the first statewide WQT rules though these were rescinded in 2013 for lack of use. Michigan is a partner on this CIG.	B
<i>Wisconsin</i>	Wisconsin has developed state guidance that is being tested and piloted in Green Bay by the GLC, thus it is one of the few explicit trading efforts in the GL basin.	C
<i>Pennsylvania</i>	Recognized as having one of the more robust WQT programs with detailed state-level infrastructure and framework (though only for the Chesapeake Bay).	D
Watershed Programs		
<i>Great Miami River (Pilot)</i>	Pilot watershed trading program in Ohio with over ten years of PS/NPS pre-compliance trading efforts.	E
<i>Ohio River Basin (Pilot)</i>	Pilot watershed trading program involving an interstate trading agreement between Ohio, Indiana and Kentucky.	F
Ontario Programs		
<i>South Nation Conservation</i>	Provides provincial perspective on Ontario's longest running WQT effort described as "Total Phosphorus Management" which has successfully engaged farmers and municipal point sources.	G
<i>Lake Simcoe</i>	Provides provincial perspective on a phosphorus offset program for stormwater where MOE, OMFRA and others are participating in the CIG.	H

WQT Program Cross-cut Analysis

The cross-cut analysis first examines WQT program considerations identified in Table 1 for each program noted in Table 2. These WQT considerations are sorted into three

distinct categories to differentiate their purpose and function in a trading program. These categories include: 1) trading structure, rationale and eligibility requirements; 2) WQT program calculation fundamentals; and, 3) long-term WQT program considerations. Attachments A-G provide these detailed summaries.

Information from these detailed program summaries is integrated and synthesized in Table 3 for all eight programs examined. This provides quick reference to specific program information for comparison purposes.

Table 3. WQT Program Cross-cut Summary.

Water Quality Trading Program Element	WQT Program							
	Ohio	Michigan (rescinded)	Pennsylvania	Wisconsin	Great Miami (Pilot)	Ohio River (Pilot)	South Nation	Lake Simcoe
Legal Basis for Trading Rule, Guidance or Plan	Rule	Rule	Rule	Guidance	Plan	Plan	Plan	Plan
Trading Driver <i>TMDL, Pre-TMDL, WQS/WQBELS, and/or Growth</i>	TMDL, Pre-TMDL, WQBELS	TMDL, Pre-TMDL, WQBELS	TMDL, Growth	TMDLs, WQS/WQBELS	Pending WQS/WQBELS	TMDLs; pending WQBEL	Growth	Growth
Eligible Trades <i>PS-PS, PS-NPS, and/or NPS-NPS</i>	PS-PS; PS-NPS	PS-NPS	PS-PS; PS-NPS	PS-PS; PS-NPS	PS-PS; PS-PS	PS-NPS	PS-NPS	NPS-NPS
Market Structure <i>Clearinghouse, Bilateral, or Exchange Market</i>	Bilateral or Clearinghouse	Exchange market	Clearinghouse	Bilateral or Clearinghouse	Clearinghouse	Clearinghouse	Clearinghouse	Clearinghouse
Eligible Entities <i>Agriculture, WWTP, NPDES Permittees, and Stormwater (SW)</i>	WWTPs, SW, Agriculture (including CAFOs with restrictions)	WWTPs, SW, Agriculture	Agriculture, WWTPs, SW	WWTPs, NPDES Permittees, Agriculture	Agriculture	NPDES Permittees, Agriculture	Agriculture, WWTPs	Agriculture, SW
Pollutants Traded <i>TP, TN, TSS, Other non-bioaccumulative pollutants, and/or cross pollutant trading</i>	TP, TN, TSS	TP, TN, TSS, Cross-Pollutant	TP, TN, TSS	Non-bioaccumulative pollutants, cross-pollutant trading	TP, TN	TP, TN	TP	TP
Program Restrictions/Restricted Waters <i>Upstream credits only, Downstream credits with discount factor, watershed limited, and/or limited amount of credit use</i>	Upstream, limited credit use (Director discretion)	Upstream, Downstream, limited credit use (20% for WWTPs)	Upstream, Downstream	Upstream, downstream, watershed	Upstream	Upstream Only	Watershed limited	Watershed limited
Use of Public Money <i>No restrictions on use, partial restriction, and/or all use restricted</i>	All	Partial	None	Partial restriction	All	Partial	None	Partial
Baseline Definition <i>current conditions (loading), regulatory requirements/TMDL allocations, interim milestones</i>	Current, Regulatory	Current, Regulatory	Regulatory	Regulatory, Interim	Current	Current (3-year history), Regulatory	Current	Current
Credit Definition <i>Seasonal, Annual, or Contemporaneous w/ permit</i>	Contemporaneous	Annual, Seasonal, Contemporaneous	Annual	Annual*	Annual	Annual	Annual	Annual
Credit Calculation Method(s) <i>Region V**, State-specific, Other</i>	Region V	Region V	State-specific, other	Other	Region V, other	Region V	Other	Other
Trade Ratios <i>(Variable)</i>	2:1 non-TMDL waters; 3:1 TMDL waters; 1:1 for PS/PS	2:1 PS-NPS; 1.1:1 PS-PS	3:1	PS-NPS: 2.1:1; PS-PS: 1.1:1	1:1, 2:1 or 3:1	Trading partner specific ratio	4:1	2.5:1
Risk Assurances <i>Reserve Pool; Reasonable Replacement (True-up) Period; Corrective Action/Contractual; Not Stated</i>	True-up, Corrective Action/Contractual	Reasonable Replacement; Corrective Action/Contractual	Reserve Pool	Corrective Action/Contractual	Reserve Pool; Corrective Action/Contractual	Reserve Pool; Corrective Action/Contractual	Not stated	Reserve Pool
Net Water Quality Benefit <i>Implicit w/ TR, Explicit, or Not stated</i>	Implicit (in PS/NPS trades)	Explicit requirement (10% of reductions)	Explicit	Implicit in trade ratio	Not stated	Explicit	Implicit in high trade ratio	Implicit in trade ratio
Program Tracking <i>Public Access vs. Non-public Access; State registry vs. Non-state registry</i>	Public Access; Non-state registry	Public Access; State Registry	Public Access; State registry	Public Access; non-State registry	Non-public access; Non-state registry	Public access; Non-state registry	Non-Public access	Public access; Non-provincial registry
Monitoring and Evaluation <i>Ambient monitoring, Site-specific water quality monitoring, None specified, Program evaluation (Y/N?)</i>	Ambient monitoring, Program evaluation (Y)	Ambient monitoring; Program evaluation (Y)	None specified, Program Evaluation (Y)	Site-specific (PS-PS), Program Evaluation (N)	Ambient, Site-specific, Program evaluation (Y)	None specified, Program evaluation (Y)	Ambient monitoring; Program evaluation (Y)	Site-specific monitoring; Program Evaluation (Y)
Certification and Verification <i>Certification of credit application by state or non-state entity; Verification of practice installation by state or non-state entity; Long-term verification audits (Y/N/NS)</i>	Certification; Verification; Long-term verification	State certification, Long-term audits	State certification; State verification	State certification; Non-state verification	State certification; Non-state verification	State certification; Non-state verification	Non-provincial certification; Non-provincial verification	Non-provincial certification; non-provincial verification
Compliance and Enforcement <i>State-delegated CWA Authority, WQT Program Administrator</i>	State	State	State, Administrator	State	Administrator	Administrator	Province, Administrator	Administrator

*WI Credit Definition: NPS credits generated using annual estimation can be applied at any time throughout the year and still be considered contemporaneous with the permit's averaging period.

**This is more specifically "MDEQ Pollutants Controlled Calculation Methods" consisting of Region V model for sheet/rill erosion and NRCS volume-voided method for gully and bank erosion.

4. Summary of Findings

The cross-cut analysis serves as a tool to help identify and highlight commonalities and differences among state-wide WQT programs for Ohio, Michigan (though rescinded in 2013), Pennsylvania, and Wisconsin as well as watershed-based programs in the Great Miami River of Ohio (pilot), the Ohio River Basin (pilot), South Nation watershed (Ontario), and Lake Simcoe watershed (Ontario). The strengths and weaknesses of these programs are used to inform framework discussions around the Western Lake Erie Basin trading program. This report summarizes findings in two ways:

- Trading program/project experiences to highlight the status of these efforts relevant to applications for a WLEB trading framework.
- Trading program considerations that examine relevant similarities and differences in relation to the WLEB setting where the only applicable trading rules that apply are those for Ohio.

Summary Findings by Trading Program/Project Experience

Each of the jurisdictions surrounding the WLEB (Ohio, Indiana, Michigan, and Ontario) has had some level of experience with WQT. Based on the cross-cut analysis, this experience is summarized as follows:

- Ohio is the only jurisdiction surrounding the WLEB with promulgated trading rules. These rules were originally adopted in 2006 with subsequent updates and approval in 2012. No formal trading plans (as required by the trading rules) have yet been approved for compliance trading, though some may soon be proposed.
- Indiana’s participation in WQT is limited to the ORB pilot trading project and “stewardship” credit generation by Indiana agricultural producers in the ORB.
- Michigan’s WQT experience is relegated to what many viewed as too much complexity in the rules, making them difficult to use, particularly absent was Michigan’s formal development of WQT infrastructure. Rigid interpretation of baseline provisions for credit generation also discouraged the use of WQT. There were no formal trades attempted between 2002, when these rules were promulgated, and 2013 when they were rescinded due to lack of use. Michigan has however, utilized offset provisions in select NPDES permits and acknowledges offset opportunities in new stormwater permits.
- Ontario has perhaps one of the longest running examples of watershed trading for total phosphorus in the South Nation River where a select number of WWTPs have been able to accommodate municipal growth and increased discharges using reductions from agriculture through a “Total Phosphorus Management Program”. In separate examples in the Lake Simcoe basin, a number of municipalities have provisions for “offsets” in their Certificates of Approval (the Canadian equivalent of U.S. NPDES discharge permits) for Sewage Treatment Plants to achieve additional phosphorus reductions required beyond expensive upgrades. The Lake

Simcoe Regional Conservation authority has additionally developed the Lake Simcoe Phosphorus Offset Program that would require developers to meet a zero-discharge for stormwater runoff. Phase I of this proposed project would entail credit generation through stormwater retrofits in existing urban areas only. No credit generation through agricultural best management/conservation practices is proposed in this phase. Rather, the proposed Lake Simcoe Phosphorus Offset Program would involve credit generation through stormwater retrofits in existing urban areas. Where new stormwater controls are insufficient to achieve this, phosphorus offset credits originating from stormwater retrofits of existing municipal infrastructure can be used for compliance. Program implementation is pending certain program element approvals by the provincial authority.

Summaries of other state-level WQT programs in the WLEB region provide additional information for the cross-cut analysis including:

- Wisconsin approved WQT guidance in 2013. There has been limited trading activity in the state since guidance development. The Great Lakes Commission has worked on their Fox P Trade program in the Lower Fox/Wolf River Basin with no trades to date. A variety of challenges surfaced with use of the current Wisconsin DNR guidance. Adaptations to this guidance are being incorporated into the Fox P Trade program through collaboration of partners and the WDNR.
- Pennsylvania has perhaps the most active WQT program participation since guidance was originally established in 2006 and rules promulgated in 2013. This program is however, restricted to the Chesapeake Bay watershed. Early program criticisms focused on credit baselines not necessarily in alignment with Bay goals (and eventually Bay TMDL load allocations), and select credit-generating practices of manure export. Both criticisms were addressed within recently promulgated rules.

Relevant watershed-based trading program summaries targeted for the cross-cut include:

- Great Miami watershed pilot trades in this southern Ohio basin were initiated in 2006 for six utility buyers. Nutrient reductions achieved by a wide range of agricultural conservation practices have been tracked in a registry maintained by the Miami Conservancy District. Over 400 tons of nutrients have been contracted in the last decade. All reductions were associated with “pre-compliance” trades in anticipation that buyers would eventually receive more stringent effluent limits for phosphorus and nitrogen associated with pending numeric nutrient criteria to be issued by OEPA. Such numeric limits have not yet been established and market demand for compliance credits is uncertain.
- The ORB Water Quality Trading Project established a three-state agreement in 2012 for pilot trades between Ohio, Indiana, and Kentucky. The project’s Pilot Trading Plan established the authority to conduct interstate trades through

participating states signing a Pilot Trading Plan. The ORB project serves as a representative model for the WLEB. This is particularly relevant as this trading plan was established and approved by OEPA in the context of existing WQT Rules for Ohio. The lack of market demand has resulted in the interim testing of trading approaches with “stewardship” credits that may be used to address corporate stewardship goals; this is in anticipation of future compliance trading.

Summary Findings by Program Consideration

The cross-cut analysis found general uniformity among several program options as noted in Table 3 including:

- Trading drivers
- Eligible trades
- Market structure
- Eligible entities
- Pollutants traded
- Baseline definition
- Credit definition
- Credit calculation method(s)
- Program tracking
- Certification and verification
- Compliance and enforcement

This analysis revealed more apparent variation among notably fewer categories including program restrictions, use of public money, trade ratios, risk assurances and net water quality benefit. Variation among programs is expected as a result of varying regulatory program requirements and public policy. Recognizing the intent here is to identify specific elements of select trading programs that will help bolster a framework for trading in the WLEB, differences are identified to help build a framework suitable to various jurisdictional needs.

Of the WLEB jurisdictions, only Ohio has state-wide promulgated rules pertaining to water quality trading. This initially suggests that a WLEB framework should first comport with OEPA rules while secondarily addressing other jurisdictional considerations. For this reason the Project Team has focused more specifically on how other select program characteristics differ from Ohio’s state-wide rules. These differences are summarized as follows.

Program Restrictions

Under Ohio’s trading rules, eligible credits are generated upstream of the credit buyer. The Director may use discretion to allow downstream trading if deemed appropriate. This differs from Michigan, Pennsylvania, and Wisconsin’s rules and the Ohio River pilot project all of which allow for downstream crediting. Some programs justify downstream crediting by applying a higher trade ratio or alternative correction factor to account for such transactions. With proper quantification and validation, downstream crediting may be an applicable transaction in the Western Basin. Downstream crediting

may allow for more widespread credit transactions as well as more ‘potent’ reductions by credit generators situated closer to WLEB.

Trade Ratios and Retired Credits to Ensure Water Quality Benefit

Trade ratios are an inherently variable framework element often dictated by available data on pollutant fate and transport within a particular watershed and/or uncertainties in calculating equivalence between sources. OEPA trading rules employ two simplistic trade ratios, 2:1 and 3:1, dependant on whether trading is occurring in non-TMDL or TMDL listed waters, respectively. As illustrated in Table 3, state and watershed programs apply a variety of differing trade ratio applications.

Trade ratios, as previously defined in Table 2, are the primary trading mechanism to ensure load reduction equivalency between trading participants. A trade ratio may also incorporate additional factors to ensure the load reduction accomplished through trading is in excess of this minimum equivalency. This additional factor may be applied as part of a more conservative trade ratio to ensure equivalency, or alternatively, a “net water quality benefit”.

A net water quality benefit may be explicitly stated in trading rules, as in the case with Michigan’s former rules which stated 10% of traded reductions were retired (not eligible to be traded), which is also done in the ORB Trading Project where 10% of credits are automatically retired. Net benefit may also be implicit within a trade ratio as is the case in the South Nation program that employs a high trade ratio of 4:1 which assumes a net water quality benefit occurs with every trade. Ohio rules do not require credit retirement. Point source/non-point source trading rarely occurs at 1:1 since this ratio would be difficult to ensure equivalency or a net water quality benefit. However, the Great Miami (pilot) program does allow for 1:1 pre-TMDL compliance trading. This program was developed prior to the state-wide promulgated rules and was grandfathered into the 2006 codified trading rules in cooperation with OEPA. The Great Miami program uses this trade ratio to incentivize early reductions from agricultural non-point sources prior to point sources receiving new permits with more stringent effluent limits. Those entities who participate in trading prior to the development of a TMDL are allowed to trade at 1:1 while those deferring until after a new effluent limit is established must trade at higher ratio. This risk-reward framework has encouraged substantial early program participation as noted above.

Only one program examined in this cross-cut analysis, the ORB Trading Project, uses trade-specific ratios compared to other programs with default ratios. The ORB project determines participant-specific ratios based on watershed modeling results from WARMF model simulations. Such simulations establish fate and transport factors for

total phosphorus and total nitrogen that are specific to the locations of buyers and sellers in the eligible trading reaches of this project.

It is possible, but likely unsupportable, to consider similar trade-specific ratios in the WLEB. This is primarily because no consistent model applications exist across all tributaries to the WLEB as in the ORB trading areas. If such trade-specific ratios were required for a WLEB WQT framework, this could severely limit trading until such time that consistent model simulations were calibrated and verified for each tributary. Therefore, other models may be useful to support default trade ratios for the WLEB. However, any models used to support trading in the WLEB, must account for both particulate and soluble phosphorus transport. TP/SRP and other programmatic elements (for example downstream credit generation) will be important considerations for setting trade ratios in the WLEB.

Risk Assurances

Water quality trading presents numerous risks for participants, especially credit buyers. Buyers of non-point source-generated credits make the assumption, for example, that credit sellers will implement and maintain best management/conservation practices for the duration of the trade agreement. If these sellers default on their obligations, the credit buyers must still achieve the required load reductions either through traditional methods or by contracting with another credit generating entity. Potential trading participants may be averse to engaging in what may be perceived as an overly risky program. Trading programs can therefore enact a variety of strategies to mitigate risk. Programs in this analysis highlight diverse examples of risk mitigation.

Best management/conservation practices may fail as a result of natural causes or other unforeseen circumstances through no fault of the credit seller. Ohio's trading rules recognize this possibility and employ a 90-day 'grace' period to remedy failing/failed BMPs. The grace period does not guarantee credits will be available, but instead provides credit sellers an opportunity to either remedy failing/failed BMPs or pursue other corrective measures provided by the trading plan. Michigan's former trading rules generally left these responsibilities to the buyers and sellers allowing for a reasonable replacement window for a failed BMP; yet significant penalties would have been imposed on sellers that intentionally defaulted on credit generation to better ensure that water quality was being protected. Wisconsin's Fox P Trade Program has a bilateral contract template which similarly provides a grace period to remedy credit deficiencies.

To help ensure credits are available in the case of BMP failure or credit sellers defaulting, some programs (Pennsylvania, the Great Miami, ORB and Lake Simcoe) use a reserve pool of credits to allow credit buyers to remain in compliance. A reserve pool is most

often established by requiring trading participants to generate excess credits to contribute to the reserve, or by dedicating nutrient reduction outcomes from other projects to this pool.

The framework for the WLEB will need to consider the applicability of these various risk assurance methods, especially in alignment with flexible options that can be proposed within a trading plan required under OEPA rules.

Market Structures

Though the majority of programs evaluated in the cross-cut identify a clearinghouse as their market structure for trading, it is worthwhile to consider here the conditions which influence the decisions for selecting an operating structure. A clearinghouse is a central entity that functions as the holder of credits whereby buyers and sellers both come to seek or sell credits, respectively. The clearinghouse may be a state agency (e.g., PennVest in Pennsylvania), a state-recognized authority (the Miami Conservancy District, South Nation Conservation Authority and the Lake Simcoe Regional Conservation Authority) or a third-party (e.g., EPRI in the ORB program). This type of WQT program structure typically lowers transaction costs for buyers and sellers by eliminating the time/expense associated with engaging one another, negotiating credit pricing, and verification of BMPs. This program structure may also assume the risk associated with BMP failure and other possible credit default conditions. Lower transaction costs do not necessarily equate to lower overall costs for a program. Developing a clearinghouse is often expensive (both time and capital expenses). A program may recoup costs by charging fees to trading participants, as is the case with Pennsylvania.

An exchange structure was originally envisioned with Michigan's former trading rules. In this case, buyer and seller participation in trades were to be reviewed by the Michigan DEQ but all obligations of performance were between the trading parties. A state exchange was envisioned whereby DEQ-eligible buyers and sellers could connect, leaving no obligation on the state to broker or transact deals. Such deals would otherwise be bilateral transactions between parties.

Ohio trading rules allow trading program plans to dictate market structures which could include any one of the three approaches; clearinghouses, exchanges, or bilateral transactions. Generally, market brokers or aggregators can participate under these structures taking on varying levels of contractual liability while assisting buyers and sellers in market entry and or obligations.

Findings from the supply and demand analysis for the WLEB may largely dictate the appropriate market structure for trading in the basin. If demand for credits in the Basin

suggests a low anticipated trade volume then the expense of developing a robust clearinghouse may not be justified and other structures might be more appropriate.

5. Initial Recommendations for Framework Considerations in an Erie P Market

As a starting point for PMT discussions, Table 4 identifies initial recommendations to address the various elements examined herein for a trading program in the WLEB. In particular these recommendations recognize promulgated trading rules from OEPA, but also the flexibility of these rules that could accommodate other desired trading program features suitable to other jurisdictions.

Table 4. Initial Recommendations for an Erie P Market Trading Framework. (Recommended approaches that are shaded and/or underlined may require discussion with OEPA in the context of Ohio’s WQT rules.)

Water Quality Trading Program Considerations/Options	Recommended Erie P Market Approach
Legal Basis for Trading <i>Rule; Guidance; Plan</i>	Plan
Trading Driver <i>TMDL; Pre-TMDL; WQS/WQBELs; and/or Growth</i>	WQBELs, <u>Growth</u>
Eligible Trades <i>PS-PS; PS-NPS; and/or NPS-NPS</i>	PS-NPS; <u>NPS-NPS</u>
Market Structure <i>Clearinghouse; Bilateral; or Exchange Market</i>	To Be Determined
Eligible Entities <i>Agriculture; WWTPs; NPDES Permittees; and Stormwater</i>	WWTPs; Stormwater; Agriculture
Pollutants Traded <i>TP; TN; TSS; Other non-bioaccumulative pollutants, and/or Cross pollutant</i>	TP
Program Restrictions/Restricted Waters <i>Upstream credits only; Downstream credits with discount factor; Watershed limited; and/or Limited amount of credit use</i>	Upstream and <u>Downstream</u>
Use of Public Money <i>No restrictions on use; Partial restriction; and/or All use restricted</i>	Partial
Baseline Definition <i>Current conditions (loading); Regulatory requirements/TMDL allocations; Interim milestones</i>	Current; Regulatory; <u>Interim</u>
Credit Definition <i>Seasonal; Annual; or Contemporaneous w/ permit</i>	Annual
Credit Calculation Method(s) <i>Region V; State-specific; Other</i>	Region V; Other (for <u>Dissolved P</u>)
Trade Ratios <i>(Variable)</i>	2:1

<p align="center">Risk Assurances</p> <p align="center"><i>Reserve pool; Reasonable replacement (True-up) period; Corrective action/contractual; Not stated</i></p>	Reserve Pool
<p align="center">Net Water Quality Benefit</p> <p align="center"><i>Implicit w/ trade ratio; Explicit; or Not stated</i></p>	<u>Explicit</u> in addition to 2:1 (in PS-NPS trades)
<p align="center">Program Tracking</p> <p align="center"><i>Public access vs. non-public access; State registry vs. non-state registry</i></p>	Public Access; To Be Determined
<p align="center">Monitoring and Evaluation</p> <p align="center"><i>Ambient monitoring; Site-specific water quality monitoring; None specified; Program evaluation</i></p>	Plan Specific
<p align="center">Certification and Verification</p> <p align="center"><i>Certification of credit application by state or non-state entity; Verification of practice installation by state or non-state entity; Long-term verification audits</i></p>	Certification; Verification; Long-term verification
<p align="center">Compliance and Enforcement</p> <p align="center"><i>State-delegated CWA authority; WQT Program Administrator</i></p>	To Be Determined by Trading Plan

It is anticipated that PMT discussions will refine and may even change these initial recommendations. Thus, a final program framework will reflect findings of this cross-cut analysis as well as deliberations amongst key stakeholders participating in this project.

Attachment A

Ohio WQT Rules Summary

Ohio WQT Program Information³

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
(Rule) State of Ohio Water Quality Trading, Chapter 3745-5 of the Administrative Code
Trading Driver
Total Maximum Daily Load (TMDL) Compliance
Pre-TMDL: Water Quality Standards driven Water Quality Based Effluent Limits (WQBELs) ⁴
Eligible Trades
Point Source to Point Source (PS/PS)
Point Source to Non-point Source (PS/NPS)
Water quality trading activities can occur: 1) in a watershed; 2) in a TMDL area; or 3) in any other area where the director determines that water quality trading activities will achieve the purposes outlined in the rules.
Market Structure
Clearinghouse or bilateral trades- Structure is stipulated in the water quality trading management plan
Eligible Entities
Wastewater treatment plant (WWTP)
Municipal stormwater
Concentrated animal feeding operations (restrictions apply)
Pollutants Traded
Phosphorus, nitrogen and sediment (only bioaccumulative toxics explicitly prohibited)
Program Restrictions and Restricted Entities and/or Waters
The use of a water quality credit shall: <ol style="list-style-type: none"> 1. Not cause or contribute to a violation of water quality standards; 2. Not cause impairment of existing use or designated uses, as defined in Chapter 3745-1 of the Administrative Code, including adversely affecting water quality at an intake for drinking water supply. 3. Not exceed a loading capacity established by a TMDL 4. Not be used to comply with TBEL on either secondary treatment regulations as specified in 40 C.F.R. 133, the national effluent limitations guidelines and performance standards as specified in 40 C.F.R. 405 through 499, or established based on the best professional judgment of the permit writer pursuant to section 402(a)(1) of the CWQ and 40 C.F.R. 122.44(a)(1); or 5. In accordance with section 6111.03 of the Revised Code not conflict with an area wide waste treatment management plan adopted in accordance with section 208 of the Federal Water Pollution Control Act. <p>Other restrictions as designated by the Ohio EPA (OEPA) director.</p>
Use of Public Money
NPS reductions from BMPs shall be eligible to generate credits in direct proportion to the percent local contribution (federal program) and not eligible to generate credits when partially or fully funded by a grant under Section 319 of Clean Water Act or through OEPA water resources restoration sponsor program.

³ Unless otherwise noted, all programmatic information is gleaned from: State of Ohio, Water Quality Trading- Chapter 3745-5 of the Administrative Code. Effective November 1, 2012. Accessed at http://epa.ohio.gov/portals/35/rules/05_all.pdf

⁴ Personal communication with Gary Stuhlfauth. April, 2016. A State Supreme Court ruling determined that TMDL WLAs must go through legislative approval/rule making to be converted into WQBELs. OEPA is also working on eutrophication criteria, however the promulgation of these rules appears to be several years removed.

WQT Program Calculation Fundamentals

Baseline Definition

For permittees in an approved TMDL water, the baseline shall be the lower of:

1. Wasteload allocation established by the TMDL⁵; or
2. The current discharge level.

For permittees in an area where there is not an approved TMDL or where water quality fully supports designated uses assigned in Chapter 3745-1 of the Administrative Code, the baseline shall be the lower of:

1. The existing NPDES permit limit;
2. A technology-based performance standard; or
3. The current discharge level.

For NPS, the baseline shall be the pollutant load associated with existing land uses and management practices. These practices must comply with any applicable federal, state or local requirements and shall:

1. Be established by using an accurate, representative, and reliable process and operational information, available flow and monitoring data, pollutant loading data, and records that are available, and that are deemed acceptable by the director; and
2. Unless otherwise specified, be established using information and data representative of the three year period before the date that a change is made to generate a pollutant load reduction. A different time period, such as the previous full crop rotation history, that is representative of historical operations and provides accurate and reliable data on existing pollutant loads may be used if certified by a qualified soil and water conservation professional or deemed acceptable by the director.

For stormwater sources regulated under an NPDES permit, the water quality baseline shall be:

1. The numeric effluent limit, if one is established in the NPDES permit; or
2. The pollutant specific loading achieved after implementation of management practices specified in or approved under the NPDES permit.

The director may consider data and information submitted as part of a water quality trading management plan application that supports the use of alternate methods of setting baselines, provided that:

1. The data are established using information representative of a three-year period; and
2. The data are established using accurate, representative and reliable process and operation information, available flow and monitoring data, pollutant loading data, and records that are available and the director deems that acceptable.

Credit Definition

Credits are typically determined on a mass per unit time for reductions:
Phosphorus (lbs/yr); Nitrogen (lbs/yr); Sediment (tons/yr)

Credits must be generated during the same time period when they are used for compliance.

Credit Calculation Methods

If methods and procedures are specified by federal regulations or NPDES permits, these will be applicable. Where methods and procedures do not exist, use load reduction spreadsheet tools and/or generally accepted engineering methods. Credit calculation methods used to determine load reductions only address sediment attached phosphorus.

Credit determination process is carried out by a qualified SWCD Professional.

Trade Ratios

2:1 for PS/NPS (non-TMDL watershed)

3:1 for PS/NPS (TMDL watershed)

1:1 for PS/PS

Director can impose alternative trade ratios for PS/PS or PS/NPS trading, if deemed necessary based on

⁵ Recent conversation with OEPA staff indicate individual TMDLs will be developed for each discharger which will require legislative approval.

specific information, monitoring and observations, protection of water quality standards, etc.
Trade ratios only account for fate and transport of sediment attached phosphorus.
Risk Assurances
With proper notification, state establishes a 90-day grace period to replace failing BMPs. Additional language in the water quality trading management plan can specify additional risk assurances.
Net Water Quality Benefit
Yes. Implicit (as trade ratio) for PS/NPS trades and as imposed by the director (explicit)
Long-term WQT Program Considerations
Program Tracking
Documentation of WQT activities and credit transactions is maintained by operator of trading program.
The director or other authorized management personnel shall have access, upon request, to activities including: <ol style="list-style-type: none"> 1. Any records that are maintained to document point source/point source trades; 2. Any records that are maintained to document point source/non-point source trades; 3. Water quality monitoring data collected as part of the water quality trading activities; and 4. Any records necessary to assess the effectiveness of a BMP to reduce a pollutant load
Public should be involved in the process through the use of public notices and meetings.
Monitoring and Evaluation
Ambient water quality monitoring plan shall include: <ol style="list-style-type: none"> 1. A list of chemical, biological and stream habitat parameters being monitored; 2. The sampling frequency for each parameter being monitored; 3. The location of each sampling site; and 4. Identify the methods and procedures used to monitor each parameter
The director may require an evaluation of water quality trading activities that: <ol style="list-style-type: none"> a. Describes the number and types of water quality trades; b. Includes the costs of purchasing water quality credits; c. Includes any administrative costs associated with water quality trading activities; d. Provides a determination of any net cost savings resulting from the water quality trading activities; e. Includes an assessment of the overall environmental and the economic effectiveness of the water quality trading activities; and f. Describes any need for corrective measures.
The director may reduce the scope of this evaluation based on consideration of factors, such as the number of trades that occurred, the number of NPS BMPs that were implemented, the status of the BMPs, and the overall participation level in the trading activities
The director may require additional information if deemed necessary for specific situations.
Certification and Verification
The water quality trading management plan shall: Include a list that illustrates the range of BMPs anticipated to be used in the trading activity, including the frequency for: 1) conducting field inspections of any BMP; 2) assessing the pollutant removal rates and the load reduction for each BMP; and, 3) collecting water quality monitoring data for evaluating BMP effectiveness.
A qualified soil and water conservation professional (defined in rule) shall: <ol style="list-style-type: none"> 1. Calculate any point source-nonpoint source water quality credit; 2. Select the appropriate BMP; 3. Determine the baseline for the generation of water quality credits and quantifying pollutant load reductions for any BMP; 4. Conduct field inspections of any BMP to ensure correct installation and proper function, and to

determine BMP failure; and

5. Conduct water quality monitoring to obtain data to evaluate BMP effectiveness and to evaluate and improve the method used to quantify pollutant load reductions and water quality credits.

Compliance and Enforcement

Compliance and enforcement procedures are overseen by OEPA, including:

1. Any permittee who participates in water quality trading activities is responsible for meeting all applicable permit requirements, including all NPDES permit effluent limits.
2. With proper notification, state establishes a 90-day grace period for a permittee to replace failing BMPs or return to compliance with its NPDES permit limits.
3. The director may deny any noncompliant water quality trading management plan application.
4. For any water quality trading activities in effect that are not in accordance with an approved water quality trading management plan, except those water quality trading activities covered under paragraph (D) of rule 3745-5-04 of the Administrative Code, the director may: a) require the submittal of a new water quality trading management plan application, submitted to OEPA; or b) revoke the approved water quality trading management plan.
5. Participating in water quality trading activities does not prevent the director from taking enforcement action for violations of Chapter 6111. of the Revised Code or any other applicable rules or laws.

Attachment B

Former Michigan WQT Rules Summary

Michigan WQT Program Information^{6 7}

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
(Rule) Michigan Water Quality Trading Rules, MCL 324.3103 and 324.3106 (Rescinded August, 2013).
Trading Driver
Total Maximum Daily Load (TMDL) Compliance
Eligible Trades
Point source to Nonpoint source (PS-NPS)
Trading may occur as: 1) <i>Open nutrient trading</i> , which occurs in an attainment area or other area where a total maximum daily load has not been established and a watershed management plan has not been approved; or, as 2) <i>Closed nutrient trading</i> , which occurs within a receiving water or in a watershed where water quality standards are not being met for the pollutant that is being trading.
Michigan’s trading rules allowed for: 1) intra-plant trades; 2) cross-pollutant trades; and, 3) trading under a remedial action or lake wide management plan.
Market Structure
Clearinghouse
Eligible Entities
Wastewater treatment plants
Entities generating urban stormwater
Agricultural operations
Pollutants Traded
Phosphorus, nitrogen and sediment (only bioaccumulative toxic explicitly prohibited)
Program Restrictions and Restricted Entities and/or Waters
The use of credits pursuant to subdivisions (a) and (b) of subrule R 323.3007 shall not be construed to constitute a lowering of water quality pursuant to R 323.1098(8)(k).
The use of credits by a point source to increase the discharge of TP or TN under the provisions of R 323.3020 shall be limited to a 20% increase above the discharge level authorized in a national permit, unless a greater use of credits is specifically authorized by special conditions in the permit or by a formal permit modification approved by the Department of Environmental Quality (DEQ) in accordance with federal and state permit regulations.
Use of Public Money
NPS reductions from USDA or NRCS cost share programs shall be eligible to generate credits in direct proportion to the percent local contribution. No projects using CWA funding are eligible to generate credits.
WQT Program Calculation Fundamentals
Baseline Definition
For Point Sources (Buyers), the baseline shall be the actual or allowed discharge level that complies with the most protective of the following: 1) Water Quality Based Effluent Limit (WQBEL); 2) Cap and wasteload allocation under a TMDL; and 3) A cap and wasteload allocation specified in a WMP approved by the DEQ, remedial action plan, or lake wide management plan.

⁶ Michigan’s Water Quality Trading Rules were rescinded effective August, 2013. The rule has not been implemented by the DEQ as the program has not been funded or staffed nor have any requests for trading been proposed pursuant to these rules. (http://www.michigan.gov/documents/deq/deq-Summary-DEQ-Rescinded-Rules_383448_7.pdf)

⁷ Unless otherwise noted, all programmatic information is gleaned from: Michigan Department of Environmental Quality- Surface Water Quality Division; with authority conferred on the Department by sections 3103 and 3106 of 1994 PA 451, MCL 324.3103 and 324.3106.

The point source baseline shall be expressed in the pounds of a specific pollutant discharged per day and calculated by using the following equation:

$B=f*c*k$; where:

B = the baseline

f = flow expressed in million gallons per day (mgd)

c = pollutant concentration expressed in milligrams per liter (mg/l)

k = a unit conversion constant of 8.346 liter pounds per million gallons milligrams

For all credit generators (**Sellers**) (except stormwater entities regulated under a NPDES permit) the baseline shall be established by using data representative of the 3 year period before changes were made to generate credits.

For stormwater entities regulated under NPDES (which no numeric effluent limit has been set) loading achieved through implementation of BMPs specified in the permit shall be considered baseline

For non-agricultural, unpermitted non-point sources, the pollutant-specific loading associated with existing land use and BMPs will serve as the baseline.

Nonpoint sources, subject to applicable requirements, the baseline is the most protective of cap and load allocation of: 1) a TMDL; 2) watershed management plan; 3) remedial action plan; or, 4) lake-wide management plan.

Credit Definition

Credits expressed on a mass per unit time: Phosphorus (lbs/yr); Nitrogen (lbs/yr); Sediments (tons/yr)

Credit Calculation Methods

MDEQ Pollutants Controlled Calculation and Documentation for Section 319 Watersheds in conjunction with Michigan Trading Rule 323.3014-15 and 323.3013.

Alternative methods approved by MDEQ

Trade Ratios

2:1 for Point source to Nonpoint source trading

1.1:1 for Point source to Point source trading

Risk Assurances

The credit seller and buyer must submit a Notice of Generation and Notice of Use, respectively to the State which must be completed for trades to occur. Upon submission, buyers and sellers are liable to perform as specified in documentation. Rules state that a seller is liable for treble damage remuneration of insufficient credits if a seller fails to produce credits. A buyer of insufficient credits still retain permit responsibility with or without trading, however a true-up period is possible to ensure buyers meet permit requirements.

Administrative, civil or criminal penalties could be leveraged against both buyers and sellers which serves as an additional deterrent for credit default.

Net Water Quality Benefit

Except for a source of stormwater regulated under a national permit, each point source that generates discharge reductions and registers credits shall contribute 10% of the discharge reductions to the department to address uncertainty and provide a net water quality benefit.

Each stormwater source regulated under a national permit and each NPS that generates load reductions and registers credits shall contribute 50% of the load reductions to the department to address uncertainty and provide a net water quality benefit.

A source may request approval from the director for a contribution less than 50% but not less than 10%

Long Term WQT Program Considerations
Program Tracking
The rules tasked DEQ with establishing and maintaining a water quality trading registry to: 1) register discharge and load reductions that are generated; 2) register and track the generation, use, and trading of credits; 3) register the discharge and load reductions that are contributed to the state for retirement as a water quality contribution under R 323.3016(1) and (2); and, 4) provide real time public access to information on the water quality trading program.
Monitoring and Evaluation
DEQ was responsible for evaluating program function and operation every three years and watershed monitoring every five years in-line with the existing basin monitoring cycle.
Certification and Verification
Rules require liability agreements between buyers and sellers and Notice of Generation and Notice of Use submitted to DEQ. Field verification of BMPs is conducted by an independent third party.
Compliance and Enforcement
Michigan Department of Environmental Quality

Attachment C

Wisconsin WQT Guidance Summary

Wisconsin WQT Program Information⁸

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
Rule under Chapter NR 217 s. 283.84 and NR 151.002 of the Wisconsin Administrative Code
Trading Driver
WPDES permit holder compliance with water quality based effluent limitation (WQBELs), for the phosphorus stream criteria and waste load allocations for TMDL based WQBELs.
Eligible Trades
Point Source to Nonpoint Source (PS-NPS)
Point Source to Point Source (PS-PS)
Trading may be used to offset an increase in pollutant load from an existing discharger or the entire load of a new discharger.
Market Structure
Bilateral or Clearinghouse
Eligible Entities
Municipal and industrial Wisconsin Pollutant Discharge Elimination System (WPDES) permit holders and agricultural producers.
Trading may occur between a PS and WDNR or a local governmental unit pursuant to s. 283.84 (1)(c)
Pollutants Traded
WDNR will consider any pollutant parameter for trading, excluding bioaccumulative chemicals of concern as identified in ch. NR. 105, Wis Adm. Code.
Cross-pollutant trading, which is the use of credits for one pollutant to demonstrate compliance with WQBELs for a second pollutant, is acceptable when there is adequate information to establish and correlate impacts between the two pollutant parameters.
Program Restrictions and Restricted Entities and/or Waters
Trading should not create localized exceedance of water quality and must not result in the exceedance of WQBELs for acute toxicity as derived pursuant to ch. NR 106, Wis. Adm. Code. This includes limits for acute whole effluent toxicity and limits based on acute criteria for temperature.
The use of trading to demonstrate compliance with technology-based effluent limitations (TBELs) established pursuant to ss. 283.13 (1) through (4), Wis. Stats., is not allowed unless authorized by the administrative rule that establishes the TBEL. Trading cannot be used to demonstrate compliance with a TP TBEL derived pursuant to Subchapter II of ch. NR 217, Wis. Adm. Code.
Permitted MS4s are not allowed to be credit users to meet the runoff pollution performance standards contained in ch. NR 151, Wis. Adm. Code, except for agreements between adjacent municipalities under a long term stormwater management plan pursuant to ss. NR 151.13(2)(b)3 and NR 216.07 (6), Wis Adm. Code.
Trading may not be used by concentrated animal feeding operations (CAFOs) to meet P delivery minimization requirements of s. NR 243.14 (5), Wis. Adm. Code.
When credits are available, the timing of credit use will depend on the source of the credits. When a PS other than a permitted MS4 generates credits, only those credits generated during the compliance period of the credit user's WQBELs may be used. For example, the demonstration of compliance with a monthly

⁸ Unless otherwise noted, all programmatic information is gleaned from: Wisconsin Department of Natural Resource-Bureau of Water Quality Program Guidance. 2013. "Guidance for Implementing Water Quality Trading in WPDES Permits", guidance number 3800-2013-04. Accessed at http://dnr.wi.gov/topic/surfacewater/documents/WQT_guidance_Aug_21_2013signed.pdf

average WQBEL for a specific month and year may take into consideration only those credits that are generated during that month and year. Credits generated during a give month may not be carried forward to the next month.

Use of Public Money

If a NPS previously installed management practices through cost-share agreements funded by state cost-share dollars, for example the Targeted Runoff Management (TRM) or Notice of Discharge grant programs, credits generated though those practices shall not be used for trading purposes pursuant to s. NR 153.15 (2)(f), Wis. Adm. Code.

Trading partners should review the conditions of other cost-share grants to determine if credits may be used from practices installed using those funds.

Cost share often needed to bring nonpoint sources into initial compliance with statewide performance standards.

WQT Program Calculation Fundamentals

Baseline Definition

Point Sources (buyers):

For point sources, the credit threshold is set equal to the TBEL or WQBEL, whichever is lower. For example, when a WPDES permit imposes a TBEL for TP but not a WQBEL, the credit threshold equals the TBEL. If the WPDES permit contains both a TBEL and a WQBEL for the same pollutant and the WQBEL is more restrictive, the credit threshold equals the WQBEL.

Interim credits are generated for practices that achieve reductions prior to the development of a final baseline. These interim credits can be used for up to 5 years at which point the reductions associated with these interim practices are retired to the environmental benefit. Long term credits are generated from reductions that go beyond the baseline⁹

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

Nonpoint Sources (sellers):

For nonpoint sources, the credit threshold is set equal to either the applicable statewide performance standard or the TMDL load allocation, whichever is lower. If the NPS is located in a watershed without an approved TMDL, the credit threshold equals the current pollutant load. To generate credits, the current pollutant load must be reduced through urban or agricultural management measures and practices. For NPSs the term "current pollutant load" refers to the pollutant load existing at the time that the trade agreement is reached. Pursuant to s. 283.84, Wis. Stats. Modeling will likely be used to quantify the current pollutant load as well as the reductions made from agricultural and urban management practices. When credits are generated by a NPS, only load reductions that occur after the trade agreement is reached are available to generate credits pursuant to s. 283.84 (1)(b), Wis. Stats.

MS4s, in the absence of an approved TMDL, shall have a credit threshold corresponding to a 20% TSS reduction in accordance with Stage 1 requirements contained in s. NR 151 (2)(b)1.b, Wis Adm Code and applicable WDNR guidance. For pollutants other than TSS, the credit threshold shall be set at the pollutant level corresponding to the 20% TSS reduction. The credit threshold for permitted MS4s covered by an approved TMDL is equal to the more restrictive of the WLA or the 20% TSS reduction. This can be expressed either on a mass basis (lbs/yr) or on a percent reduction basis as measured from the baseline condition represented in the TMDL calculations.

⁹ The use of interim of establish a strong precedent for using water quality trading to bring credit generating sites into compliance with their obligations.

The credit threshold for an agricultural area that is not addressed by an approved TMDL is set at the current pollutant load even when the current pollutant load is less than the state-wide performance standard in ch. NR 151, Wis. Adm Code. The current pollutant load represents historical operations prior to the change made to generate credits. For agricultural areas addressed by an approved TMDL, the credit threshold is set to reflect the TMDL LA. The LA may be expressed either as a mass over a specific period (day, month, or year), a modification of statewide performance standards in ch. NR 151, Wis. Adm. Code, or as a percent reduction from an assumed baseline condition.

Credit Definition

Reduction parameters measured on a mass per unit time basis: Phosphorus (lbs/yr); TSS (tons/yr)

Credit Calculation Methods

Trade ratios, and subsequently credits, are quantified using the SNAP-Plus model. Credit calculation methods do not address soluble phosphorus.

Trade Ratios

Trade ratio considers delivery, equivalency, retirement, and uncertainty factors. The ratio may also consider downstream trading and habitat improvement.

TMDL WQBEL Delivery Factor:

When trading to meet a TMDL WQBEL, any delivery factors used in the TMDL also must be used to calculate the delivery factor of the trade. IF the TMDL assumes no delivery factors or does not simulate fate and transport, the trade does not have to account for delivery because the delivery factor is implicit in the allocations and, therefore, reflected in the credit threshold (i.e., the delivery factor equals zero). When TMDLs do not include fate and transport, pollutant loads are assumed to move through the system in a conservative fashion with no losses due to settling of other processes. This results in downstream allocations being lower with an implicit margin of safety because there are not pollutant losses assumed to have occurred in the system.

Non-TMDL WQBEL Delivery Factor:

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

Downstream Trading Factor

Downstream trading factor is needed when the credit generator is located downstream from the credit user’s point of standards application. This factor is used to help prevent a violation of water quality criteria in the receiving water between the credit user and generator.¹⁰

Equivalency Factors

An equivalency factor is not necessary (i.e., equals zero) for trading of TP credits. Chapters NR102 and NR 217, Wis. Adm. Code, establish water quality criteria and WQBELs only for TP. While soluble and sediment-bound P have different transport capacities, these difference are account for in the calculation of the delivery factor.

Section 283.84 (1m)(a), Wis. Stats. requires that a trade result in water quality improvement (a greater load reduction than would otherwise be achieved absent trading). To accomplish this, the final trade ratio for trades involving credits generated by a NPS shall never be less than 1.2:1. The trade ratio for trades involving credits generated by a PS shall not be less than 1.1:1. If a trade ratio, calculated using this guidance, is lower than the minimum ratios stated here, the more restrictive ratio is used.

Risk Assurances

Assurances in contract language between entities

¹⁰ Alternatively, on a case by case basis WNDR has allowed the consideration of ‘point of standards’ application for determining groups of dischargers that can trade without having to utilize the downstream discount factor.

Net Water Quality Benefit
Section 283.84(1m)(a), Wis. Stats. requires trades to result in water quality improvement. Wisconsin guidance defines water quality improvement to be a greater load reduction than would otherwise be achieved absent trading. A PS credit generator’s pollutant load must be reduced below its current level of discharge to insure water quality improvement.
Long-term WQT Program Considerations
Program Tracking
WDNR is responsible for tracking the use of credits within a watershed in order to prevent duplication of credit use, to ensure that the capacity of a watershed to generate credits is not exceeded by the number of credits being using within the, and to gauge the progress of TMDL implementation.
Monitoring and Evaluation
The quantification of credits for point-to-point trades requires the use of effluent monitoring. The credit generator verifies the generation of credits through effluent monitoring reported to WDNR on monthly discharge monitoring reports (DMRs)
Certification and Verification
Verification: Management practice registration is submitted to WDNR to register the practices is installed in accordance with the WQT plan. Information can be reviewed at a later date for trade verification and auditing purposes.
Compliance and Enforcement
WDNR should consider several factors when determining the appropriateness of trading enforcement actions such as: 1) cause of the violation; 2) number of times that the discharger has not complied with permit requirements; 3) number of instances that the management practice in question has been damaged/ineffective; 4) whether the violation was self-reported; 5) the significance of the violation (e.g., a violation that results in a 75% loss of credits is more significant than one that results in a 25% loss); and 6) the time necessary to regain compliance.
The wastewater engineer/specialist is responsible for determining whether enforcement actions are necessary and working with the permittee to bring them back into compliance as quickly as possible.

Attachment D

Pennsylvania WQT Rules Summary

Pennsylvania WQT Program Information for Susquehanna and Potomac River Watersheds¹¹

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
(Policy) Pennsylvania Nutrient/Sediment Trading Policy established under 25 Pa. §96.8
Trading Driver
Zero net increase for TN/TP discharges for new and or expanding treatment facilities
Cap loads for significant discharges (based on 6mg/L TN and 0.8mg/L TP)
Chesapeake Bay tributary strategy compliance
Eligible Trades
Point source to Nonpoint source (PS-NPS)
Point source to Point source (PS-PS)
Market Structure
Clearinghouse administered by PENNVEST (Pennsylvania Infrastructure Investment Authority)
Eligible Entities
Agricultural operations (NPS)
Wastewater treatment facilities (PS)
Pollutants Traded
Phosphorus ; Nitrogen; Sediments
Program Restrictions and Restricted Entities and/or Waters
Trades must involve comparable credits (no cross-pollutant trading)
Trading may not be used to comply with Technology Based Effluent Limits (TBELs)
Trading is limited to Pennsylvania defined watersheds (Susquehanna and Potomac River Watersheds)
Use of Public Money
BMPs implemented with state and federal funds will be allowed to generate credits for the portion paid for by the state or federal government unless restrictions have been placed on the funds by the grantor
WQT Program Calculation Fundamentals
Baseline Definition
Agricultural buffers or manure setbacks (if within 100 feet of surface water) OR 20% reduction of credits
Point source (Credit Generators):
For a point source or nonpoint source to be eligible to generate and trade credits, it must meet baseline and threshold eligibility requirements as defined in 25 Pa. Code § 96.8(d). In addition, to address concerns expressed by EPA, the eligibility requirements summarized below must be satisfied to generate credits to meet the legal requirements of the Chesapeake Bay TMDL.
Effective October 1, 2015, to be eligible to generate credits for sale, all Significant Sewage point sources with an assigned Cap Load must demonstrate treated yearly effluent concentrations below 6.0 mg/L TN and 0.8 mg/L TP (i.e., “baseline” concentrations) in accord with the procedures described below and in the Phase 2 WIP Nutrient Trading Supplement.
Pennsylvania’s Department of Environmental Protection (DEP) procedures for point sources to generate and trade credits consist of the following:

¹¹ Unless otherwise noted, all programmatic information is gleaned from Pennsylvania Department of Environmental Protection – Phase 2 Watershed Implementation Plan Nutrient Trading Supplement (revised February 2016). Accessed at <http://files.dep.state.pa.us/Water/BNPNSM/NutrientTrading/NutrientTradingSupplementToPhase2WIP.pdf>

- To generate credits, facilities must be able to demonstrate they are in compliance with their NPDES permit.
- The total amount of credits the facility is certified to generate cannot exceed its permitted Cap Load.
- DEP final approval of this point source certification was published in the Pennsylvania Bulletin on Oct 3, 2015 and will expire on Sep 30, 2017.
- New credit calculation formulas are effective Oct 1, 2015 (Compliance Year 2016)

Nonpoint Sources (Credit Generators):

As a result of EPA’s concerns and objections to NPDES permits related to the baseline and threshold eligibility requirements for the generation of credits by agricultural operations, DEP has not approved any requests for credit certification for nonpoint sources since October 1, 2013. DEP plans to implement an approach to establish baseline eligibility for nonpoint sources, as follows:

1. Credit Certifications Using Practice Based Approach Through September 30, 2017

For NPS, baseline eligibility requirements include compliance with the following regulations as applicable:

- 25 Pa. Code Chapter 102, Erosion and Sedimentation Control Regulations – All plowing and tilling activities must implement and maintain BMPs to minimize the potential for accelerated erosion and sedimentation. Written erosion and sedimentation control plans are required for agricultural plowing or tilling or animal heavy use areas that disturb 5,000 square feet or more
- 20 Pa. Code Section 91.36 – Define pollution control and prevention requirements at agricultural operations, including requirements related to land application of animal manure
- 25 Pa. Code Section 92a.29 – Define the requirements for Concentrated Animal Feeding Operations (CAFOs) with NPDES permits
- 25 Pa. Code Chapter 83, Subchapter D – These regulations promulgated by the State Conservation Commission define and regulate Concentrated Animal Operations (CAOs) through the development and implementation of Nutrient Management Plans.

The additional threshold eligibility requirements that must be met before an agricultural operation can generate credits include implementation of one of the following:

- Manure is not mechanically applied within 100 feet of a perennial or intermittent stream with a defined bed or bank, a lake or pond, and commercial fertilizer is applied at or below appropriate agronomic rates
- A minimum of 35 feet of permanent vegetation is established and maintained between the field and any perennial or intermittent stream with a defined bed or bank, a lake, or a pond. No mechanical application of manure may occur within the 35 foot vegetative buffer.
- A downward adjustment of at least 20% to the overall amount of pollution reduction generated by the pollution reduction activity

In order to generate credits from the hauling of poultry manure, the manure must be applied to a site outside of the Chesapeake Bay watershed that is nutrient deficient in accordance with a nutrient management plan or nutrient balance sheet completed by a certified nutrient planner. The application of commercial fertilizer to the site where the poultry manure is being removed must be traced and documented. The additional 3:1 trading ratio will be applied to the final number of credits generated.

2. Approval of Credit Certifications After October 1, 2017 or when the approved WRI Multi-State Trading Tool or other approved tool is finalized and calibrated to Phase 6 of the Chesapeake Bay Watershed Model, whichever is earlier.

DEP is in the process of refining the WRI Multi-State Trading Tool being developed in partnership with the Chesapeake Bay Foundation and the Chesapeake Bay Program to calculate credits from agricultural nonpoint sources using a performance based approach. When this tool is developed and calibrated to Phase 6 of the Chesapeake Bay Watershed Model, eligibility to generate credits will be determined by compliance with the previously mentioned regulations.

DEP will approve credit certification requests that calculate credits using the performance-based trading tool approved by DEP where the pollution reductions activity exceeds the nutrient baseline loading rate (lb-

TN or TP/acre) as determined by the Chesapeake Bay TMDL model run.
Credit Definition
Credits are expressed in mass per unit time: Phosphorus (lbs/year); Nitrogen (lbs/year); Sediments (tons/year)
Credit Calculation Methods
<p>Scientifically acceptable (must be reviewed and approved by Pennsylvania DEP Point Source Credit Calculations:</p> <ul style="list-style-type: none"> - Q = Average Daily Flow on day of sampling over the course of the Compliance Year in MGD - TN_{Conc} = TN Effluent Concentration in sample (mg/L) - TP_{Conc} = TP Effluent Concentration in sample (mg/L) - 6.0 = TN concentration limit for credit generation (mg/L) - 0.8 = TP concentration limit for credit generation (mg/L) - n= Number of samples taken during year - y = Days in year - TN_{dr} = TN Chesapeake Bay delivery ratio - TP_{dr} = TP Chesapeake Bay delivery ratio - 0.9 = 10% Reserve ratio - 8.34 = Gallons to pounds conversion factor <p>TN Credits: $[(Q * (6.0 - TN_{Conc}) * 8.340 / n) * y * TN_{dr} * 0.9]$ TP Credits: $[(Q * (0.8 - TP_{Conc}) * 8.340 / n) * y * TP_{dr} * 0.9]$ DEP's Annual Chesapeake Bay Spreadsheet provides automated calculations of nutrient credits generated on an annual basis using raw (daily) self monitoring data. Use of this spreadsheet is required for wastewater facilities that wish to register credits with DEP.</p>
Trade Ratios
<p>DEP is implementing a 3:1 trade ratio as an interim step until DEP can develop a performance-based or other approved method-based tool to use to establish baseline eligibility for nonpoint sources. This is in response to EPA's concern and ensure consistency with the Chesapeake Bay TMDL.</p> <p>Ratio accounts for delivery and location (edge-of-segment) factors and credit reserve factor (10%).</p>
Risk Assurances
Credit proposals from generator/aggregator must address risk and be approved by DEP; 10% of all credits held in reserve DEP in part for BMP failure
Net Water Quality Benefit
Yes, implicit in the 3:1 trade ratio
Long Term WQT Program Considerations
Program Tracking
<p>Buyers and Sellers must complete applicable credit registration document for approval by DEP. Information related to certification, verification, and registration is traced in the DEP Nutrient Trading Database and posted on the DEP website.</p>
Monitoring and Evaluation
Not stipulated in trading policy
Certification and Verification
<p><u>Certification</u> Credit must be approved and certified by DEP.</p> <p><u>Verification</u> Required by policy—proposed by entity submitting credit proposal and approved by DEP</p> <p>Verification is a written approval by DEP that the pollutant reduction activity (s) generated nutrient credits based upon the approved verification plan in the certification application. Process as follows:</p> <ul style="list-style-type: none"> -NPS credit generators must follow their approved verification plan to generate and have DEP approval of credits before they can sell them

- PS must submit their DMR information using the approved DEP Supplemental DMR spreadsheets
- Verified credits may only be used in Compliance Year in which they were generated
- NPS credit generators use N or P spreadsheets to calculate nutrient credits in addition to all other conditions set forth in their approved certification
- Point source credit generators will use the Annual Chesapeake Bay Spreadsheet form to calculate credits in addition to all other conditions set forth in their approved certification

Compliance and Enforcement

Department of Environmental Protection (under accordance with U.S. EPA and Chesapeake Bay)

Attachment E

Great Miami River WQT Pilot Program Summary

Great Miami River (Pilot) WQT Program Information¹²

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
Program was developed pre-Ohio EPA Water Quality Trading rule. Stakeholders negotiated with State officials to include existing program in Ohio Water Quality Trading Rules Chapter 3745-5 of the Administrative Code
Trading Driver
Pre-compliance for numeric nutrient standards
Eligible Trades
Point source to Non-point source (PS-NPS)
Market Structure
Clearinghouse
Eligible Entities
Eligible buyers are public and private wastewater utilities that: 1) hold a state-issued NPDES permit; 2) have their NPDES permit modified to reflect their participation in the Trading Program; and 3) participate in funding the administrative and analytical costs for the trading program.
Entities eligible to generate credits include: 1) agricultural entities,
Pollutants Traded
Total Phosphorus and Total Nitrogen
Program Restrictions and Restricted Entities and/or Waters
Credits used to meet NPDES permit requirements must be generated during the permit's compliance averaging time of the eligible buyer's permit limit. All trades must occur upstream of the eligible buyer's discharge point in the watershed.
Use of Public Money
No BMPs funded through federal or state cost share can generate credits for trading in the Great Miami River pilot. (These funds are considered to fulfill the TMDL load allocation requirements eliminating TMDL baseline requirements in WQT).
WQT Program Calculation Fundamentals
Baseline Definition
Credit Buyers must: 1) Hold a state-issued NPDES permit; 2) Have their permit modified to reflect participation in the Trading Program; and, 3) Participate in funding the administrative and analytical costs for the Trading Program.
Credit Sellers must voluntarily implement management practices, which generate nutrient reductions that go above and beyond what is required by local, state and federal laws and regulations.
Credit Definition
Credits are calculated on a mass per unit time basis: Phosphorus (lbs/year); Nitrogen (lbs/year)
Credit Calculation Methods
Ohio DNR Load Reduction Spreadsheet
EPA Region 5 Model and other DNR approved BMP estimation models
Pollutants Controlled Calculations/Documentation for Section 319 Watersheds Training Manual
These calculation methods only account for sediment attached phosphorus.
Trade Ratios
Eligible buyers that participate in the Trading Program before NPDES compliance requirements for nutrients are called "Investors" while those who participate in trading after regulatory requirements are enacted are called "Contributors". Investors are able to participate in trading at a more favorable trade ratio

¹² Unless otherwise noted, all programmatic information is gleaned from: The 2005 Great Miami River Watershed Water Quality Credit Trading Program Operations Manual.

than Contributors. Trade ratios are also dependent on the water quality attainment status at the eligible buyers discharge point. Ratios are as follows:

- Investors discharging to fully attaining waters trade at 1:1; if discharging to impaired waters, trade at 2:1
- Contributors discharging to fully attaining waters trade at 2:1; if discharging to impaired waters, trade at 3:1

Risk Assurances

The Trading Program incorporates two strategies to assure on-going NPDES permit compliance in the event of a management practice failing: 1) A Management Practice Contingency Plan; and, 2) an Insurance Pool of credits.

The Contingency Plan assures a timely and coordinated response to practice failure. The Plan is developed and maintained in collaboration with ODNR.

The Insurance Pool will be operated according to guidelines developed in consultation with OEPA, ODNR and USEPA. The guidelines anticipate the following uses:

1. Credits may be withdrawn from the pool, if necessary, to replace credits that are lost due to a failed management practice. The SWCD staff responsible for oversight of the management practice will make the determination that a management practice has failed.
2. Credits may be sold to generate funds for projects that would yield additional pollutant reductions.
3. Credits may be sold to generate funds to cover Trading Program costs.

A portion of the pooled credits originate from projects that are funded by “Contributor” status eligible buyers. For Contributors with discharges to attaining waters, one of every two required credits is directed to the Insurance Pool. For Contributors discharging to non-attaining water, one of every three required credits is directed to the Insurance Pool. In addition, water quality improvement projects subsidized by other sources of funds such as Section 319 may generate credits for deposit in the Insurance Pool. WCS will maintain adequate credits in the Insurance Pool.

Insurance Pool credits have a life of five years from date of deposit; unused credits after five years are retired.

Net Water Quality Benefit

Not specifically identified. Ancillary environmental benefits beyond water quality are expected with each trade.

Long-term WQT Program Considerations

Program Tracking

Program administrator will track and maintain credit tracking and online registry

Monitoring and Evaluation

Miami Conservancy District conducted continuous monitoring on a subwatershed scale.

Certification and Verification

Applications reviewed/certified by ODNR and verification inspections are conducted by SWCD professionals.

Reductions will be verified through inspections and by conducting water quality monitoring at a portion of the project sites.

Compliance and Enforcement

Immediate oversight by Miami Conservancy District with ultimate authority assumed by OEPA

Attachment F

Ohio River Basin Interstate WQT Pilot Project Summary

Ohio River Basin Interstate WQT (Pilot) Project Information¹³

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
(Rule) State of Ohio Water Quality Trading, Chapter 3745-5 of the Administrative Code
Trading Driver
Pre-TMDL: Water Quality Standards driven Water Quality Based Effluent Limits (WQBELs)
Eligible Trades
Point source to Non-point source trading (PS-NPS)
Interstate trading (Ohio, Indiana and Kentucky)
Market Structure
Clearinghouse with registry
Eligible Entities
NPDES point source dischargers
Corporations/Individuals seeking quantified stewardship to meet sustainability goals
Nonpoint source agricultural producers
Pollutants Traded
Phosphorus and Nitrogen
Program Restrictions and Restricted Entities and/or Waters
Trading may not cause an exceedance of applicable water quality standards, impair waters for designated use or result in localized impact (i.e. “hot spot”).
Trading cannot be used to meet TBELs of an NPDES permittee.
Trades must comply with state and federal regulations
Use of Public Money
Public monies can be used to achieve current conditions but cannot be used to generate credits
WQT Program Calculation Fundamentals
Baseline Definition
Nonpoint sources
Must reduce TP/TN loading below current conditions and comply with applicable legal requirements.
Agricultural NPS will provide three years of farm practice history to establish the baseline.
Credit Definition
Credits are based on annual average loading of TN and/or TP. Each credit will have a minimum 12-month term (measured from the date that it is first verified with on-site inspection) and may be renewed for successive terms provided that it continues to be implemented and verified
Credits will be measured at the point of generation (“Point of Generation Credits”) and at the point of use (“Point of Use Credits”).
Credits are measured based on mass reductions over a period of time: Total Phosphorus (lbs/year); Total Nitrogen (lbs/year)

¹³ Unless otherwise noted, all programmatic information is gleaned from: Electric Power Research Institute’s Pilot Trading Plan 1.0 for the Ohio River Basin Interstate Water Quality Trading Project. Accessed at <http://wqt.epri.com/pdf/Full-Trading-Plan-as-amended.pdf>

Credit Calculation Methods
<p>EPA Region 5 Spreadsheet Model will be used to estimate nutrient reductions at the edge of the field (i.e., Point of Generation Credits);</p> <p>WARMF Model will be used for estimating nutrient attenuation (reduction) from edge-of-field to the point of use (i.e., Point of Use Credits).</p> <p>Point of Use Credits will be calculated as follows:</p> <p>Trading Ratio = $(F_{\text{field}} * F_{\text{river}} * F_{\text{instream}} * F_{\text{equivalence}} * F_{\text{safety}})$</p> <p>Where:</p> <ul style="list-style-type: none"> • Edge-of-field (F_{field})- Magnitude of TN and TP reduction at edge-of-field due to BMPs (estimated using EPA Region 5 model). This equals the Point of Generation Credit • Edge-of-River (F_{river})- Fate and transport attenuation as load reduction reaches edge-of-river (estimated with WARMF) • In-stream assimilation (F_{stream})-Attenuation due to in-stream processing of TN and TP load (estimated with WARMF). • Credit Equivalence ($F_{\text{equivalence}}$)- Considers chemical nature of load reduction (as nitrate, ammonia, organic N, etc) relative to buyer's need (estimated with WARMF) • Margin of Safety (F_{safety})- Safety factor to account for uncertainties in credit calculation (estimated with EPA Region 5 spreadsheet model and WARMF)
Trade Ratios
Trade specific ratio between buyer and seller derived from watershed modeling and includes an equivalency and safety factors.
Risk Assurances
<p>A credit reserve will be established to account for uncertainty and/or failure. Credits may be withdrawn from the reserve, as necessary, to replace credits that are lost or fail to materialize. The reserve will be established initially at 10% of the total credit pool, and will be adjusted periodically to address the degree of risk associated with credit loss. The reserve pool is populated prior to the trade ratio being applied and is equally represented from all projects across the three state area (10% of all credits generated for each project).</p> <p>Any episodic failure will be subject to corrective action within 90 days. Any loss of credits resulting from such failure will be managed through correction action and the credit reserve.</p>
Net Water Quality Benefit
<p>10% of all credits generated are retired to ensure net environmental benefit. An additional 10% is placed in the reserve pool PRIOR to the trade ratio being applied.</p> <p>In the event that the reserve is not exhausted in any calendar year, all or a portion of the surplus may be retired as a net water quality benefit.</p>
Long-term WQT Program Considerations
Program Tracking
State-approved credit registration and tracking system is accounting for serialized credits, operated by Markit.
Monitoring and Evaluation
Annual on-site monitoring of BMPs to ensure they meet NRCS practice standards
Certification and Verification
The installation of projects per NRCS practice standards are confirmed by the local SWCD. Projects are verified by state-approved entity such as the state agriculture office or resource management specialist. Credits are certified by the state permitting authority. Finally, they are released and made available for purchase. All approvals and on-site photos are posted in public view for each pound on the on-line registry. This process occurs annually for each project.
Compliance and Enforcement
The permit and agricultural offices in Ohio, Indiana, and Kentucky (6 agencies total).

Attachment G

South Nation Total Phosphorus Management Program Summary

South Nation River, Ontario Total Phosphorus Management Program¹⁴

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
Provincial Ministry of the Environment and Climate Change (MOECC) Policy; Certificate of Approval to Operate a Wastewater Treatment Plant requires an P offset
Trading Driver
Water quality impairments for Phosphorus in the South Nation watershed. Zero net increase for new/expanding discharges
Eligible Trades
Point Source to Non-point Source
Market Structure
Clearinghouse
Eligible Entities
Agricultural operations and onsite Ag waste facilities (non-point source) Wastewater treatment plants (point source)
Pollutants Traded
Phosphorus
Program Restrictions and Restricted Entities and/or Waters
Phosphorus Management Plan targeted for South Nation watershed
Use of Public Money
Provincial funding allocated for construction of new/expanded facilities can be used to award cost share grants to farmers implementing BMPs
WQT Program Calculation Fundamentals
Baseline Definition
None
Credit Definition
Credits measured in load reductions per unit time: Total Phosphorus (lbs/year)
Credit Calculation Methods¹⁵
Determined using formulae derived from studies in Canada and elsewhere
<u>Milkhouse washwater</u> <i>P controlled by milkhouse washwater (excluding manure) projects</i> $= \# \text{ cows} * 0.69 \text{ kg P/cow/yr}$ <i>P controlled by milkhouse washwater (including manure) projects</i> $= \# \text{ cows} * 2.76 \text{ kg P/cow/yr}$
<u>Manure storage</u> <i>P controlled by proper manure storage of beef feedlot manure</i> $= \# \text{ of animals} * \# \text{ days} * P \text{ excreted} * 0.30$ <i>P controlled by proper manure storage of dairy pile manure</i> $= \# \text{ animals} * \text{ days} * P \text{ excreted} * 0.07$
<u>Clean water diversion</u> <i>P savings from clean water diversion for feedlot manure</i> $= \# \text{ animals} * \text{ days} * P \text{ excreted} * 0.30 * (\text{reduced feedlot runoff volume/original feedlot runoff volume})$ <i>[for dairy pile, replace 0.30 with 0.07]</i>

¹⁴ Programmatic information gleaned from the 2006 South Nation Conservation, “Total Phosphorus Management Instruments” as well as several sources including documents previously compiled by Kieser & Associates, personal communication and other documentation cited in the following description.

¹⁵ O’Grady, D. 2008. Point to non-point phosphorus trading in the South Nation River watershed. WIT Transactions on Ecology and the Environment, Vol. 108.

<p><u>Livestock access</u> <i>P saving from restricted livestock access</i> = # of animals * days * phosphorus excreted * 0.03</p>
<p><u>Septic systems</u> <i>P savings = P loading (failed) – P loading (functional),</i> Where <i>P loading (failed or functional) = 0.6 kg TP ca⁻¹ year⁻¹ * (# persons) * (1-A),</i> Where <i>A = attenuation in vadose zone (0 – failed ; 0.4 functional; 0.7 – functional sand mixed with either silt, clay or red mud)</i></p>
<p><u>Conservation tillage</u> <i>P controlled per year by no-till = 0.5kg*hectares</i> <i>P controlled per year by cover cropping = 0.4 kg * hectares</i></p>
<p><u>Buffer Strips</u> <i>P controlled per year by buffer strip = 0.67 kg * ha cropland buffered</i></p>
Trade Ratios
4:1 for PS to NPS trades
Risk Assurances
Farmer to Farmer peer-review on BMP installation and functioning
Net Water Quality Benefit
Yes, implicit in high trading ratio (4:1).
Long-term WQT Program Considerations
Program Tracking
Information tracked by South Nation Conservation Authority; no public tracking registry.
Monitoring and Evaluation
Ambient water quality monitoring conducted and program evaluated by South Nation Conservation Authority audits.
Certification and Verification
Multi-stakeholder Clean Water Committee approves all credit-generating projects. The Committee is composed of farmers, industry, municipalities, farm organizations and South Nation Conservation. Committee reviews projects and whether or not they meet the criteria for funding. Farmers, as opposed to paid professionals, conduct field verification of BMPs.
Compliance and Enforcement
South Nation Conservation Authority and Ontario Ministry of the Environment and Climate Change

Attachment H

Lake Simcoe Phosphorus Offset Program Summary

Lake Simcoe Phosphorus Offset Program¹⁶

Trading Structure, Rationale and Eligibility Requirements
Legal Basis for Trading
Policy promulgated under the Lake Simcoe Protection Plan (part of the Lake Simcoe Protection Act, 2008, S.O. 2008, c. 23)
Trading Driver
Policy of net zero discharge of TP from new developments (or redevelopment to existing parcels) to Lake Simcoe.
Eligible Trades
Nonpoint source to nonpoint source offsets
Market Structure
Clearinghouse
Eligible Entities
Entities eligible to generate P offsets include municipalities, all private land owners, and agricultural private landowners. Entities eligible to obtaining P offsets are municipalities/developers.
Eligibility within the Urban Stormwater Retrofit Program rests on three considerations: 1) an ability to meet baseline requirements; 2) watershed location and, 3) participant status
Pollutants Traded
Phosphorus
Restricted Entities and/or Waters
Offset requirement and trading is limited to Lake Simcoe watershed
Use of Public Money
Funding may be available through the Urban Stormwater Retrofit Program and municipalities are required to spend money for certain retrofits. The Landowner Environmental Assistance Program (LEAP) provides landowners with funding and technical assistance for environmental projects including stream bank restoration and agricultural practice improvements. Some LEAP projects do provide P reductions that in the future will be recognized.
WQT Program Calculation Fundamentals
Baseline Definition
During construction phase, required erosion and sediment control measures must be installed Land development must comply with Lake Simcoe Phosphorus Policy Any redevelopment greater than 0.5 ha are required to implement erosion/sediment control during the construction phase to minimize P export. Residual P loads will be offset. Landowners must demonstrate land use practices/management activities have not changed in the last three years, often referred to as an “existing conditions baseline”.
Credit Definition
Phosphorus (ton/year)
Credit Calculation Methods
The Simcoe Offset Program uses established protocols from various state agencies pertaining to specific management practices including: Pennsylvania Department of Environmental Protection (Agricultural BMPs reduction calculations); Wisconsin NRCS Standard 629 (Milkhouse waste correction calculation); Montana Department of Environmental Quality (septic system loading calculation); and, Michigan Department of Environmental Quality (bank stabilization and gully erosion calculations).
Trade Ratios
2.5:1 (referred to as ‘offset ratio’ in documentation)
Risk Assurances
In the event a management practice fails to deliver anticipated offsets an established back-up pool of offsets generated by LEAP-funded projects that generate P reductions will cover offsets. The back-up pool will

¹⁶ Unless otherwise noted, all programmatic information is gleaned from: The Lake Simcoe Region Conservation Authority’s 2014 “Lake Simcoe Phosphorus Offset Program” Summary Report. Accessed at: <http://www.lsrca.on.ca/pdf/reports/offset-program.pdf>

provide a temporary replacement until the primary management measure can be repaired or replaced by the party responsible for operation and maintenance.
Net Water Quality Benefit
Offsetting must result in net water quality benefits to Lake Simcoe. The Program ensures net benefits through three mechanisms: <ol style="list-style-type: none"> 1. The Zero Export policy supporting the Program requires the reduction of P loads below existing levels for new development or redevelopment parcels. 2. The half of the LEAP offsets that are allocated to the environmental benefit of Lake Simcoe rather than the back-up offset pool 3. The application of the 2.5:1 offset ratio that ensures a great P reduction than required to offset new growth residual loads.
Long Term WQT Program Considerations
Program Tracking
Lake Simcoe Phosphorus Offset Program Administrator will track the following: project inventory; environmental phosphorus reductions; phosphorus offsets (where the trade ratio is applied to phosphorus reductions); back-up pool phosphorus reductions as well as any use of such reductions to make up for failed offsets; offset and LEAP project verification and inspection activities and results; and, enforcement actions and/or revocation activities.
Not all project information will be available to the public.
Monitoring and Evaluation
Monitoring occurs pre-installation of BMPs to better estimate TP loads from land use and post-install monitoring occurs to measure BMP effectiveness
Certification and Verification
3 rd Party project verification occurs to ensure BMPs are installed and functioning properly. The Lake Simcoe Phosphorus Offset Program manual provides the necessary documentation to be completed as part of this process.
Compliance and Enforcement
Lake Simcoe Phosphorus Offset Program Administrator