

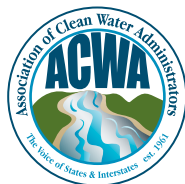
Building a Water Quality Trading Program: Options and Considerations

Version 1.0 | June 2015: Point-Nonpoint Trades

A Product of the National Network on Water Quality Trading



The logos represent groups and organizations serving as National Network participants with the USDA as a technical advisor.



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This document does not represent a consensus opinion, endorsement, or particular recommendation from any one National Network contributor. It seeks to cover the broad range of topics related to water quality trading to assist local stakeholders to develop and implement trading frameworks that meet local needs and conditions. This document does not create any binding requirements or standards of practice. Ultimately, local stakeholders, state regulators, and/or U.S. EPA will clarify those requirements that apply to any particular trading programs or trading program participants.

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The document would not have been possible without the hours and dedication of all the National Network participants listed on the front cover. Thank you! Also, U.S. EPA and USDA played an important role in providing comments on drafts of the document.

WEBSITE AVAILABILITY

All information contained in this document is available at www.wri.org/nn-wqt.

Information on the National Network is available at www.willamettepartnership.org/nn-wqt.

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About the National Network on Water Quality Trading

This document was developed by the National Network (Network) on Water Quality Trading (WQT), a dialogue among 18 diverse organizations (listed below) representing agriculture, wastewater and stormwater utilities, environmental groups, regulatory agencies, and the practitioners delivering WQT programs. The purpose of the Network is to establish a national dialogue on how water quality trading can best contribute to achieving clean water goals. This includes providing options and recommendations to improve consistency, innovation, and integrity in water quality trading.

The organizations below participated in the development of this document through a series of workshops and communications held between 2013 and 2015.

National Network Participants	
<p>American Farmland Trust</p> <p>http://farmland.org/</p> <p>A national conservation organization dedicated to protecting farmland, promoting sound farming practices, and keeping farmers on the land.</p>	<p>National Association of Clean Water Agencies</p> <p>http://www.nacwa.org/</p> <p>The leading advocate for responsible national policies that advance clean water whose members include publicly owned treatment works and municipal stormwater utilities.</p>
<p>Association of Clean Water Administrators</p> <p>http://www.acwa-us.org/</p> <p>A national, nonpartisan professional organization whose members are the state, interstate, and territorial officials responsible for the implementation of surface water protection programs throughout the nation.</p>	<p>National Association of Conservation Districts</p> <p>http://www.nacdnet.org/</p> <p>The nonprofit organization that represents America’s 3,000 conservation districts and the 17,000 men and women who serve on their governing boards.</p>
<p>Chesapeake Bay Foundation</p> <p>http://www.cbf.org/</p> <p>The largest independent conservation organization dedicated solely to saving the Bay. Serving as a watchdog, it fights for effective, science-based solutions to the pollution degrading the Chesapeake Bay and its rivers and streams.</p>	<p>National Milk Producers Federation</p> <p>http://www.nmpf.org/</p> <p>The voice of more than 32,000 dairy producers on Capitol Hill and with government agencies, NMPF develops and carries out policies that advance the well-being of dairy producers and the cooperatives they own.</p>
<p>Electric Power Research Institute</p> <p>http://www.epri.com/</p> <p>EPRI conducts research, development and demonstration relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, it brings together scientists and engineers as well as experts from academia and the industry to help address challenges in electricity.</p>	<p>The Freshwater Trust</p> <p>http://www.thefreshwatertrust.org/</p> <p>Founded in 1983, The Freshwater Trust accelerates the pace and scale of freshwater restoration through the use of science, technology and market-based solutions to restore rivers on a timeline that matters. The nonprofit uses quantified conservation to fix more rivers faster and in 2013, received the U.S. Water Prize for its innovation.</p>
<p>Environmental Defense Fund</p> <p>http://www.edf.org/</p> <p>A national nonprofit whose mission is to preserve the natural systems on which all life depends.</p>	<p>Kieser & Associates, LLC</p> <p>http://www.kieser-associates.com/</p> <p>A unique team of scientists, engineers, and economists who find creative solutions for environmental problems.</p>

National Network Participants *(continued)*

<p>Maryland Department of Agriculture</p> <p>http://mda.maryland.gov/</p> <p>A state agency providing leadership and support to agriculture and the citizens of Maryland by conducting regulatory, service, and educational activities that assure consumer confidence, protect the environment, and promote agriculture.</p>	<p>The Ohio Farm Bureau Federation</p> <p>http://ofbf.org/</p> <p>A federation of 87 county Farm Bureaus forging a partnership between farmers and consumers, advocating for Ohio’s farm families on issues that help them in business and, in turn, providing non-farmers a wide variety of food choices.</p>
<p>Mississippi River Collaborative</p> <p>http://www.msrivercollab.org/</p> <p>A partnership of state, regional, and national environmental organizations and legal centers working on issues affecting the Mississippi River and its tributaries. The Collaborative harnesses the resources and expertise of its diverse organizations to reduce pollution entering the Mississippi River as well as the Gulf of Mexico.</p>	<p>Troutman Sanders</p> <p>http://www.troutmansanders.com/</p> <p>An international law firm with more than 600 lawyers practicing in offices located throughout the United States and Asia. The firm’s clients range from large multinational corporations to individual entrepreneurs.</p>
<p>U.S. Water Alliance</p> <p>http://www.uswateralliance.org/</p> <p>A nonprofit established to break down the “silos” and provide sector-wide leadership for building a national platform for holistic water policy. The Alliance is committed to uniting people and policy for water sustainability in a changing climate.</p>	

Coordinators

<p>Willamette Partnership</p> <p>http://willamettepartnership.org/</p> <p>A nonprofit working to expand the pace, scope, and effectiveness of conservation.</p>	<p>World Resources Institute</p> <p>http://www.wri.org/</p> <p>A nonprofit global research organization that turns big ideas into action at the nexus of environment, economic opportunity and human well-being.</p>
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Technical Advisor

<p>U.S. Department of Agriculture</p> <p>http://www.usda.gov/</p> <p>A federal agency providing leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on sound public policy, the best available science, and efficient management.</p>
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The document also draws from the last several decades of experience building WQT programs across the country. It does not represent a consensus opinion from all Network participants, but instead reflects a series of robust conversations during workshops, numerous conference calls, and a survey to gather feedback on the range of options presented in the document sections.

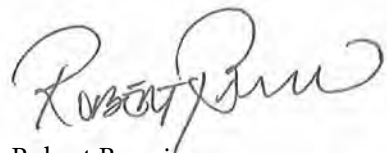
Foreword: US Department of Agriculture

Water quality trading programs provide a catalyst for developing innovative, practical solutions for improving water quality, while generating environmental benefits at lower cost and providing a new source of revenue for farmers, ranchers and forest landowners. Trading complements existing conservation efforts by providing additional resources for water quality improvement and associated environmental benefits, such as air quality improvements and creating and enhancing wildlife habitat.

USDA is committed to advancing voluntary, market-based solutions to improve water quality, and supports the development of transparent, scientifically rigorous guidelines for water quality trading programs. We welcome efforts of the National Network on Water Quality Trading. While USDA cannot specifically endorse the proposals and alternatives discussed in this compendium, we believe *Building a Water Quality Trading Program: Options and Considerations* incorporates the most complete discussion of water quality trading program development to date. The effort can serve as an instructive tool for states, members of the agricultural community and others as they look to learn from past experiences to develop effective water quality trading programs.

On behalf of the USDA Environmental Markets Council, we thank those who contributed to the effort, and congratulate the participants in the National Network on Water Quality Trading for initiating the collaborative and stakeholder-driven dialogue that led to the development of this thoughtful, instructive and comprehensive resource for water quality trading.

USDA Environmental Markets Council Co-Chairs



Robert Bonnie
Undersecretary for Natural Resources and Environment



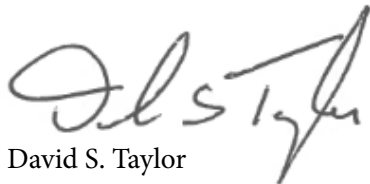
Robert Johansson
Acting Chief Economist

Foreword: National Association of Clean Water Agencies

Successful water quality trading programs involving point source discharges have demonstrated that trading can provide much-needed flexibility, while generating more cost-effective environmental benefits than traditional regulatory approaches. Faced with an ever-growing crisis on nutrient pollution and an environmental statute in need of updating to allow for more holistic, watershed-based approaches, the nation must look to further broaden the use of water quality trading and similar management approaches to find more opportunities for collaboration between point and nonpoint sources, including agriculture.

By providing point source dischargers with more flexibility to meet pollutant load reduction requirements, water quality trading can help incentivize wider participation from nonpoint sources in ongoing efforts to address the nutrient challenge. Water quality trading programs, by their very nature, cannot conform to a one-size-fits-all model, and the sometimes daunting task of assembling a trading program from scratch has been an impediment to more widespread use of this important tool. Stakeholders at the local and state level need to develop the water quality trading programs that will best meet the needs of a particular watershed.

Building a Water Quality Trading Program: Options and Considerations incorporates a wide range of perspectives on how water quality trading programs can achieve their goals. That diversity, and the depth of information presented, will make the document that the National Network on Water Quality Trading produced a valuable resource to inform new and evolving trading programs across the country.



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Table of Contents

Executive Summary	1
Introduction	6
Purpose & Audience for the Document	7
Trading Is One Tool of Many to Improve Water Quality	7
Vision & Guiding Principles for Water Quality Trading Programs	10
Outline of the Document	12
Moving Forward	14
1 Policy & Regulatory Instruments to Support Trading	15
1.1 Building Trading into a State’s Regulatory Program	15
1.1.1 Forms of State Authority for Trading	16
1.1.2 Providing Opportunity for Public Process and Comment Related to Trading	21
1.2 Waterbody Conditions that Impact Trading	21
1.2.1 No Impairment	21
1.2.2 Impaired But No TMDL (i.e., Pre-TMDL)	22
1.2.3 Post-TMDL	23
1.2.4 Alternative to a TMDL	24
1.3 Mechanisms for Effectuating the Trade	26
1.3.1 Key Trading Provisions in a Permit	27
1.3.2 Incorporating Trading into a Permit	31
2 Trading Basics: Who, Where, What, & How	33
2.1 Types of Trades	33
2.2 Appropriate Regulatory Trading Instruments & Sectors	36
2.3 Trading Areas	37
2.4 Appropriate Pollutants for Trading	41
2.5 Appropriate Credit-Generating Actions	43
2.6 Environmental Justice & Equity Considerations	47
3 Trading Eligibility	49
3.1 Eligibility for Buyers & Trades	50
3.1.1 Meeting Technology-Based Effluent Limitations (TBELs)	50
3.1.2 No Localized Impacts	51
3.1.3 Antibacksliding	52
3.1.4 Antidegradation	52
3.1.5 Consistency with Standard Methods for Permits	52
3.2 Nonpoint Source Project Eligibility	53
3.2.1 Trading Baseline	54
3.2.2 Expressing Baseline	57
3.2.3 Timing of Meeting the Trading Baseline	58
3.2.4 Scale of Applying the Trading Baseline	59
3.2.5 Project Timing	61
3.2.6 Use of Public Funds Dedicated to Conservation	62
3.2.7 Credit Stacking in Other Environmental Markets	65

4	Quantifying Water Quality Benefits	66
4.1	Identifying, Evaluating, & Approving Standard Methods	68
4.1.1	Modeling	69
4.1.2	Pre-Determined Rates	72
4.1.3	Direct Monitoring	72
4.1.4	Selecting a Quantification Approach	73
5	Managing Risk & Uncertainty	78
5.1	Trading Ratios	78
5.1.1	Uncertainty Ratio	80
5.1.2	Types of Uncertainty Addressed by Uncertainty Ratios	82
5.1.3	Reserve Ratio	83
5.1.4	Retirement Ratio	85
5.1.5	Combining & Documenting Ratios	86
5.1.6	Applying Ratios	87
5.2	Taking a Holistic Approach to Managing Uncertainty	89
5.2.1	Regulatory Risk	92
5.2.2	Market Risk	93
5.2.3	Buyer Risk	94
6	Credit Characteristics	95
6.1	Credit Life & Project Life	96
6.1.1	Length of Credit Life (Annual, Seasonal, or Permanent)	96
6.1.2	“Banking” Credits for Later Use	98
6.1.3	Project Expiration & Renewal	98
6.1.4	Other Credit Characteristics	100
7	Project Implementation & Assurance	102
7.1	Project Site Screening	102
7.2	BMP Guidelines	104
7.3	Project Design & Management Plans	107
7.4	Documenting Pre- & Post-Project Site Conditions	109
7.4.1	Documentation of Pre-Project Site Conditions	109
7.4.2	Documentation of Post-Project Site Conditions	111
7.5	Project Protection & Stewardship Requirements	111
7.5.1	Requiring Project Protection	112
7.5.2	Minimum Project Protection Period	113
7.5.1	Do Project Protection Agreements Need to Be Recorded with the Property?	115
7.6	Project Stewardship Funds	115
8	Project Review, Certification, & Tracking	119
8.1	Project Review (Initial) & Certification	120
8.1.1	Required Components of Initial Review	121
8.1.2	Confirming Project Implementation	123
8.1.3	Sample Project Documentation a Trading Program Could Require	124
8.2	Project Review (Ongoing) & Certification	125
8.2.1	Ongoing Review of Project Implementation	125
8.2.2	Ongoing Review of Eligibility & Credit Calculation	127
8.2.3	Failure to Meet Performance Standards	128

8.3	Dealing with Differences of Opinion during Project Review	128
8.4	Tracking & Credit Issuance	129
8.4.1	Timing of Credit Issuance	129
8.4.2	Serialization of Credits upon Issuance	133
8.4.3	Information Tracked for Each Credit	134
8.4.4	Timing of Credit Retirement	134
8.4.5	Suspending or Canceling Credits	135
8.5	Credit Ledger/Registry & Public Information	136
8.5.1	Format for the Ledger/Registry	136
8.5.2	Public Availability of Information on Projects	138
8.6	Public Notice & Comment during the Credit Lifecycle	141
9	Compliance & Enforcement	143
9.1	Compliance Determination	143
9.2	Using a“True-up” Period for Compliance	145
9.3	Enforcement	146
10	Program Improvement & Tracking	147
10.1	Improving Program Standards, Protocols, & Process (Discussion)	148
10.2	Improving Quantification Methods over Time	150
10.2.1	Collecting Relevant Data to Improve Quantification Methods	150
10.3	How Changes Are Incorporated	153
10.4	Standard Process for Approving New & Modified BMPs	155
10.5	Evaluating Programmatic Effectiveness	157
10.5.1	Developing an Effectiveness Monitoring Framework	157
11	Roles, Responsibilities, Transaction Models, & Public Participation	160
11.1	Roles & Responsibilities in Trading Program Administration	160
11.1.1	Site Screening for Eligibility	162
11.1.2	Initial Project Review & Certification	164
11.1.3	Ongoing Project Review	166
11.1.4	Reviewer Qualifications	168
11.1.5	Managing the Ledger/Registry	169
11.1.6	Trading Program Improvement Processes & Updates	170
11.1.7	Responsibility for Implementing Effectiveness Monitoring	172
11.2	Roles & Considerations for Trading Transaction Models	172
11.3	Agencies Partnering with Third Parties	175
11.3.1	Considerations in Assigning Tasks to Third Parties	176
11.4	Stakeholder Process	177
	Conclusion	179
	Glossary	180
	References Cited	194

Tables

Table i.a	States with Active Trading Statute, Rule, Policy, and Guidance Referenced in this Document	8
Table i.b	Active Watershed Trading Frameworks and Permits Referenced in this Document	9
Table 1.1.1	Building State Authority for Trading	18
Table 1.3.1	How to Incorporate Credits in Permit Compliance Reporting	30
Table 1.3.2	Incorporating the Details of a Trading Plan into a Permit	32
Table 2.1	Allowable Trading Scenarios	34
Table 2.2	Determining the Regulatory Instruments under which Trading Is Allowed	36
Table 2.3	Delineating Trading Areas	40
Table 2.4	Eligible Pollutants for Trading	42
Table 2.5a	Deciding Which BMPs Are Eligible to Generate Credits	44
Table 2.5b	A Sample of BMPs Approved in Some Existing Water Quality Trading Programs	46
Table 3.0	Additionality Considerations and Crosswalk with Common Uses in WQT Programs	49
Table 3.2.2	Expressing Baseline Requirements	57
Table 3.2.4	Scale at which to Apply Baseline Requirements	60
Table 3.2.5	Setting a Base Year for Project Eligibility	61
Table 3.2.6	Addressing the Use of Public Conservation Funds	64
Table 4.1.4	Selecting an Approach to Quantifying Water Quality Benefits	74
Table 5.1.1	Establishing an Uncertainty Ratio	81
Table 5.1.2	Forms of Uncertainty Addressed by a Ratio	82
Table 5.1.3	What Is Covered by the Reserve Pool	84
Table 5.1.4	Using a Retirement Ratio	85
Table 5.1.5	Lumping Ratios or Keeping Them Separate	86
Table 5.1.6	When Ratios Are Applied	88
Table 5.2	Types of Uncertainty and Mechanisms for Reducing Uncertainty Risks	90
Table 6.1.1	Setting Credit Life	97
Table 6.1.3	Project Renewal	99
Table 7.1	Site Screening	103
Table 7.2	Determining BMP Quality	106
Table 7.3	Use of Project Design and Management Plans	108
Table 7.4.1	Required Pre-project Documentation	110
Table 7.5.1	Legal Protection of Crediting Projects	112
Table 7.5.2	Minimum Project Protection Period	113
Table 7.5.3	Project Protection that Runs with the Land	115

Table 7.6a	When Stewardship Funds Need to be in Place	116
Table 7.6b	Example Components of a BMP Guideline	117
Table 8.1.1	Balancing Cost and Accountability of Initial Project Review	121
Table 8.1.2	Confirming Project Implementation	123
Table 8.1.3	Sample Project Documentation	124
Table 8.2.1	Frequency of Ongoing Project Review	126
Table 8.2.2	Eligibility and Credit Calculations Are Reviewed	128
Table 8.4.1	Timing of Credits Issuance	130
Table 8.4.2	Using Serial Numbers to Track Credits	133
Table 8.4.4	Retiring Credits	135
Table 8.5.1	Using Ledgers to Track Credits	137
Table 8.5.2a	Summary of Project Information and Privacy Concerns	139
Table 8.5.2b	Withholding Personal Information from Public Discourse	140
Table 8.6	Public Notice and Comment	141
Table 9.1	Compliance Review	144
Table 9.2	Using a "True-up" Period	145
Table 9.3	Trading-Specific Enforcement Provisions	146
Table 10.1	Improving the Trading Program over Time	149
Table 10.2.1	Improving Quantification Methods	151
Table 10.3	Options and Considerations for When Program Improvements Take Effect	153
Table 10.4	Approving New and Modified BMPs	156
Table 10.5.1	Developing a Program Effectiveness Monitoring Strategy	159
Table 11.1.1	Site Screening Options	163
Table 11.1.2	Initial Project Review and Certification	164
Table 11.1.3	Ongoing Project Review	167
Table 11.1.4	Project Reviewer Qualifications	168
Table 11.1.5	Management of the Credit Ledger	169
Table 11.1.6	Management of the Trading Processes and Quantification Methods	171
Table 11.1.7	Management of Program Effectiveness	172
Table 11.2.7	Program Transaction Model	173

Figures

Figure 2.3	Options for Trading Areas	39
Figure 3.2.1	Flowchart of Decisions for Developing a Trading Baseline	56
Figure 4.0	Scale in Quantifying Water Quality Benefits	67
Figure 5.1	Treatment of Trading Ratio Topics in the 2007 Permit Writer’s Toolkit and This Document	80
Figure 8.0	Example Overview of the Process for Credit Generation and Sale	119
Figure 8.4.1	Options A, B, C, and D for the Timing of Credit Issuance as It Relates to the Credit Issuance Process for Project Developers and Program Administrators	129
Figure 10.5.1	Hierarchy of Monitoring Metrics	158

Boxes

Box i.	What Is a Trading Program?	13
Box 1.1	Market Participant Roles	16
Box 2.3	Other Factors Influencing Where Credits Are Purchased	38
Box 2.4	Cross-Pollutant Trades	41
Box 3.2.1	Determining Nonpoint Source Regulatory Requirements	53
Box 5.1	Reductive Ratios vs. Set-Aside Ratios	78
Box 5.1.1	U.S. EPA Region 3 Technical Memo on Uncertainty Ratios for the Chesapeake Bay	80
Box 7.4.1	Example of Information Documenting Pre-Project Site Conditions	109
Box 10.0	Program Improvement Definitions	147
Box 11.3	Examples of Agency Partnership with Third Parties	176

Table of Acronyms

BMP	Best Management Practice
CBOD	Carbonaceous Biological Oxygen Demand
CBWM	Chesapeake Bay Watershed Model
CWA	Clean Water Act
CWS	Clean Water Services
DMR	Discharge Monitoring Report
ECAS	Ecosystem Credit Accounting System
ENR	Enhanced Nutrient Removal
FL DEP	Florida Department of Environmental Protection
ID DEQ	Idaho Department of Environmental Quality
LA	Load Allocation
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MI DEQ	Michigan Department of Environmental Quality
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
MT DEQ	Montana Department of Environmental Quality
NACWA	National Association of Clean Water Agencies
NMPF	National Milk Producers Federation
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OH DNR	Ohio Department of Natural Resources
OH EPA	Ohio Environmental Protection Agency
OR DEQ	Oregon Department of Environmental Quality
ORSANCO	Ohio River Valley Water Sanitation Commission
PA DEP	Pennsylvania Department of Environmental Protection
SMBSC	Southern Minnesota Sugar Beet Cooperative
SWCD	Soil and Water Conservation Districts
TBEL	Technology Based Effluent Limit
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
VA DEQ	Virginia Department of Environmental Quality
WA DOE	Washington Department of Ecology
WI DNR	Wisconsin Department of Natural Resources
WLA	Waste Load Allocation
WQBEL	Water Quality Based Effluent Limit
WQT	Water Quality Trading

EXECUTIVE SUMMARY

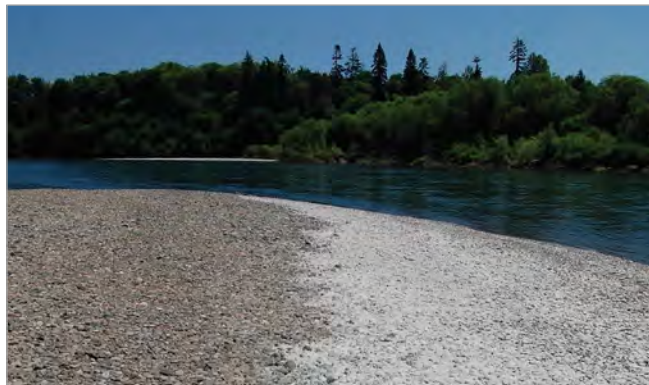
The United States has made significant progress in cleaning its rivers, lakes, and oceans. Investment in wastewater treatment plant technology, conservation practices with land managers, and restoration of natural systems is working in many places. The public supports clean water, yet there is still a long way to go in achieving the vision of fishable, swimmable waters. More than half of the country's streams, lakes, and estuaries are not meeting the water quality standards established under the Clean Water Act to provide clean drinking water, recreation, fish and wildlife habitat, and other designated uses.¹

The work that lies ahead to achieve clean water will require additional tools and new approaches that can account for watershed dynamics, allow flexibility on how to achieve clear, enforceable goals, and target investment where it can most effectively improve water quality. Water quality trading, under the right conditions, can fit these criteria.

Water Quality Trading Programs: Potential & Key Dilemmas

Water quality trading (WQT) is a flexible approach that provides one source the choice of installing onsite technology or practices or working with other sources offsite to generate equal or greater pollutant reductions. However, moving a WQT program forward can be challenging for several reasons:

- The Clean Water Act does not apply evenly to all sources of pollution within a watershed, generating debate about who is responsible for reducing what pollution and when;
- Where watershed science is incomplete, it can be difficult to build an effective, efficient WQT program. It can be more challenging to set clear water quality goals and determine the contribution of individual projects toward those goals;



When designed well and combined with other tools, water quality trading can help achieve water quality goals in a way that is beneficial for landowners, communities, and the environment. Photo courtesy of Willamette Partnership.

¹ U.S. Environmental Protection Agency, *National Summary of State Information*, (March 2015), available at http://ofmpub.epa.gov/waters10/attains_nation_cy.control#STREAM/CREEK/RIVER.

- A successful trading program involves multiple stakeholders who bring different perspectives and vocabularies. The lack of a common vocabulary can hinder communication and development of shared understanding;
- Different stakeholders have different tolerances for risk and uncertainty. There needs to be a holistic look at risk management in WQT. If every program design decision is the lowest risk option from an ecological perspective, WQT may not be cost effective. Conversely, if every decision entails ecological risk, WQT may not achieve water quality objectives;
- It can be easy to lose sight of the bigger water quality vision when talking about the details of a WQT program, but talking about WQT at a high level without going into detail may limit confidence in a program's ability to succeed; and
- There are no easy ways to share the lessons learned from two decades of experience with new trading programs, so opportunities for reducing start-up costs and effort may be lost.

These challenges can lead to long discussions or disputes around:

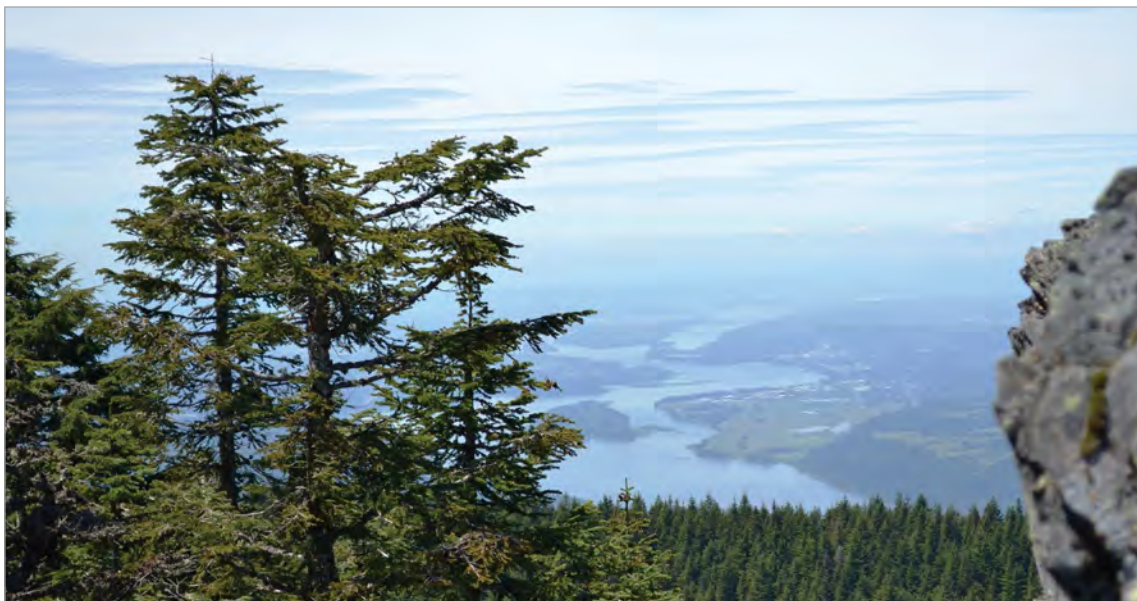
- The pollution reductions expected from market participants prior to buying and selling credits (i.e., baseline requirements);
- How to manage uncertain science or other risks (e.g., selecting credit quantification methods or setting the right trading ratio); and
- How to engage the public to provide comments and shape how trades will work.

A National Network Forms to Discuss These Dilemmas

The National Network on Water Quality Trading was established in 2013 to discuss these challenges and to develop information resources for others interested in building trading programs that meet clean water goals. The Network's 18 initial participating organizations represent a diversity of agricultural operations, wastewater utilities, environmental groups, regulatory agencies, and practitioners delivering trading programs. This diversity is similar to that found in most emerging programs in the country. Over the past two years, the Network's dialogue has focused on identifying common trading issues and the options, considerations, and examples important to building a trading program.

This publication, *Building a Water Quality Trading Program: Options and Considerations*, is the product of that dialogue. The document focuses on trades wherein permitted wastewater and/or stormwater facilities (point sources) purchase water quality benefits from nonpoint sources (often agriculture) that reduce pollution above and beyond what they are required to do. It provides some essential tools for new and evolving water quality trading programs, including:

- A vision and set of guiding principles to anchor trading program decisions;
- Options with pros/cons and examples for each of the 11 elements common to trading programs across the country;
- Consistently defined and used terminology; and
- A depth of references and dialogue supporting the reasoning behind the Network's choices of options and considerations.



As trading programs have developed, they have been guided by the same goals as those set out in the Clean Water Act—to restore fishable, swimmable waters in ways that eliminate harmful pollution and support clean water as an important part of healthy communities and healthy economies. Photo courtesy of Willamette Partnership.

Characteristics of Successful Trading: Guiding Principles

As trading programs have developed, they have been guided by the same goals as those set out in the Clean Water Act—to restore fishable, swimmable waters in ways that eliminate harmful pollution and support clean water as an important part of healthy communities and healthy economies. Along the way, trading program developers have had to wrestle with tough ecological, economic, and social tradeoffs and face the reality that trading often represents one small, though potentially important, part of meeting those larger CWA goals cost effectively.

A water quality trading program should be consistent with the 2003 U.S. EPA Trading Policy and the CWA² and consider the following guiding principles:

1. Accomplish regulatory and environmental goals;
2. Be based on sound science;
3. Provide sufficient accountability, transparency, accessibility, and public participation to ensure that promised water quality improvements are delivered;
4. Produce no localized water quality problems;
5. Be consistent with the CWA regulatory framework; and
6. Include appropriate compliance and enforcement provisions to ensure long-term success.

² See U.S. Environmental Protection Agency, *Water Quality Trading Policy*, 68 Fed. Reg. 1608, p. 1610, (“CWA Requirements. Water quality trading and other market-based programs must be consistent with the CWA.”) (Jan. 13, 2003) (final policy) (hereafter “2003 U.S. EPA Trading Policy”), available at <http://www.gpo.gov/fdsys/pkg/FR-2003-01-13/pdf/03-620.pdf>.

Characteristics of Successful Trading: Common Elements

The Network has identified 11 elements common to many trading programs to consider when designing and implementing WQT programs. Regarding each of these elements, there is no “one size fits all” solution. Instead, considerations can make different options more or less viable under different conditions. The elements that should be considered in the design of a new trading program include:

1. Identifying and establishing regulatory instruments to support trading;
2. Defining who is eligible to trade, where trading can occur, and what is being traded;
3. Determining eligibility for participants in the trading program;
4. Quantifying water quality benefits;
5. Managing risk and uncertainty in the trading program;
6. Defining credit characteristics;
7. Establishing project implementation and assurance guidelines;
8. Establishing procedures for project review, certification, and tracking;
9. Ensuring compliance and enforcement;
10. Establishing adaptive management guidelines for ongoing program improvement and performance tracking; and
11. Defining roles, responsibilities, transaction models, and stakeholder engagement processes.

Prospects for Trading in the Future

National Network participants immediately recognized that trading programs are built to fit the unique ecological, social, and other conditions of a watershed, and emphasized the importance of sensitivity to local needs. *Building a Water Quality Trading Program: Options and Considerations* therefore does not provide explicit recommendations. It provides options and considerations intended to facilitate easier and more consistent decision-making across a range of new and evolving trading programs.

There is a growing interest in trading programs. Several states are contemplating new statewide trading statutes or rules, and more wastewater utilities are using trading approaches. However, not everyone is persuaded that trading programs are being designed in ways consistent with the Clean Water Act and other environmental goals. Further growth in trading, and its success in improving water quality, will depend on:

- Clear and consistent documentation of assumptions and decisions underlying trading program development and operations;
- Serious consideration of watershed science and goals in guiding the practical workings of trading programs;
- Incorporation of WQT into a suite of water quality protection goals and tools; and
- Regular, informative communications to the public to build confidence that progress is being made toward clean water goals in a timely way.

New and emerging trading programs can use this document to help meet some of these future challenges by using the information to:

- Provide consistent language for new trading programs;
- Speed decisions through the options and examples to frame local dialogue; and
- Understand how different stakeholder groups may perceive different trading program design choices.

The Network and its participants will continue to build the tools and information resources needed to support water quality trading programs as they emerge and evolve, including information targeted for stakeholder groups, issues, and places.

INTRODUCTION

Water links us in ways that underpin healthy communities, economies, and ecosystems. When Congress passed the Clean Water Act (CWA) in 1972, it aimed to protect those links in ways that would restore the nation's waters to levels that would support fishing, swimming, and the other designated uses on which we rely.³ The challenges and opportunities facing pollution control and water quality are diverse and evolving. Cities continue to grow, our understanding of pollutant dynamics improves, and innovations in technology and policy create the opportunity for new solution sets. States and communities need a diversity of strategies and tools to achieve the CWA's vision of fishable and swimmable waters and, ideally, support job growth, improve public health, and meet other community goals.

All terms defined in this document's glossary are *italicized* the first time they appear in the text.

Water quality trading (WQT) can be one of those tools. WQT gives point source dischargers flexibility on how to meet clean water requirements— providing a pathway for point sources (e.g., wastewater or urban stormwater dischargers) and nonpoint sources (e.g., agricultural producers) to partner with other point or nonpoint sources to purchase credits generated by water quality improvement projects. WQT can occur between two point sources, point and nonpoint sources, or two nonpoint sources. Most often, WQT is discussed as a tool for a source to meet its CWA regulatory requirements by purchasing additional water quality improvements (e.g., reduced pounds of nutrient discharge) from another entity instead of, or in addition to, installing technology at its own facility.



NRCS Soil Conservationist working with landowner in South Dakota. In many WQT programs, credits are generated through improving water quality on agricultural lands. Courtesy of Don Poggensee / NRCS.

3 Federal Water Pollution Control Act, 33 U.S.C. § 1251, et. seq. (commonly referred to as “Clean Water Act”).

Building and running trading programs usually stimulates a dialogue amongst diverse stakeholders. That dialogue raises difficult questions around:

- How the Clean Water Act as a whole should apply to point and nonpoint sources, and different land uses;
- The meaning of different terms and how they relate to trading program decisions;
- What science should be used and what policy objectives should be chosen;
- How and how far the trading program should go to keep stakeholders informed about trading activity; and
- How to achieve a program that is cost-effective for states and communities to operate.

The National Network on Water Quality Trading tried to replicate many of those challenging conversations across the multiple trading programs in operation around the country. This document captures the depth and breadth of those conversations.

Purpose & Audience for the Document

This document aims to provide a reference on common elements and decisions inherent in WQT program design (especially point-nonpoint WQT programs) and the range of options. The information in this document should make it easier to establish WQT programs, provide greater transparency about what WQT programs can accomplish, and help WQT program developers meet their clean water goals.

Trading efforts to date have demonstrated an enormous diversity in their design based on what works for different locales, different objectives, and the mix of stakeholders designing a trading approach. Yet, when reviewing the choices individual WQT program developers have made, it is clear that WQT stakeholders are presented with a similar set of issues and make many of the same program design choices.

The current audience for this document includes those involved in developing, implementing, or commenting on **point-nonpoint** WQT programs. The document assumes the reader will have a basic understanding of the CWA regulations and how WQT programs work.

Trading Is One Tool of Many to Improve Water Quality

Water quality trading can be an important tool to help achieve the goals of the CWA and other public objectives.⁴ When designed well and combined with other tools, WQT can help achieve water quality goals in ways that are beneficial for landowners, communities, and the environment.

Water quality trading programs continue to emerge across the country. Fifteen states have established policies to support water quality trading, mostly focused on reducing nutrients (e.g., nitrogen and phosphorus), but also addressing temperature, sediment, and salinity (see **Table i.a**).⁵ In 2003, U.S. Environmental Protection Agency (U.S. EPA) released its national policy framework (2003 U.S. EPA Trading Policy) for water quality

4 See 2003 U.S. EPA Trading Policy, *supra* note 2, at 68 Fed. Reg. 1608, p. 1609, (“Water quality trading is an approach” to “[f]inding solutions to [] complex water quality problems.”).

5 This includes states with legislation, policy, guidance, or draft guidance on water quality trading at the state level as of June 2015 (i.e., Arkansas, Colorado, Florida, Idaho, Maryland, Minnesota, Montana, North Carolina, Ohio, Oregon, Pennsylvania, Utah, Virginia, Washington, and Wisconsin). This does not include states with individual watershed-specific authorized trading frameworks or pilot programs, such as Connecticut.

Table i.a States with Active Trading Statute, Rule, Policy, and Guidance Referenced in this Document

IMPLEMENTING STATE AGENCY (ACRONYM USED)	FORM OF STATEWIDE TRADING AUTHORITY (INCLUDING CHESAPEAKE, AND MULTIPLE WATERSHED RULES FOR NORTH CAROLINA)				PERMITS ISSUED WITH TRADING
	STATUTE	RULE	POLICY	GUIDANCE	
Arkansas Department of Environmental Quality (ADEQ)	X				
Colorado Department of Public Health and the Environment (CDPHE)			X		X
Florida Department of Environmental Protection (FL DEP)	X	X			X
Idaho Department of Environmental Quality (ID DEQ)		X		X	X
Maryland Department of Agriculture (MDA) and Maryland Department of the Environment (MDE)	X		X	X	
Minnesota Pollution Control Agency (MPCA)	X				X
Montana Department of Environmental Quality (MT DEQ)		X	X		
North Carolina Department of Environment and Natural Resources (NC DENR)		X			
Ohio Environmental Protection Agency (OH EPA)		X			X
Oregon Department of Environmental Quality (OR DEQ)	X			X	X
Pennsylvania Department of Environmental Protection (PA DEP)		X		X	X
Utah Department of Environmental Quality (UT DEQ)		X			
Virginia Department of Environmental Quality (VA DEQ)	X	X		X	X
Washington Department of Ecology (WA DOE)				X	
Wisconsin Department of Natural Resources (WI DNR)	X			X	

trading, which describes conditions for allowing off-site compliance for National Pollution Discharge Elimination System (NPDES) permit effluent limits. Prior to and since the release of the 2003 U.S. EPA Trading Policy, several pilot or watershed-based trading programs have demonstrated an enormous diversity in their design, building a considerable and valuable base of experience, but also creating challenges to successful implementation of WQT at scale. Inconsistency between trading programs has led to mistrust by some observers, particularly from environmental or agriculture groups. Further, without consistent approaches, the cost of designing and operating trading programs remains high.

Successful WQT programs include systems to maintain transparency around the methods they employ, ensure real and verifiable pollutant reductions, track and review projects and credits throughout their lifecycle, rely on sound science, and establish clear lines of responsibility. This document, *Building a Water Quality Trading Program*, captures the innovations, experiences, and lessons learned from the active state policies and numerous active point-nonpoint trading programs (see **Table i.b**) in the country, helping WQT trading programs to:

- Reduce the start-up time and costs around trading program development;
- Provide greater transparency about program methods and goals; and
- Meet their water quality goals.

Trading may not be appropriate for all water quality challenges, and its efficacy must be evaluated before assuming it can be useful in a particular watershed.

Table i.b Active Watershed Trading Frameworks and Permits Referenced in this Document

(Active trading programs are defined as those with completed, approved program designs and/or have completed transactions. The list does not include all programs, nor does it include active point-point trades. Additional information on active trading programs is available at Forest Trends' State of Watershed Payments at <http://www.watershedconnect.org/projects/>.)

TRADING OR OFFSET (PILOT OR PROGRAM)	STATE	WERE THERE TRADES/OFFSETS?	CURRENTLY ACTIVE?
Laguna de Santa Rosa Water Quality Credit Trading Market (CA City of Santa Rosa)	CA	Yes	Yes
Cherry Creek Basin Water Quality Authority Trading Program (CO Cherry Creek Basin)	CO	Yes	Yes
Long Island Sound Nitrogen Control Program (CT Nitrogen Credit Exchange)	CT	Yes ⁱ	Yes
Pilot Water Quality Credit Trading Program for the Lower St. Johns River (FL Lower St. Johns River)	FL	Yes	Yes
Lower Boise River Effluent Trading Demonstration Project (ID Boise River)	ID	No ⁱⁱ	Yes
Maryland Nutrient Trading Program (MD Chesapeake Bay)	MD	No	Yes
City of Kalamazoo permit (MI Kalamazoo River)	MI	No	No
Rahr Malting Company permit (MN Rahr Malting)	MN	Yes	Yes
Southern Minnesota Beet Sugar Cooperative permit (MN SMBSC)	MN	Yes	Yes
North Carolina Ecosystem Enhancement Program (NCEEP)	NC	Yes	Yes
Tar-Pamlico Nutrient Trading Program (NC Tar Pamlico)	NC	Yes	Yes
Alpine Cheese Company permit (OH Alpine Cheese permit)	OH	Yes	Yes
Great Miami River Watershed Water Quality Credit Trading Program (OH Great Miami)	OH	Yes	Yes
Clean Water Services permit (OR CWS permit)	OR	Yes	Yes
City of Medford permit (OR Medford permit)	OR	Yes	Yes
Nutrient Credit Trading Program (PA Chesapeake Bay)	PA	Yes	Yes
Chesapeake Bay Watershed Nutrient Credit Exchange Program (VA Chesapeake Bay)	VA	Yes	Yes
Ohio River Basin Water Quality Trading Project (OH River Basin trading project)	Multiple	Yes	Yes

i The Long Island Sound Nitrogen Control Program consists solely of point source to point source trades.

ii The City of Boise has recently gained approval for a phosphorus offset from the "Dixie Drain" project. However, this project was not completed under the Lower Boise Framework.

Vision & Guiding Principles for Water Quality Trading Programs

As trading programs have developed, they have been guided by the same goals of the CWA— to restore fishable, swimmable waters in a way that eliminates harmful pollution and supports clean water as an important part of healthy communities and economies. Along the way, trading program developers have had to wrestle with challenging ecological, economic, and social tradeoffs and face the reality that trading often represents one small, though potentially important, part of meeting those larger CWA goals cost effectively.

One of the first discussions of the National Network focused on guiding principles for WQT programs. A WQT program should be consistent with the 2003 U.S. EPA Trading Policy and the CWA⁶ and consider the following guiding principles:

1. Accomplishes regulatory and environmental goals

Water quality trading is supported when it allows sources to comply with their allocations and permit effluent limits in a way that is linked to meeting applicable water quality standards—and protecting the designated uses that the Total Maximum Daily Load (TMDL) and permits are designed to achieve⁷— and when it addresses the causes of a pollutant of concern without negatively affecting other parts of the environment. Additionally, water quality trading is supported when it seeks to provide for the long-term stewardship and management of practices that produce water quality benefits.⁸

2. Is based on sound science

Water quality trading is supported when program goals, credit quantification methods, and adaptive management systems are based on sound science and on their ability to achieve water quality goals, instead of economic justifications alone.⁹ Current information is rarely perfect and science evolves; therefore, water quality trading programs should monitor and evaluate outcomes to regularly improve and report on the progress toward water quality goals.

3. Provides sufficient accountability, transparency, accessibility, and public participation to ensure that promised water quality improvements are delivered

Water quality trading programs should seek to foster transparent information on program rules and processes, project locations, the volume of transactions, and program effectiveness over time. Trading documents should foster accountability by clearly articulating who is responsible for producing water quality improvements, and by providing a mechanism for identifying and correcting problems, including dispute resolution. Accountability in trading is improved when the public is engaged and participating from the earliest stages through the development of programs. Including robust public input not only strengthens trading effectiveness and credibility, but also provides sufficient information for regulatory agencies and the public to regularly determine that trades and individual credits comply with a permittee's waste load allocation and effluent limitations.¹⁰

6 See 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610 (“CWA Requirements. Water quality trading and other market-based programs must be consistent with the CWA”).

7 *Id.* at p. 1611. Trading cannot cause an impairment of existing or designated uses.

8 *Id.* at pp. 1609-1610.

9 *Id.* at p. 1612 (“Program Evaluations. Periodic assessments of environmental and economic effectiveness should be conducted and program revisions made as needed”).

10 *Id.*

4. Does not produce localized water quality impacts

The use of water quality trading is not supported where it causes or contributes to a violation of relevant numeric or narrative water quality standards at any location in a watershed¹¹, except where consistent with the Clean Water Act.¹²

5. Is consistent with the CWA regulatory framework

As described in the 2003 U.S. EPA Trading Policy, water quality trading must be consistent with the relevant provisions of the CWA and its implementing regulations, such that it does not seek to circumvent the installation of any minimum treatment technology required by federal and/or state regulations at the site of a point source, adversely affect water quality at an intake for drinking water supply,¹³ delay implementation of a TMDL approved or established by U.S. EPA, or cause the combined point source and nonpoint source loadings to exceed the cap established by a TMDL.¹⁴ Water quality trading is a tool to more cost-effectively meet CWA requirements, not evade them.

6. Includes appropriate compliance and enforcement provisions to ensure long-term success

Water quality trading programs must develop mechanisms that allow regulatory agencies to ensure the overall enforcement of the CWA goals and objectives (e.g., required documentation, project review, tracking, enforcement provisions, and adaptive management).

Besides the above guiding principles, it is important for trading programs to provide efficient and effective ways for point sources to meet their CWA goals and to provide the right conditions for landowners to participate.¹⁵ In many instances, stakeholders may choose to design trading programs that will achieve ancillary environmental benefits beyond the required reductions in specific pollutant loads (e.g., the creation and restoration of wetlands, floodplains and wildlife, fish and/or waterfowl habitat, and reduction of multiple pollutants).

Acknowledging that while every trading effort should strive toward these possible outcomes, local conditions may make it difficult to achieve them all. At a minimum, trading programs must meet all of the relevant requirements of the CWA, and must follow other applicable requirements. Individual trading programs will inevitably face unique situations and issues. These guiding principles should provide state agencies and other stakeholders with a cohesive approach to thinking through design issues that should be contemplated when establishing a WQT program.

11 *Id.*

12 See 40 C.F.R. § 131.13 (authorizing mixing zones, low flows and variances). Another potential exception could include a permit consistent with 40 C.F.R. § 122.4(i). No permit may be issued: (i) To a new source or a new discharger if the discharge from its construction or operation will cause or contribute to a violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards ... and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged, must demonstrate, before the close of the public comment period, that: (1) There are sufficient remaining pollutant load allocations to allow for the discharge; and (2) The existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards.

13 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1611.

14 *Id.* at p. 1610.

15 Stakeholders within the National Network differed on whether or not it is appropriate to consider transaction costs when developing water quality trading programs.

Outline of the Document

This document is meant as a comprehensive and robust reference of WQT program considerations based on select programs in the U.S. Each section is organized around one of the 11 elements of a trading program (see below). Each subsection deals with a particular issue within that element by providing context, introducing options, then providing considerations and examples intended to help new and developing trading programs get started, and to guide existing programs through adaptive management. The Network has identified 11 elements common to many trading programs to consider when designing and implementing WQT programs. These include:

1. Identifying and establishing regulatory instruments to support trading;
2. Defining who is eligible to trade, where trading can occur, and what is being traded;
3. Determining eligibility for participants in the trading program;
4. Quantifying water quality benefits;
5. Managing risk and uncertainty in the trading program;
6. Defining credit characteristics;
7. Establishing project implementation and assurance guidelines;
8. Establishing procedures for project review, certification, and tracking;
9. Ensuring compliance and enforcement;
10. Establishing adaptive management guidelines for ongoing program improvement and performance tracking; and
11. Defining roles, responsibilities, transaction models, and stakeholder engagement process.

Throughout the document, examples are drawn from active and developing trading programs around the country. The structure of discussion and associated examples in this document focuses on a single issue, but trading programs often develop interconnected approaches using multiple trading elements to deal with the same issue. For most of the trading program elements described in this document there is no single best practice. A well-developed WQT program will have the flexibility to meet the needs of local stakeholders and to adjust to the scientific, social, and ecological realities of particular watersheds.

This document currently examines point-nonpoint water quality trading—trades where point sources with some regulatory obligation to reduce pollution purchase lower-cost credits from nonpoint sources that reduce pollution above and beyond what they would otherwise be required to do.¹⁶ Trades have included both *offsets* for future growth (e.g., a growing city needs to offset nutrient stormwater runoff from new construction or increased wastewater discharges)¹⁷ and crediting against current discharges (e.g., a new TMDL creates a reduction requirement for a wastewater and/or stormwater utility). Future efforts by the Network may revise this document to incorporate considerations for point-point or other forms of trading. The document assumes understanding of the CWA regulations and how WQT programs work. Other references provide more background and history on WQT, and include:

¹⁶ See generally 2003 U.S. EPA Trading Policy *supra* note 2.

¹⁷ See 40 C.F.R. § 122.4(i) for conditions regarding the permitting of new sources (No permit may be issued: (i) To a new source or a new discharger if the discharge from its construction or operation will cause or contribute to the *1012 violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards ... and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged, must demonstrate, before the close of the public comment period, that: (1) There are sufficient remaining pollutant load allocations to allow for the discharge; and (2) The existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards).

- 2003 U.S. EPA Water Quality Trading Policy¹⁸ and 2007 U.S. EPA Water Quality Trading Toolkit for Permit Writers;¹⁹
- *In It Together: A How-To Reference for Building Point-Nonpoint Water Quality Trading Programs*;²⁰
- *Getting Paid for Stewardship: An Agricultural Community Water Quality Trading Guide*;²¹ and
- World Resources Institute's *Addressing Risk and Uncertainty in Water Quality Trading Markets*²², *Comparison Tables of State Nutrient Trading Programs in the Chesapeake Bay Watershed*,²³ and *Water Quality Trading Programs: An International Overview*.²⁴

Trading programs can be built by multiple stakeholders and rest on several documents describing the authority to trade, how trading will work, and who can participate. This document uses definitions for parts of a trading program described in **Box i. What Is a Trading Program?**

Box i. What Is a Trading Program?

In this document, *trading program* is a general term to describe the approach to trading taken by a state agency and/or WQT stakeholders. Trading programs use some of the terms below differently than this document. *WQT program developers* are the individuals or collectives who decide about trading program design. Sometimes, the state water quality agency may be the trading program developer; in other cases, the role may be filled by a collective of representatives from state and federal regulatory agencies, agriculture groups, point sources, environmental advocates, and other interested stakeholders.

Multiple documents exist in which information about a trading program is commonly described, including:

Trading guidance: This term includes a range of federal and state-level authoritative documents that articulate how trading should occur. Trading guidance includes binding documents, such as a state's statute, rule, or policy. It also includes non-binding documents, such as a state's guidance, management directive, or other technical documents.

Trading framework: Watershed-level documents that contain details of trading processes and standards (e.g., Ohio's Great Miami River Trading Program¹); and

Trading plan: The incorporation of trading elements into a permit or other binding agreement applicable to a permittee. A permittee's trading plan may incorporate the terms of relevant state-wide trading guidance or a watershed trading framework by reference, or it may include specific details within the permit itself.

1 The Miami Conservancy District (Ohio), *Great Miami River Watershed Water Quality Credit Trading Program: Operations Manual*, (2005) (hereafter "MCD 2005"), available at <https://www.miamiconservancy.org/water/documents/TradingProgramOperationManualFeb8b2005secondversion.pdf>.

18 2003 U.S. EPA Trading Policy *supra* note 2, at p. 1609.

19 U.S. Environmental Protection Agency, Office of Wastewater Management, *Water Quality Trading Toolkit for Permit Writers*, (2007; updated 2009) (hereafter "2007 U.S. EPA Toolkit for Permit Writers"), available at <http://water.epa.gov/type/watersheds/trading/WQTToolkit.cfm>.

20 Willamette Partnership, USDA Office of Environmental Markets, Pinchot Institute for Conservation, & World Resources Institute, *In It Together: A How-To Reference for Building Point-Nonpoint Water Quality Trading Programs: Designing and Operating a Trading Program* (Full Report), (2012) (hereafter "In It Together (Full Report)"), available at <http://willamettepartnership.org/publications/>.

21 Conservation Technology Information Center, *Getting Paid for Stewardship: An Agricultural Community Water Quality Trading Guide*, (2006), available at http://www.ctic.org/media/users/lvollmer/pdf/GPfS_Final%281%29.pdf.

22 Sara Walker and Mindy Selman. *Addressing Risk and Uncertainty in Water Quality Trading Markets*. World Resources Institute, (2014) (hereafter "WRI Risk & Uncertainty"), available at <http://www.wri.org/publication/addressing-risk-and-uncertainty-water-quality-trading-markets>.

23 Evan Branosky, Cy Jones, & Mindy Selman, *Comparison Tables of State Nutrient Trading Programs in the Chesapeake Bay Watershed (WRI Fact Sheet)*, World Resources Institute, (2011) (hereafter "WRI Comparison Tables 2011"), available at http://www.wri.org/sites/default/files/comparison_tables_of_state_chesapeake_bay_nutrient_trading_programs.pdf.

24 Mindy Selman, Evan Branosky, and Cy Jones, *Water Quality Trading Programs: An International Overview*, World Resources Institute, (2009) (hereafter "Selman et al. 2009"), available at <http://www.wri.org/publication/water-quality-trading-programs-international-overview>.

Moving Forward

The National Network recognizes that trading programs are dynamic and must adapt to ever-changing circumstances and requirements. It is challenging to generate WQT program options that balance the needs for standard approaches, local flexibility, and communication of information to diverse audiences. The options and considerations discussed in this document will be “living”—evolving as trading programs generate new lessons learned. The Network hopes that a much wider range of stakeholders will read, comment, and shape these options and considerations into the next iteration.

1 POLICY & REGULATORY INSTRUMENTS TO SUPPORT TRADING

For trading under the CWA to be a viable and effective tool for water quality compliance and improvement, it must be supported by one or more policy and regulatory instruments. Authority for WQT is derived from federal and state laws and regulations and is ultimately referenced either in an individual discharger's NPDES permit, a general permit, a watershed NPDES permit covering multiple dischargers, or a similarly enforceable agreement. The CWA authorizes U.S. EPA to work with tribal governments to provide "treatment in the same manner as a state."²⁵ Throughout the document, state requirements can also include tribal requirements.

This section describes some of the context and considerations important to building trading into state-level regulatory programs and regulatory instruments for individual point sources. These policies and regulatory instruments are inextricably linked to CWA requirements.

1.1 Building Trading into a State's Regulatory Program

A WQT program and permittee trading plans must include provisions that make them defensible, efficient, and transparent in order to be successful and withstand opposition or legal challenges. The size and scope of the potential trading activity may influence the policy and regulatory instruments selected. If trading is anticipated in multiple watersheds throughout a state, then it may warrant state guidance or a trading framework to act as a common set of policy and regulatory instruments that can be applied consistently. By contrast, if trading is only anticipated in one or two areas, then the need for state or watershed-level policy or regulatory instruments may be less urgent.



A state may derive its authority to trade from state statute, rules, agency policy, or a combination thereof. Photo courtesy of Michigan Municipal League / Creative Commons.

WQT program developers, particularly state regulatory agencies, should identify the sources of state and federal authority for approving trades. Many of the first trades grew out of pilot programs for

25 See 40 CFR 131.8 and 131.4(c).

individual point sources. Although the CWA does not provide explicit authority for trading, the authority is implicit in the statute. U.S. EPA asserts that the CWA provides authority to trade.²⁶ Absent explicit federal authorization, many states have relied upon their own authorities to approve trades. Fifteen states now have some form of statewide statute, policy, or guidance governing trading.²⁷

When building trading programs, stakeholders need to consider the role of water quality standards as the basis for water quality goals, which regulatory instruments might best support trading in different scenarios, and what opportunities can be provided for public engagement. Opportunities for such engagement will occur as laws and rules are adopted (under each state's administrative procedures act), and when permits are issued (under standard NPDES permitting procedures). State policy and guidance may not be subject to the same public participation requirements as laws, rules, and permits, but enhancing opportunities for public participation will help states design trading programs that meet participants' needs, increase stakeholder support and participation, and reduce risks of legal challenges.

1.1.1 Forms of State Authority for Trading

The 2003 U.S. EPA Trading Policy²⁸ anticipates that a buyer's NPDES permit or other enforceable mechanism will reflect the requirements necessary for compliance with the CWA and if trading is an option for achieving compliance. If trading is an option, the permit provides the specific trading requirements for the permitted discharge, which might include the number of required credits depending on a source's discharge concentration and/or mass limits, contemporaneous averaging periods, compliance schedules, monitoring, and reporting requirements.

Box 1.1 Market Participant Roles

Permittee (often Buyer): Any entity with a discharge approved or pending approval under state- or federally-issued permit (e.g., NPDES permit). This document focuses on point source permittees seeking or granted permission to purchase water quality credits as a means of permit compliance. Permittees may include wastewater treatment plants, industrial facilities, stormwater utilities or any buyer.

Project Developer (often Seller): Any entity that develops credits, whether that entity is the permittee, a contractor of the permittee that develops or aggregates credits, or a landowner developing credits on a permittee's behalf. An Aggregator is a project developer that collects pollutant reduction credits from several producers to sell in bulk to permitted industrial and municipal facilities.

Program Administrator: The organization responsible for the operation and maintenance of a water quality trading program. Responsibilities of a program administrator may include: defining credit calculation methodologies, protocols, and quality standards; project review; and credit registration. Program administrators may include third parties, permittees, or state, federal, or local agencies.

²⁶ 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1609. See also 40 C.F.R. § 130.2(i) ("If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent."). But see *Food and Water Watch v. U.S. EPA*, 2013 WL 6513826 (D. D.C. 2013) (plaintiffs challenged use of trading as illegal under the Clean Water Act; court dismissed for lack of standing without reaching the merits of the claims).

²⁷ See note 6 and accompanying text.

²⁸ 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

To make trading more practicable and defensible, states can establish trading programs through statewide authority derived from state statute and rules, with policy and guidance clarifying those authorities. Statutes and rules carry the effect of law, receive greater deference from the courts, and are less easily overturned by a change in elected leadership. Agency policy and guidance, on the other hand, are developed internally and do not have the force and effect of law, are afforded less deference by the courts, and are more easily reversed or rescinded. States without a statewide framework specific to trading have also used their broader regulatory authorities (e.g., their authority to issue NPDES permits and implement applicable water quality standards) to authorize individual trades.

Each form of authority has its pros and cons, and states may consider using a combination of approaches to support their authorization of trades. Each state will need to decide which authorities to cite in the permit record (or develop if not yet in existence) to support trading. The more uniform this becomes, the more scalable trading will become within and among states. The courts have not yet interpreted much of the law as it relates to WQT. Some current options, or combination of options, may, therefore, ultimately be determined to be inconsistent with the CWA and will not be viable in the future. The least risky approach for states seeking to support trading is for the state legislature to pass a trading-specific statute or for the relevant state agency to promulgate a trading-specific rule. There are several options for building a state's authority for trading.

Table 1.1.1 Building State Authority for Trading

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Specific WQT statute</p> <p>Here, authorization occurs through a piece of state legislation governing WQT in all or a portion of the state. In 2005 Virginia enacted legislation authorizing WQT within the Chesapeake Bay Watershed.ⁱ</p>	<p>Statutes are enacted by a legislature. Agency interpretation of statutes is afforded the greatest deference in the administrative law context, and provides the greatest certainty in establishing requirements on trading. However, statutes are often lighter on detail, can be difficult to change, and may constrain the implementing agency's flexibility.</p>	<p>Oregon authorized the development and implementation of a pollutant reduction trading pilot in 2001.ⁱⁱ In 2005, legislation authorized the VA Nutrient Credit Exchange Association.ⁱⁱⁱ Arkansas and Minnesota both authorize trading in statute.*</p>
<p>Option B:</p> <p>Use of existing enabling legislation</p> <p>In this case, states do not have a trading framework in place as a matter of statute, rule, policy, or guidance, but nonetheless approve trades based on broader and more general agency-enabling legislation (e.g., relying on their mission of environmental protection to approve trades that achieve this mission).</p>	<p>This option preserves the greatest flexibility for agencies in evaluating trades, but may leave them exposed to <i>ultra vires</i> (acting “beyond their power”) challenges. This option also increases uncertainty for permittees, who may then be more hesitant to engage in trading.</p>	<p>State agencies used authorities in their enabling legislation in the case of the MN Rahr Malting permit^{iv} and OH Alpine Cheese permit, although the Alpine Cheese permit is now referenced in the OH EPA trading rules.^v</p>
<p>Option C:</p> <p>Regulations</p> <p>Regulations, or rules, are adopted by an agency of the executive branch of government (e.g., U.S. EPA or a state environmental agency) under the agency's authorizing statutes and minimum process safeguards (including public notice and comment). For example, some state water quality standards are adopted as regulations and are thereafter subject to U.S. EPA review and approval before they become “applicable” (as that term is used in various parts of the CWA such as section 303(d)(1)(C)). State WQT regulations not part of that standards package may not be subject to U.S. EPA review and approval at the time they are adopted, but NPDES permits issued in accordance with those regulations may be subject to U.S. EPA objection if U.S. EPA believes that the permits do not meet the objectives of the CWA.</p>	<p>Rules and regulations have the force of law and are typically adopted by state agencies following a public process. Rules may take considerable time to adopt and can be difficult to change. Rules formalize the parameters of trading, and make it easier for agencies to incorporate trading-related items into permits. Agency interpretation of its own rules receives considerable deference.</p> <p>Regulations that are part of a state's water quality standards package are subject to U.S. EPA review and approval. Other implementation regulations may not be.</p>	<p>The FL DEP,^{vi} OR DEQ,^{vii} ID DEQ,^{viii} PA DEP,^{ix} and the OH EPA,^x and UT DEQ* have promulgated administrative regulations to help implement state WQT programs. These rules vary in the depth and breadth.</p>

*(continued)***Table 1.1.1 Building State Authority for Trading**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option D:</p> <p>Policy</p> <p>While administering the programs for which they bear statutory responsibility, most agencies adopt and adhere to policies that help to clarify, interpret, and facilitate implementation of trading.</p>	<p>Like guidance documents, policies do not have the force of law, cannot establish entirely new standards and requirements, but may be afforded some limited deference by courts, especially when they are adopted through a public process and consistently followed. Policies take far less time than statutes or rules to put in place but are much more limited in their scope and effect.</p>	<p>U.S. EPA released its Water Quality Trading Policy in 2003, explaining its position on how the CWA authorizes WQT programs, and describing the elements of a successful program.^{xi}</p>
<p>Option E:</p> <p>Agency guidance</p> <p>Agencies may issue guidance to assist agency staff, regulated parties, and the public in understanding how existing laws and regulations regarding WQT will be specifically interpreted, implemented, and enforced. These policies are meant specifically to guide internal agency decision-making.</p>	<p>Guidance documents do not have the force of law, must interpret existing law rather than establish entirely new standards and requirements, and are afforded minimal deference by courts. Guidance is typically written in terms of “may” and “should,” not “must” and “shall.” This internal guidance is not meant to bind external parties.</p>	<p>WI DNR has issued twin guidance documents for specifying protocols and developing a strategy for WQT. That guidance is also linked to statute.^{xii}</p> <p>OR DEQ,^{xiii} ID DEQ,^{xiv} and WA DOE^{xv} have all issued agency guidance documents to assist the state agencies in implementing trades authorized by law or regulation.</p>
<p>Option F:</p> <p>Combination</p> <p>The aforementioned options rarely exist in isolation and instead typically work together or iteratively to create a greater authoritative structure. When acting under its authority granted by enabling legislation and the authority delegated by the U.S. EPA under the CWA, a state agency may determine there is value in undergoing notice and comment for rulemaking. The resulting substantive rule may then require a policy or guidance document to explain the program details. The flow of authority from statutory delegation, to rule, to policy creates a strong framework on which to implement trading.</p>	<p>By using a combination of statute, rule, guidance, and policy, an agency can create robust scaffolding for trading. Where a statute or rule provides the force of law, a policy can add nuance and detail. Using a combination may also encourage the development of stronger authorities over time. For example, an agency with a successful policy may feel more comfortable promulgating a rule based on that tried and true policy.</p>	<p>Many of the states appearing in examples above in fact use a combination of authority sources. The following are just two examples. ID DEQ has a rule allowing trading generally,^{xvi} and a statewide guidance document provides details.^{xvii} Virginia’s legislature has passed a nutrient exchange law,^{xviii} and the state agency also published a guidance document.^{xix}</p>

(continued)

Table 1.1.1 Building State Authority for Trading

OPTIONS	CONSIDERATIONS	EXAMPLES
i	Code of Virginia §§ 62.1-44.19:12 – 19, (2014), available at http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+TOC62010000003000010000000 .	
ii	See Minnesota Pollution Control Agency, Rahr Malting Co. National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit # MN0031917 (draft), (undated) (hereafter “MN Rahr Malting Permit”), available at http://www.pca.state.mn.us/index.php?option=com_k2&id=715_1248a1315a91e0ead67f851640883724&task=download&view=item (referencing the Minnesota water quality statutes, the Minnesota administrative rules on water quality, and the CWA). See also Minnesota Pollution Control Agency, Rahr Malting Co. National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit # MN0031917 Fact Sheet, (undated), available at http://www.pca.state.mn.us/index.php?option=com_k2&id=716_36642cde6193e8c319f730758e4fc47c&task=download&view=item .	
iii	Oregon Revised Statute § 468B.555 (2013), available at https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2013ors468B.html .	
iv	See Minnesota Pollution Control Agency, Rahr Malting Co. National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit # MN0031917 (draft), (undated) (hereafter “MN Rahr Malting Permit”), available at http://www.pca.state.mn.us/index.php?option=com_k2&id=715_1248a1315a91e0ead67f851640883724&task=download&view=item (referencing the Minnesota water quality statutes, the Minnesota administrative rules on water quality, and the CWA). See also Minnesota Pollution Control Agency, Rahr Malting Co. National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit # MN0031917 Fact Sheet, (undated), available at http://www.pca.state.mn.us/index.php?option=com_k2&id=716_36642cde6193e8c319f730758e4fc47c&task=download&view=item .	
v	Ohio Environmental Protection Agency, <i>Alpine Dairy, LLC NPDES Permit</i> , (2014) (hereafter “OH Alpine Cheese Permit”), available at http://wwwapp.epa.ohio.gov/dsw/permits/doc/3IH00100.pdf (referencing the CWA and the Ohio Water Pollution Control Act).	
vi	Florida Admin. Code §§ 62-306.100 – 800 (2014), available at https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-306 . The Florida rules apply specifically to a pilot program in one basin, the Lower St. Johns River Basin.	
vii	Oregon Admin. Rules § 340-041-0028(12)(f) (2014), available at http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_041.html .	
viii	Idaho Admin. Code § 58.01.02.055.06 (2014), available at http://adminrules.idaho.gov/rules/current/58/0102.pdf .	
ix	Pennsylvania Code Title 25 § 96.8 (2014), available at http://www.pacode.com/secure/data/025/chapter96/s96.8.html .	
x	Ohio Admin. Code §§ 3745-5-01 – 14 (2014), available at http://epa.ohio.gov/dsw/rules/3745_5.aspx .	
xi	2003 U.S. EPA Trading Policy, <i>supra</i> note 2. See also 2007 U.S. EPA Toolkit for Permit Writers, <i>supra</i> note 19.	
xii	Wisconsin Department of Natural Resources, <i>A Water Quality Trading How To Manual (Guidance No. 3400-2013-03)</i> , (2013) (hereafter “WI DNR 2013a”), available at http://dnr.wi.gov/topic/SurfaceWater/documents/WQT_howto_9_9_2013signed.pdf and Wisconsin Department of Natural Resources, <i>Guidance for Implementing Water Quality Trading in WPDES Permits (Guidance No. 3400-2013-04)</i> , (2013) (hereafter “WI DNR 2013b”), available at http://dnr.wi.gov/topic/surfacewater/documents/WQT_guidance_Aug_21_2013signed.pdf .	
xiii	Oregon Department of Environmental Quality, <i>Water Quality Trading in NPDES Permits Internal Management Directive</i> , (2009; updated 2012) (hereafter “OR DEQ 2009”), available at http://www.deq.state.or.us/wq/pubs/imds/wqtrading.pdf .	
xiv	Idaho Department of Environmental Quality, <i>Water Quality Pollutant Trading Guidance</i> , (2010) (hereafter “ID DEQ 2010”), available at http://www.deq.idaho.gov/media/488798-water_quality_pollutant_trading_guidance_0710.pdf .	
xv	Washington Department of Ecology, <i>Draft Washington Water Quality Trading/Offset Framework</i> , (2010) (hereafter “WA DOE 2010”), available at http://www.ecy.wa.gov/programs/wq/swqs/WQTradingGuidance_1010064.pdf .	
xvi	Idaho Admin. Code, <i>supra</i> note Table 1.1.1(viii), at § 58.01.02.055.06.	
xvii	ID DEQ 2010, <i>supra</i> note Table 1.1.1(xiv).	
xviii	Code of Virginia, <i>supra</i> note Table 1.1.1(i), at §§ 62.1-44.19:12 – 19.	
xix	Virginia Department of Environmental Quality, <i>Trading Nutrient Reductions from Nonpoint Source Best Management Practices in the Chesapeake Bay Watershed: Guidance for Agricultural Landowners and Your Potential Trading Partners</i> , (2008) (hereafter “VA DEQ 2008”), available at http://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/VANPSTradingManual_2-5-08.pdf .	
*	Arkansas Act 335 §§ 1 – 2 (2015), available at http://www.arkleg.state.ar.us/assembly/2015/2015R/Acts/Act335.pdf . Minnesota Statute Annotated § 115.03(10) (2014), available at https://www.revisor.mn.gov/statutes/?id=115.03 . Utah Admin. Code § R317-2(3.5) (2015), available at http://www.rules.utah.gov/publicat/code/r317/r317-002.htm .	

1.1.2 Providing Opportunity for Public Process and Comment Related to Trading

This document discusses roles for stakeholder engagement throughout, but states should be clear as to when and where formal public review and comment are or are not provided. States will likely provide this opportunity at several points. The common opportunities for public review and comment include:

- Statewide trading statute, rule, policy, or guidance;
- TMDL or watershed strategies and associated implementation plans that include reference to trading or that will shape trading;
- NPDES permits or other binding agreements authorizing trading; and/or
- Post-implementation analysis of the effectiveness of a pilot trading system.



States should be clear as to when and where formal public review and comment are or are not provided during public process and comment related to trading. Photo courtesy of American Farmland Trust.

1.2 Waterbody Conditions that Impact Trading

The waterbody conditions under which water quality trading might occur arise out of four distinct scenarios: no impairment, pre-TMDL, post-TMDL, and alternative to a TMDL. Each is described below in more detail.

1.2.1 No Impairment

In waterbodies that are in attainment of water quality standards (and therefore not covered by a TMDL), a point source discharge may have the reasonable potential to cause or contribute to a violation of water quality standards, and trigger the need for a water quality based effluent limit (WQBEL). These WQBELs would serve as the impetus for WQT.²⁹ In this scenario, the permit can be the regulatory instrument for the trade, together with any authorizing law or regulation that may exist under state law. Antidegradation requirements would still apply to permits in this scenario. With the permit serving as the driver for trading, a remaining question is what baseline nonpoint sources should meet before generating credits. The 2003 U.S. EPA Trading Policy states that, absent a TMDL, existing state and local requirements and current conditions for nonpoint sources define the baseline for generating credits.³⁰

²⁹ 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

³⁰ *Id.*

1.2.2 Impaired But No TMDL (i.e., Pre-TMDL)

Tens of thousands of waterbodies around the country have been identified as impaired under §303(d) of the CWA (i.e., are not attaining water quality standards) but are not yet subject to TMDLs. In these interim permitting scenarios (post-303(d) listing, but pre-TMDL), practices vary widely across U.S. EPA regions and states. Absent any nationally applicable rules or practices, some states impose criteria-end-of-pipe limits on point sources; others impose even more stringent limits (on the theory that even a miniscule addition of the pollutant causing the impairment will contribute to the continuation of this impairment). In either case, these interim limits (i.e., post-listing, pre-TMDL) are WQBELs and, as such, serve as the impetus for WQT.

The 2003 U.S. EPA Trading Policy specifically addresses the pre-TMDL trading scenario and provides as follows:

“EPA supports pre-TMDL trading in impaired waters to achieve progress towards or the attainment of water quality standards. EPA believes this may be accomplished by individual trades that achieve a net reduction of the pollutant traded or by watershed-scale trading programs that reduce loadings to a specified cap supported by baseline information on pollutant sources and loadings.

EPA also supports pre-TMDL trading that achieves a direct environmental benefit relevant to the conditions or causes of impairment to achieve progress towards restoring designated uses where reducing pollutant loads alone is not sufficient or as cost-effective.”³¹

Like the no impairment scenario, in the pre-TMDL scenario, the permit can serve as one of the regulatory instruments for the trade, together with any authorizing law or regulation that may exist as a matter of state law.

Depending on the approach that a state selects for interim permitting (i.e., post-303(d) impairment listing, but pre-TMDL), trading opportunities may be enhanced or constrained. For example, in a state where NPDES permittees are allowed to hold the line based on their existing effluent quality before a TMDL is established, there may be no demand from existing point sources for trading.³² By contrast, in a state where NPDES permittees receive more stringent limits based on the state’s reasonable potential analysis,³³ then trading may be an important tool for compliance.

One impediment to trading pre-TMDL may be the availability, or absence, of watershed information or plan to support the trade.³⁴ Regulatory agencies need to know which pollutant or combination of pollutants is causing the impairment, the other sources discharging this pollutant, and how much of an impact those discharges have on the overall water quality issue in the watershed. They also likely need to know whether these other sources are in proximity to the permittee, whether models are in place to demonstrate the fate and transport (e.g., cumulative effects) of the pollutant in the waterbody, and, if trading is allowed, whether localized impacts will be created based on pollutant loadings. Another impediment is that state agencies may not be able to guarantee that required reductions and trading requirements (e.g., baselines and ratios)

31 *Id.*

32 Some states have elected to defer the imposition of new or more stringent WQBELs in an impaired water body before a TMDL is established, especially in situations where there are multiple sources and causes of impairment and the state has not yet conducted the TMDL analysis to determine relative contributions and reduction requirements. However, these states may be susceptible to opposition or challenge on grounds that they lack the authority to defer this critical determination. In short, it is not clear whether a “hold the line” approach is defensible, or defensible in all cases. Even absent demand from existing point sources, new sources in growing communities may drive demand for credits.

33 When issuing a permit, the permitting authority must determine if the discharges have a reasonable potential to cause or contribute to a violation of a state water quality standard. 40 C.F.R. § 122.44(d)(1).

34 See *Friends of Pinto Creek v. U.S. EPA*, 504 F.3d 1007, 1011-12 (9th Cir. 2007), citing 40 C.F.R. § 122.4 (2000).

developed pre-TMDL will stay the same post-TMDL, creating regulatory uncertainty for point sources. These and other questions will need to be addressed in order to approve a trade in an impaired waterbody before a TMDL is in place.

1.2.3 Post-TMDL

In the post-TMDL scenario, the TMDL serves as the primary structure for the trading framework or plan. NPDES permits are written to be consistent with the assumptions of the TMDL, and the resulting QBEL continues to serve as the immediate driver for the trade. Over 60,000 TMDLs have been established throughout the country over the past decade. Once in place, TMDLs establish the assimilative cap for pollutant loadings from both point and nonpoint source contributors in the respective watershed. Under the federal NPDES permitting regulations (replicated in every state delegated NPDES permitting authority, with only minor variation), NPDES permits must contain limits “consistent with the assumptions and requirements” of the “waste load allocations” assigned to point sources in the underlying TMDL.³⁵ U.S. EPA has interpreted these regulations to mean that the permit limits need not be identical to the waste load allocations, just consistent with them.³⁶ So a daily TMDL may lead to non-daily permit limits, and a numeric waste load allocation may be applied through non-numeric best management practices in a permit (in both cases, when properly explained and justified in the underlying permit record).

The 2003 U.S. EPA Trading Policy specifically addresses the post-TMDL trading scenario and provides as follows:

“Trades and trading programs in impaired waters for which a TMDL has been approved or established by EPA should be consistent with the assumptions and requirements upon which the TMDL is established. EPA encourages the inclusion of specific trading provisions in the TMDL itself, in NPDES permits, in watershed plans and the continuing planning process.

EPA does not support any trading activity that would delay implementation of a TMDL approved or established by EPA or that would cause the combined point source and nonpoint source loadings to exceed the cap established by a TMDL.”³⁷



In an “Impaired But No TMDL” scenario, interim permitting can serve as one of the regulatory instruments for trading along with any authorizing law or regulation that may exist as a matter of state law. Photo courtesy of Sean Munson / Creative Commons.

35 40 C.F.R. § 122.44(d)(1)(vii)(B).

36 U.S. Environmental Protection Agency, *Establishing TMDL “Daily” Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015, (April 25, 2006) and Implications for NPDES Permits* (2006), available at <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/dailyloadsguidance.cfm>.

37 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

States may also have additional requirements surrounding trading in the context of a TMDL. Obviously, the more specific and detailed a TMDL, or authorizing statute or rule is, in regard to trading, the easier it will be for the state permitting agency to approve trades for TMDL consistency. If a TMDL is silent on trading, and the state is without authorizing statute or rule, then the state agency may be less willing to approve trading in a permit.

Some states require the development of TMDL implementation plans (either in concert with the TMDL itself or immediately after a TMDL has been established). In these cases, TMDL implementation plans are good sources that can provide additional details relevant to trading, including a schedule and phased milestones for achieving the TMDL cap, and direction to implementing agencies regarding the actions expected of nonpoint sources under their jurisdiction and when. Whether a state develops an implementation plan or not, U.S. EPA requires TMDLs to provide “reasonable assurances” that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable.³⁸

The TMDL does not just impact point sources through NPDES permits, but also sets load allocations (LAs) for nonpoint sources. The 2003 U.S. EPA Trading Policy and 2007 U.S. EPA Toolkit for Permit Writers both state that the nonpoint source trading baseline should be established or derived from this TMDL LA as the baseline for nonpoint source trading in the context of a TMDL.

1.2.4 Alternative to a TMDL

Sometimes a state may choose not to proceed with developing a TMDL for a waterbody listed as impaired, but to pursue an alternative pollution reduction strategy instead. In June 2012, U.S. EPA published a guidance document listing the use of alternative approaches as a new goal of the CWA 303(d) program³⁹ and has confirmed that states have authority and discretion to do so in two particular circumstances: Category 5m for waters impaired predominantly by the atmospheric deposition of mercury;⁴⁰ and Category 4b for impaired waters but for which other pollution controls are in place and expected to restore water quality within a reasonable period of time.⁴¹ This discussion focuses on Category 4b.

U.S. EPA regulations recognize that alternative pollution control requirements may obviate the need for a TMDL. And, as a consequence, particular waterbodies, even if they are impaired, need not be included on a state’s 303(d) list if technology-based effluent limitations required by the CWA, more stringent effluent limitations required by state, local, or federal authority, or “[o]ther pollution control requirements (e.g., best management practices) required by local, State or Federal authority” are stringent enough to implement applicable water quality standards.⁴² U.S. EPA, through guidance, has acknowledged that the most effective method for achieving water quality standards for some impaired waterbodies may be through controls

38 U.S. Environmental Protection Agency, *Guidelines for Reviewing TMDLs Under Existing Regulations Issued in 1992*, (2002) (hereafter “2002 TMDL Guidelines”), available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2002_06_04_tmdl_guidance_final52002.pdf.

39 See U.S. Environmental Protection Agency, *A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program*, (2013), available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/vision_303d_program_dec_2013.pdf (“use [of] alternative approaches, in addition to TMDLs, that incorporate adaptive management and are tailored to specific circumstances where such approaches are better suited...to achieve the water quality goals of each state.”).

40 See U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, *Information Concerning 2008 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions*, Section 9, (2006), available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/2008_ir_memorandum.cfm.

41 See U.S. EPA, Office of Wetlands, Oceans and Watersheds, *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act*, Section 5, (2005) (hereafter “2006 Integrated Reporting Guidance”), available at <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2006irg-report.pdf>.

42 See 40 C.F.R. §130.7(b)(1).



TMDLs establish the assimilative cap for pollutant loadings from both point and nonpoint source contributors in the respective watershed. In a post-TMDL scenario, the TMDL serves as the primary structure for a trading framework or plan. Photo courtesy of U.S. Army Corps of Engineers Los Angeles District / Creative Commons.

developed and implemented without TMDLs (referred to as a Category 4b alternative). Under this 4b alternative, states must provide adequate documentation that the required control mechanisms will address all major pollutant sources and establish a clear link between the control mechanisms and water quality standards.⁴³

In evaluating whether a particular set of pollution controls are, in fact, “requirements” for a 4b alternative evaluation, U.S. EPA will consider several factors including:

“(1) authority (local, state, federal) under which the controls are required and will be implemented with respect to sources contributing to the water quality impairment (e.g., self-executing state or local regulations, permits, and contracts and grant/funding agreements that require implementation of necessary controls), (2) existing commitments made by the sources to implement the controls (including an analysis of the amount of actual implementation that has already occurred), (3) the availability of dedicated funding for the implementation of the controls, and (4) other relevant factors as determined by EPA depending on case-specific circumstances.”⁴⁴

U.S. EPA has affirmed that the “other pollution control requirements” may include, or rely on, water quality trading, so long as they follow the principles described in the 2003 U.S. EPA Trading Policy.⁴⁵

Under this alternative scenario, a state may elect to place an impaired water on its category 4b list instead of on its 303(d) list, using some form of watershed plan or watershed strategy to identify the pollution control requirements that are stringent enough to implement applicable water quality standards within a reasonable period of time, along with an implementation schedule and a monitoring plan to track the effectiveness of the controls identified. In this plan or strategy, the state may provide for water quality trading, and allow the plan or strategy to serve as the initial regulatory instrument for future trades.^{46,47}

43 2006 Integrated Reporting Guidance, *supra* note 41, at pp. 53-56.

44 *Id.* at p. 55. See also the additional EPA guidance documents on this issue located at U.S. Environmental Protection Agency, *Water: Total Maximum Daily Loads (303d): EPA Guidance*, <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/guidance.cfm#reporting> (Oct. 18, 2013).

45 *Id.*

46 *Id.* at pp. 54-55.

47 Helen Bresler, Laurie Mann, and Eric Monschein, *Category 4b Demonstration for Pathogen Impaired Tributaries to Puget Sound in Kitsap County, Washington*, *Water Environment Federation*, TMDL 2009: 821-829, (2009), available at <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/11D.pdf>.

1.3 Mechanisms for Effectuating the Trade

Regardless of the scenario (no impairment, pre-TMDL, post-TMDL, or alternative to a TMDL), all trades eventually must be reflected in an NPDES permit (for point sources), a 401 water quality certification,⁴⁸ or some other enforceable agreement.⁴⁹

For NPDES point sources (including municipal wastewater treatment plants [WWTPs]), industrial dischargers, and regulated stormwater⁵⁰), there are three basic kinds of NPDES permits: individual, general, and watershed- or area-specific. An individual permit is assigned to an individual point source and governs only discharges from that source. A general permit may be assigned to a class or multiple classes of similarly-situated point sources (e.g., U.S. EPA's multi-sector general permit for stormwater discharges associated with industrial activity). And a watershed- or area-specific permit may address multiple point sources within a defined watershed or area.

Regardless of the type of permit, there is no one-size-fits-all approach to effectuating a trade. In some permits, the water quality-based effluent limitations are assigned in one section, and the authorization to trade for compliance with these limitations is set forth in a separate section. In other permits, the limitations themselves are expressed in the alternative or on a sliding scale, depending on whether the point source elects to trade or not (and, if so, in whole or in part).



There is no one-size-fits-all approach to incorporating a trade into an NPDES permit. Photo of riparian buffer strip courtesy of American Farmland Trust.

⁴⁸ Under Section 401 of the Clean Water Act, any applicant for a federal license or permit (e.g., a dredge or fill permit from the U.S. Army Corps of Engineers under Section 404 of the CWA, an NPDES permit issued by EPA in a state that does not yet have delegated NPDES authority, or certification of a nonpoint source hydroelectric facility) must obtain a certification from the state in which the discharge originates that the discharge will comply with the state's water quality regulatory requirements, including water quality standards. In some cases, this "401 certification" will need to impose additional state-based limits or conditions in order to assure compliance with these requirements. As part of these limits or conditions, a state may elect to authorize water quality trading, and thus allow the 401 certification to serve as the initial regulatory instrument for authorizing future trades.

⁴⁹ A permit or certification is not the exclusive mechanism for formalizing a trade. Instead, states may elect to do so through some other form of enforceable agreement. For example, in a bilateral trade, a state may allow the credit buyer and seller to enter into a private contract, pursuant to which the parties provide the state with third party oversight and enforcement rights. Alternatively, in a dynamic, multi-party trading scheme, a state may allow multiple credit buyers and sellers to sign on to a trading plan or agreement that governs all future trades, subject to oversight and enforcement by the state or U.S. EPA. And in an enforcement context, a state may allow a point source to trade as a "supplemental environmental project" (SEP) or as part of a Natural Resource Damage Assessment settlement to mitigate enforcement fines and penalties, using a consent decree or settlement agreement to formalize the trading obligation. This is a new concept that several EPA regions and states have embraced. The Consent Decree between U.S. EPA and the Scranton Sewer Authority (Pennsylvania) for combined sewer overflows (CSO) contains a provision for nutrient trading. See U.S. Environmental Protection Agency, *Scranton Sewer Authority – Scranton – Pennsylvania Settlement*, (Dec. 13, 2012), available at <http://www2.epa.gov/enforcement/scranton-sewer-authority-scranton-pennsylvania-settlement>. Trades in these contexts may face opposition from environmental groups.

⁵⁰ Under its phased approach to stormwater permitting under Section 402(p) of the Clean Water Act, U.S. EPA has designated municipal separate storm sewers (based on population served), industries (based on SIC code), and construction activities (based on total acres disturbed) for NPDES permitting requirements. In addition, U.S. EPA and states retain "residual authority" to designate other stormwater sources on a case-by-case basis (for example, based on a demonstration that a particular unregulated source is causing or contributing to a violation of water quality standards).

Through the 2003 U.S. EPA Trading Policy, U.S. EPA has expressed support for:

“...several flexible approaches for incorporating provisions for trading into NPDES permits: i) general conditions in a permit that authorize trading and describe appropriate conditions and restrictions for trading to occur, ii) the use of variable permit limits that may be adjusted up or down based on the quantity of credits generated or used; and/or, iii) the use of alternate permit limits or conditions that establish restrictions on the amount of a point source's pollution reduction obligation that may be achieved by the use of credits if trading occurs. EPA also encourages the use of watershed general permits, where appropriate, to establish pollutant-specific limitations for a group of sources in the same or similar categories to achieve net pollutant reductions or water quality goals through trading. Watershed permits issued to point sources should include facility specific effluent limitations or other conditions that would apply in the event the pollutant cap established by the watershed permit is exceeded.”⁵¹

Where multiple point sources are involved in trading, a watershed- or area-specific permit is appealing because it provides greater flexibility for variation and adjustment over any trading period.

1.3.1 Key Trading Provisions in a Permit

Although there is no one-size-fits-all approach to effectuating a trade through an NPDES permit, key provisions in every NPDES permit need to be tailored to allow trading.

1. Permit Effluent Limits

Foremost are the permit effluent limits and potential trading obligations resulting from a new or more stringent WQBELs. These limits serve as the driver for trading. The WQBEL is typically expressed as a concentration or mass effluent limit that can identify both treatment expectations (and credit purchase obligations). Limits also include a time component (e.g., monthly discharge limits) that needs to match up with the timing of credit generation (*see Section 6*). Units are commonly expressed as an instantaneous maximum and/or an average over time. Sometimes, permit WQBELs are based on a CWA *variance* that is included and described in a different section of the permit.⁵² In other cases, the WQBELs are not immediately enforceable but are subject to a compliance schedule that describes how much time the permittee has to achieve those WQBELs (e.g., 3 years from the effective date of the permit), together with any interim milestones that must be achieved during this schedule.⁵³ In all cases, these schedules must be individually justified and lead to compliance with WQBELs “as soon as possible.”⁵⁴

51 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1611. *See also* 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19.

52 When the underlying water quality standards cannot immediately be achieved due to any of the six factors set forth in 40 C.F.R. § 131.10(g), a state may grant a temporary variance from those standards to a specific discharger, to multiple dischargers, or even on a watershed-wide basis. 40 C.F.R. § 131.13. Since variances affect the underlying standards themselves, they are commonly reflected in both the state standards regulation (revisited every three years as part of the required “triennial review” of standards (40 C.F.R. § 131.20)) and in the affected permits. As part of issuing a variance, a state may impose additional trading-related conditions.

53 When new water quality-based requirements are imposed in a permit, a state may, when appropriate, authorize a schedule by which a point source can achieve compliance with these requirements. 40 C.F.R. § 122.47. These schedules are commonly reflected in the NPDES permit itself, but some states prefer to authorize them by way of a separate, stand-alone compliance order.

54 U.S. Environmental Protection Agency, Office of Water, *Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permit*, (2007)(hereafter “EPA WQBEL Schedule 2007”), available at <http://water.epa.gov/lawsregs/guidance/wetlands/upload/signed-hanlon-memo.pdf>.

Note that WQBELs are not always expressed as numeric limits. Sometimes, WQBELs are narrative, which can make it difficult to quantify the amount of pollutants a facility needs to trade for to achieve compliance. For example, industrial and construction stormwater permittees are subject to a series of non-numeric best management practices. Similarly, *municipal separate storm sewer system* (MS4) permittees are subject to six minimum measures to reduce wet weather impacts in order to reduce pollutants in stormwater to the “maximum extent practicable.” And combined sewer permittees are subject to a requirement to develop and implement long term control plans (LTCPs) to reduce and eventually eliminate combined sewer overflows (CSOs). These plans often incorporate narrative goals. To simplify use with trading, narrative goals can be converted to numeric loads to set treatment requirements and remaining credit obligations.

2. Monitoring and Reporting Requirements

The monitoring section of a permit details the specific parameters to be monitored, monitoring frequency (e.g., daily/monthly/annually), the type of sample required (e.g., grab/composite/continuous), the actual physical form of the report (e.g., Discharge Monitoring Report (DMR)), and the timing for reporting to the regulatory agency. Any trading-related monitoring may be required in addition to, but not instead of, the monitoring obligations under the CWA that apply to all point sources and their associated NPDES permits. A trading plan may also require some form of monitoring, including project-level implementation and performance tracking for credit project review.



Trading-related monitoring may be required, but is in addition to, not instead of, the monitoring obligations under the CWA. Photo courtesy of USDA / Creative Commons.

3. Special Conditions

Special conditions supplement numeric effluent limitations and define activities a permittee must take to reduce pollution and/or the potential for discharges or to collect information.⁵⁵ Special conditions can define additional details and information needed to support trading (e.g., trading ratios, nonpoint source baseline requirements, and project review expectations).

The level of detail on trading required in a NPDES permit depends on the existence and robustness of state trading guidance or watershed trading framework. Two key considerations should guide permit contents related to trading. First, a permit should contain enough detail to demonstrate compliance with the CWA (e.g., effluent limits and guidelines for types of credit projects), in order to protect the permittee against enforcement actions. Second, a permittee should consider the level of scrutiny expected from concerned stakeholders and the public. Groups experienced in reviewing DMRs may question systems that do not provide a similar monitoring rigor and reporting. Permit modification should be considered when additional details are developed or requested. There are several options for where in a permit's compliance reporting to insert credit quantities.

55 U.S. Environmental Protection Agency, Office of Water, *NPDES Permit Writer's Manual* (Special conditions in National Pollutant Discharge Elimination System (NPDES) permits supplement numeric effluent limitations and require the permittee to undertake activities designed to reduce the overall quantity of pollutants being discharged to waters of the United States, to reduce the potential for discharges of pollutants, or to collect information that could be used in determining future permit requirements.), Ch.9, pp. 1, (Sept 2010), available at http://water.epa.gov/polwaste/npdes/basics/upload/pwm_chapt_09.pdf.

Table 1.3.1 How to Incorporate Credits in Permit Compliance Reporting

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Include credit quantities purchased and a permittee’s attestation to their validity in the DMR; <u>do not</u> include projects in the DMR.</p> <p><u>Do not</u> require reporting on projects or types.</p>	<p>DMRs are reported nationally to U.S. EPA, and there may not be a way to report any more detail on trades than quantity of credits, included as note in the comment box. This approach relies heavily on other tracking systems to confirm credit validity (e.g., third party project review and registration) and may not be considered comparable to DMR reporting associated with other treatment options. Some members of the environmental community do not believe this option provides enough opportunity to independently confirm a permittee’s attestation.</p> <p>If the state regulatory agency is already attesting to the validity and quantity of credits, it may be redundant for a permittee to do that again.</p>	<p>The authors are not aware of trading programs that use this approach.</p>
<p>Option B:</p> <p>Include credit quantities purchased in the DMR, relying on the state regulatory agency attestation to their validity. Supplemental forms to the DMR are provided to show credits purchased, linked to the registration number of the credits provided by the state program verifying credit validity. The liability for attesting to validity of the credits lies with the entity verifying the credits.</p>	<p>This allows for the state program to alleviate some of the burden for confirming validity from the permittee.</p>	<p>PA DEP requires permittees to document the use of credits and offsets in DMR forms, which must be submitted at the end of each compliance year. Credits can only be used to meet permit effluent limits for the compliance period for which they are certified, verified, and registered or approved, by the PA DEP.ⁱ</p>
<p>Option C:</p> <p>Require a more detailed monitoring report on program’s trading activity in addition to the DMR.</p> <p>Reporting on credit quantities is done by required submittals outside of the DMR.</p>	<p>Permittees can provide reports on trading activity, just like they would on activities for other required programs. Those reports can include summarized project information such as BMP performance.</p>	<p>The MN Rahr Malting permitⁱⁱ and MN SMBSC permitⁱⁱⁱ both require annual submittals of farmer contracts, credit estimate reports, and an annual report.</p> <p>WI DNR requires permittees to include credit quantities and an attestation to their validity in the DMR, and submittal of an annual report.^{iv}</p>
<p>i Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 § 96.8(h)(6).</p> <p>ii MN Rahr Malting Permit, <i>supra</i> note Table 1.1.1(iv).</p> <p>iii 2007 U.S. EPA Toolkit for Permit Writers, <i>supra</i> note 19, at pp. A-50, A-51, & A-56 in Appendix A.</p> <p>iv WI DNR 2013a, <i>supra</i> note Table 1.1.1(xii), at § 6.</p>		

1.3.2 Incorporating Trading into a Permit

To make trading an enforceable compliance option, the details of how a permittee can use trading to achieve compliance need to be incorporated into a permit. Those details can be included in various places in the permit. The details can be included as: (1) special conditions, incorporated by reference to an external trading plan, framework, or trading guidance; (2) in the effluent limits section; or (3) in other parts of the permit. Permit writers should consider how placement of trading details might relate to potential permit violations, or how placement of a trading detail might trigger a permit modification later on, depending on where it is inserted. For technology-based solutions on site, it is rare to specify a treatment technology in a permit; but for trades offsite, it may be important to lock in the specifications for best management practices (BMPs). The key trading details to include somewhere in the permit or through a reference to the trading plan, framework, or guidance are:

- *Trading area* (justification and how it is protective of the relevant designated uses);
- *Baseline* (sources of applicable regulation or law, how baseline is expressed in the permit – i.e., as a set of minimum BMPs, as a percentage load reduction target for all nonpoint sources, or, an overall requirement for a trading area);
- *Description of credit quantification methodology* (how pre- and post-project conditions are estimated, how credit values are derived, how baseline is accounted for);
- *Trading ratio* (articulation of assumptions and components, including description of scientific, policy, and risk management assumptions and components);
- *Risk mitigation mechanisms* (e.g., *reserve pool*, insurance, and performance bonding);
- *Project pre-screening* (whether this function is required or suggested, and if required, who is responsible for this function);
- *Allowable credit-generating actions* (approved actions, identification of quality and performance standards for those actions);
- *Credit life* (when credits become valid, how long credits remain valid, renewability of credits);
- *Project site design, maintenance and implementation/performance confirmation* (whether these components are required, and if so, the frequency and aspects of these confirmations);
- *Project review* of project site implementation and performance (whether required, the entity that will perform, the frequency and content, and the standards by which performance is judged); and
- *Credit registration* (if required, characteristics of credit registry, information disclosure minimums).

Following are specific options for incorporating the details of a trading plan into a permit.

Table 1.3.2 Incorporating the Details of a Trading Plan into a Permit

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Include trade details as a special condition(s) or by reference to a trading plan using a special condition.</p> <p>The condition(s) can either reference a trading framework developed for the watershed and approved by the state, an attached trading plan, or could at least include a general outline of all of the components that should be included in a permittee's trading plan.</p>	<p>The permit language could authorize the use of credits consistent with an approved trading framework or plan.</p> <p>Ideally, trading frameworks have been built and approved for a watershed, but some permittees may need time to develop a detailed trading plan. If this is the case, the permit could establish a timeline by which the permittee must submit its trading plan to the relevant regulatory agency, and could clearly note that no trades may be used as <i>offsets</i> by the permittee until the detailed trading plan is approved by the agency. That trading plan would be publicly noticed with opportunity for comment and, once approved, incorporated by reference into the permit.</p>	<p>The OH Alpine Cheese Company's permit was conditioned on the implementation of a Nutrient Trading Plan involving reducing nutrient loading from nearby farms. The permit references the specific Trading Plan; the permit would revert to TMDL compliance if the permittee failed to implement the plan.ⁱ</p> <p>PA DEP permits authorize trading consistent with the state-approved trading framework as a special condition.ⁱⁱ</p>
<p>Option B:</p> <p>Incorporate details of trading into the effluent limits or monitoring section of a permit.</p>	<p>In some states, a violation of conditions within the effluent limits sections of the permit may be tied to heftier enforcement action and penalties. In other states, modifications to this section of a permit can also trigger "major modifications" subject to public notice and comment. Therefore, including all the details of trading here can make it more difficult to adaptively manage a trading program.</p>	<p>The authors did not find any examples of permits supporting point-nonpoint trades that included trade details in the effluent limits section. In one point-point program, facilities participating in the State of Connecticut's Nitrogen Credit Exchange must comply with annual discharge limits in a general permit by either falling below the threshold or securing credits to cover the difference. The credit authorization is in the effluent limits section.ⁱⁱⁱ</p>

i Electric Power Research Institute, *Case Studies of Water Quality Trading Being Used for Compliance with National Pollutant Discharge Elimination System Permit Limits*, pp. 3-6, (2013) (hereafter "EPRI Case Studies"), available at [http://op.bna.com/env.nsf/id/rlen-9ffsex/\\$File/000000003002001454.pdf](http://op.bna.com/env.nsf/id/rlen-9ffsex/$File/000000003002001454.pdf). See also OH Alpine Cheese Permit, *supra* note Table 1.1.1(v), at p. 21.

ii Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(h).

iii EPRI Case Studies, *supra* note Table 1.3.2(i), at pp. 3-32 – 3-34. See also State of Connecticut Department of Environmental Protection, *General Permit for Nitrogen Discharges*, § 4(b), (2010), available at http://www.ct.gov/deep/lib/deep/water/municipal_wastewater/2011_2015_nitrogen_gp.pdf.

2 TRADING BASICS: WHO, WHERE, WHAT, & HOW

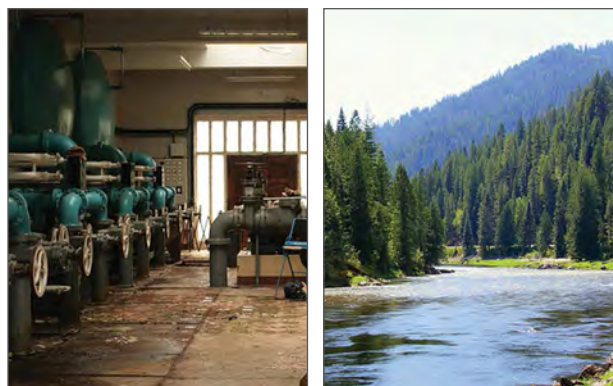
This section describes the basic elements that must be identified in a trading program to define who may participate, where trades can occur, what can be traded, and the actions that can generate credits.

2.1 Types of Trades

Four general types of trades can be used to meet different needs. In the regulatory context, trading has been used to 1) offset existing discharges, or 2) offset new or expanded discharges. In the voluntary context, trading can be used to 3) meet water quality goals before a TMDL or other requirement is needed, or 4) create purely voluntary water quality benefits.

To offset an existing discharge, a Wastewater Treatment Plant (WWTP) might purchase temperature credits to meet the temperature requirements in its permit rather than build a more expensive chiller. In this scenario, trading presents a choice between installing technology on site and purchasing credits from BMPs installed offsite.

As an offset for expanded discharges, stormwater permits might require new developments to offset their nutrient impacts by purchasing credits.⁵⁶ In impaired waters, trading may not be considered appropriate for new or expanded discharges without a comprehensive plan.⁵⁷ A new discharger proposing to add a pollutant to an impaired waterway where a TMDL exists, and who will cause or contribute to decreased water quality, must comply with two conditions: first, that there are



A wastewater treatment plant purchasing temperature credits to meet its temperature requirements in permits rather than build a more expensive chiller is an example of offsetting an existing discharge. Photo courtesy of Redmires Water Treatment Works / Creative Commons (left) and USFS / Creative Commons (right).

56 North Carolina Admin. Code Title 15A § 02B.0240(e)(5) (2014), available at http://portal.ncdenr.org/c/document_library/get_file?uuid=724dab6f-6f8b-4cf2-b18d-25ad35fc3445&groupId=38364.

57 See *Friends of Pinto Creek v. U.S. EPA*, supra note 34. See also *In RE: the Cities of Annandale and Maple Lake NPDES/SDS Permit Issuance for the Discharge of Treated Wastewater*, No. A04-2033, Decided: May 17, 2007 (Supreme Court of Minnesota), available at <http://www.mncenter.org/issues/water/special-water-bodies/lake-pepin.aspx>. It is important to note, however, that the *Pinto Creek* case is not binding on legal decisions beyond the Ninth Circuit. This is a developing area under the Clean Water Act, and precise instructions on which type of plan (or criteria within a plan) would be acceptable are not available at this time. However, it may be in a state's best interest to compile a broad, integrated plan that incorporates both compliance schedules and trading activities. The stronger and more comprehensive the plan, the more favorable a court using the *Pinto Creek* logic might view trading.

“sufficient remaining pollutant load allocations”; and second, that existing dischargers are operating under compliance schedules consistent with applicable water quality standards.⁵⁸

Finally, trading may also be used as a voluntary means of offsetting impacts or achieving net water quality benefits. For example, conservation groups may desire to purchase and retire credits for net water quality benefit, or corporate buyers may wish to purchase credits to help meet corporate sustainability or supply chain goals.

The options below describe different trading scenarios.

Table 2.1 Allowable Trading Scenarios

TYPES OF TRADES	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Allow trading to achieve compliance with an existing permitted discharge</p>	<p>Trading to achieve regulated permit requirements allows the option to purchase credits in lieu of potentially expensive technology upgrades or installation.</p>	<p>The OR Clean Water Services (CWS) permit and the OR City of Medford permit include purchasing temperature offsets in lieu of installing expensive chillers at their points of discharge, although both anticipate offsetting new growth in the future.ⁱ City of Medford is purchasing credits now to cover projected exceedances in the future.</p>
<p>Option B:</p> <p>Allow trading to offset new growth</p>	<p>Trading to offset new growth has been used in areas where state-level regulations have been placed upon new or expanding developments. The suitability of this option depends upon whether the requirements are in place to allow water quality offsets from new development or new or expanding regulated sources. Generally, growth offsets are associated with long-term or permanent credits.</p> <p>There is legal risk associated with this option due to uncertainty around whether, and under what conditions, offsets can be used to enable new or expanded discharges of a regulated pollutant in impaired waterways.ⁱⁱ See Footnote 34 on more considerations tied to the Pinto Creek case.</p>	<p>MDE policy states that all new or expanded point source nutrient loads must be fully offset. However, all existing major WWTPs are required to upgrade to Enhanced Nutrient Removal (ENR) technology and cannot use trading to meet these stricter standards.ⁱⁱⁱ</p>
<p>Option C</p> <p>Allow trading to achieve compliance with current discharges and offsets for new growth</p>	<p>State-level regulations and other demand drivers will largely dictate the appropriateness of this option. Allowing for both may introduce complexity in the program. For example, offsets for new construction and associated runoff might require permanent protection for a BMP, but offsetting an annual WWTP discharge might require shorter-duration contracts.</p>	<p>VA DEQ trading policy allows for point-source to point-source trading to achieve existing permit requirements. To offset new growth, Virginia also allows for point-source to nonpoint-source trading. Most demand comes as permittees for new development purchase phosphorus offsets to meet stormwater requirements.^{iv}</p> <p>Similarly, several NC nutrient strategies – Tar Pamlico, Neuse, Jordan and Falls – allow point sources to trade to offset exceedances of their annual nitrogen or phosphorus group caps while separately requiring new development to offset nutrient loading from stormwater. To date, only the stormwater offsets have been actively trading in the program as the point sources have not yet exceeded their permit limits.^v</p>

58 40 C.F.R. § 122.4(i), *supra* note 17.

(continued)

Table 2.1 Allowable Trading Scenarios

TYPES OF TRADES	CONSIDERATIONS	EXAMPLES
<p>Option D:</p> <p>Allow for pre-regulatory trades</p>	<p>Some trading programs may be established in advance of an approved TMDL and/or water quality criteria with the aim of incentivizing early action from point sources and nonpoint sources alike. Concerns sometimes arise that early purchase of credits may leave fewer credits for smaller permittees who wait to purchase credits until they have a regulatory requirement in place.</p>	<p>The OH Great Miami program was established prior to anticipated implementation of a TMDL with the goal of inviting early action from point sources. Point sources that chose to purchase credits in advance of regulation received a more favorable trading ratio for early participation.^{vi}</p>
<p>Option E:</p> <p>Encourage voluntary trades</p>	<p>WQT program developers may wish to encourage non-regulated voluntary buyers to participate in regulatory trading programs. These buyers may desire to purchase and retire credits for net environmental benefit or as a way of purchasing voluntary offsets for their activities.</p> <p>In many cases, WQT programs will not be built solely for voluntary trades. Trading programs may wish to allow purchases of credits for both compliance and voluntary reasons.</p>	<p>MDA policy allows for “private or public parties wishing to purchase credits” to participate in the trading program on a voluntary basis.^{vii} The Ohio River Basin trading project is currently trading stewardship credits to meet voluntary targets between farmers and power plants.^{viii}</p>

i OR DEQ 2009, *supra* note Table 1.1.1(xiii), at § 1.3.

ii *See Friends of Pinto Creek v. U.S. EPA. supra* note 34.

iii Maryland Department of the Environment, *Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed*, p.1., (2008) (hereafter “MDE 2008”), available at http://www.mde.state.md.us/assets/document/NutrientCap_Trading_Policy.pdf.

iv Virginia Admin. Code Title 9 § 25-820-10 – 80 (2014), available at <http://leg1.state.va.us/000/reg/TOC09025.HTM#C0820>.

v North Carolina Department of Environment and Natural Resources, Division of Water Resources, *Nutrient Strategies*, (undated), available at <http://portal.ncdenr.org/web/wq/ns>.

v David A. Newburn & Richard T. Woodward, *An Ex Post Evaluation of Ohio's Great Miami Water Quality Trading Program*, *Journal of the American Water Resources Association* 48 (1): 156-169, (2012), available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2011.00601.x/abstract>.

vii Maryland Department of Agriculture, *Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed Phase II-B: Guidelines for the Exchange of Nonpoint Credits Maryland's Trading Market Place (draft)*, p. 6, (2008) (hereafter “MDA 2008a”), available at http://www.mdnutrienttrading.com/docs/Phase%20II-B_Crdt%20Purchase.pdf.

viii In the initial stage of the Ohio River Basin Trading Project, credits are only used to promote voluntary environmental and sustainability goals. However, the program strives for acceptance of its credits as permit compliance. *See* Electric Power Research Institute, *EPRI Transacts First Credits in World's Largest Water Quality Trading Program*, (Mar. 11, 2014), available at <http://www.epri.com/Press-Releases/Pages/EPRI-Transacts-First-Credits-in-World%E2%80%99s-Largest-Water-Quality-Trading-Program.aspx>.

2.2 Appropriate Regulatory Trading Instruments & Sectors

Trading guidance, trading frameworks, or individual trading plans can provide direction to stakeholders on which regulatory instruments are suitable for trading for a state, watershed, or permittee (see **Section 1** for building trading into regulatory instruments). There are two common options programs use to determine which regulatory instruments are appropriate for trading.

Table 2.2 Determining the Regulatory Instruments under which Trading Is Allowed

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A</p> <p>Pre-defined list of appropriate regulatory instruments and sectors</p>	<p>This approach makes it clear for permittees which types of permits or regulatory decisions might allow for trading, and clarifies which sectors and land use categories are eligible for trading. This approach provides clarity but might unduly limit options to trade. The trading program can be clear that appropriate regulatory instruments and sectors are not fixed and, instead, focus on where trading is supported currently.</p>	<p>In its FL Lower St. Johns River Pilot program, FL DEP allowed NPDES permit holders, including MS4s, to purchase credits where permits are updated to include trading.ⁱ</p> <p>OH EPA allows modified NPDES permit holders to purchase credits, including CAFOs subject to special restrictions.ⁱⁱ</p> <p>MDE and MDA's trading program allows for modified NPDES permit holders, except MS4 permittees, to purchase credits.ⁱⁱⁱ MDE is now considering whether to allow MS4 permittees to purchase credits.^{iv}</p> <p>PA DEP allows municipal and industrial NPDES permit holders with wasteload allocations to trade.^v</p>
<p>Option B</p> <p>Case-by-case basis</p>	<p>Trading may be appropriate within different types of regulatory instruments, and a case-by-case approach maintains flexibility to incorporate trading into many types of CWA regulatory instruments.</p> <p>Where standard, structured processes are not utilized, this option increases uncertainty and negotiation time because each permit must establish trading provisions (as opposed to referencing an already approved trading framework to support and expedite the decisions).</p>	<p>ID DEQ typically requires TMDLs for trading, but exceptions are determined on a case-by-case basis.^{vi} WA DOE determines what trades are appropriate on a case-by-case basis.^{vii}</p> <p>OR DEQ lists some appropriate types of trades, but authorizes trades that comply on a case-by-case basis, which may include trades within NPDES permits, hydroelectric certification, other 401 certifications, and trades outside of TMDLs.^{viii}</p> <p>The OH EPA water quality trading rules require the submission of a Water Quality Trading Management Plan to consider approval of new trading program within any permit or similar regulatory instrument.^{ix}</p>

i Florida Department of Environmental Protection, *The Pilot Water Quality Credit Trading Program for the Lower St. Johns River*, pp. 21 & 25 in Appendix A (2010) (hereafter "FL DEP 2010"), available at <http://www.dep.state.fl.us/water/wqssp/docs/WaterQualityCreditReport-101410.pdf>.

ii Ohio Admin. Code, *supra* note Table 1.1.1(x), at § 3745-5-03(C).

iii MDE 2008, *supra* note Table 2.1(iii), at § 6.

iv Maryland Department of the Environment, *Trading Between Sectors to Meet Bay Targets*, (undated), p.2 (copy on file with authors).

v Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(h).

vi ID DEQ 2010, *supra* note Table 1.1.1(xiv), at § 4.4.

vii WA DOE 2010, *supra* note Table 1.1.1(xv), at p.6.

viii OR DEQ 2009, *supra* note Table 1.1.1(xiii), at §§ 1.1, 2.1, & 4.1.

ix Ohio Admin. Code, *supra* note Table 1.1.1(x), at § 3745-5-05.



Trading can be built into NPDES permits, MS4 stormwater permits, 401 water quality certifications, and other appropriate regulatory instruments. Image: Aaron Webb / Creative Commons.

2.3 Trading Areas

Trading areas define the geographic boundaries within which buyers and sellers can conduct trades with each other. The 2003 U.S. EPA Trading Policy states that trading areas should be defined to “coincide with a watershed or TMDL boundary,” resulting in, “trades that affect the same waterbody or stream segment and [help] ensure that water quality standards are maintained or achieved throughout the trading area and contiguous waters.”⁵⁹ A trading area usually has a defined point of concern where water quality goals must be met. The point of concern may be an impaired lake, estuary, or other water body, and is generally the most downstream point within the trading area. Many TMDLs for nutrients (e.g., Chesapeake Bay⁶⁰ and Lower Boise River⁶¹) or water temperature (e.g., Willamette River⁶²) identify a point of maximum impact, which is the location within the waterway where the effects of pollutant loading have been identified as the greatest.

Trading areas may be small or large. Larger trading areas facilitate more trading as they will tend to include more potential buyers and sellers. Whatever the size of the trading area, it should be defined so there is a clear link between the credited pollution reduction and the permitted discharger ultimately using those credits.

59 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

60 MDA 2008a, *supra* note Table 2.1(vii), at p.7.

61 Idaho Department of Environmental Quality, *Lower Boise River Subbasin Assessment and Total Maximum Daily Load*, at § “TMDL Targets”, (2015), available at <https://www.deq.idaho.gov/media/1118789/draft-final-lbr-tp-tmdl-addendum-2015.pdf>.

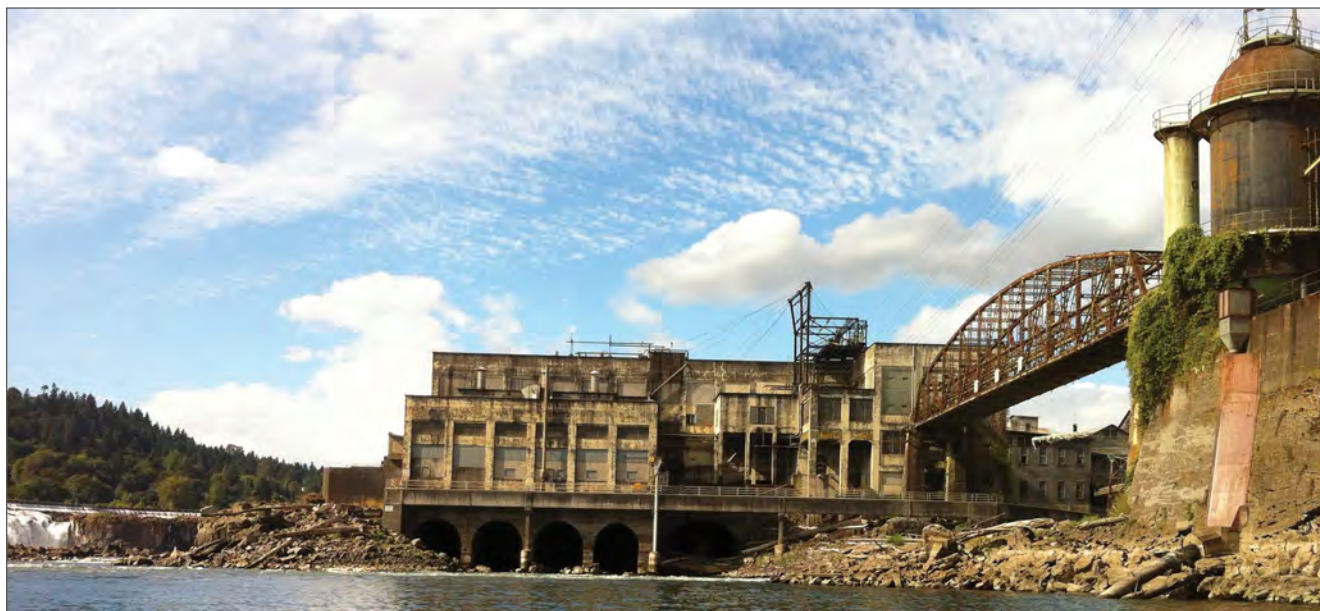
62 Oregon Department of Environmental Quality, *Willamette Basin TMDL*, pp. 14-32 – 14-33, (2006), available at <http://www.deq.state.or.us/wq/tmdls/docs/willamettebasin/willamette/chpt14wqmp.pdf>.

Crossing State Lines

Where a watershed crosses state lines, the trading areas may be a combination of watershed and state boundaries. For example, Maryland has defined three trading areas for its program: the Potomac, the Patuxent, and a combination of the Susquehanna, the Eastern Shore, and the Western Shore watersheds. The point of concern for each of these is the Chesapeake Bay. The Patuxent lies entirely within the State of Maryland while the other trading areas are a combination of watershed and state boundaries. Trading within those areas is limited to the portions within Maryland.⁶³ Similarly, Virginia limits trades to only the portion of the Potomac within Virginia, excluding projects in the Maryland, Pennsylvania, and West Virginia portions. The Chesapeake Bay states, however, have discussed and may consider interstate trading within these cross-state basins in the future.⁶⁴

Box 2.3 Other Factors Influencing Where Credits Are Purchased

Beyond trading areas, there are other ways to link pollution discharge at one location to water quality benefits at another (*see* Trading Ratios in **Section 5.1**). Point sources may purchase credits within an area smaller than what is defined by a trading area for a variety of non-compliance related reasons. For example, a city may prefer to buy credits within its boundaries for civic reasons (e.g., supporting local landowners, promoting healthy communities, and providing green space within city boundaries), or credits may be purchased from particular areas needing ecological improvement to support the targeted designated uses. Whatever the size of the trading area, a clear link should exist between the credited pollution reduction and the compliance requirements of the permitted discharger that will use those credits.



Trading areas will vary depending on the point of concern. They may be small or large, but whatever the size, the trading area should be defined so that there is a clear link between the credited pollution reduction and the permitted discharger ultimately using those credits. Courtesy of Aaron Webb / Creative Commons.

⁶³ MDA 2008a, *supra* note Table 2.1(vii), at p.7.

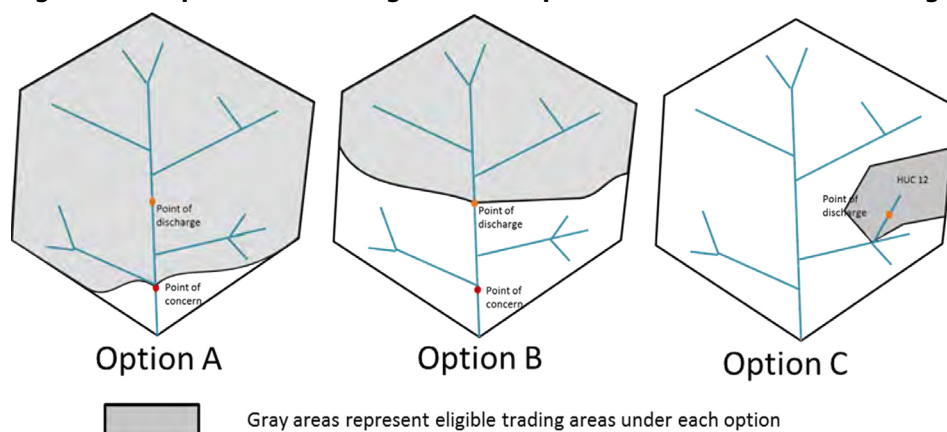
⁶⁴ Walker and Selman, *Comparison and Effectiveness of Chesapeake Bay Nutrient Trading Program Policies*, at p.40, (2015), Prepared for USDA Office of Environmental Markets. *In press*.

In other cases, trading across state lines is encouraged. The Ohio River Basin project was designed to facilitate interstate trading. Credits generated in one state may be used by a permittee in another state “so long as the trade is scientifically defensible and does not violate the prohibitions set forth [in the trading plan].”⁶⁵ The program has been endorsed by Ohio River Valley Sanitation Commission, which represents Illinois, Indiana, Ohio, Pennsylvania, New York, Kentucky, Virginia, and West Virginia.⁶⁶ It is being piloted in Indiana, Ohio, and Kentucky.⁶⁷

Trading Area Restrictions

Legally, trades must be conducted in a manner that ensures that regulated discharges do not cause or contribute to an exceedance of applicable water quality criteria. To this end, some trading programs restrict the trading area for buyers based on their location. For instance, to ensure that trades do not result in temporary exceedances above water quality standards, a trading program may require that buyers purchase credits only from upstream sources. The approaches described below and depicted in Figure 2.3 represent a range of options for delineating trading areas.

Figure 2.3 Options for Trading Areas (all options include interstate trading where appropriate)



65 Electric Power Research Institute, *Pilot Trading Plan 1.0 for the Ohio River Basin Interstate Water Quality Trading Project*, p. 3, (2012)(hereafter “EPRI 2012”), available at <http://wqt.epri.com/pdf/Full-Trading-Plan-as-amended.pdf>.

66 *Id.* at p. 33.

67 *Id.* at p.3.

Table 2.3 Delineating Trading Areas

OPTIONS		EXAMPLES
<p>Option A:</p> <p>Upstream of the point of concern</p> <p>Watersheds with a TMDL or other water quality strategy have often defined a point of concern where water quality goals need to be met. Pollution reductions need to occur above that point of concern, allowing all point source discharges in the watershed above the point of concern to participate in a trading program.</p>	<p>This approach allows for credits to be generated downstream of the point of discharge so long as they are upstream of the point of concern (e.g., defined in a TMDL or other water quality assessment) and do not cause or contribute to the violation of water quality standards.ⁱ</p> <p>Some watersheds may have multiple points of concern that shape a trading area. For example, the Chesapeake Bay TMDL defines the Bay as a point of concern, but state TMDLs and other assessments identify other points of concern, and, thus, smaller trading areas in some cases.</p>	<p>MT DEQ bases its trading area on watershed boundaries and, unless otherwise authorized by MT DEQ, requires that most credits be generated upstream of the point of concern.ⁱⁱ</p> <p>In Maryland, the Chesapeake Bay acts as a point of concern. Five trading basins, which align with the major river basins flowing into the Bay, act as trading areas. However, in cases where a buyer is located in a smaller, local TMDL watershed, credits must be obtained within the smaller watershed.ⁱⁱⁱ</p> <p>The Chesapeake Bay also acts as a point of concern in Pennsylvania. Currently, PA DEP implements its trading program to achieve no net increase in the discharge of pollutants at Pennsylvania's overall point of compliance for the Chesapeake Bay. However, trades are allowed between river basins within the state boundaries.^{iv}</p>
<p>Option B:</p> <p>Upstream of the point of discharge</p> <p>Here, buyers are restricted to purchasing credits above the physical outfall of the permitted facility or its receiving waterbody <i>mixing zone</i>.</p>	<p>This straightforward approach simplifies the process of setting a trading area and clarifies the analysis of potential pollution hot spots. However, it may preclude important pollution reductions, especially where point sources are located near the headwaters of a watershed, few trades can be generated upstream, and the major impacts to designated uses occur downstream.</p> <p>National Network participants commented that this approach may be overly limiting, and that it was most important to define trading areas with science.</p>	<p>The OH Great Miami program requires all credit generation to occur upstream of a discharger seeking to trade, unless the trade is to meet a TMDL, in which case the trading area may be derived from the TMDL.^v</p> <p>The Ohio River Basin project also defines trading areas as upstream of a point of discharge.^{vi}</p>
<p>Option C:</p> <p>Downstream trading is allowed within a small watershed</p> <p>In this approach, the purchase of credits must occur from projects upstream of the point of discharge, except for sources within the same Hydrologic Unit Code (HUC) in the same sub-watershed (e.g., small HUC-12 watersheds).^{vii}</p>	<p>This option may provide small WWTP or stormwater utilities the ability to offset a portion of their compliance requirements with nonpoint source-generated credits located downstream within the same small subwatershed (e.g., HUC-12), provided that the trade does not result in an <i>exceedance</i> of any applicable water quality criteria.</p> <p>An adequate match of supply to demand should be taken into consideration before committing to this type of trade.</p>	<p>WI DNR, in watersheds with no TMDL, requires trades be upstream of a point of discharge, except if located within the same HUC-12 watershed. If downstream purchases are made, an additional discount factor is applied based on the ratio of the buyers' loading to stream loading at the point of discharge. Watersheds with a TMDL can trade upstream of a point of concern (<i>see Option A</i>).^{viii}</p>

*(continued)***Table 2.3 Delineating Trading Areas**

OPTIONS	CONSIDERATIONS	EXAMPLES
i	As more states begin to create numeric river and stream criteria, the need to consider trading areas upstream of discharges may become more important.	
ii	Montana Department of Environmental Quality, <i>Montana Policy for Nutrient Trading</i> (Circular DEQ-13), § IV.4, (2012) (hereafter “MT DEQ 2012”), available at http://deq.mt.gov/wqinfo/Circulars.mcp .	
iii	MDE 2008, <i>supra</i> note Table 2.1(iii), at § 4.5. See also U.S. Environmental Protection Agency Region 3 & U.S. Environmental Protection Agency Region 2, <i>Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment</i> , § 2, (2010), available at http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html . Note that the MDE guidance was based on a Tributary Strategy that has since been replaced with the Chesapeake Bay TMDL.	
iv	Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 §§ 96.8(h)(2) & (i)(2)-(3).	
v	MCD 2005, <i>supra</i> note Table 2.3(v), at § 3.2.	
vi	Electric Power Research Institute, <i>Written Statement of Record Regarding: The Role of Trading in Achieving Water Quality Objectives</i> , (2014) (hereafter “EPRI Testimony 2014”), available at http://wqt.epri.com/pdf/EPRI%20Testimony%20WQT%20Final%204-17-14.pdf .	
vii	Hydrologic units are identified by HUCs. Hydrologic units are divided into six levels, each nested within each other. HUC-12 hydrologic units are identified by a 12- digit code, are the smallest standard units, and are called “subwatersheds.” HUC-10 hydrologic units are “watersheds.” The Watershed Boundary Dataset contains data on all HUCs. See U.S. Geological Survey & U.S. Department of Agriculture, National Resources Conservation Service, <i>Federal Standards and Procedures for the National Watershed Boundary Dataset: Techniques and Methods 11-A3</i> (4 th ed.), (2013), available at http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_021581.pdf . See also U.S. Geological Survey, <i>Hydrologic Unit Maps</i> , (Mar. 6, 2014), available at http://water.usgs.gov/GIS/huc.html .	
viii	WI DNR 2013b, <i>supra</i> note Table 1.1.1(xii), at §§ 2.10 & 2.11.1. See also WI DNR 2013a, <i>supra</i> note Table 1.1.1(xii), at §§ 2 & 4.	

2.4 Appropriate Pollutants for Trading

The 2003 U.S. EPA Trading Policy encourages the trading of nutrients, sediments, and other pollutants, but does not currently support the trading of persistent bioaccumulative toxics.⁶⁸ Most trading programs have focused on phosphorus and nitrogen. Trading has also occurred for pollutants such as temperature. The 2003 U.S. EPA Trading Policy contemplates trading for other pollutants as well, noting that “trading of pollutants other than nutrients and sediments has the potential to improve water quality and achieve ancillary environmental benefits if trades and trading programs are properly designed.” The 2003 U.S. EPA Policy also says that such trades “may pose a higher level of risk and should receive a higher level of scrutiny to ensure they are consistent with water quality standards.”⁶⁹

Box 2.4 Cross-Pollutant Trades

The 2003 U.S. EPA Trading Policy¹ and several states allow for cross-pollutant trades in limited circumstances (e.g., offsetting a biochemical oxygen demand loading with phosphorus credits), especially when pollutants contribute to similar impairments within a waterbody (e.g., low dissolved oxygen). Cross-pollutant trades may be appropriate where the science exists to quantify and substantiate the equivalency and an equivalency ratio (see **Section 5.1**) is used to translate the impact of reduced loading of one pollutant to an equivalent impact from the other. A watershed strategy or TMDL can provide a good context for why cross-pollutant trading makes sense, and can provide the science to connect different forms of pollutants to the same desired outcome.

1 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

68 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

69 *Id.*

Ultimately, each state agency will need to support and defend its decisions regarding which pollutants are appropriate for trading and the characteristics that may better support trading for that particular pollutant. These characteristics include, but are not limited to:

- Sound science linking the contribution of pollutants at a point source and field scale to the designated uses for a waterbody;
- A low likelihood of localized impacts (i.e., protecting human or aquatic life health); and
- The presence of clear pollution reduction goals or standards to guide trading decisions.

Each trading program must define the pollutants that are eligible for trading, including the *units of trade* (e.g., lbs/year) and forms of pollutants (e.g., total phosphorus vs sediment-attached or ortho-phosphorus). Often, a trading program's choice of eligible pollutants, units, and pollutant forms will be shaped by the relevant permit or other regulatory instrument driving trades.

In all circumstances (and regardless of the pollutants at issue) trades may not cause or contribute to a violation of water quality standards or impair the *designated uses* of a receiving water. Different trading program elements will need to be designed for different pollutants. There are several approaches to determining appropriate pollutants for trading.

Table 2.4 Eligible Pollutants for Trading

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Pollutants listed in the 2003 U.S. EPA Trading Policy and others approved by the state</p> <p>Appropriate pollutants for trading include all of those listed in the 2003 U.S. EPA Trading Policy (nitrogen, phosphorus, sediment and Total Suspended Solids (TSS), and oxygen-demand parameters) and those authorized by the state agency via its trading policies or approved permits (e.g., temperature).</p>	<p>This approach provides guidance on which pollutants may be more appropriate for trading. It also provides flexibility to add additional pollutants to the list already mentioned by U.S. EPA and approved by an individual state.</p>	<p>OR DEQ supports trading of temperature and oxygen-demanding parameters, which include BOD, ammonia, nutrients, sediment, and total suspended solids (TSS), but the list is not meant to be exhaustive.ⁱ</p> <p>WI DNR allows trading of any pollutant other than bioaccumulative chemicals of concern, anticipating that most will be phosphorus and TSS.ⁱⁱ</p> <p>VA DEQ,ⁱⁱⁱ MT DEQ,^{iv} and the Ohio River Basin project^v trade nitrogen and phosphorus in mass per unit time (pounds per year). MDE^{vi} and PA DEP both allow trading of nitrogen, phosphorus, and sediment in units of pounds per year. There are no current sediment trades in PA yet.^{vii}</p>
<p>Option B:</p> <p>No pre-approved list</p> <p>Pollutant eligibility is determined on a case-by-case basis by the state agency. There are no pre-approved or listed pollutants deemed appropriate for trading.</p>	<p>This approach is similar to option A, but with greater flexibility. It may also generate the most legal and regulatory risk for state agencies to continually evaluate proposals and dischargers.</p>	<p>The authors are not aware of any states that provide no information about which pollutants will be considered for trading. OR DEQ does not have official state guidance that specifies acceptable pollutants for trading, but it does provide a list of parameters for which trading is supported and encouraged in its Internal Management Directive, an internal resource for agency staff.^{viii}</p>

*(continued)***Table 2.4 Eligible Pollutants for Trading**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>Limited list</p> <p>Eligibility is restricted to a pre-selected, limited number and type of pollutants.</p>	<p>This pollutant eligibility approach makes trading straightforward but leaves less room for flexibility.</p>	<p>ID DEQ broadly allows for nutrient trading and suspended solids, does not currently consider temperature and bacteria, but could consider other pollutants on a limited basis.^{ix}</p>
<p>i OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at §§ 2.4-2.5.</p> <p>ii WI DNR 2013a, <i>supra</i> note Table 1.1.1(xii), at § 2.</p> <p>iii VA DEQ 2008, <i>supra</i> note Table 1.1.1(xix), at pp. 1 & A-1.</p> <p>iv MT DEQ 2012, <i>supra</i> note Table 2.3(ii), at §§ I & II.2.</p> <p>v EPRI 2012 <i>supra</i> note 65, at p. 2.</p> <p>vi MDE 2008, <i>supra</i> note Table 2.1(iii), at §§ 3.10 & 3.11.</p> <p>vii Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 § 96.8(b)(3) – (4).</p> <p>viii OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at §§ 2.4 & 2.5.</p> <p>ix ID DEQ 2010, <i>supra</i> note Table 1.1.1(xiv), at §§ 4.7, 4.8, & 6.1.</p>		

2.5 Appropriate Credit-Generating Actions

Not all BMPs or project types may necessarily generate credits. Several factors can help determine the appropriateness of credit-generating actions: 1) whether the project reduces the pollutant parameter of concern (i.e., generates water quality benefits); 2) whether an adequate method exists to document the reduction generated from the project; and 3) whether the pollution reduction resulting from the practice will take place in a contemporaneous time period with the discharge or water quality impact. This information may not be available for all pollutants, each watershed, or all land uses, which means trading program participants may need to generate more information prior to allowing a particular BMP type or use the best available science and professional judgment.

Engaging stakeholders, especially agriculture, in identifying the priority practices to include can be an important part of building confidence in the trading program development process. **Table 2.5b**, at the end of Section 2, lists examples of approved BMPs in Oregon, Idaho, the Ohio River Basin, Maryland, Pennsylvania, Wisconsin, and Washington trading documents. The table is not meant as an exhaustive list, but a sample of state programs or BMPs approved for trading where authors could easily get information.



In a trading program, participants may need to generate more information prior to allowing a particular BMP type or use the best available science and judgment. Fanno Creek riparian planting photo courtesy of Willamette Partnership.

A list of appropriate BMPs can also communicate BMP guidelines for crediting procedures (e.g., appropriate site conditions, project review procedures, performance standards) and criteria for implementation and generation of credits (e.g., effectiveness, design, implementation, and installation standards). These are further discussed in **Section 7.3**. Quantification of the various BMPs' load reductions is discussed separately in **Section 4**. Using baselines, or minimum performance standards, for eligibility to participate in a trading program is discussed in **Section 3.2**. There are several options for deciding which types of BMPs are eligible to generate credits.

Table 2.5a Deciding Which BMPs Are Eligible to Generate Credits

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>The designated trading program administrator pre-authorizes categories of credit-generating BMPs.</p> <p>This approach provides a predictable list of which BMPs can generate credits or not, but may not keep up with innovations provided by new and more effective practices.</p>	<p>This approach provides the greatest level of control around the types of BMPs that will be incentivized through trading. This may be appropriate where watershed analyses provide a clear understanding of the types of actions needed on the ground to restore water quality. Pre-approved lists can be updated and changed over time.</p> <p>Many National Network participants expressed that without the ability to add new BMPs, this option may not keep up with innovation provided by new and more effective practices.</p>	<p>FL DEP lists eligible credit-generating actions and those actions excluded from trading.ⁱ</p> <p>WI DNR,ⁱⁱ ID DEQ,ⁱⁱⁱ VA DEQ,^{iv} CO Cherry Creek Basin program,^v and MN SMBSC permit^{vi} all have an approved BMP list for generating credits. New BMP types can be added to these lists.</p>
<p>Option B:</p> <p>Appropriate BMPs are considered on a case-by-case basis.</p> <p>This more flexible approach allows innovation, but can be time-intensive with each BMP evaluated on a case-by-case basis.</p>	<p>This approach allows for greater flexibility and innovation by project developers seeking to generate credits. It can work well in situations where trading programs are unsure upfront of the optimal types of BMPs they want or where credit quantification methods for BMPs are still in development. However, evaluating BMPs on a case-by-case basis can be time-intensive.</p>	<p>The authors are not aware of any programs that explicitly state BMP types are considered <i>only</i> on a case-by-case basis.</p>

*(continued)***Table 2.5a Deciding Which BMPs Are Eligible to Generate Credits**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>BMPs are pre-approved at the state level, streamlining review for a local trading program.</p> <p>A combination of Options A and B, in this case: those BMPs pre-approved at the state-level undergo streamlined review for an individual trading program, whereas other BMPs, including new and innovative practices, undergo full review on a case-by-case basis.</p>	<p>This approach merges Options A and B and facilitates quicker review for pre-approved BMPs, but also recognizes the possibility that other BMPs may become eligible to generate credits. Under this approach, a trading program must maintain two BMP approval processes at the program and project levels, though that may not necessarily lead to greater operating costs.</p> <p>National Network participants liked the option of a list of pre-approved BMPs with the ability to easily add new BMPs. Participants expressed that a list provides clarity and helps reduce ongoing administrative costs. There was also a lot of interest in the ability to incorporate new technologies and customize BMPs for particular watersheds.</p>	<p>MT DEQ considers eligible actions on a case-by-case basis in addition to a list of approved BMPs (referred to as <i>qualifying actions</i>).^{vii}</p> <p>OR DEQ^{viii} has a list of approved BMPs, but also allows for proposals of trades not on the list to be considered on a case-by-case basis.</p> <p>OH Alpine Cheese permit includes eligible BMPs implemented according to standards approved by NRCS, incorporated into the OH DNR/ OH EPA spreadsheet, or a new BMP type approved by OH EPA, OH DNR, and Ohio State University.^{ix}</p>

i FL DEP 2010, *supra* note Table 2.2(ii), at pp. 22-23 in Appendix A.

ii WI DNR 2013a, *supra* note Table 1.1.1(xii), at Appendix A.

iii ID DEQ 2010, *supra* note Table 1.1.1(xiv), at pp. 32-33 in Appendix A.

iv VA DEQ 2008, *supra* note Table 1.1.1(xix), at p. 6.

v Cherry Creek Basin Water Quality Authority, *Trading Program Guidelines*, § II.B, (undated) (hereafter “CCBWQA 1997”), available at <http://colowqforum.org/pdfs/water-quality-trading/documents/Cherry%20Creek%20Basin%20Trading%20Program%20Guidelines.pdf>.

vi See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at pp. A-50 & A-53 in Appendix A.

vii MT DEQ 2012, *supra* note Table 2.3(ii), at § IV.3.

viii OR DEQ 2009, *supra* note Table 1.1.1(xiii), at § 3.4.

ix The Ohio State University, Holmes Soil and Water Conservation District, & Alpine Cheese Company, *A Plan to Reduce Phosphorus Loading and Improve Stream Ecological Function in the Middle Fork and Adjoining Watersheds of the Sugar Creek Watershed: Joint Recommendations for the Alpine Cheese Phosphorus Nutrient Trading Plan*, pp. 11-12, (2006) (hereafter “OSU, HSWCD, & Alpine Cheese Co. 2006”), available at http://www.epa.ohio.gov/portals/35/WQ_trading/alpine%20cheese%20trading%20plan%201%201%2006.pdf.

Table 2.5b A Sample of BMPs Approved in Some Existing Water Quality Trading Programs

WATER QUALITY ATTRIBUTE	BMP TYPE	BMPs	SIMILAR TO NRCS PRACTICE CODE	WP	STATE							
					OR	ID	ORB †	MD	PA	WI	WA	
Temperature (kcal)	Structural	riparian forest buffer/restoration	391		X	--	--	--		--		
		flow augmentation			X*	--	--	--		--		
Nutrients (Nitrogen, Phosphorus, Sediment)	Structural	riparian forest buffer/restoration	391		X		X	X	X		X ^{i,ii}	
		tree planting	612				X	X	X			
		livestock exclusion fencing	382		X		X	X ⁱⁱⁱ	X ⁱⁱⁱ		X ⁱ	
		off-stream watering						X	X		X ⁱ	
		stream bank stabilization system	580, 395						X		X	
		dredging and aquatic habitat restoration	395								X	
		animal waste management system	359, 629, 313, 632, 633, 591					X	X	X ⁱⁱⁱ		
		barnyard runoff control/loafing lot management.							X	X ⁱⁱⁱ		
		sediment basins					X		X		X	
		underground outlet					X					
		sprinkler irrigation					X					
		micro irrigation					X					
		surge irrigation					X					
		tailwater recovery					X					
		diversion						X	X		X	
		roof runoff structure							X		X	
	heavy use protection area						X	X				
	retirement of highly erodible land							X	X			
	wetland restoration					X	X	X	X	X		
	Management or Practice-based	vegetated treatment system									X	
		conservation easement for permanent protection of areas with perennial vegetation									X	
		cover cropping				X		X	X	X	X	
		crop rotations				X	X					
		conservation tillage				X		X	X	X	X	
		filter strips					X	X	X		X	
		rotational grazing							X ^{iv}	X ^{iv}		
straw in furrows						X						
nutrient management						X	X		X ^v	X	X ⁱⁱ	
polyacrylamide						X						
grass waterways							X	X		X		
phytase feed additive								X	X			
riparian grass buffer/restoration							X	X	X ^v			

* Accepted on a case-by-case basis where sufficient information and/or modeling exist.

** Methodologies and protocols are available, quantification method not yet approved by state agency.

† ORB (Ohio River Basin) represents several states of the Ohio River Basin including Ohio, Indiana, and Kentucky. Other projects are approved on a case by case basis.

i Occurs in combination with riparian forest restoration, livestock exclusion fencing, and off-stream watering. May need additional supporting actions.

ii Occurs in combination with riparian forest restoration and nutrient management.

iii Occurs with either off-stream watering or both off-stream watering and rotational grazing.

iv Occurs in combination with off-stream watering and livestock exclusion fencing.

v Depending on the site, these BMPs may be part of a baseline requirement or could generate credits based on an operation's nutrient management/manure management or conservation plan.

2.6 Environmental Justice & Equity Considerations

Managers establishing WQT programs should also remain alert to environmental justice concerns.⁷⁰ Environmental justice issues arise when the administration or enforcement of environmental laws concentrates harm disproportionately in populations of lower socioeconomic means and without meaningful access to governmental decision making.⁷¹ Two basic environmental justice concerns have been expressed by some: first, that localized impacts could inadvertently arise more often in low income and minority communities; and second, that the economic advantages of trading will not be shared proportionately with landowners and farmers of lower socioeconomic means.⁷²



An environmental justice concern with trading is that localized impacts could inadvertently arise more often in low income and minority communities. Additionally, economic advantages of trading may not be shared proportionately with landowners and farmers of lower socioeconomic means. Photo courtesy of Dave Sutherland / Creative Commons.

U.S. EPA employs an agency-wide strategy to alleviate environmental justice concerns,⁷³ a component of which is a goal that “[n]o segment of the population, regardless of race, color, national origin, or income, as a result of U.S. EPA’s policies, programs, and activities, suffers disproportionately from adverse human health or environmental effects, and all people live in clean, healthy, and sustainable communities.”⁷⁴

Although the CWA prohibits localized impacts,⁷⁵ whether the adjacent community is disadvantaged or not, the fact remains that illegal localized impacts can sometimes arise. Enforcement of the CWA requires adequate agency oversight, but also relies in part on alert citizens to raise challenges to illegal activity.⁷⁶ Some

70 See, e.g., Ann Sorensen & Benjamin Maloney, *Financial, Environment, and Social Impacts of WQT*, ADVANCES IN WATER QUALITY TRADING AS A FLEXIBLE COMPLIANCE TOOL (Water Environment Federation, in press).

71 See generally Luke Cole & Sheila Foster, *FROM THE GROUND UP: ENVIRONMENTAL RACISM AND THE RISE OF THE ENVIRONMENTAL JUSTICE MOVEMENT* (New York University Press, 2001), available at http://books.google.com/books/about/From_the_Ground_Up.html?id=R6rj8XMSjx4C.

72 See generally, Rena Steinzor, Robert Verchick, Nick Vidargas, & Yee Huang, *Fairness in the Bay: Environmental Justice and Nutrient Trading* (Briefing Paper No. 1208 by the Center for Progressive Reform) (2012), available at http://www.progressivereform.org/articles/WQT_and_EJ_1208.pdf.

73 EPA accomplishes this effort in administering Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, (Feb 11, 1994), available at <http://www.epa.gov/environmentaljustice/resources/policy/index.html#order>.

74 U.S. Environmental Protection Agency, *The Environmental Protection Agency’s Environmental Justice Strategy* (1995) (no page numbers; see “Development of the Environmental Justice Strategy”), available at http://www.epa.gov/environmentaljustice/resources/policy/ej_strategy_1995.pdf.

75 40 C.F.R. § 122.44(d)(1)(i).

76 33 U.S.C. § 1365 (citizen suits).

observers worry that water quality trading could cause localized impacts to disproportionately accumulate in communities with less capacity to express concern, especially in areas of low-income and communities of color.^{77,78} Proper program development and enforcement should mitigate these concerns.

Beyond environmental justice concerns, there are other equity questions with trading to consider. For credit sellers, there may be concern about who can participate in trading. Farmers who are early actors and good stewards may spend more to generate the same amount of credits as farmers who have not implemented the same early BMPs. WQT program developers can support early actors with information about how trading baselines are set, how risk is calculated, and the timing of when credits can be generated. In auction settings, there is also some concern that lower income farmers may set their prices too low to get some level of payment for their credits.

For credit buyers, there may be concern that sophisticated permittees could deplete low-hanging trading options early in the development of a trading program, leaving only difficult and expensive compliance options available for small or economically disadvantaged communities. During program development, U.S. EPA and state agencies should engage economically disadvantaged communities, as well as environmental and agriculture groups, in addressing these concerns.

77 See Clifford Rechtschaffen, *Advancing Environmental Justice Norms*, 37 U.C. Davis Law Review 95, 103 (2003), available at <http://digitalcommons.law.ggu.edu/pubs/36/>.

78 See U.S. Environmental Protection Agency, *EPA Water Quality Trading Evaluation Final Report*, p. 3-9 (2008), available at <http://www.epa.gov/evaluate/pdf/water/epa-water-quality-trading-evaluation.pdf> (briefly describing a situation on the Neuse River where large permitted allocations seemed environmentally sound at first but could have disparately affected a local lake community).

3 TRADING ELIGIBILITY

This section explains the basic eligibility requirements that credit buyers and credit sellers need to meet in order to participate in trading. Many of the eligibility criteria used in trading are intended to make sure trades help make progress toward meeting water quality objectives. Sometimes, this determination is based in the concept of additionality, which is the idea that credit-generating actions produce new water quality benefits. Additionality is used in other environmental markets, such as carbon and habitat,^{79,80} which use several evaluation criteria. In WQT programs, these additionality concepts can be operationalized by establishing clear eligibility criteria (see **Table 3.0**).⁸¹

Table 3.0 Additionality Considerations and Crosswalk with Common Uses in WQT Programs

ADDITIONALITY CONSIDERATION	COMMON USE IN WQT	
	POINT SOURCE BUYERS	NONPOINT SOURCE SELLERS
Legal, regulatory, and institutional: Defines the statute, regulation, guidance, or industry standards that apply to the project.	Meet technology-based effluent limits (Section 3.1.1) No localized impacts (Section 3.1.2) Antibacksliding (Section 3.1.3) Antidegradation (Section 3.1.4) Compliance with permit conditions (Section 3.1.5)	Meet trading baseline (Section 3.2.1)
Timing: Defines the time period during which the project or activity can be implemented to generate credits.		Credits generated after a base year (Section 3.2.3)
Investment: Demonstrates that the project or activity would not have gone forward without the revenue from credits.		Considerations on certain uses of funds (payment stacking, Section 3.2.6) and generating more than one credit type (credit stacking, Section 3.2.7)
Double counting: Demonstrates that the environmental benefits being sold from a given project or activity are unique and have not been sold or accrued elsewhere.		Considerations on certain uses of funds (payment stacking, Section 3.2.6) and generating more than one credit type (credit stacking, Section 3.2.7)

79 See Sivan Kartha, Michael Lazarus, & Maurice LeFranc, *Market Penetration Metrics: Tools for Additionality Assessment?*, *Climate Policy* 5(2): 147-165, (2005), available at <http://www.tandfonline.com/doi/abs/10.1080/14693062.2005.9685547>.

80 See Brian J. McFarland, *Carbon Reduction Projects and the Concept of Additionality*, *Sustainable Development Law and Policy* 11(2): 15-18, (2011), available at <http://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?article=1463&context=sdlp>.

81 World Resources Institute, *The Greenhouse Gas Protocol, The GHG Protocol for Project Accounting*, (2003), available at http://www.ghgprotocol.org/files/ghgp/ghg_project_protocol.pdf.

3.1 Eligibility for Buyers & Trades

In water quality trading programs, the permittee or buyer must meet certain conditions under state and federal law (and guidance) before they may be eligible to purchase credits for compliance purposes. The 2003 U.S. EPA Trading Policy states that sources and activities required to obtain a federal permit pursuant to sections 402 or 404 of the CWA must do so to participate in a trade or trading program.⁸² A permittee's compliance history is mentioned in the 2003 U.S. EPA Trading Policy, but is not included here as an eligibility criterion—though agencies may wish to consider compliance history in some cases.⁸³ The eligibility criteria below can be treated by trading programs as requirements or as a guideline from which to add or subtract.



For point sources, meeting technology-based effluent limitations (TBELs) for a pollutant should be a prerequisite to participate in a trading program. U.S. EPA and many environmental groups do not support the use of trading to meet TBELs. Courtesy of Chesapeake Bay Program / Creative Commons.

3.1.1 Meeting Technology-Based Effluent Limitations (TBELs)

A point source that has attained TBEL requirements can obtain credits to achieve its water quality based effluent limits (WQBELs). The CWA requires point sources to meet the more stringent of TBELs or WQBELs. The intent of a TBEL is to achieve a minimum level of treatment for most sources and pollutants based on readily available technology. Meeting applicable TBELs for a pollutant should be a prerequisite for point sources to participate in a trading program. Importantly, U.S. EPA and many environmental groups do not support the use of trading to meet TBELs⁸⁴ unless otherwise explicitly authorized through regulation.⁸⁵ Trading provisions could be included in new TBELs authorized through federal regulation, but some states may not support the use of trading to meet TBELs in any situation. TBELs may not exist for all parameters for all sources.⁸⁶

82 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1611.

83 Some states may choose to exclude or provide greater scrutiny on trading with certain permittees who have a poor compliance record.

84 *Id.* at pp. 1610-1611. EPA has stated that it may consider including provisions for trading in the development of *new and revised* technology-based effluent guidelines in appropriate circumstances. *Id.* at p. 1611.

85 For instance, the “water bubble” is a regulatory implementation method allowing the iron and steel industries to conduct intraplant trading in some circumstances. *See also* 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at pp. 6 & 27. *See also* 40 C.F.R. § 420.03.

86 TBELs are derived by using national effluent limitation guidelines by industry. Industry-specific technology-based effluent guidelines have been promulgated for over 50 different industrial categories. *See* 40 C.F.R. pts. 405–99 (2013). The permitting entity can also rely on ad hoc best professional judgment to set TBELs if no effluent limit guidance exists. *See* 33 U.S.C. § 1342(a)(1); 40 C.F.R. § 125.3(a)(2) (2013). While TBELs exist for all sources, they do not exist for all pollutants from all sources. In the case of publicly owned treatment works (POTWs), TBELs are secondary treatment standards as defined in CWA section 1314(d)(1). 33 U.S.C. § 1311(b)(1)(B). POTW facilities have TBELs for five-day biochemical oxygen demand (BOD), total suspended solids (TSS), and pH. 40 C.F.R. § 133.102 (2013). POTWs do not have secondary treatment TBELs for temperature or nutrient discharges. *See id.* In late 2012, EPA rejected a rulemaking petition to include nitrogen and phosphorous removal standards within the national secondary treatment standards for POTWs. Letter from Michael H. Shapiro, U.S. EPA Deputy Asst. Administrator, to Ann Alexander, Natural Resource Defense Council (Dec. 12, 2012), *available at* http://www.epa.gov/npdes/pubs/ow_shapiro_nrdcpetition.pdf.



At a minimum, WQT programs must maintain and protect existing use (e.g., fishing/fish consumption, water-based recreation, drinking water supply) in impaired waters under federal antidegradation policies. Courtesy of USFS Region 5 / Creative Commons.

3.1.2 No Localized Impacts

Avoiding the creation of local concentrations of pollution, referred to as localized impacts, near-field impacts, or hotspots, is required by law and is a common concern associated with WQT. No pollutants may be discharged or activities conducted that cause or contribute to a violation of water quality standards except as allowed in regulatory mixing zones under a compliance schedule.⁸⁷ In its assessment of potential localized impacts, agencies should also consider whether trading in this instance will comply with the Endangered Species Act and other species and habitat protection laws.

If a discharge causes local pollution concentrations that exceed narrative or numeric water quality criteria, a discharger may be deemed in noncompliance with the CWA and should not be allowed to engage in trading unless localized impacts are adequately mitigated through on-site technology or processes. Where predicting localized impacts is difficult, some trading programs have included provisions to revisit effluent limits to protect water quality standards.⁸⁸

Each permit that proposes trading will need some level of review to ensure the trade does not create local pollution concerns. A compliance schedule can phase in measures to limit these concerns. Trading programs can also facilitate that review through mechanisms to limit local pollution concentrations, such as:

- Watershed analyses and models can incorporate the best science to avoid localized impacts;⁸⁹

⁸⁷ 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

⁸⁸ North Carolina Department of Environment and Natural Resources, *Neuse River Basin – Nutrient Sensitive Waters Management Strategy: Wastewater Discharge Requirements* (15A NCAC 2B .0234 (7)(g) The director shall establish more stringent limits for nitrogen or phosphorus upon finding that such limits are necessary to protect water quality standards in localized areas.), (Rule 15A NCAC 2B .0234 Neuse Estuary rules), (Dec. 2010), available at <http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environment%20and%20natural%20resources/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0234.pdf>.

⁸⁹ For example, in the Ohio River Basin Trading Project, trades are disallowed if a hotspot would result. EPRI 2012, *supra* note 65, at p. 3. The WARMF model was calibrated for the Ohio River Basin Trading Project, in part, as a way to identify potential localized impacts. See generally *id.* See also Electric Power Research Institute, *Program on Technology Innovation: Modeling Nutrient Trading in the Ohio River Basin*, (2009), available at <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001018691>.

- Trading can be limited for pollutants with more risk of accumulation in local areas;⁹⁰ and
- Trading can be limited to areas upstream of a point of concern.⁹¹

3.1.3 Antibacksliding

The U.S. EPA policy of “antibacksliding” is intended to assure continued progress toward improved water quality as permits are renewed, reissued, or modified as part of existing effluent guidelines. As defined in CWA sections 303(d)(4) and 402(o) and 40 C.F.R. § 122.44(l), unless falling under a relevant exception, a reissued permit must be as stringent as the previous permit.⁹² Given that WQT programs are typically implemented through a modification of an existing NPDES permit, precautions should be taken so a program follows the CWA’s antibacksliding provisions. Trading may serve as another avenue for achieving a source’s permit requirements, but it can in no way lessen a source’s requirements.

3.1.4 Antidegradation

Federal antidegradation policies ensure that approved actions will not degrade water quality and to ensure that existing designated uses and high quality waters are preserved. The 2003 U.S. EPA Trading Policy describes the need for trading programs to comply with antidegradation policies, stating:

“Trading should be consistent with applicable water quality standards, including a state’s and tribe’s antidegradation policy established to maintain and protect existing instream water uses and the level of water quality necessary to support them, as well as high quality waters and outstanding national resource waters (40 C.F.R. 131.12). EPA recommends that state or tribal antidegradation policies include provisions for trading to occur without requiring antidegradation review for high quality waters. EPA does not believe that trades and trading programs will result in ‘lower water quality’ as that term is used in 40 C.F.R. § 131.12(a)(2), or that antidegradation review would be required under U.S. EPA’s regulations when the trades or trading programs achieve a no net increase of the pollutant traded and do not result in any impairment of designated uses.”⁹³

However, U.S. EPA’s policy statements from 2003 on the interaction of trading and antidegradation, like other parts of the policy, have not been tested in federal court and could prove controversial in practice. WQT programs must, at a minimum, maintain and protect existing uses in impaired waters. In high quality waters, states cannot further degrade water quality unless found “necessary to accommodate important economic or social development” in the area.⁹⁴ Project applicants might conduct a *Tier 2 antidegradation review* that considers trading as one of several less-degrading alternatives reviewed.⁹⁵

90 For example, WI DNR, Ohio EPA, and OR DEQ all disallow trading of bioaccumulative chemicals of concern. WI DNR 2013a, *supra* note Table 1.1.1(xii), at § 2; Ohio Admin. Code, *supra* note Table 1.1.1(x), at § 3745-5-03(B); and OR DEQ 2009, *supra* note Table 1.1.1(xiii), at § 2.4 & Appendix G.

91 OR DEQ, WI DNR, MT DEQ, ID DEQ, and the Miami Conservancy District (Ohio) all either require or recommend that trades occur upstream of points of concern or discharges. OR DEQ 2009, *supra* note Table 1.1.1(xiii); WI DNR 2013a, *supra* note Table 1.1.1(xii), at § 2; MT DEQ 2012, *supra* note Table 2.3(ii), at § IV.4; ID DEQ 2010, *supra* note Table 1.1.1(xiv), at § 3; and MCD 2005, *supra* note Table 2.3(v), at § 3.2.

92 See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. Glossary-1 in Glossary.

93 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1611.

94 40 C.F.R. § 131.12(a)(2).

95 “Tier 2” antidegradation review refers to the review of high-quality waters required by 40 C.F.R. § 131.12(a)(2) on either a pollutant-by-pollutant or waterbody-by-waterbody basis. See also U.S. Environmental Protection Agency, *Water Quality Standards Handbook*, § 4.5, (2014), available at <http://water.epa.gov/scitech/swguidance/standards/handbook/chapter04.cfm>.

3.1.5 Consistency with Standard Methods for Permits

Trading should not supersede the methods and procedures (e.g., sampling protocols, monitoring frequencies) specified by federal regulations or in NPDES permits. U.S. EPA believes this is necessary to provide clear and consistent standards for measuring compliance and to ensure that appropriate enforcement action can be taken.

3.2 Nonpoint Source Project Eligibility

For regulated sources selling credits, additional pollution reductions are those that go beyond those regulatory and permit obligations. However, for sellers not regulated for water quality (e.g., most agriculture sources), it can be more difficult to define pollution reductions that are additional to what “would have” or “should have” happened in the absence of trading. It can also be difficult to define clear, broadly applicable eligibility criteria to diverse crop types and agriculture operations. Thus, it is important to include agriculture stakeholders in defining eligibility criteria. Decisions regarding the establishment of eligibility requirements can be challenging when stakeholders have different expectations or interpretations of what is expected of nonpoint sources.

There are three basic eligibility criteria for nonpoint source projects and activities, including:

- **Trading baseline requirements**, which set a minimum level of activity and/or environmental performance that the *project developer* must meet before being eligible to sell credits in the trading program. The trading baseline considers existing landowner-level obligations that must be met prior to generating credits and can include regulatory requirements, TMDL obligations, and/or trading program obligations;
- **Project timing requirements**, which set distinct bounds around the time period after which a project must be installed to be eligible to generate credits; and
- **Public funds restrictions**, which describe how public funds can be used for projects generating credits in a WQT program. These restrictions indirectly address issues of financial additionality and double counting.

Box 3.2.1 Determining Nonpoint Source Regulatory Requirements

The following questions may arise in identifying regulatory requirements for project eligibility:

- **Which regulations are applicable?** There may be several regulations that apply to particular landowners (e.g., water rights laws, endangered species considerations, local land use restrictions, and state regulatory or statutory mandates). It may be challenging to discern which regulations apply and which do not. Regulators may want to specify which applicable regulations the trading program is concerned about.
- **What constitutes regulatory compliance?** Nonpoint source regulatory requirements are not always straightforward or specific, and as a result, evaluating regulatory compliance may be difficult. For instance, state regulations may require that agricultural producers have a nutrient management plan without specifying whether the plan must be available, fully implemented, or somewhere in between. In other cases, vague water quality directives in state law may exist without being translated into any on-the-ground restrictions or supported with enforcement. The clearer state requirements can be, the easier they will be to translate into trading baselines.
- **How is compliance with existing regulations confirmed?** Trading programs can best implement baseline requirements where there is a clear path to confirm compliance at the credit-generating site. This may be an explicit authorization (e.g., permit), or the lack of a formal violation or enforcement action.

3.2.1 Trading Baseline

The trading baseline establishes a minimum level of effort or level of implementation that must be achieved before the project or landowner is eligible to generate credits. The trading baseline should be set in a manner that considers whether the credit-generating activities go beyond those that are already required by law, existing abatement requirements derived from a TMDL or other water quality goal, and/or required by the trading program itself. The three potential components that comprise the trading baseline are described in more detail below.

- **Regulatory requirements.** Regulatory requirements generally form the foundation of any trading baseline (see **Figure 3.2.1** for clarification on how the term baseline is used throughout this document and how baseline options can be derived). Because a trading program is most often applied on top of an existing regulatory framework, those existing regulatory requirements must be met in order for credits to be generated. The trading baseline ensures that projects provide water quality benefits beyond any relevant requirements stemming from federal, state, tribal, and local regulation in place at the time of implementation. For example, if state law requires riparian pastures to exclude animals from surface waters, then having streamside fencing in place would be required to meet regulatory requirements and would not be a BMP eligible to generate credits. As another example, some relevant state regulations call for non-disturbance; meaning that regulatory requirements would be satisfied if a landowner demonstrates that its operations are not worsening conditions. Identifying and interpreting regulatory requirements can be straightforward or difficult (see **Box 3.2.1** for a discussion of some of the issues that may arise when determining how to meet regulatory requirements).
- **TMDL or other water quality obligations.** Where there is a TMDL in place, the 2003 U.S. EPA Trading Policy states that nonpoint source “pollutant reductions [should be] greater than those required by a regulatory requirement or established under a TMDL.”⁹⁶ The 2007 Permit Writers Toolkit further interprets this to mean that “each nonpoint source participating in trading under a TMDL make reductions consistent with the LA before they can generate credits (additional reductions) for sale. This approach ensures that progress is made toward water quality standards with each trade.”⁹⁷ Establishing a trading baseline that adequately accounts for required nonpoint source obligations under a TMDL is intended to ensure that credits generated from nonpoint sources exceed those that are expected under the TMDL at the time of the proposed trade. A trading program should consider whether TMDL nonpoint source load allocations (LAs), as converted into enforceable site-specific requirements at a particular point in time, are stringent enough to help achieve those LAs in the long term, and whether the trading baseline for a program is consistent with U.S. EPA reasonable assurance determinations for a TMDL. Utilizing LAs as part of the trading baseline is made difficult in practice by U.S. EPA not having TMDL implementation authority, and because state agencies have varying approaches and authority related to TMDL implementation.



Nonpoint source baselines need to be informed by regulatory requirements, TMDL obligations, and any obligations from the trading program itself. The baseline level conversation can be challenging if these expectations are not clear. Photo of water control structure courtesy of USDA NRCS South Dakota / Creative Commons.

96 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610.

97 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. 29.

Translating TMDL LA requirements to individual nonpoint sources or projects can also be challenging. TMDLs are not typically written with trading, or nonpoint source implementation necessary to achieve those LAs, in mind.

For example, the 2007 U.S. EPA Toolkit for Permit Writers notes that a nonpoint source's baseline “would be derived from the nonpoint source's LA[,]”⁹⁸ but it does not specify how to derive baseline for particular sites from the LA. For instance, TMDLs may not link LAs to particular BMPs, specify timelines for achieving LAs, or provide the information needed to interpret load reduction expectations at the site level—all of which would make it more feasible for trading programs to derive trading baselines from TMDLs. If TMDLs are unclear about how LAs apply to individual nonpoint sources, states and TMDL-implementing agencies will need to determine the site-specific requirements derived from the TMDL that may inform and/or set trading baseline. Moving forward, states can update or write new TMDLs with the clarity that could better support trading.⁹⁹



Baselines are usually established using one of three approaches: technology or practice-based, performance-based, or through a standard water quality contribution threshold. Half mile project photo courtesy of Willamette Partnership.

- Trading program obligations.** In some instances, such as where TMDL LAs prove difficult to translate into site-specific requirements, a trading program may set forth its own set of requirements as part of the trading baseline. These requirements may reflect trading program stakeholder views on the role of nonpoint source sectors in reducing pollutant loading, or seek to avoid penalizing early adopters of conservation practices. Similarly, if other water quality goals or obligations are in place (e.g., the Minnesota River Basin Plan was used to inform the MN Rahr Malting permit¹⁰⁰) and set affirmative water quality obligations for nonpoint source performance, the trading baseline may consider translating those obligations into eligibility requirements for participation in the WQT program. Trading programs where there are no TMDL obligations or existing regulatory requirements might consider establishing minimum standards as part of the trading baseline.

Trading baseline can affect the trading program's viability.¹⁰¹ If the baseline is set too high, it will be difficult for projects to achieve creditable load reductions at a reasonable cost and may limit the potential supply of credits. Alternately, if a trading program sets baseline levels too low, it may raise concerns that the program

98 *Id.* at p. 29.

99 See Bobby Cochran and Tim Martin, *Building a Total Maximum Daily Load to Better Support Water Quality Trading*, Willamette Partnership, (2014), available at http://willamettepartnership.org/wp-content/uploads/2014/10/Building-TMDLs-to-Better-Support-Trading_2014-10-10.pdf.

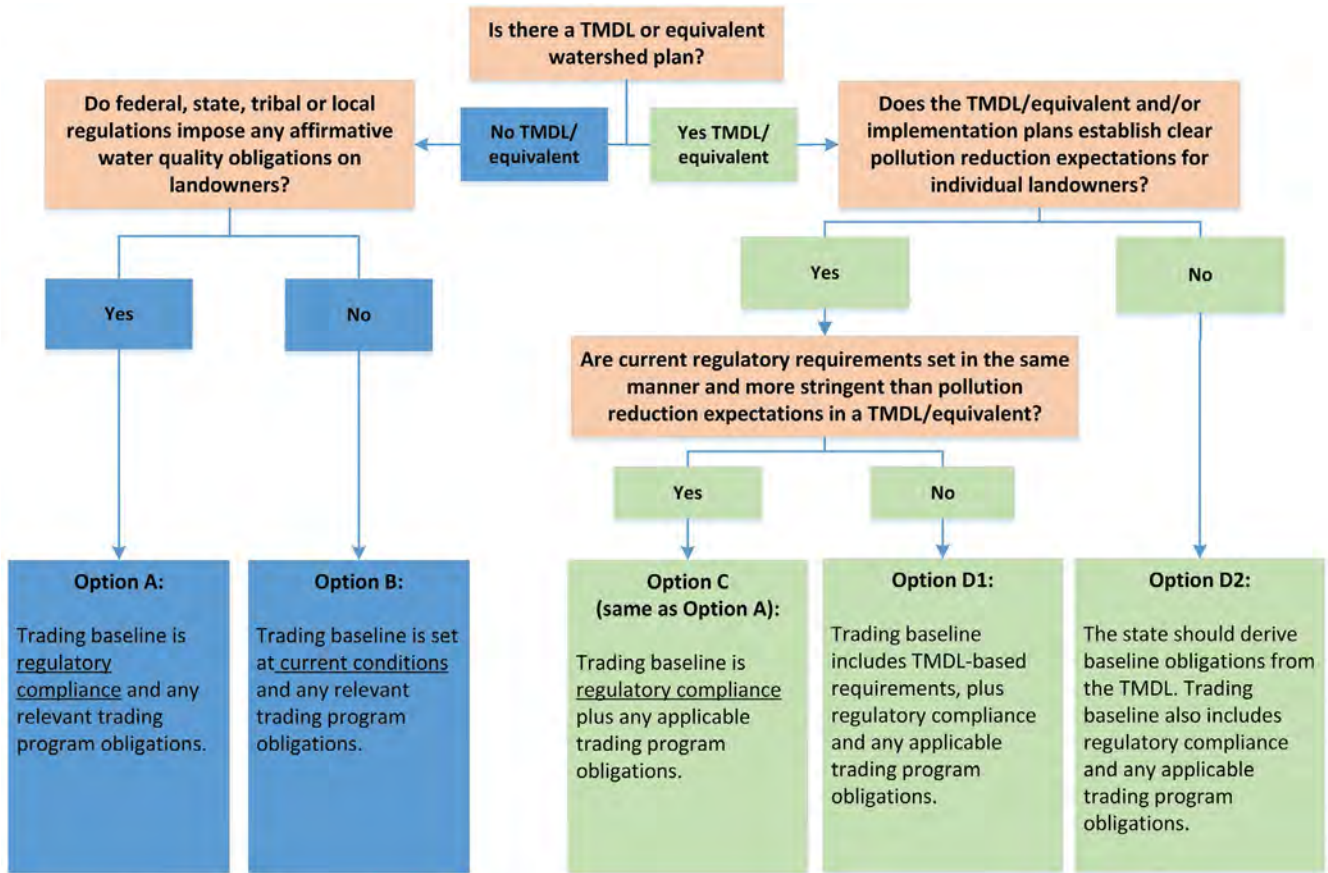
100 Minnesota Pollution Control Agency, Minnesota River Basin Plan (2001), available at <http://www.pca.state.mn.us/index.php/view-document.html?gid=9946> and MN Rahr Malting Permit, *supra* note Table 1.1.1(iv), at Attachment #2 (esp. pp. 10-14).

101 See American Farmland Trust Center for Agriculture in the Environment, *Setting Agricultural Baselines in Water Quality Trading Programs*, at pp. 7-9, (2013), available at https://4aa2dc132bb150caf1aa-7bb737f4349b47aa42dce777a72d5264.ssl.cf5.rackcdn.com/SettingAgriculturalBaselines_FINAL.pdf.

is not helping to achieve overall water quality goals. Setting a trading baseline too low may also penalize agricultural producers that have “done the right thing” by implementing BMPs early and voluntarily. A low trading baseline may also create perverse incentives to delay or remove existing BMPs in order to maximize the credits that could later be generated in a trading program. Ultimately, improving water quality is the goal and must inform baseline decisions.

Options for establishing a trading baseline are presented below and are divided into options for trading programs where no TMDL or other watershed goal exists, and trading baseline options for where a TMDL/ watershed goal does exist.

Figure 3.2.1 Flowchart of Decisions for Developing a Trading Baseline



3.2.2 Expressing Baseline

States that establish baselines in their trading programs have generally taken three approaches to expressing baseline requirements, as informed by TMDLs, water quality goals, or other sources of information. These options do not apply where baseline is defined as the current condition.

Table 3.2.2 Expressing Baseline Requirements

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Technology or practice-based baseline</p> <p>A minimum set of BMPs that must be in place before credits can be generated.</p>	<p>The practice-based approach can be seen as fair in the sense that it requires the same level of effort from all landowners: if the practice is in place, the landowner can proceed with trading without any additional action. However, environmental performance is not guaranteed because the effectiveness of BMPs differs by type of operation and location. Thus, it may be that some landowners implementing the required practices achieve greater environmental benefits than other landowners implementing the same practices.</p>	<p>VA DEQ trading policy currently requires landowners to implement the following practices before being eligible to trade: livestock exclusion, riparian buffers, cover crops, conservation tillage, and nutrient management. If these practices are implemented, VA DEQ has determined, via the Chesapeake Bay Model, that these practices meet the reductions necessary under the TMDL for the agricultural sector.ⁱ</p>
<p>Option B:</p> <p>Performance-based baseline</p> <p>A level of environmental performance that must be achieved before a landowner is eligible to trade.</p>	<p>A performance-based approach to baseline provides flexibility for farmers as it allows landowners to use the BMPs that make the most sense on their operation in order to achieve the baseline. Also, a performance-based approach can account for the farm-level variability in pollutant loading that occurs for a variety of reasons including slope, soil type, and proximity to waterways. In doing so, this method can potentially achieve a more accurate environmental outcome. However, demonstrating compliance with a performance-based baseline may be more complex and involve significant data gathering for model inputs and/or monitoring efforts.</p>	<p>The trading program run by MDA and MDE requires agriculture operations to achieve an environmental performance consistent with the nitrogen and phosphorus LAs established for agriculture in the TMDL before trading can occur.ⁱⁱ An on-farm assessment tool is used to establish the performance level of each farm wishing to trade.</p> <p>WI DNR uses SnapPlus v2 to determine an agricultural field's baseline expectations for nutrient management practices.ⁱⁱⁱ</p>
<p>Option C:</p> <p>Standard water quality contribution</p> <p>In lieu of requiring a set of practices or level of environmental performance, some programs have opted to create a standard water quality contribution ratio that retires a certain percentage of all credits towards meeting water quality goals.</p>	<p>Requiring a standard contribution is a straightforward approach, but in this case, neither level of effort nor level of environmental performance is equal among landowners. The retirement percentage will potentially favor those landowners who are implementing relatively cheap practices (likely those who are late adopters) while failing to reward early actors.</p> <p>Some National Network participants were less comfortable with this approach, but expressed that it could be viable if scientifically tied back to baseline load reduction goals.</p>	<p>The 2000 Lower Boise River Effluent Trading Framework (ID Boise River) required all projects to retire a percentage of credits toward covering the nonpoint sector's pollution reduction expectations prior to a TMDL being implemented.^{iv} The OH EPA rules state set baseline for agriculture as the pollutant load associated with existing land uses and management practices.^v</p>

*(continued)***Table 3.2.2 Expressing Baseline Requirement**

OPTION	CONSIDERATIONS	EXAMPLES
i	VA DEQ 2008, <i>supra</i> note Table 1.1.1(xix), at pp. 3-5.	
ii	Maryland Department of Agriculture, <i>Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed Phase II-A: Guidelines for the Generation of Agricultural Nonpoint Nutrient Credits</i> (draft), pp. 6 & 8 (2008) (hereafter "MDA 2008b"), available at http://www.mdnutrienttrading.com/docs/Phase%20II-A_Crdt%20Generation.pdf .	
iii	WI DNR 2013a, <i>supra</i> note Table 1.1.1(xii), at § 6 & Appendix A. See also WI DNR 2013b, <i>supra</i> note Table 1.1.1(xii), at § 2.7.3 & Table 4.	
iv	Ross & Associates Environmental Consulting, Ltd., <i>Lower Boise River Effluent Trading Demonstration Project: Summary of Participant Recommendations for a Trading Framework</i> , prepared for Idaho Department of Environmental Quality, § 2.2.7, (2000), available at https://www.deq.idaho.gov/media/489512-boise_river_lower_effluent_report.pdf .	
v	Ohio Admin. Code, <i>supra</i> note Table 1.1.1(x), at § 3745-5-09.	

3.2.3 Timing of Meeting the Trading Baseline

Timing of meeting the trading baseline may differ among programs. Programs may struggle with whether baseline must be met prior to generating credits, or whether a landowner who does not currently meet baseline might simultaneously undertake actions to meet baseline and generate credits. Most trading programs allow landowners to meet baseline and generate credits simultaneously (e.g., if a landowner must implement a nutrient management plan to be eligible for the trading program, they may implement the plan in the same year they install a credit-generating practice such as a riparian buffer).

Other baseline timing issues might arise from uncertainties related to the TMDL obligations. Programs may phase in an increasingly strict baseline over time, affording early participants a lower threshold for entry, and increasing entry requirements in future years. This approach may be used in a watershed where a TMDL is under development but not yet implemented or where TMDL implementation timelines are unclear or not specified. Alternately, the TMDL might initially establish minimum pollution reduction levels (that the agency then requires through implementation) expecting those levels will become more stringent over time as the TMDL is implemented. Wisconsin allows nonpoint sources to generate short-term, or interim, credits for activities they have undertaken to comply with the TMDL load allocation. Reductions generated beyond the threshold are considered long-term credits.¹⁰² The timelines for a phased-in approach will likely need justification, similar to compliance schedules for point sources.¹⁰³ Such an approach would be consistent with U.S. EPA's phased TMDL implementation memo.¹⁰⁴ Some environmental groups have indicated that an interim or phased approach is not acceptable, and others believe a phased approach is only acceptable where documentation is provided to justify the delay in implementation specific to the watershed in question.

¹⁰² WI DNR 2013b, *supra* note Table 1.1.1(xii), at § 2.8.

¹⁰³ EPA WQBEL Schedule 2007, *supra* note 54.

¹⁰⁴ U.S. Environmental Protection Agency, *Benita Best-Wong memorandum to Water Division Directors re: Clarification regarding "Phased" Total Maximum Daily Loads*, (2006), available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/tmdl_clarification_letter.cfm.



Trading programs can allow landowners to meet the baseline and generate credits simultaneously. For example, a landowner that needs to implement a nutrient management plan to be eligible for a trading program can implement the plan in the same year they install a riparian buffer to generate credits. Photo of grass filter strip courtesy of American Farmland Trust.

3.2.4 Scale of Applying the Trading Baseline

The scale at which a trading baseline is applied is an issue that often arises in WQT programs. For instance, would a landowner need to meet the trading baseline on the entire farm or only on individual fields? What if the landowner owns more than one operation? Would all operations under common ownership and control need to meet baseline before they were eligible to trade? Another option might be to require that all landowners in a subwatershed meet the baseline requirements before any individual could sell credits.

These questions are getting at the issue of leakage. Leakage in environmental markets occurs where environmental improvements are happening in one location, at the expense of increasing environmental degradation somewhere else. For instance, if a landowner meets baseline on one part of their operation by reducing manure applications, but they then increase manure applications on other parts of their operation, there is potentially no net benefit. There are several options for which scale to apply trading baselines.

Table 3.2.4 Scale at which to Apply Baseline Requirements

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Require baseline to be met on individual fields</p> <p>Baseline eligibility is determined on a field-by-field basis without considering the larger operation (although <i>regulatory baseline</i> requirements continue to apply uniformly).</p>	<p>By restricting baseline determination to individual fields, a program runs the risk that there will be environmental leakage as producers may increase inputs on other fields that are not enrolled in the trading program.</p> <p>For some nonpoint source projects, like stream restoration or reforestation, it may not make sense to evaluate project eligibility on an entire operation, but rather to treat the project discretely. This option may also open up more opportunities for farmer participation in trading.</p> <p>Some programs have applied this option to the portion of baseline beyond regulatory compliance, ensuring the whole operation is in compliance before examining individual fields.</p>	<p>PA DEP requires regulatory compliance to be met first for the whole operation, and then assesses the trading baseline on a field-by-field basis.ⁱ</p>
<p>Option B:</p> <p>Require baseline to be met on the entire farm</p> <p>Credits can only be generated if the entire farm is in compliance with baseline.</p>	<p>By requiring a farm-level assessment to determine baseline, the program can ensure that leakage is not occurring within the operation. However, several issues may arise in cases where farm fields are not contiguous, where a landowner rents out portions of its operation, or where a landowner operates multiple distinct operations. In addition, data and project review needs will increase when the baseline compliance for the entire farm/operation must be determined.</p> <p>WQT program developers would also need to define whether “whole farm” means every field needs to meet baseline or whether in aggregate the farm meets baseline (e.g., where some fields may be over-performing and others under-performing).</p>	<p>MDA and MDE and the VA DEQ trading programs require that baseline be assessed on the entire farm.^{ii,iii}</p>
<p>Option C:</p> <p>Require baseline to be met by entire sub-watershed</p> <p>Credits cannot be generated until the entire sector within the subwatershed has demonstrated compliance with its baseline obligations.</p>	<p>In some cases, trading programs may require that all landowners in a watershed to meet baseline requirements prior to any one landowner being able to generate credits. This approach provides certainty that LAs or other watershed-level nonpoint pollution reduction goals are achieved prior to trading. On the down side, this approach may significantly limit supply of credits or the ability of willing landowners to participate.</p>	<p>In the MI Kalamazoo River trading program, MI DEQ indicated that it would require agriculture to meet its LA in the watershed before any individual producer could trade.^{iv}</p>
<p>i Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 § 96.8(d).</p> <p>ii Maryland Department of Agriculture, <i>Producing and Selling Credits in Maryland’s Nutrient Trading Market: Guidance for Agricultural Producers and Landowners in the Chesapeake Bay Watershed</i>, p.7, (2013), Copy on file with authors.</p> <p>iii VA DEQ 2008, <i>supra</i> note Table 1.1.1(xix), at p. 3.</p> <p>iv Mark Kieser, Kieser and Associates, and Mindy Selman, World Resources Institute, personal communication (March 2014). Note that both the Kalamazoo and MI DEQ trading guidance are not active and no trades occurred.</p>		

3.2.5 Project Timing

Trading programs often set distinct bounds around the time period during which eligible projects must be implemented. This is typically done to retain consistency with a TMDL or to encourage credit-generating projects be implemented for the express purpose of WQT.¹⁰⁵ There are several options for determining a base year to define timing of project eligibility.

Table 3.2.5 Setting a Base Year for Project Eligibility

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Establish a fixed base year</p> <p>To address issues with project timing a program may set a base year after which projects are eligible to generate credits. This base year may be the year the WQT program comes into effect, the date that the TMDL was implemented, the date the NPDES permit was issued, or some other benchmark date.</p>	<p>A base year may be set at a benchmark date for the WQT program. This may be the date the program was established, the date the TMDL was implemented, or the date the NPDES permit was established. Any project implemented after this benchmark date is potentially eligible to generate credits in the program. This approach runs the risk of allowing in projects that were already implemented for other reasons and do not contribute additional water quality improvements. As the program matures, this fixed date may reach several years into the past, increasing the likelihood of eligible projects that do not generate additional water quality benefits.</p>	<p>The OR DEQ guidance uses the NPDES permit to define the base year for project eligibility, which could be based on the TMDL or permit issuance date. For example, if the TMDL or NPDES permit was issued in 2010, then any project developed after 2010 is eligible to generate credits towards permit compliance.ⁱ</p> <p>VA DEQ currently establishes a baseline year of 2005 for land use conversion credits. Credits are determined by evaluating what the land use was prior to 2005 (the year that trading was authorized in state code) compared to the proposed land use change.ⁱⁱ Thus, if a producer wants to generate credits by converting a pasture to forest in 2013, but the parcel of land in question was actually forested prior to 2005, then benefits generated from the site would not be eligible to sell.</p>
<p>Option B:</p> <p>Use current year</p> <p>This approach uses the current year as the base year for project eligibility.</p>	<p>By using the current year, a program ensures that all projects generate new water quality benefits in terms of timing. However, when the current year is used as the yardstick for eligibility, it may adversely “punish” early actors — those landowners who took early action to establish BMPs on their operations. These BMPs cannot be used to generate credits. This may be seen as unfair when farmers who did not take early action are now able to generate and sell credits for the same activities. In the case of annual practices, some have worried that farmers who have been practicing BMPs like cover crops or low till would discontinue these activities so that they could resume them at a later date and then sell those benefits as credits.</p>	<p>The MDA and MDE trading program only allows projects initiated in the year of the project application date to be eligible to generate credits. Maryland also stipulates that annual practices (such as cover crops and conservation tillage) are considered eligible each year and may be used to generate credits as long as trading baseline requirements have been met. The provision was made for annual practices because Maryland wished to eliminate any perverse incentives that would cause a producer to discontinue an annual practice such as cover crops in an effort to re-establish it as a “new” practice in the WQT program.ⁱⁱⁱ</p> <p>In the Ohio River Basin trading project, farmers get credit for practices implemented after the current year.^{iv}</p>

¹⁰⁵ Note that these criteria are not related to the credit life, which is the period from the date a credit becomes usable as an offset by a permittee (i.e., its “effective” date), to the date that the credit is no longer valid (i.e., its “expiration” date), often one year or one season, as discussed in Section 6.1.

(continued)

Table 3.2.5 Setting a Base Year for Project Eligibility

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>Establish an eligibility window</p> <p>This option creates a <i>look-back period</i>, for example, allowing practices implemented within the past three years, or as part of an early action period, to be eligible to generate credits.</p>	<p>This approach is a compromise between the base year and current year approaches. The window can be informed by the current year, and thus, eligible projects are sure to always be somewhat recent. This approach may also avoid some of the concerns over fairness and remove disincentives that may now apply to some early actors under the current year approach. However, the earliest actors still may not be able to participate.</p> <p>Some programs may also use this option to provide incentives for early actions, allowing projects that document their intent to generate credits if they can meet program requirements.</p>	<p>The CA City of Santa Rosa nutrient offset program allowed credit for any nutrient removal/reduction actions implemented after 2007 and prior to the 2011-2012 discharge season to count for the first three years of the program.^v</p>
<p>i OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at § 3.2.</p> <p>ii Code of Virginia, <i>supra</i> note Table 1.1.1(i), at §§ 62.1-44.19:20.B.2.f.</p> <p>iii MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at § 4.5.</p> <p>iv EPRI 2012, <i>supra</i> note 65, at p.4.</p> <p>v California Regional Water Quality Control Board, North Coast Region, <i>Santa Rosa Nutrient Offset Program</i>, in Resolution No. R1-2008-0061 Approving the Santa Rosa Nutrient Offset Program for the Santa Rosa Subregional Water Reclamation System, p. 5, (July 24, 2008) (hereafter “Santa Rosa Offset Program 2008”), available at http://www.waterboards.ca.gov/northcoast/board_decisions/adopted_orders/pdf/2008/080730_0061_Res_SantaRosaNutrients.pdf.</p>		

3.2.6 Use of Public Funds Dedicated to Conservation

Many WQT programs include provisions governing the use of public funds dedicated to conservation for activities to generate credits for sale in the market.^{106, 107, 108} The provisions often include restrictions meant, either directly or indirectly, to ensure that the environmental benefit secured through the sale of the credit is in addition to what would have occurred without it. Unlike carbon markets, most WQT programs do not test formally for whether a project would have happened anyway if not for the WQT program payment. Instead, WQT programs look to projects funded with multiple payment sources (e.g. public conservation funds and WQT program payments) as a measure of whether the project would have been implemented without a credit payment and to ensure water quality benefits could not be claimed by more than one of those funding sources.

The USDA administers several Farm Bill programs like the Environmental Quality Incentives Program (EQIP) which provides payments to landowners who implement environmentally beneficial practices (e.g.,

106 See WRI Comparison Tables 2011, *supra* note 23, at p. 11.

107 Willamette Partnership, *Ecosystem Credit Accounting System: General Crediting Protocol Version 2.0*, pp. 14-15, (2013) (hereafter “Willamette Partnership ECAS 2013”), available at http://willamettepartnership.org/wp-content/uploads/2014/06/General-Crediting-Protocol-v2.0_2013-11-01_Final.pdf.

108 Public conservation funds are defined here to include those targeted to support voluntary natural resource protection and/or restoration. Public loans intended to be used for capital improvements of public water systems (e.g., state Clean Water Revolving Funds and USDA Rural Development funds) and utility stormwater and surface water management fees are not considered public funds dedicated to conservation.

riparian buffers, cover crops, and wetland restoration). Since USDA assumes no ownership of any credits generated from practices paid for with these funds,¹⁰⁹ the environmental benefits associated with these practices could be offered as credits for sale, even though they may have occurred without the additional payment from the sale of credits. Absent justification that the credit-generating activities represent new environmental benefits, there could be questions about how trades using these credits help make progress toward water quality objectives.

Multiple funding sources can be critical to implementing larger projects and broader watershed improvement strategies. Trading programs should not shy away from applying multiple sources of funding, but need to be clear about which funding is generating which water quality benefits, and for whom.

When multiple funding sources are used, double counting may also be a concern. Double counting can be addressed by developing policies that establish what can be sold into WQT markets and what is counted toward other overlapping programs. In the Chesapeake Bay, Maryland and Virginia do not allow water quality benefits associated with federal or state conservation funding to be sold as credits in the WQT program.¹¹⁰ In part, these provisions are in place because the state watershed implementation plans rely on those same funding sources to meet nonpoint source sector load allocations.

Using cost share and other public conservation funds to help farmers reach baseline requirements, however, is not considered double counting, and is allowed in almost all programs where there is an agricultural nonpoint source baseline.¹¹¹

Double counting and financial additionality concerns that arise when using public conservation funds to generate credits are often tempered by the possibility that restrictions on the use of these funds will limit credit supply and increase the price of credits, thereby decreasing the demand for trading and the potential for improved water quality. The three options provided below describe how WQT programs have tackled the use of public conservation funds in trading.



Several Farm Bill Programs like the Environmental Quality Incentives Program provide payments to landowners implementing environmentally beneficial practices (e.g., cover crops and wetland restoration). The environmental benefits associated with these could be offered as credits for sale, although there could be questions about how trades using these credits help make progress toward water quality goals. Trading programs should be clear about which funding is generating which water quality benefits, and for whom. Photo courtesy of USDA / Creative Commons.

109 7 C.F.R. § 1466.36.

110 See WRI Comparison Tables 2011, *supra* note 23, at p. 11.

111 Willamette Partnership, USDA Office of Environmental Markets, Pinchot Institute for Conservation, & World Resources Institute, *In It Together: A How-To Reference for Building Point-Nonpoint Water Quality Trading Programs: Designing and Operating a Trading Program (Part 2)*, p. 31, (2012) (hereafter "In It Together (Part 2)"), available at <http://willamettepartnership.org/publications/>.

Table 3.2.6 Addressing the Use of Public Conservation Funds

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Never allow public funds to be used for credit-generating projects</p> <p>Do not allow projects funded in whole or in part by public funds dedicated to conservation to generate credits.</p>	<p>If public conservation funding is never allowed, then programs can be more certain that the project would have been completed without the credit payment and the benefits are not double counted. However, disallowing public conservation funds to co-finance projects may reduce participation by landowners, who may need the multiple payments to incentivize participation, or preclude the development of larger projects that need to leverage multiple funding sources to be viable.</p> <p>This option was important to several of the National Network participants. Some felt this was unnecessarily restrictive, others felt it was a preferred option.</p>	<p>The MDA and MDE trading program does not allow for the use of public conservation funds in whole or in part to generate credits.ⁱ While the BMP is under contract, when the publicly funded contract is expired, BMPs can be certified and used to generate credits.</p>
<p>Option B:</p> <p>Allow projects partially funded by public funds to generate credits in proportion to the private investment</p> <p>Credits are based on the proportion of private funds relative to the full cost of the project (planning, design, construction, and maintenance).</p>	<p>Allowing for public conservation funds for projects to generate credits in proportion to the amount of private investment may still raise questions about whether projects could have been completed with the public payment alone.</p> <p>Proportionate crediting is based on the full cost of the project (planning, design, construction, and maintenance) and care must also be taken to ensure that water quality benefits counted towards meeting the TMDL are restricted to the portion of benefits attributed to the public funds.</p> <p>This option may be more complex to administer and track. However, this option is generally viewed as a good compromise and has been adopted by several programs.</p>	<p>As a result of some challenges in Oregon’s wetland mitigation banking program, interagency guidance, which did not include OR DEQ, allowed for credits to be generated in proportion to private investment in the project.ⁱⁱ</p>
<p>Option C:</p> <p>Allow public funding to generate credits</p> <p>This option places no restrictions on the use of public conservation funds to generate credits in the WQT program.</p>	<p>Allowing for public conservation funds for projects to generate credits without any restrictions may raise questions about whether trades generate additional water quality benefits. This approach may also create financial inefficiencies and potential inequities for farmers that do not receive conservation payments. However this approach can increase landowner participation by creating added financial incentives to install BMPs. The intent of the program providing payments to allow credit generation or not also matters.</p> <p>This approach will undermine support for trading programs with some stakeholder groups, and could create legal risks for point sources under the CWA.</p>	<p>PA DEP allows projects receiving federal conservation funding, to generate credits, but requires approval from the funding source prior to generating credits.ⁱⁱⁱ</p>

i MDA 2008b, *supra* note Table 3.2.2(ii), at pp. 6-7 & 11.

ii See U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Oregon Department of State Lands, Oregon Watershed Enhancement Board, and Oregon Department of Fish and Wildlife, *Oregon Interagency Recommendations: Public Funds to Restore, Enhance, and Protect Wetland and At-Risk, Threatened and Endangered Species Habitats: Appropriate Uses of These Funds in Species and Wetland Mitigation Projects*, (2008) (hereafter “Oregon Interagency Recommendations on Public Funds”), available at <http://www.fws.gov/oregonfwo/LandAndWater/Documents/PublicFunding-final.pdf>.

iii Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(e)(4)(ii).

3.2.7 Credit Stacking in Other Environmental Markets

Credit stacking, or allowing credits for multiple environmental markets to be generated from a single project area, has frequently been a topic of discussion for WQT program designers.¹¹² In reality, most environmental markets are in the early stages and have rarely interacted, and so the issue of stacking is still relatively hypothetical. One approach to avoid double counting is proportional accounting, which is the generation of multiple credit types where a project site generates more than one distinct environmental benefit on non-spatially overlapping areas.¹¹³

This document does not extend to options around credit stacking with other environmental markets. However, WQT programs that wish to lay the groundwork for credit stacking opportunities in the future should pay careful attention to their eligibility policies. If stacking is to occur there must be clear eligibility policies that ensure credits within each respective environmental market are generating the additional progress toward environmental goals expected.

112 See David Cooley & Lydia Olander, *Stacking Ecosystem Services Payments: Risks and Solutions*, 42 *Envtl. Law Reporter* 10150, (2012). See also Jessica Fox, Royal C. Gardner, & Todd Maki, *Stacking Opportunities and Risks in Environmental Credit Markets* (News & Analysis), 41 *Envtl. Law Reporter* 10121, (2011), available at <http://wqt.epri.com/pdf/credit-stacking-environmental-opportunities-and-risks.pdf>. See also North Carolina General Assembly, Program Evaluation Division, Department of Environment and Natural Resources Wetland Mitigation Credit Determinations (Report No. 2009-04), (Dec. 16, 2009), available at http://www.ncleg.net/PED/Reports/documents/Wetlands/Wetland_Report.pdf. See also Alice Kenny, *When is Credit-Stacking a Double Dip?*, Ecosystem Marketplace, (Nov. 16, 2009), available at http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7147§ion=home. See also Willamette Partnership & The Freshwater Trust, *Draft Regional Recommendations for the Pacific Northwest on Water Quality Trading*, § 5.3, (2014) (hereafter “WP & TFT 2014”), available at http://willamettepartnership.org/wp-content/uploads/2014/09/PNW-Joint-Regional-Recommendations-on-WQT_ThirdDraft_2014-08-05_full1.pdf. See also Royal C. Gardner and Jessica, Fox *The Legal Status of Environmental Credit Stacking*, *Ecology Law Quarterly*, Vol. 40, No. 4, 2013; Stetson University College of Law Research Paper No. 2014-2, (2013), available at <http://ssrn.com/abstract=2375858>.

113 Gardner and Fox, *supra* note 112.

4 QUANTIFYING WATER QUALITY BENEFITS

This section considers approaches to quantifying water quality benefits. Water quality benefits are the pollution reductions tracked from the edge of a field (seller location) into a waterbody and downstream to a point of concern. Quantifying water quality benefits is the first step in estimating credit values. The final credit value is ultimately a function of the measured water quality benefits adjusted by baseline requirements (*see Section 3*) and trading ratios (*see Section 5*).

The selected quantification method should demonstrate accuracy, repeatability, sensitivity, transparency, and practicality, though some trade-offs between these goals are inevitable. Modeling approaches are classified as empirical or mechanistic and can be refined through calibration, validation, sensitivity analyses, and uncertainty analyses. WQT program developers will need to review possible methods, adapt existing methods to local conditions and data availability, and evaluate the method through technical review. Some trading programs may formally incorporate the selected method into official guidance or law. Finally, using standard quantification methods can streamline credit approvals by reducing review times.

Considerations for Choosing Credit Quantification Methods

Selection of quantification methods should consider:

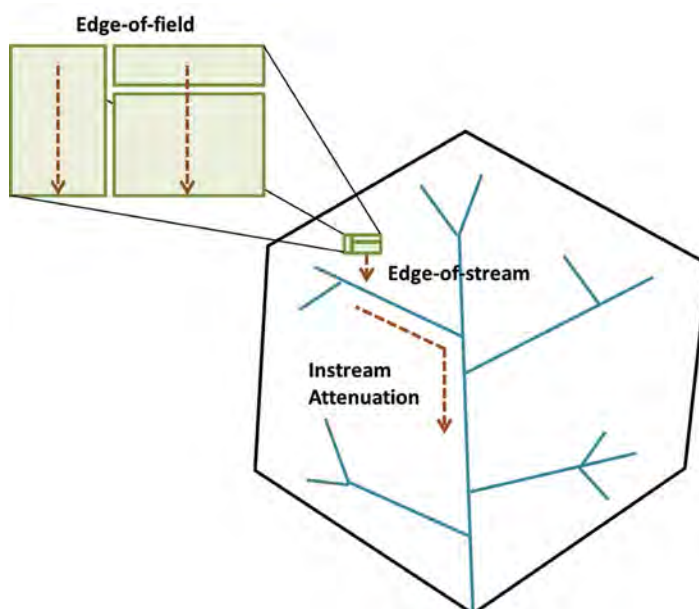
1. Best available science;
2. Practicality, given the user's qualifications, input requirements, data availability, and necessary resources to operate;
3. Which BMP load reductions can be quantified by the method (i.e., are there alternative methods?); and
4. Integration with other WQT program components such as:
 - a. Eligibility criteria;
 - b. Trade ratios (e.g., uncertainty ratios);
 - c. Conservative assumptions; and
 - d. Adaptive management based on monitoring and evaluation.

Approaches to quantifying water quality benefits fall into three general categories: 1) *modeling*; 2) *use of pre-determined pollution reduction rates*; and 3) *direct monitoring*. Water quality modeling approaches involve predicting the fate of pollutants using mathematical simulation procedures calibrated by direct measure in ideal cases. Pre-determined rates are developed by setting standard values for water quality benefits based on the best available science. Direct monitoring involves measuring water chemistry (e.g., river turbidity or temperature) and/or surrogates for water quality (e.g., rate of stream bank erosion or shade from riparian vegetation) to directly measure changes in pollutant load.

Typical Components of Quantifying Water Quality Benefits

Quantification often includes components operating in three physical locations, as shown in Figure 4.0: edge-of-field, edge-of-stream, and instream *attenuation*. Each component may be considered separately or together.

Figure 4.0 Scale in Quantifying Water Quality Benefits



Edge-of-field quantification methods estimate or measure the change in pollutant loading between *post-project site conditions* and the *pre-project site conditions*. Represented as an equation:

$$\text{Water quality benefits (Edge-of-field)} = \text{Post-project performance} - \text{Pre-project performance}$$

Edge-of-stream quantification methods are used to estimate how much of the pollutant load is delivered from the field where it is generated into the waterbody.

Instream attenuation quantification methods estimate or measure how much of the pollutant is transported from that point at which it enters the waterbody to a point of concern downstream. The 2007 U.S. EPA Permit Writer's Toolkit treats edge-of-stream delivery and instream attenuation as trading ratios.¹¹⁴ However, as these values are typically derived from scientific assessments, they are considered part of credit quantification in this document. Here, the water quality benefits can be represented as:

$$\text{Water quality benefits} = (\text{Post-project performance} - \text{Pre-project performance}) * \\ \text{Fraction delivered to the waterbody} * \text{Fraction attenuated to the point of concern}$$

To then calculate the number of credits that can be sold from a project site, water quality benefits may be adjusted by: A) applicable baseline requirements (*see Section 3.2*), and B) applying trading ratios and/or reserve pool requirements (*see Section 5*).

114 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. 30-31.

Characteristics of a Good Quantification Method

The following was adapted from *In It Together*¹¹⁵—a document compiled by Willamette Partnership and a variety of partner agencies. A quantification method for WQT should be selected based on a balance of:

- *Accuracy*: representative of true pollution load reductions. Assessments of uncertainty, like reporting confidence intervals associated with model results, can help to represent the level of accuracy;
- *Repeatability*: consistently delivers the same result given the same data, location, and factors, despite different users (i.e., is not overly subjective). *Protocols* or user guidance can greatly improve the consistency with which a method is applied;
- *Sensitivity*: variation in quantified credit amounts reflect actual differences in the water quality indicators being measured, and not stochastic or background variation;
- *Transparency*: easy to understand and well-documented relationship of inputs/indicators to the overall estimate of pollution reduction. Ideally, methods are well-vetted in the scientific community and posted in the public domain for use by others without charge; and
- *Practicality*: pragmatic and economical to set up and apply, easy to use for the targeted user group, and compatible with other relevant models (e.g., TMDL models) so its outputs can plug easily into evaluations of overall program performance.

Finding a quantification method that meets all of these criteria may be difficult. Almost always, WQT program developers must make some tradeoffs in selecting methods depending on the program's objectives. For example, models that are more complex may more accurately represent the dynamics that drive water quality changes, but that complexity may also make them harder to use and/or less transparent to external stakeholders. Regardless of the method or method type, some level of uncertainty is a reality when estimating or measuring water quality benefits of conservation and restoration actions (*see Section 5.2* for a discussion on holistically managing risk and uncertainty in program design and *Section 5.1.1* for uncertainty ratios specifically).

4.1 Identifying, Evaluating, & Approving Standard Methods

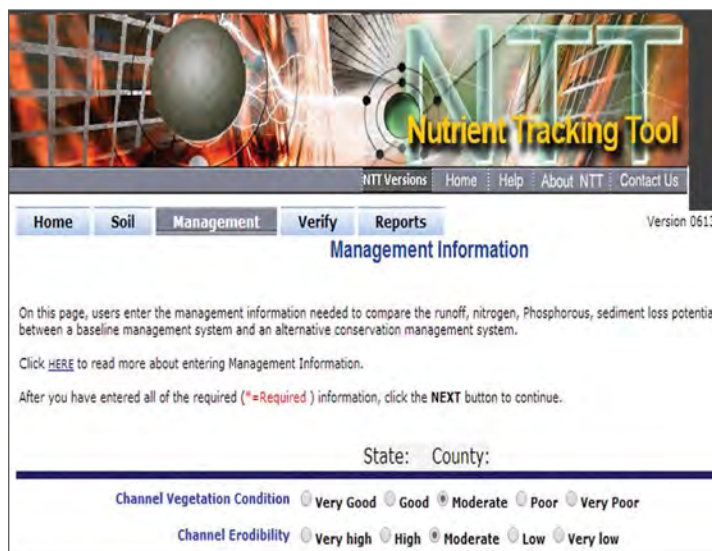
Sometimes, a trading program's quantification method will be set by the relevant regulatory instrument or analyses completed by agency staff (e.g., Chesapeake Bay Watershed model). In other cases, such methods may not be available or may not have been developed with the scale or resolution to work for trading. Faced with these circumstances, several regions and states have developed processes for review and selection of credit quantification methods. The process will differ depending on which type of approach is being used for a particular water quality credit in a given physiographic location. The discussion below is provided to outline issues for consideration in the selection, review, and adoption of quantification methods.

115 In It Together (Part 2), *supra* note 111, at p. 20.

4.1.1 Modeling

Models synthesize what we know about the natural world into equations that estimate the outcomes of implementing specific BMPs at specific locations.¹¹⁶ Two basic types of models exist: mechanistic and empirical.

- Mechanistic models** seek to predict the outcome of a system based on an understanding of its internal physical, chemical, and/or biological processes. Developing a mechanistic model requires a thorough understanding of the cause-and-effect interactions. By exploring what *causes* the outcomes observed in empirical data, mechanistic models can be useful for informing decisions about which component of a system to address. For example, a mechanistic model used to explore vehicle fuel efficiency might involve computing an energy balance for the different components of the engine and using total mileage and fuel spent to determine energy losses in the system. By breaking down the system into component parts, the mechanistic model can provide insight into how the engine might be made more fuel-efficient. Increasing the level of detail in a mechanistic model may improve accuracy, but it also drastically increases the amount of data needed for a successful simulation that might not always be available.¹¹⁷
- Empirical models** fit regressions and other equations to match the observed relationships seen in experimental data, establishing a correlation between cause (e.g., soil type, crop, and BMP) and effect (e.g., pollutant load reduction) with relative indifference to the complex hydrologic or biological processes that occur in between.¹¹⁸ In the example of understanding a vehicle's fuel efficiency, an empirical model might fit a regression to measurements of the distance traveled and the amount of gas in the tank. That equation could estimate how far the car can go for a given amount of gas but does not explain *why* one car is more efficient than another. Empirical models are statistically strengthened by increasing the sample size, and they are primarily used to accurately estimate outcomes from complex systems.



Models estimate the outcomes of implementing specific BMPs at specific locations. Calibration, validation, sensitivity, and uncertainty analysis will produce a model that is best suited to local application that users can best understand model accuracy, sensitivity, and uncertainties. The processes employed for formal approval of a model may be determined by the accuracy demanded by regulators and stakeholders and by available resources and data.

116 See Lydia Olander, Todd Walter, Peter Vadas, Jim Heffernan, Ermias Kebreab, Marc Ribaldo, Thomas Harter, & Chelsea Morris, Nicholas Institute for Environmental Policy Solutions, *Refining Models for Quantifying the Water Quality Benefits of Improved Animal Management for Use in Water Quality Trading (NI R 14-03)*, pp. 9-12, (2014), available at http://nicholasinstitute.duke.edu/ecosystem/publications/refining-models-quantifying-water-quality-benefits-improved-animal-management-use-water#.VGD6yvnF_KN.

117 *Id.* at p. 44.

118 See U.S. Environmental Protection Agency, Office of the Science Advisor, Council for Regulatory Environmental Modeling, *Guidance on the Development, Evaluation, and Application of Environmental Models* (EPA/100/K-09/003), p. 43, (2009), available at http://www.epa.gov/crem/library/cred_guidance_0309.pdf.

Multiple models may be required to determine the effect of an upstream, upland BMP on a downstream point of concern for each parameter. Many models are aggregations of other models representing different processes, (i.e., water balance, crop growth, soil erosion), and may comprise a composite of empirical and mechanistic models.

Selection and review of modeling approaches often includes several steps:

A) Identify Relevant Methods and Select a Model

Model selection, empirical or mechanistic, should consider the characteristics listed above (accuracy, repeatability, sensitivity, transparency, practicality) and the following questions, adapted from Olander, et. al., *Refining Models*.¹¹⁹

- Does the model operate at an appropriate scale and resolution?
- Does the model deliver information in the same units and on the same time scale as the regulatory water quality standard?
- Can the model be adapted to local conditions and realistically represent local agriculture systems and practices?
- Do model data requirements match program data availability?
- Are model sensitivity and uncertainty appropriate relative to the magnitude of desired pollutant load reductions?
- Has the model reasonably kept pace with advances in scientific understanding, and has it been well developed and tested by rigorous scientific principles?
- Is the model user-friendly for WQT personnel, and will the model give consistent results across multiple users for the same scenarios? Is the model practical and economical to set up and apply?
- Does the model have adequate support to be applied and updated as needed?
- Is the model compatible with other program models so the program performance and success can be evaluated?

B) Adapt to Local Conditions (Set-Up and Refine)

Once a model is selected, one or more processes are typically applied to set-up the model, refine its outputs, and understand its inherent sensitivity and uncertainty. Processes for model refinement and evaluation include:

- *Model Set-up and Parameterization is the process of developing and integrating standard datasets for the local area (e.g., soils, climate, and crop management) and setting initial model parameter values (the constants within model equations that stand for inherent properties of the system), often by considering values in the published literature.*¹²⁰

119 Lydia Olander, Todd Walter, Peter Vadas, Jim Heffernan, Ermias Kebreab, Marc Ribaud, Thomas Harter, & Chelsea Morris, Nicholas Institute for Environmental Policy Solutions, *Refining Models for Quantifying the Water Quality Benefits of Improved Animal Management for Use in Water Quality Trading (NI R 14-03)*, (2014), available at http://nicholasinstitute.duke.edu/ecosystem/publications/refining-models-quantifying-water-quality-benefits-improved-animal-management-use-water#.VGD6yvnF_KN.

120 Yonathan Bard, *Nonlinear Parameter Estimation*, p. 11, New York, NY: Academic Press (1974).

- *Calibration* is the process of comparing model predictions (outputs) for a given set of assumed conditions with observed data for the same conditions.¹²¹ This comparison is used to inform the estimation and adjustment of model parameters, resulting in a model that more accurately and precisely estimates observed conditions. Where local data are not available, a model can also be calibrated against published data of similar conditions, though this approach has a higher level of uncertainty. Models can only be calibrated for events or scenarios for which some form of measured data exist, so the effectiveness of calibration is largely driven by the breadth and quantity of data available.
- *Validation* is an iterative process which tests the capabilities of a calibrated model to reproduce system behavior within acceptable bounds.¹²² During validation, the model is run on a series of scenarios and compared with measured data. Validation scenarios and data should differ from those used during calibration. R^2 (the coefficient of determination) and other measures are used to represent how well the model “fits” the data; specifically, they represent the fraction of system variability that can be explained/predicted by the model.
- *Sensitivity analysis* is used to explore the rate of change in the outputs of a model relative to changes in model inputs, and to increase the user’s understanding of the relationship between input and output values in a model.¹²³ *Uncertainty analysis* is a highly related process focused on identifying sources of uncertainty in a model, the magnitude of that uncertainty, and how it is propagated.¹²⁴ Uncertainty analyses may be integrated in the quantification process, or as part of program trading ratios (see **Section 5.1.1**).

Full calibration, validation, sensitivity, and uncertainty analysis will produce a model that is best suited to local application and for which users can best understand model accuracy, sensitivity, and uncertainties. The processes employed may be determined by the accuracy demanded by regulators and stakeholders and by available resources and data.

Where measured data is not available for validation, expert judgement has been a coarse guide for evaluating the validity of model outputs.¹²⁵ In these cases, stakeholders and regulators must decide whether the resulting model predictions meet their needs. Also in these cases, adaptive management and monitoring to improve the model over the time (see **Section 10**) and conservative uncertainty factors are important.

121 See Daniel N. Moriasi, Jeffrey G. Arnold, Michael W. Van Liew, Ronald L. Bingner, Daren Harmel, & Tamie L. Veith, *Model Evaluation Guidelines for Systematic Quantification of Accuracy in Watershed Simulations*, Transactions of the American Society of Agricultural and Biological Engineers, 50(3): 885-900, (2007), available at <http://swat.tamu.edu/media/90109/moriasimodeleval.pdf>. See also Timothy Trucano, Laura Swiler, Takeru Igusa, William Oberkampf & Martin Pilch, *Calibration, Validation, and Sensitivity Analysis: What’s What*, Reliability Engineering and System Safety 91: 1331-1357, (2006), available at <http://web.stanford.edu/group/uq/docs/RESS-Trucano.pdf>.

122 *Id.*

123 *Id.*

124 David J. Pannell, *Sensitivity Analysis of Normative Economic Models: Theoretical Framework and Practical Strategies*, Agricultural Economics 16(2): 139-152, (1997), available at <http://www.sciencedirect.com/science/article/pii/S0169515096012170>.

125 Yamhill Soil & Water Conservation District, *Applying the Nutrient Trading Tool Across Oregon: Final Report*, (2012), (copy on file with authors).

C) Technical Review

This may be an internal agency process or may be conducted by an independent entity. In either case, results of the technical review should be made publicly available and incorporated into technical documentation as possible. This could include publishing results in peer-reviewed scientific literature (e.g., publication of methods for developing attenuation coefficients for the Ohio River Basin trading project).¹²⁶

D) Formal Approval

Formally approving the model or tool might be the inclusion of the tool within state guidance, an approval letter from the state water quality agency or U.S. EPA approved trading framework, or approval to use the tool within an NPDES permit or other regulatory instrument.

4.1.2 Pre-Determined Rates

As an alternative to modeling each BMP or transaction individually, some programs have developed standard/pre-determined effectiveness rates for relevant BMPs, typically derived from measured data, literature values, or iterative modeling exercises.

Technical review and agency approval is also typically required in the selection of pre-determined rates. When selecting literature values, modeling results, or other means as the basis of standard rates, program developers should consider providing public documentation describing how the rates were selected, why those rates are appropriate for or transferable to the proposed trading geography and conditions, and some guidance or analysis about the likely sources of variation in performance of those BMPs based on local conditions. Review by an expert panel may provide added confidence in the establishment of predetermined rates.

4.1.3 Direct Monitoring

Trading programs may seek direct measurement of load reductions through use of an instream water quality monitoring program. For this section, direct monitoring refers to the measurement of edge-of-field improvement in water quality resulting from BMPs installed to



An instream water quality monitoring program may be used in trading programs to directly measure load reductions. Direct measurement approaches are often required to go through a technical review and agency approval process for use in trading. Photo courtesy of Chesapeake Bay Program / Creative Commons.

¹²⁶ Arturo A. Keller, Xiaoli Chen, Jessica Fox, Matt Fulda, Rebecca Dorsey, Briana Seapy, Julia Glenday, & Erin Bray, *Attenuation Coefficients for Water Quality Trading*, Environmental Science and Technology 48(12): 6788-6794, (2014), available at <http://pubs.acs.org/doi/abs/10.1021/es500202x>.

generate credits, and/or the direct measurement of instream attenuation of pollutant reductions from the edge of a field to the point of compliance. Technical review and agency approval is also often required before direct measurement approaches are approved for use in trading. Information reviewed in this process may include:

- Monitoring plan and quality assurance plan, including approach to establishing a current condition from which to measure change;
- Intended instrumentation (or sampling methodology) that captures water quality data frequently enough to create an estimate of average water quality improvement over a specified time (e.g., year, season, or month) and produces estimates of variation within that time period;
- Instrumentation that is objectively verifiable. A project reviewer can confirm the instrument is appropriate for the purpose, installed and calibrated correctly, and produces adequate results;
- Record-keeping procedures to catalogue each sample taken, including date, time, method of data collection, and results; and
- Approved load estimation techniques or methods.

4.1.4 Selecting a Quantification Approach

There are several options used by program developers to quantify the water quality benefits of BMPs (described comprehensively in the sections above).

Table 4.1.4 Selecting an Approach to Quantifying Water Quality Benefits

QUANTIFICATION APPROACHES	CONSIDERATIONS ¹	EXAMPLES
<p>Option A:</p> <p>Models</p> <p>Many water quality trading programs use modeling to estimate edge-of-field and edge-of-stream water quality benefits as well as instream attenuation of pollutants.</p>	<p>Where existing models suit program needs, and where sufficient local data is available for calibration and validation, models can be more site-specific than standard rates. Models may also be the only option for estimating benefits from new types of BMPs.</p> <p>In many cases, correct and consistent use of models requires a moderate-to-high level of training and technical capacity amongst users (which is greatly improved if technical support and/or clear protocols on the generation of model inputs and appropriate assumptions are available). Where there is a high level of subjectivity in model use, evaluating modeling exercises for the purposes of verification can be time intensive.</p> <p>Additionally, robust calibration, validation, and sensitivity analysis processes associated with refining mechanistic models can be data-, time-, and cost-intensive. In some cases, development and calibration of a program-specific model might not lead to more accurate results than simpler approaches, such as the adaptation of existing methods to quantify water quality benefits.</p>	<p>Many trading programs rely on modeling in whole or in part to quantify water quality benefits.</p> <p>Empirical: Many field-scale estimates utilize empirical models. The Ohio River Basin trading projectⁱⁱ and OH Great Miami programⁱⁱⁱ use the U.S. EPA Region V Spreadsheet Tool for Estimating Pollutant Load (STEPL). The OH Alpine Cheese permit uses the ODNR/OH EPA spreadsheet.^{iv} WI DNR guidance uses Snap Plus for nutrient management practices.^v</p> <p>Mechanistic: Many watershed-scale models are mechanistic, including WARMF, which has been calibrated for use in the Ohio River Basin project.^{vi} WI DNR uses mechanistic models for point source and nonpoint source reductions in small urban catchments, SLAMM or P8 for point source.^{vii}</p> <p>OR DEQ and the OR CWS permit use Shade-a-lator to estimate thermal energy blocked through shade from riparian forest restoration.^{viii}</p>
<p>Option B:</p> <p>Pre-determined pollution reduction rates</p> <p>These values are often expressed as ratios and/or percentages (e.g., 50% of the phosphorus load will attenuate between two specified points A and B) or absolute loads (e.g., use of cover crop and conservation tillage will reduce sediment loading by 2 tons/acre/year in this location).</p>	<p>Pre-determined rates provide a high level of repeatability and predictability in a trading program because there is no need to verify user-determined inputs into models or worry about errors in direct monitoring data collection. Consistent application of pre-determined rates requires low-to-moderate technical expertise. The costs to maintain rates over time are lower than the other options, stemming primarily from targeted monitoring efforts to confirm or refine selected values.</p> <p>Yet, pre-determined rates by themselves may not be as sensitive to site- or system-specific conditions as modeling approaches. Many of these rates are also only relevant in the local geographic area for which they were developed. Developing pre-determined rates is data intensive and development costs may be high where relevant studies or modeled values are not available.</p>	<p>VA DEQ uses lookup tables established according to BMP efficiencies based on the Chesapeake Bay Watershed Model (CBWM).^{ix}</p> <p>MN SMBSC permit uses literature values as the basis for estimating benefits from livestock exclusion for different months and distances from the stream.^x</p>

*(continued)***Table 4.1.4 Selecting an Approach to Quantifying Water Quality Benefits**

QUANTIFICATION APPROACHES	CONSIDERATIONS ¹	EXAMPLES
<p>Option C:</p> <p>Direct monitoring</p> <p>These values are obtained through direct measurement of a BMP's benefit.</p>	<p>Direct monitoring may be the best option for BMP types under certain conditions (e.g., there are a limited and/or a controlled number of variables affecting water quality and technology exists to cost-effectively monitor water quality). Direct monitoring can reduce the uncertainty of measuring water quality benefits from nonpoint sources, and several programs have eliminated or reduced the need for uncertainty factors for BMPs measured with direct monitoring.</p> <p>Some BMP types where direct monitoring could make sense include improvements across an irrigation district where inputs and outputs can be closely monitored, there is negligible nutrient cycling, or there are minimal inputs or withdrawals in a reach. Direct measurement is also often used for ambient water quality monitoring at the reach or watershed scale and serves as an important tool for calibrating and validating models.</p> <p>Direct monitoring can be costly and time consuming to implement, requiring the development of a rigorous monitoring and/or sampling plan, quality assurance plan, and installation and maintenance of instrumentation. Direct monitoring can also require collecting current condition data over several weather conditions to establish current water quality levels. Additionally, it is difficult to causally link BMPs to measurable improvements at a single site, isolating those improvements from variability due to biological processes, variation in weather, and other actions occurring in the watershed. It is even more difficult to track the reductions associated with an individual project from their point of generation to the point of compliance.</p> <p>Better technology for instream water quality measurement at the field scale and higher resolution and frequency remote sensing are likely to make direct measurement of water quality benefits more cost-effective and usable in the near term.</p> <p>Some National Network members expressed that direct monitoring had limited applications in trading because of the difficulty tied to measuring the benefits of individual BMPs. Others felt direct monitoring could significantly improve certainty and could also provide data useful to tracking overall program effectiveness (see Section 10.5).</p>	<p>The FL Lower St. Johns River pilot project does not require uncertainty ratios for directly monitored BMPs, and for some BMPs using estimation methods may require downstream monitoring to evaluate the effects of BMPs.^{xi}</p> <p>ID DEQ^{xii} allows methods to estimate credits if direct monitoring is technically infeasible or too costly. The state also does not require application of an uncertainty factor if credits are measured by direct monitoring.</p> <p>A number of efforts are underway to provide real-time, low-cost nutrient instruments, and to use higher resolution remote sensing to quantify measures such as flow and sediment loss.</p>

(continued)

Table 4.1.4 Selecting an Approach to Quantifying Water Quality Benefits

QUANTIFICATION APPROACHES	CONSIDERATIONS ¹	EXAMPLES
<p>Option D:</p> <p>Combination of approaches</p> <p>There may be two or more approaches needed to cover the multiple scales of components of credit quantification.</p>	<p>Utilizing multiple types of quantification methods in combination allows a trading program to take advantage of strengths and avoid shortfalls associated with any single approach. However, WQT program developers will need to develop mechanisms to account for different types of uncertainty stemming from different methods, provide training and support for multiple methods, and consider how each one will be improved and supported over time.</p>	<p>MDA uses the Chesapeake Bay Nutrient Tracking Tool,^{xiii} which combines the Nutrient Tracking Tool (NTT), a dynamic model that estimates farm-level nutrient losses based on site-specific soil, weather and field management, with CBWM's predetermined BMP effectiveness rates and attenuation factors.^{xiv}</p> <p>The Ohio River Basin trading project uses an empirical model to estimate edge-of-field reductions (EPA Region 5 Spreadsheet) and watershed mechanistic model, WARMF^{xv}, to estimate delivery to the waterway and attenuation instream to the point of compliance.^{xvi}</p>

i Considerations have been adapted from In It Together (Part 2), *supra* note 111, at pp. 20-23.

ii EPRI 2012, *supra* note 65, at p. 3.

iii MCD 2005, *supra* note Table 2.3(v), at § 3.1. The program has modified the spreadsheet and added modules (e.g., cover crops) (Sarah Hippensteel, Miami Conservancy District, personal communication, April 8, 2015).

iv OSU, HSWCD, & Alpine Cheese Co. 2006, *supra* note Table 2.5(ix), at p. 4.

v WI DNR 2013b, *supra* note Table 1.1.1(xii), at § 2.14.2.

vi Electric Power Research Institute, *Ohio River Basin Trading Project: Watershed Model*, (undated), available at <http://wqt.epri.com/watershed-model.html>.

vii WI DNR 2013b, *supra* note Table 1.1.1(xii), at § 2.14.2.

viii OR DEQ 2009, *supra* note Table 1.1.1(xiii), at Appendix A.

ix VA DEQ 2008, *supra* note Table 1.1.1(xix), at p. A-3.

x See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. A-49 in Appendix A.

xi FL DEP 2010, *supra* note Table 2.2(ii), at page 34 and 39.

xii ID DEQ 2010, *supra* note Table 1.1.1(xiv), at §§ 6.1 & 6.2.

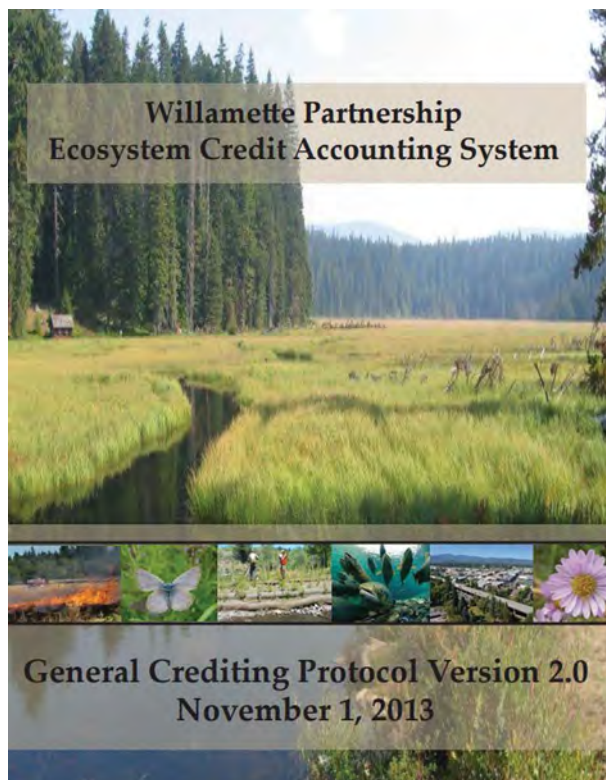
xiii MDA 2008b, *supra* note Table 3.2.2(ii), at p. 9; and State of Maryland, *Nutrient Trading*, (May 1, 2014), available at <http://www.mdnutrienttrading.com/>.

xiv See Texas Institute for Applied Environmental Research (TIAER), *Nutrient Tracking Tool*, (undated), available at [http://nn.tarleton.edu/nttWeb082014/\(S\(byqjo2ttgdolyeooykpe4ojt\)\)/default.aspx](http://nn.tarleton.edu/nttWeb082014/(S(byqjo2ttgdolyeooykpe4ojt))/default.aspx) and Edward Osei, Ali Saleh, & Mindy Selman, *Calibration of NTT and Generation of Adjustment Factors – Chesapeake Bay Watershed* (unpublished), (undated), (copy on file with authors).

xv See Electric Power Research Institute, *Watershed Analysis Risk Management Framework (WARMF)* (Product ID 1005470), (Published Mar 2006), available at <http://www.epa.gov/athens/wwqtsc/html/warmf.html>.

xvi EPRI 2012 *supra* note 65, at Section 8 pp. 5-7 (2012).

In select scenarios where other technical analyses cannot be used to address the ecological process and the fate of target pollutants in question, a trading program may then restrict the eligible locations for credit-generating projects to those areas that quantification methods can reasonably cover. Willamette Partnership's Ecosystem Credit Accounting System has no method for estimating nutrient delivery to the waterbody. To account for this, the program only allows properties with a direct hydrologic connection to the waterbody to generate nutrient credits under the assumption that if the runoff does not travel across adjacent lands, there will be no attenuation for which to account. This approach allows the program to move forward in the face of scientific uncertainty, but the approach may disqualify many lands, landowners, and potentially valuable projects from participating.



A trading program may restrict eligible credit generating projects to those areas that quantification methods can reasonably cover. For example, to account for Willamette Partnership's Ecosystem Credit Accounting System having no method for estimating nutrient delivery to the waterbody, the program only allows properties with a direct hydrologic connection to the waterbody to generate nutrient credits.

5 MANAGING RISK & UNCERTAINTY

In building WQT programs, many decisions are focused on addressing and mitigating various forms of uncertainty: scientific or biophysical uncertainty (i.e., inaccuracies in quantification, variability in performance), regulatory risk (i.e., risk that regulations will change in the future), market uncertainty (i.e., risk that there will not be adequate credit supply and/or credit demand), and buyer risk (i.e., risk that purchased credits will not be delivered as promised). Combinations of eligibility policies, approved credit-generating actions, credit quantification methods, and trading ratios can be integrated to successfully address these uncertainties, and when constructing a program, WQT managers can tailor each component to consider policy objectives, watershed goals, economic feasibility, and acceptable levels of risk or uncertainty. **Section 5.1** focuses on trading ratios, a numeric value that is multiplied by the number of credits that would otherwise be required, as one of the primary tools for managing risks and uncertainty related to nonpoint source credit estimation and project failure. **Section 5.2** then discusses tools that WQT program developers can use to develop a holistic approach for managing other forms of risk.

Box 5.1 Reductive Ratios vs. Set-Aside Ratios

Ratios can be put into two categories: reductive ratios and set-aside ratios. Reductive ratios reduce the amount of estimated environmental benefits or credits attributed to a project (e.g., uncertainty ratios, delivery ratios, and equivalency ratios). A set-aside ratio is a portion of credits set aside in a pool or ledger that can potentially be accessed at a later time (reserve ratios) or may be set aside for net environmental benefit (retirement ratios).

5.1 Trading Ratios

A trading ratio is a numeric value used to adjust available credits for a seller or credit obligation of a buyer based on various forms of risk and uncertainty. Ratios can be used to ensure that the environmental benefit of a credit-generating project is equivalent to or greater than the reduction that would occur if the buyer installed treatment technology on site. Trading ratios are often expressed as a number of credits needed per unit of discharge (e.g., a 2:1 ratio means that two credits are needed per one unit of impact), or as a discount factor (e.g., a 10% reduction factor applied to the estimated credits).

WQT programs generally develop one or more types of trading ratios that are applied (either individually or as a lumped factor) to estimated pollutant reductions and/or credits. Trading ratios are frequently used to mitigate risk and uncertainty associated with the quantification of nonpoint source load. They can also be used to set aside credits for purposes like net water quality benefit or insurance against project failure.

When developing trading ratios, one should also consider the WQT program's policy objectives, watershed goals, economic feasibility, and acceptable levels of risk or uncertainty.

The assumptions underlying the chosen ratios should be carefully documented in a transparent manner. This section discusses the following types of ratios:

- **Uncertainty ratio:** A ratio that reduces the estimated pollution reduction or estimated credit amount in order to compensate for scientific uncertainty, including potential inaccuracies in estimation methods and/or variability in project performance. Sometimes, the uncertainty ratio is used to compensate for lack of scientifically derived attenuation factors.
- **Reserve ratio:** A ratio that sets aside a portion of the estimated credits into a reserve pool to insure against unforeseen credit losses due to project failure.
- **Retirement ratio:** A ratio applied to the estimated credits which sets aside a portion of credits for net environmental benefit. The purpose of this ratio may be seen as way to accelerate water quality improvements and demonstrate environmental gains. In other cases, it is used as a hedge against potential environmental degradation.



A trading ratio is used to account for risk and uncertainty. It may be used to adjust the number of credits available for a seller or the number of credits that would otherwise be required by the permittee. Photo courtesy of Creative Commons.

In addition to the above ratios, the 2007 U.S. EPA Permit Writer's Toolkit further defined delivery ratios and equivalency ratios (see below).¹²⁷ Because these factors are often derived from and incorporated in the measurement or modeling of water quality benefits, they are discussed in detail in **Section 4** of this document. However, these factors may often be included in a lumped trading ratio, so they are also described here for the sake of clarity.¹²⁸ **Figure 5.1** depicts how this document differs from the 2007 Permit Writer's Toolkit in what context it considers different trading ratios.

- **Delivery ratios:** Delivery ratios (or location factors) account for the relative impact of each source's pollutant loading on the point of concern, due to natural assimilation processes that result in a diminished, or attenuated, downstream impact. As a pollutant travels further from its source of origin, natural processes (e.g., denitrification) may reduce the load through sequestration or alter the persistence of the pollutant. Credits are often discussed as units of delivered pollution, meaning they represent the attenuated impact of a water quality benefit in one location as it affects the point of concern. For example, a pound of pollutant coming from a source nearer to the area of concern may have a larger impact on that area than a pound coming from a source several miles upstream. Delivery ratios can be derived through watershed models or from the literature. The science behind delivery ratios and quantification methods are discussed in more detail in **Section 4**. This section addresses how programs that do not have model- or literature-derived attenuation factors may roll these factors into a trade ratio.
- **Equivalency ratios:** Equivalency ratios are used to account for differences in impact from different forms of the same pollutant, or when a trading program allows for cross-pollutant trading. For example, wastewater plants may discharge more soluble phosphorus and nonpoint sources may discharge sediment-attached phosphorus, which is less bio-available for algae growth. Because

127 See **Box 2.3** for additional discussion of cross-pollutant trades.

128 See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at pp. 30-32.

permits and trading programs may focus on total phosphorus, an equivalency ratio can be used to reconcile these discrepancies and adjust for the varied effects these different forms of phosphorus may have in the environment. Equivalency ratios can also be used to equate two pollutants that have an impact on the same water quality function (e.g., CBOD and temperature impacts on dissolved oxygen concentrations).

To create a defensible program, the trading ratio must address the uncertainties introduced by nonpoint source credits. However, because WQT is a market-based program where demand will be informed by price, caution is recommended when selecting ratios to avoid creating redundancy in uncertainty measures, compounding multipliers, or using excessively large factors without justification. Where ratios are set for individual trades, their development should follow a consistent approach and be documented in a transparent manner.

5.1.1 Uncertainty Ratio

The uncertainty ratio can create a margin of safety when estimating nonpoint source credits to help ensure that water quality benefits are not overestimated. Uncertainty ratios have been used in WQT programs primarily to compensate for scientific uncertainties in the estimation methodologies. For instance, an uncertainty ratio can help compensate for variability in BMP performance resulting from weather and soils, as well as account for time lags between the implementation of a practice and its impact on water quality. In cases where scientific models are not available to derive attenuation factors, uncertainty ratios have also been used to cover attenuation of pollution from field to stream and/or from stream to point of concern. Uncertainty ratios are reductive ratios that adjust the number of estimated water quality benefits that are attributed to a project.

Not all trading programs have uncertainty ratios applied to nonpoint source credit estimation. When determining where (or whether) to set the uncertainty ratio, programs should consider the degree of uncertainty introduced through nonpoint source pollution reduction estimations and whether that uncertainty is, in part, already compensated for through conservative estimation factors, direct monitoring, or other means. The 2003 U.S. EPA Water Quality Trading Policy states that it supports a number of approaches to

Figure 5.1 Treatment of Trading Ratio Topics in the 2007 Permit Writer’s Toolkit and This Document

	Trading Ratios	Quantification of Water Quality Benefits
2007 U.S. EPA Permit Writer’s Toolkit	<ul style="list-style-type: none"> • Delivery • Location • Equivalency • Uncertainty • Retirement 	<ul style="list-style-type: none"> • Edge-of-field
National Network	<ul style="list-style-type: none"> • Retirement • Reserve 	<ul style="list-style-type: none"> • Edge-of-field • Delivery • Location • Equivalency • Uncertainty

Box 5.1.1 U.S. EPA Region 3 Technical Memo on Uncertainty Ratios for the Chesapeake Bay

U.S. EPA Region 3 recently released a technical memo regarding uncertainty for the Chesapeake Bay that favors adoption of a 2:1 uncertainty ratio in all point-to-nonpoint source trades.¹ The 2:1 ratio is based on average hydrology and average BMP effectiveness over the lifespan of a project, as well as the uncertainty inherent in using models to estimate pollutant loads.² U.S. EPA Region 3 acknowledges opportunities for a ratio lower than 2:1 if programs can demonstrate factors that reduce uncertainty; where uncertainty can be reduced by monitoring; or where implementation of BMPs for land conservation ensure permanent protection (e.g., through a conservation easement) and load reductions can be reliably determined.³

1 U.S. Environmental Protection Agency, Region III, *Accounting for Uncertainty in Offset and Trading Programs* (EPA Technical Memorandum), p. 10, (2014), available at http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/TradingTMs/Final_Uncertainty_TM_2-12-14.pdf.

2 *Id.*

3 *Id.*

compensate for scientific uncertainty associated with estimating nonpoint source load reductions, including monitoring, trading ratios of greater than 1:1, use of conservative performance values, trade-specific discount factors, retirement ratios and reserve ratios.¹²⁹ Different uncertainty ratios could be used for different types of practices and/or trades. For instance, there may be different considerations for point to nonpoint source trades versus point to point trades. Similarly, some management practices may have less uncertainty associated with them because their impacts are better understood and can be more accurately estimated. There are several options for establishing the uncertainty ratios.

Table 5.1.1 Establishing an Uncertainty Ratio

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Uncertainty ratio is greater than 1:1</p> <p>An uncertainty ratio of greater than 1:1 is applied to estimated reductions to compensate for uncertainties related to nonpoint source pollution reduction estimations.ⁱ</p>	<p>If quantification methodologies do not or cannot account for all uncertainties through conservative estimates and/or inclusion of factors such as weather and soils in the estimation methodology, then application of an explicit uncertainty ratio may be necessary. In addition, if there is no distinct attenuation factor applied as part of credit quantification, the uncertainty ratio can be used to roughly account for attenuation of pollution from the point of reduction to the point of concern.</p>	<p>For all trades involving new or expanding point sources under their watershed general permit, VA DEQ applies a 2:1 uncertainty ratio to all nonpoint source credits in order to account for uncertainty in estimation.ⁱⁱ</p>
<p>Option B:</p> <p>No uncertainty ratio (or 1:1 uncertainty ratio)</p> <p>Programs may decide to not apply an uncertainty ratio if other measures are in place to account for uncertainty (e.g., project monitoring, conservative BMP performance values, or other types of trading ratios).</p>	<p>This is most appropriate where 1) nonpoint source pollution is directly measured, or 2) where scientifically rigorous estimation methodologies are in place — as long as these methodologies are suitably conservative to account for natural variations and uncertainty and scientifically derived delivery factors are in place.</p>	<p>The MDE, MDA, and PA DEP trading programs currently do not use an uncertainty ratio for BMPs that have approved efficiencies in the Chesapeake Bay Watershed Model (CBWM). Efficiencies included in the CBWM were vetted by experts and are meant to represent conservative values.ⁱⁱⁱ</p> <p>In Virginia, trades with nonpoint sources to offset stormwater impacts of new development use a 1:1 ratio.^{iv}</p>
<p>Option C:</p> <p>Variable uncertainty ratio</p> <p>A variable uncertainty ratio might be adjusted up or down for various practices. For practices where there is a greater amount of uncertainty regarding estimation and/or performance of the BMP, the ratio might be set more conservatively. For BMPs where performance has been well documented and captured using existing estimation methodologies, a less conservative uncertainty ratio may be applied.</p>	<p>If the various degrees of uncertainty for categories of practices are known, a program might be able to design an uncertainty ratio that varies according to the type of practice being implemented. Under this arrangement, a program would assign a lower uncertainty ratio to practices with well understood effects that can be quantified with greater certainty. Uncertainty ratios may also vary based on the sectors that are trading.</p>	<p>The Wisconsin phosphorus provisions regarding water quality trading provides a table of uncertainty factors for various BMPs.^v</p> <p>The Ohio River Basin trading project uses a variable uncertainty ratio, referred to as a Margin of Safety factor. The Margin of Safety factor is determined by running the WARMF or U.S. EPA Region 5 spreadsheet model to determine the possible variance in model output and its effect on the attenuation coefficients.^{vi}</p>

129 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612.

(continued)

Table 5.1.1 Establishing an Uncertainty Ratio

OPTION	CONSIDERATIONS	EXAMPLES
i	Code of Virginia, <i>supra</i> note Table 1.1.1(i), at §§62.1-44.15:35.G	
ii	Code of Virginia, <i>supra</i> note Table 1.1.1(i), at §§ 62.1-44.19:15.C and Virginia Admin. Code, <i>supra</i> note Table 2.1(iv), at Title 9 § 25-820-70 Part II B.1(1). <i>See also</i> Virginia Department of Environmental Quality, Division of Water Quality Programs, Addendum No. 1 to Guidance Memo No. 07-2008, Amendment No. 2 Permitting Considerations for Facilities in the Chesapeake Bay Watershed, p. 1, (2009), available at http://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/GM07-2008.CB_Watershed_Facilities_Pmttg-Amd-2-Add-1.pdf .	
iii	MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at p. 9.	
iv	Code of Virginia at §§ 10.1-603.8:1. G, (2012), available at https://vacode.org/10.1-603.8:1/ .	
v	WI DNR 2013b, <i>supra</i> note Table 1.1.1(xii), at § 2.11.4.	
vi	Electric Power Research Institute, <i>Ohio River Basin Trading Project: Ratios and Uncertainty</i> , (2012), available at http://wqt.epri.com/ratios-and-uncertainty.html .	

5.1.2 Types of Uncertainty Addressed by Uncertainty Ratios

WQT program developers should carefully consider what types of uncertainty are accounted for in an uncertainty ratio. Ratios should be documented and transparent and should avoid duplicating other types of risk management mechanisms within the trading program. Below are options for what the uncertainty ratio addresses.

Table 5.1.2 Forms of Uncertainty Addressed by a Ratio

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Uncertainty factor addresses estimation uncertainty only.</p> <p>A fixed uncertainty factor that accounts for uncertainties related to nonpoint source pollution estimation (e.g., time lag, variability in BMP performance, or inaccuracy of measurement). This kind of uncertainty ratio is an extension of the quantification methodology.</p>	<p>If quantification methodologies do not or cannot account for uncertainties as a result natural variability through conservative estimates and/or inclusion of factors such as weather and soils in the estimation methodology, then application of an explicit uncertainty ratio may be necessary.</p>	<p>VA DEQ program applies a 2:1 uncertainty ratio to all nonpoint source credits generated for point source offsets in order to account for uncertainty in estimation.ⁱ</p>
<p>Option B:</p> <p>Uncertainty factor addresses estimation uncertainty and attenuation.</p> <p>If there are no model-derived attenuation factors that can estimate the impact of pollution reductions at the point of concern, the uncertainty ratio may include a margin of safety to account for diminished water quality benefits at the point of concern.</p>	<p>In cases where delivery and attenuation of pollutants cannot be derived through existing models or literature, the uncertainty factor might then be set at a level that also compensates for attenuation losses.</p> <p>Some National Network participants commented that quantification methods should cover attenuation if at all possible.</p>	<p>The OH Great Miami trading program uses an uncertainty ratio that accounts for multiple forms of uncertainty and provides incentives for pre-regulatory action.ⁱⁱ The OH Great Miami program also uses an eligibility criterion to reduce uncertainty by restricting trades to locations upstream of the point of discharge.</p>
i	VA DEQ, <i>supra</i> note Table 1.1.1(xix).	
ii	MCD 2005, <i>supra</i> note Table 2.3(v), at § 3.2.1.	

5.1.3 Reserve Ratio

A reserve ratio is applied to the total credits generated from a project to set aside a centralized credit cache that can be drawn upon to compensate for unexpected project failure. In general, the reserve pool is meant to hedge against project failure as a result of weather or other force majeure (catastrophic acts of nature) and is not meant to insulate against the risk that the landowner or aggregator is not implementing or maintaining projects as promised.¹³⁰ Reserve ratios have typically been set between 5-10%,¹³¹ but there is not, as yet, a published methodology on how best to set that value so that it accounts for the risk of project failure and force majeure. Credits placed in a reserve account should continue to be tracked in order to ensure that when credits are drawn upon they are valid (e.g., not expired or generated from a failed project).



A reserve ratio is one way to compensate for unexpected project failure as a result of weather or other force majeure (catastrophic acts of nature). Photo courtesy of Erin Pettigrew / Creative Commons.

This section's primary focus is on the types of risks covered through the reserve. Additional considerations for programs that use a reserve ratio include whether a reserve ratio is appropriate, how the reserve pool will be managed, and protocols for accessing and replenishing the pool when drawn upon. There are several options for what a reserve ratio covers.

¹³⁰ See 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612. See also Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(a).

¹³¹ Pennsylvania's reserve ratio is set at 10% See Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(e). The Ohio River Basin Trading Project has a 10% contribution to the credit reserve. See EPRI 2012, *supra* note 65, at § 8.

Table 5.1.3 What Is Covered by the Reserve Pool

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>No reserve ratio</p> <p>Under this option, a program does not create a reserve pool of credits to guard against unforeseen events. Risk from unforeseen events lies with trading participants or is covered by other program design or eligibility elements.</p>	<p>Some programs have determined that no reserve ratio is necessary. Permittees expect to manage their own risk and ensure they have adequate credits when required.</p> <p>When aggregators are present, they may often self-insure against these kinds of risks. Also, contractual arrangements between buyers and sellers are likely to cover liability for unforeseen or willful circumstances which cause project failure. Credit buyers and sellers may wish to use private insurance or work through aggregators to help mitigate individual risk.</p>	<p>Trading programs in Maryland, Virginiaⁱ, North Carolina, and Oregon currently do not apply reserve ratios.</p>
<p>Option B:</p> <p>Reserve ratio for <i>force majeure</i> only</p> <p>Under this option, a reserve ratio is applied, but only for catastrophic acts of nature, and is not used for other unexpected project failures (e.g., improper maintenance of projects) which would be covered by other program elements.</p>	<p>Programs should consider whether such a pool is redundant with other types of measures being taken in the WQT program, such as self-insurance or contractual arrangements between buyers and sellers.</p>	<p>Authors are not aware of any trading programs that use this approach.</p>
<p>Option C:</p> <p>Reserve ratio for <i>force majeure</i>, project failure, and seller default</p> <p>This option requires a reserve ratio to guard against all manner of unforeseen events.</p>	<p>This type of ratio covers multiple types of uncertainty and, therefore, may need to be set higher than Option B. Regulators should consider the redundancy of the reserve pool with other active mechanisms, such as contractual agreements and self-insurance.</p>	<p>In the Ohio River Basin project and PA DEP trading programs, 10% of all credits generated are set aside in the reserve pool. The reserve pool can be drawn upon if the BMP fails or is removed due to weather, lack of landowner maintenance, or any other cause.^{ii,iii}</p>

i In Virginia, upon adoption of new nonpoint source credit certification regulations, there will be a reserve ratio of 5% to assist in offsetting potential growth in other sectors (Allan Brockenbrough, VA DEQ, personal communication, April 3, 2015).

ii EPRI 2012, *supra* note 65, at pp. 8 & E-3. See also Sara Walker & Mindy Selman, World Resources Institute, *Addressing Risk and Uncertainty in Water Quality Trading Markets*, p. 16, (Hereafter “Walker & Selman 2014”) (2014), available at <http://www.wri.org/publication/addressing-risk-and-uncertainty-water-quality-trading-markets>.

iii See Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(e)(3)(v).

5.1.4 Retirement Ratio

Retirement ratios are set-aside ratios that are meant to create a net gain in environmental benefit. The Maryland trading program sets aside 10% of all nonpoint credits purchased by a buyer to ensure the program achieves a net water quality benefit.¹³² According to the 2003 U.S. EPA Trading Policy, a retirement ratio may also be one way to compensate for uncertainty by creating a margin of safety.¹³³ Here are options for whether a program uses a retirement ratio or not.

Table 5.1.4 Using a Retirement Ratio

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>No retirement ratio</p> <p>For some programs, a retirement ratio may not be necessary.</p>	<p>If net water quality improvement is not a goal of the water quality trading program, or other protections for net environmental benefit are in place, then a retirement ratio may not be necessary.</p>	<p>PA DEP has a 10% reserve ratio, but when not needed for emergencies, these credits are retired.ⁱ Thus far, all credits from the reserve have been retired each year.</p>
<p>Option B:</p> <p>Retirement ratio is in place</p> <p>Other programs utilize a retirement ratio to achieve an overall net environmental benefit.</p>	<p>Several states have implemented a retirement ratio as a means of achieving a net water quality benefit. Some National Network participants noted that the need for a retirement ratio depended on other program elements that ensured net environmental benefit.</p>	<p>The MDE and MDA program applies a 10% retirement ratio to nonpoint source credits at the time of trade.ⁱⁱ</p> <p>The Ohio River Basin trading project has a voluntary 10% contribution of all registered credits to retirement for net environmental benefit.ⁱⁱⁱ</p>
<p>i See Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 § 96.8.</p> <p>ii Maryland Department of Agriculture, <i>Producing and Selling Credits in Maryland's Nutrient Trading Market: Guidance for Agricultural Producers and Landowners in the Chesapeake Bay Watershed</i>, p.15, (2013), Copy on file with authors.</p> <p>iii EPRI 2012, <i>supra</i> note 65, at p. E-3.</p>		

132 MDE 2008, *supra* note Table 2.1(iii), at pp. 7 & 10; and MDA 2008b, *supra* note Table 3.2.2(ii), at § 4.6.

133 2003 U.S. EPA Trading Policy, *supra* note 2, at pp. 1610 & 1612.

5.1.5 Combining & Documenting Ratios

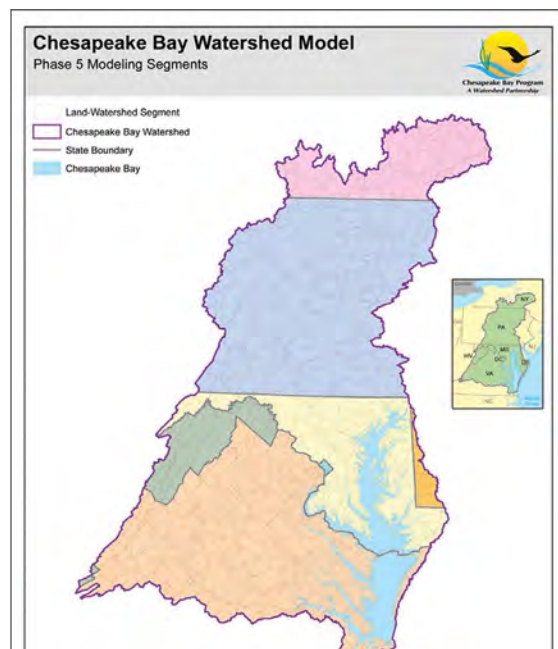
Programs may apply multiple ratios—delivery, equivalency, uncertainty, reserve, retirement—to nonpoint source reductions. How and when these ratios are incorporated varies among programs. Some have combined all ratios into a single trading ratio whereas others have kept the ratios distinct. Trading ratios may be applied separately or combined into a single factor. In either case, the technical and/or narrative reasoning behind treatment of delivery/location, equivalency, uncertainty, and retirement should be clearly documented. There are several options for lumping or splitting ratios.

Table 5.1.5 Lumping Ratios or Keeping Them Separate

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Maintain distinct and separate ratios</p> <p>Some programs may employ numerous ratios, but keep ratios separate in order to track the source of each credit adjustment. In addition, separate ratios facilitate evaluation and possible adjustment of each ratio itself as more information becomes available (e.g., uncertainty is reduced through better monitoring).</p>	<p>Maintaining distinct ratios in the program helps to articulate where credits are being adjusted or set aside and for what reason. However, it may add some complexity to the program if multiple ratios are applied. Program administrators should also consider where ratios are applied in the credit cycle (e.g., at time of estimation and prior to credit issuance, after credits are issued, or at the time of the trade, as discussed in Section 5.1.6).</p>	<p>The Ohio River Basin trading project applies multiple distinct ratios including trade-specific factors for delivery to the waterbody, in-stream attenuation, equivalency, and uncertainty/safety ratio. A 10% reserve ratio and a voluntary 10% retirement ratio also apply to all projects.ⁱ</p>
<p>Option B:</p> <p>Lump all ratios into a single trading ratio</p> <p>Other programs combine all the utilized ratios into a single ratio for ease of administration.</p>	<p>This approach may be simpler to administer. However, program administrators should consider whether they are conflating “set-aside” ratios with ratios that are meant to adjust the nonpoint source estimates (e.g., uncertainty ratios).</p>	<p>OR DEQ suggests that a combined 2:1 ratio can be used to account for time lag and variability in project performance.ⁱⁱ</p>
<p>i EPRI 2012, <i>supra</i> note 65, at note 17 (p. 8) & p. E-3.</p> <p>ii OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at § 2.6.</p>		

5.1.6 Applying Ratios

Programs differ about where the various trading ratios are applied during the credit lifecycle. In some instances, a ratio may be applied when the nonpoint source's water quality benefit is quantified (and prior to credit issuance), which reduces the number of credits issued from a project. In other cases, a ratio may be applied at the time of credit issuance (after a project is certified), or at the time of trade, effectively increasing the number of credits a buyer is obligated to purchase. It may make sense for programs to apply different ratios at different times. For instance, uncertainty ratios may be applied prior to credit issuance while a reserve ratio is applied at the time of trade. Where attenuation or delivery are included in trading ratios, factors may be applied at either time of estimation or time of trade depending on the program design. For example, in the Chesapeake Bay, the trading programs each have a consistent point of compliance (the Chesapeake Bay) and delivery factors describe nutrient attenuation from a given point in the watershed to the Bay. The factors are derived from the Chesapeake Bay Watershed Model and are applied to the estimated reductions. The buyers' credit obligation is also diminished by the attenuation factor for their location. However, in other cases, such as in the Ohio River Basin trading project, attenuation is calculated dynamically based on the location of the buyer and the seller and cannot be determined until the time of trade. There are several options for when ratios are applied during the credit issuance process.



A trading ratio may be applied at different points within the credit lifecycle. For example, trading programs in the Chesapeake Bay apply the attenuation factor at the time of credit estimation. Photo courtesy of Chesapeake Bay Program.

Table 5.1.6 When Ratios Are Applied

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Apply at time of credit estimation</p> <p>This approach would apply the ratio prior to project certification and credit issuance. A trading ratio applied at time of credit estimation would reduce the number of credits calculated from a project.</p>	<p>This may be most appropriate point at which to apply an uncertainty ratio, attenuation factor, and equivalency factor. Because these factors adjust the number of reductions attributed to a project, these ratios are best applied as part of the nonpoint source reduction estimation and prior to credit issuance. In this way, the credits issued reflect the actual quantity of water quality benefits that are attributed to a project. When ratios are applied prior to the trade, they result in increased transaction costs for the seller to generate credits.</p>	<p>The Ohio River Basin trading project applies the margin of safety (i.e., uncertainty) ratio and the equivalence ratios at the time of credit estimation.ⁱ</p> <p>Trading programs in Maryland, Virginia and Pennsylvania apply the attenuation factor at the time of credit estimation.ⁱⁱ PA DEP re-evaluates this factor at verification.</p>
<p>Option B:</p> <p>Apply at time of credit issuance</p> <p>A trading ratio applied at time of credit issuance would issue credits to a project and immediately reduce the amount of credits the seller can trade. For instance, if the project is issued 100 credits and a 10% trading ratio is applied, only 90 credits would be available to the seller. The other 10 would be set aside by the trading program.</p>	<p>Set-aside ratios such as the reserve ratio or retirement ratio are best applied after project certification, either at the time of credit issuance or at time of trade. By applying these ratios after credits are issued, programs can better track and administer these credits through a registry or other means. This is especially important in the case of a reserve ratio, which creates a reserve pool of credits that may be transferred to regulated entities in cases of project failure. When ratios are applied prior to the trade, they can result in increased transaction costs for the seller to generate credits.</p>	<p>PA DEP applies its credit reserve ratio at the time of credit issuance.ⁱⁱⁱ Similarly, VA DEQ applies its uncertainty ratio at time of credit issuance.^{iv}</p> <p>The Ohio River Basin trading project applies the retirement and reserve ratios at time of credit issuance.^v</p>
<p>Option C:</p> <p>Apply at time of trade</p> <p>A trading ratio applied at the time of the trade would require the buyer to purchase a greater number of credits than their water quality-based effluent limit to satisfy a permit requirement. If a buyer needed 99 credits to satisfy its offset requirement and a 10% trading ratio was applied at the time of trade, the buyer must purchase 110 credits and 11 would be set aside at the time of trade.</p>	<p>In general, set-aside ratios can be applied either at the time of credit issuance or at the time of trade. If the point of application is at the time of trade, then transaction costs will shift to the buyer (whereas the seller bears the transaction costs in options A and B). In addition, there may be some ratios that are dependent upon the trade parties and can only be applied at the time of the trade.</p>	<p>MDE and MDA's trading program applies the retirement ratio at the time of the trade.^{vi}</p> <p>In the Ohio River Basin trading project, the attenuation/delivery factor is calculated based on the location of the buyer and the seller, and can only be derived once these are known (i.e. the time of trade).^{vii}</p>

*(continued)***Table 5.1.6 When Ratios Are Applied**

OPTION	CONSIDERATIONS	EXAMPLES
i	EPRI 2012, <i>supra</i> note 65, at pp. 5-7 & E-3.	
ii	Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 § 96.8(a); VA DEQ 2008, <i>supra</i> note Table 1.1.1(xix), at pp. 1-2 & 7; MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at pp. 11-12 & 16.	
iii	Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 § 96.8(a).	
iv	VA DEQ 2008, <i>supra</i> note Table 1.1.1(xix), at pp. 1-2 & 7.	
v	EPRI 2012, <i>supra</i> note 65, at pp. 5-7.	
vi	MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at pp. 11-12 & 16.	
vii	EPRI 2012, <i>supra</i> note 65, at pp. 5-7.	

5.2 Taking a Holistic Approach to Managing Uncertainty

The use of trading ratios is one way in which program uncertainty and risk are addressed in water quality trading programs. However, there are several other mechanisms that deal with risk, and a successful program will likely rely on a suite of mechanisms for addressing risk. Some of these risks include:

- Scientific and biophysical risk;
- Extreme events;
- Regulatory risk;
- Market risk; and
- Buyer risk.

All tools addressing risk need to be consistent with the Clean Water Act and should be clear about what forms of risk are and are not handled by the mechanism(s) selected. Many of these are discussed elsewhere in this document. The following sections briefly describe risk mitigation mechanisms that can be adopted by WQT programs. These sections were adapted from Walker & Selman (2014), “Addressing Risk and Uncertainty in Water Quality Trading Markets.” **Table 5.2** summarizes some of the sources of risk and uncertainty in water quality trading programs and the policy mechanisms that might be put in place to help mitigate these.

Table 5.2 Types of Uncertainty and Mechanisms for Reducing Uncertainty Risks
(adapted from Walker & Selman 2014)

TYPE OF UNCERTAINTY	MITIGATING MECHANISM	PROS	CONS	COST
Scientific and Biophysical	Direct measurement	If conducted properly, may be most accurate credit estimation method	Is labor intensive Is technically challenging Has attribution challenges	high
	Conservative BMP effectiveness estimates	Can rely on available data Achieves consistency among trades	Rely on averages that are not site-specific	low
	Scientifically-vetted estimation tools and models	Can be site-specific	Have their own degrees of uncertainty	varies
	Uncertainty ratio	Communicates easy-to-understand margin of safety Can be adapted to specific BMPs or circumstances	May be duplicative if other mechanisms are in place	varies
	Retirement ratio	Assures water quality is not compromised	May be duplicative if other mechanisms are in place	varies
Extreme Events	Centralized credit reserve	Pools risk	May be duplicative if other mechanisms are in place	varies
Regulatory Risk	Grandfathering	Can encourage early action Provides market certainty	Risks compromising water quality in light of new regulations or information Not immune from third party challenge	N/A
	Certainty programs	Encourage early action Provide market certainty	Risks compromising water quality in light of new regulations or information	low
	Water quality trading design standards and best practices	Provide guidance and clear standards for program design	May not deter permit challenges unless standards are endorsed by regulatory agencies	low
Market Risk	Pre-implementation certification	Encourages project planning without upfront investments	May increase buyers' perceived risks	N/A
	Credit banks	Provide more efficiencies than bilateral exchanges Centralizes risk	Can cause some costs to be lost to intermediary Use of price-setting can interfere with market dynamics May stifle third party actors who transact sales	low
	Government guarantee	Provides assurance that credits generated will be sold	Relies on public funds to artificially stimulate market	high

*(continued)***Table 5.2 Types of Uncertainty and Mechanisms for Reducing Uncertainty Risks
(adapted from Walker & Selman 2014)**

TYPE OF UNCERTAINTY	MITIGATING MECHANISM	PROS	CONS	COST
Buyer Risk	Aggregators	Transfer liability and absorb risk Maximizes overall project development investments & shared resources Diversify credit sources	Cause some costs to be lost to intermediary	low
	Self-insurance	Can be adapted to specific BMPs or circumstances	May be duplicative if other mechanisms are in place May not be as efficient as a pooled-risk insurance policy	varies
	Ongoing Project Review	Provides easy-to-understand assurance for the public	Can be labor intensive	varies
	Shared liability	Encourages shared financial risk	Encourages shared financial risk Still attributes sole regulatory risk to buyer	N/A

5.2.1 Regulatory Risk

Regulatory risk in markets can arise if there is uncertainty whether regulations will change or be challenged, or if permit requirements or credit calculations can be subject to change with every renewal of a credit or credit project. There are several mechanisms for addressing regulatory risk.¹³⁴

- **Grandfathering** (see Section 10.3). If regulations change in a way that affects credit calculation or other program elements, grandfathering recognizes already certified credits or already sold credits as valid. Grandfathered credits may be approved by regulatory agencies, but agency approval does not preclude third party citizen suit challenges.

- **Agricultural certainty programs.** Some states that have TMDLs in place are experimenting with agricultural certainty programs. These programs establish series of activities or level of agriculture effort that qualifies a landowner for the program. As part of the program, the landowner is protected for a period of years from any future regulations. Virginia has implemented the Resource Management Plan program¹³⁵ and Maryland has passed legislation establishing its own certainty program.¹³⁶ In these states, the certainty programs are aligned with the trading programs in that landowners that qualify for the certainty program also qualify for the trading program. The certainty programs are meant to create regulatory certainty for landowners and assurances that by qualifying now for a certainty program they will continue to be eligible for the trading program as long as they are enrolled in the certainty program.



Some states with TMDLs are experimenting with agricultural certainty programs that protect a landowner for a period of years from any future regulations. In the trading context, this can create regulatory certainty and assurances for landowners that by qualifying for a certainty program, they are eligible for a trading program. Photo courtesy of USDA / Creative Commons.

- **Trading design standards and best practices.** This document discusses many ways trading guidance, frameworks, and plans can provide clear choices of program designs which can reduce regulatory risk.

134 Walker & Selman 2014, *supra* note Table 5.1.3(ii).

135 Virginia Department of Conservation & Recreation, *Resource Management Planning Program*, (Nov. 5, 2014), available at http://www.dcr.virginia.gov/soil_and_water/rmp.shtml.

136 Maryland Agricultural Certainty Program, *Maryland Senate Bill 1029*, (2013), available at <http://mgaleg.maryland.gov/2013RS/bills/sb/sb1029E.pdf>.

5.2.2 Market Risk

Market risk refers to the uncertainty experienced by buyers and sellers that there will be adequate supply and/or demand for credits. This type of uncertainty often arises in the early stages of trading program development before credit supply and demand trends are established. There are several mechanisms for addressing market risk.¹³⁷

- **Pre-implementation certification.** By certifying credits prior to the implementation of a project, sellers receive assurance that the proposed project will generate a defined number of credits. This may help to reduce uncertainty faced by agricultural credit sellers who may be hesitant about paying to install practices without some level of certainty that the practices will generate credits. Because it may be difficult to lock in credit values prior to completing a project, program administrators may provide assurance on a particular range of credits attributed to the project, allowing project developers to speculatively offer credits prior to project implementation. This approach may be especially useful in programs where demand is slow to materialize and credit sellers may be reluctant to invest upfront in projects. However, caution should be exercised as credits generated before project BMPs are installed are likely to convey more risk to the potential buyers than credits generated after installation. The Maryland trading program allows for nonpoint source projects to be certified pending implementation.¹³⁸
- **Credit banks/clearinghouses** (see Section 11.2). Credit clearinghouses can pool credits and create an aggregated supply of credits. In some cases, a credit bank may function similarly to a revolving fund and use seed money to purchase credits from suppliers in advance of demand from regulated buyers, helping to generate early participation in the WQT program and ensuring that credits will be purchased. The Pennsylvania and Ohio River Basin programs use a clearinghouse mechanism as one way to aggregate and trade credits.^{139, 140}
- **Government guarantee programs.** While not currently in existence, USDA and others have discussed government guarantee programs that would create a guaranteed performance or price for credits. A guarantee program would stimulate supply from the agriculture program. As proposed, such programs would be phased out after a certain period of time.¹⁴¹
- **True-up periods for compliance** (see Section 9.2). NPDES permits with trading can include provisions that allow buyers a window of time at the end of the compliance period to purchase needed credits. Because a facility may not know year-to-year the exact amount of credits needed for compliance because their discharges may be variable, a *true-up period* can reduce risk to regulated sources of over purchasing or under purchasing credits in any given year.

137 Adapted from Walker & Selman 2014, *supra* note Table 5.1.3(ii).

138 MDA 2008a, *supra* note Table 2.1(vii), at p. 10.

139 See Electric Power Research Institute, *Ohio River Basin Trading Project: Credit Definition and Price Details*, (2014), available at <http://wqt.epri.com/pdf/Pricing-Summary.pdf> and World Resources Institute, *Current and Potential Roles for Government in Facilitating Water Quality Markets*, pp. 4-6, (undated) (hereafter “Roles for Government”), available at http://www.usda.gov/oce/environmental_markets/water.htm.

140 See Paul K. Marchetti, *PENNVEST: Nutrient Credit Trading Program*, presented at ACES and Ecosystem Markets Conference, Washington, D.C., (Dec. 12, 2012), available at <https://conference.ifas.ufl.edu/aces12/presentations/3%20Wednesday/J-K/Session%205H/YES/0430%20P%20Marchetti.pdf> and Pennsylvania Infrastructure Investment Authority (PENNVEST), *Nutrient Credit Trading Program (NCT)*, (undated), available at http://www.portal.state.pa.us/portal/server.pt/community/nutrient_credit_trading/19518.

141 See Roles for Government, *supra* note 139, at p. 11.

5.2.3 Buyer Risk

Buyer risk refers to credit buyers' uncertainty whether they will be exposed to the risk of noncompliance under their permits. This is especially relevant where it is unknown whether credit-generating projects will be maintained throughout the life of the contract, or where permitting authorities have not approved credits prior to buyer purchases. There are several mechanisms for addressing buyer risk.¹⁴²

- **Use of aggregators.** Aggregators are entities that pool together credits from multiple projects so they can be bundled and sold as a larger package than would otherwise be possible. By creating a diverse portfolio of projects and credits, an aggregator is better protected from project default or loss than an individual credit seller. Many aggregators have tools to properly plan for the quantity and timing of credit supply needed by buyers.¹⁴³
- **Self-insurance.** Aggregators or other project developers may self-insure their credits against natural disasters and/or landowner default. The cost of self-insurance is absorbed into the credit price, but reduces risks for the buyer. Self-insurance can take on several forms, such as holding more credits than needed, purchasing an insurance policy against loss, or investing heavily in project maintenance.
- **Shared financial liability through contracts.** Under the CWA, a regulated point source cannot transfer liability for regulatory compliance. In a WQT program, a regulated entity that purchases credits is still held liable for noncompliance if the credits fail.¹⁴⁴ Inability to transfer liability is a considerable risk to a regulated buyer, both in terms of potential criminal and financial exposure (fines resulting from noncompliance). Mechanisms within buyer contracts that share financial liability with sellers/aggregators can be an effective tool for mitigating buyer risks.¹⁴⁵
- **Financial assurances requirements** (see Section 7.6). Requiring that project developers provide financial assurances for ongoing project stewardship before credit approval reduces the risk that projects will fail or not be properly maintained.
- **Ongoing project review** (see Section 8.2). Rigorous and transparent ongoing *project review protocols* can help assure buyers that projects are being adequately maintained and that the program has adequate enforcement rigor and enough consequences for those that are not maintained.

142 Adapted from Walker & Selman 2014, *supra* note Table 5.1.3(ii)

143 See To N. Nguyen, Richard T. Woodward, Marty D. Matlock, Alyssa Denzer, & Mindy Selman, *A Guide to Market-Based Approaches to Water Quality*, Texas A&M University, University of Arkansas, & World Resources Institute, (2006), available at http://www.researchgate.net/publication/252102615_A_Guide_to_Market-Based_Approaches_to_Water_Quality.

144 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612.

145 See James Shortle and Richard Horan, *The Economics of Water Quality Trading*, *International Review of Environmental and Resource Economics*, 2(2):101-133, (2008).

6 CREDIT CHARACTERISTICS

Trading programs must define the essential characteristics of a credit, including standards that identify when a credit is created, when it expires, how it is treated from an accounting standpoint, and whether multiple credits from the same action can be used for compliance with other obligations (e.g., through credit stacking). Several terms are used throughout this section describing different time periods that are important to trading and credit characteristics. Use of these terms is not consistent across trading programs or Network participants. These terms provide clear terminology within this document:

- **Credit life.** The period from the date a credit becomes usable as an offset by a permittee (i.e., its “effective” date), to the date that the credit is no longer valid (i.e., its “expiration” date), often one year or one season;
- **Project life.** The period of time over which a project or BMP is anticipated to function, and thus generate credits. The project life often extends over multiple years. Therefore, a project may have many credit lives within its project life;
- **Project protection period** (*see Section 7.5*). The period of time over which the project must be protected by a legal agreement (e.g., lease, contract, or easement). The minimum project protection period is typically tied to the project life; and
- **Credit contract period** (*see Section 7.5*). The duration of a contract between a regulated entity and a project developer or landowner.



A project may continue to generate credits for many years, and project renewal could be appropriate after carefully considering whether the BMP remains effective over time. Photo of heavy use area BMP courtesy of EPRI.

A credit is effective for use only during its credit life, which may be annual, seasonal, or permanent. Some projects may continue to generate credits for many years, and project renewal could be appropriate after carefully considering whether the BMP remains effective over time. How a program approaches credits in terms of ownership and accounting will have several important implications for agencies, buyers, and sellers. Buying and selling credits must also be accounted for in an entity’s taxes.

6.1 Credit Life & Project Life

A credit is available for use by a buyer only between its effective date and expiration, or credit life. The credit life may differ from the project life, which is the entire time over which a BMP is anticipated to function. It may also differ from the length of the contract through which a project developer agrees to deliver credits to the buyer (the credit contract period). For example, nutrient credits from a grassed buffer may have a credit life of one year or less (e.g., seasonal or monthly credit lives), even if the landowner has entered a five-year contract to install and maintain the BMP, and the project developer and permittee have entered into a 20-year contract for the delivery of credits.

6.1.1 Length of Credit Life (Annual, Seasonal, or Permanent)

When defining the credit life in a trading program, it is important to consider the seasonal dynamics of pollution. If a stream has a summertime nutrient problem and BMPs reduce pollution in the spring, then there may not be a real offset to trade. The 2003 U.S. EPA Trading Policy states, “Credits should be generated before or during the same period they are used to comply with a monthly, seasonal or annual limitation or requirement specified in an NPDES permit.”¹⁴⁶ This compliance period may be daily- or seasonally-based,



It is important to consider the seasonal dynamics of pollution when defining the credit life in a trading program. For example, if a stream has a summertime nutrient problem and BMPs reduce pollution in the spring, the temporal mismatch may make trading infeasible. Photo courtesy of Chesapeake Bay Program / Creative Commons.

or a state may allow permit averaging periods to be longer, where supporting documentation is available. In other words, a credit life needs to be based in the science that connects discharges from one source to reductions from another source. National Network participants expressed that the credit life needs to be tied to the critical period in the relevant regulatory documents. This allows room for a credit life that is monthly, seasonal, annual, or that spans multiple years if the science supports that decision and is defined in the regulatory instrument. In the Chesapeake Bay, loading (and associated point source permit effluent limits) were addressed as pounds per year. Modeling efforts were used to demonstrate that cycling of nutrients in the waterways acted to integrate variable point source monthly loads.¹⁴⁷ In other cases where pollution accumulates and impacts designated uses for years, a regulatory instrument may define a critical period where reductions in one year are equivalent to discharges in later years.¹⁴⁸ There are several examples of different critical periods and how programs have tied credit life to that critical period.

¹⁴⁶ 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612.

¹⁴⁷ U.S. Environmental Protection Agency, Office of Water, *Annual Permit Limits for Nitrogen and Phosphorus for Permits Designed to Protect Chesapeake Bay and its tidal tributaries from Excess Nutrient Loading under the National Pollutant Discharge Elimination System* (Memorandum), p. 3, (2004) (hereafter “2004 U.S. EPA Memorandum”), available at http://www.epa.gov/reg3wapd/npdes/pdf/ches_bay_nutrients_hanlon.pdf.

¹⁴⁸ Santa Rosa Offset Program 2008, *supra* note Table 3.2.5(v). The Offset Program allows the City to offset the full amount of its actual discharge for a three year period if the three-year average difference is less than or equal to zero mass units of phosphorus based on the ecology dynamics of nutrients in the Laguna de Santa Rosa watershed.

Table 6.1.1 Setting Credit Life

Critical Periods	Considerations	EXAMPLES
<p>Option A:</p> <p>Annual credit life (i.e., 12 months)</p>	<p>Annual credit lives are appropriate where reductions in pollutant load from any point in the year are effective at improving water quality during the critical period (e.g., springtime nutrient reductions from grassed filter strips and summertime exceedances at a wastewater plant contribute equally to improving dissolved oxygen during the critical period).</p>	<p>The Ohio River Basin trading projectⁱ uses an annual credit life, as do VA DEQ, MDE, and PA DEP in the Chesapeake Bay.ⁱⁱ In both of these cases, annual credit lives are based on ecological justifications and links between the timing of discharges and impacts over the year.ⁱⁱⁱ</p>
<p>Option B:</p> <p>Seasonal credit life (e.g., 3 months)</p>	<p>This option is most appropriate when water quality problems are tied to critical watershed conditions (e.g., source loadings, eutrophic seasons, and warm temperature regimes). A seasonal credit life is more precisely matched to critical periods in a TMDL or a permit.</p> <p>Seasonal credit lives may limit the types of BMPs or land uses that are eligible to provide credits to those that will function during the critical period.</p>	<p>Shade credits for the OR City of Medford permit^{iv} and OR CWS permit^v are calculated based on project performance over the specific date(s) for which the facility will need to offset a portion of their thermal load (the critical period).</p>
<p>Option C:</p> <p>Credit life spanning multiple years (e.g., 3 years or permanent)</p>	<p>Impacts, such as new construction, can create a permanent source of stormwater runoff. In these cases, credits might span multiple years or be “permanent” — linked to a project offsetting seasonal or annual loads in perpetuity. A trading program may still need to address the timing of pollution issues relative to the BMPs articulated in Options A and B. Programs may set credit values based on the pollution reductions anticipated for the critical period, even if BMPs provide pollution reduction year-round.</p>	<p>VA DEQ may use “permanent” credits in their stormwater offset trading program. Developers are required to obtain permanent offsets, relying heavily on land conversion projects with deed restrictions, in order to satisfy permit requirements.^{vi}</p>

i EPRI 2012, *supra* note 65, at p. 3.

ii WRI Comparison Tables 2011, *supra* note 23, at p. 8.

iii 2004 U.S. EPA Memorandum, *supra* note 147, at pp. 3-4.

iv Oregon Department of Environmental Quality, *City of Medford National Pollutant Discharge Elimination System Waste Discharge Permit* (Permit No. 100985), pp. 21-23, (2011) (hereafter “OR Medford Permit 2011”), available at http://www.deq.state.or.us/wqpr/4066_A1201110745419334052.PDF.

v Oregon Department of Environmental Quality, *Clean Water Services National Pollutant Discharge Elimination System Watershed-Based Waste Discharge Permit*, pp. 42-44, (2005) (hereafter “OR CWS Permit 2005”), available at <http://www.deq.state.or.us/wq/wqpermit/cwspermit.htm>.

vi Code of Virginia, *supra* note Table 1.1.1(i), at § 62.1-44.15:35.K & L.

6.1.2 “Banking” Credits for Later Use

Banking in a water quality trading context differs from the meaning of the term used in wetland mitigation. For water quality trading, banking is the generation of a credit in one time period with the intention it be used to offset a discharge in another time period—without an ecological justification for doing so. There may be strong economic or other reasons for banking credits. For example, in the WQT context, banking would allow no-till practices that reduce 100 lbs. of phosphorus in 2014 to be used to offset a wastewater discharge in 2015.

The National Network participants have suggested that banking credits is not currently recommended, but that more experience with trading and better understanding of water quality dynamics may make banking more viable in the future. Banking would still need to be consistent with the CWA. Banking has a strong potential to create temporal mismatches between when the impact occurs and when the offset is effective. The 2003 U.S. EPA Trading Policy does not directly address banking, but states that “Credits should be generated before or during the same period they are used to comply with a monthly, seasonal or annual limitation or requirement specified in an NPDES permit.”¹⁴⁹ FL DEP¹⁵⁰ and ID DEQ¹⁵¹ expressly disallow banking of credits. The authors are not aware of any programs that currently allow banking as the term is defined in this document.

6.1.3 Project Expiration & Renewal

This section discusses whether and how often a project may be renewed after the expiration of the project life. For example, how many years can a conservation tillage practice be used on the same field to generate credits? If a riparian forest continues to be in place and maintained, can credits be renewed beyond the project life (e.g., 20 years)?

Renewal of a credit-generating project assumes that a few key program components will be present, such as ongoing project review and certification, stewardship funds available for monitoring and maintenance of the BMP, and trading program rules that still allow for that type of project. Program policies around project expiration and renewal should attempt to address environmental protection, market stability, and incorporation of emerging science. Evaluation of how to balance these factors can be further informed through program integration with broader watershed management initiatives. For example, baseline nonpoint source reduction requirements may change over time if more restrictive requirements emerge, in which case the actions taken through an older project may no longer be eligible to generate credits. The program must also consider a permittee's desire for credit supply and price stability. For example, program policies on expiration or renewal that imply rising costs over time or reduce a permittee's ability to make long-range forecasts may limit participation or steer participants into other compliance options. There are several options for how programs can deal with project renewals.

149 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612.

150 FL DEP 2010, *supra* note Table 2.2(ii), at p. 33 in Appendix C.

151 ID DEQ 2010, *supra* note Table 1.1.1(xiv), at p. 5.

Table 6.1.3 Project Renewal

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Allow for ongoing project renewal</p> <p>Under this approach, a project can be renewed so long as a BMP continues to function, stewardship funds are available to support maintenance and monitoring, and necessary contracts are in place.</p>	<p>This approach links ongoing performance of BMPs with credits. Allowing for the ongoing renewal of projects past their initial credit life and project life may help to keep effective BMP practices on-the-ground for longer, additional periods of time. There are also upfront transaction costs associated with engaging new landowners and with the initial implementation of a project (e.g., development of a nutrient management plan, site preparation, and credit calculation costs). Maintaining the same project over time may make improvements to water quality more cost-effective than periodic, ongoing investment in new projects. This approach also provides a mechanism for continued funding and stewardship of already-installed projects.</p> <p>However, as time goes on, continual renewal to generate credits may make it increasingly difficult or may not be able to demonstrate how projects are making additional progress toward water quality objectives (<i>see Section 3</i>). This may be more of a problem where no watershed plan or TMDL exists.</p>	<p>The Ohio River Basin trading project establishes a term for each contract, which then “may be renewed for successive term(s) provided that [the credit] continues to be implemented and verified.”²¹</p>
<p>Option B:</p> <p>Limited number of renewal periods</p> <p>After a certain number of permit cycles or years, BMPs are fully retired, and permittees would need to purchase new credit volumes from additional projects.</p>	<p>By limiting the number of renewals, more and more projects are implemented over time. This approach is one way to move the watershed closer toward attainment of TMDL goals.</p> <p>This approach represents a higher cost of trading to permittees over time (compared with Option A), as they will need to rebuild or repurchase all of the previously held credits after a certain amount of time has passed. The available credit renewal periods must be clearly communicated to trading program participants upfront. This dynamic may push a point source to install technology and forgo trading.</p>	<p>The authors are not aware of any programs that take this approach.</p>
<p>Option C:</p> <p>Renewal at a discount</p> <p>After a certain number of permit cycles or years, the credits from previously installed BMPs may be renewed, but at a particular discount rate (also assuming stewardship funds and project protection agreements are in place).</p>	<p>This approach strikes a middle ground between options A and B in that it provides for more restoration, but also allows regulated entities to carry forward some portion of existing credits toward future compliance obligations and retire the balance of credits, thus creating a long-term incentive for regulated entities to invest in and continue investing in maintenance of BMPs for water quality trading as a compliance solution.</p> <p>This also can increase credit costs, because the full credit project needs to be maintained, but a smaller fraction of the credits are available for sale. This option has some of the same certainty challenges as Option B.</p> <p>Increasing restrictions over time in this way helps to solve broader watershed management challenges, but permittees may feel the progress comes at their expense.</p>	<p>The authors are not aware of any programs that take this approach.</p>

(continued)

Table 6.1.3 Project Renewal

OPTIONS	CONSIDERATIONS	EXAMPLES
Option D: No renewal Projects cannot be renewed after their initial project life.	This approach represents the greatest cost and administrative burden because permittees and project developers are constantly looking for new projects to generate credits. Where a trading program relies primarily on structural BMPs (which are less likely to be removed after the credit life and associated contract ends), this approach might lead to more projects, more quickly than the other options. Since it represents the highest costs, this approach is most likely to limit permittee participation in trading.	The authors are not aware of any programs that take this approach.
i EPRI 2012, <i>supra</i> note 65, at p. 3.		

6.1.4 Other Credit Characteristics

The concept of credits is new for many people, and questions come up about whether credits are property, how to account for the financial value of credits, and other financial considerations. Little formal guidance exists to answer these questions. WQT program developers will rarely have the final say-so on many of these answers, but they can take steps to provide clarity. The National Network participants identified the following questions as issues to be aware of, but limited examples exist where trading programs have provided clear examples of how to answer these questions.

A) Do Buyers or Sellers Have a Property Right to Credits?

Whether credits are considered property rights is important to both landowners and to agencies. Just as with effluent limits, agencies want the ability to increase or decrease credit quantities without being subject to legal challenges from permittees. Not all states have clarified their stance on the property nature of water quality credits, but several have stated that neither an effluent limit nor a credit is a property right.¹⁵² FL DEP regulations specifically provide that the general permit issued under Environmental Resource Permitting “does not convey . . . or create . . . any property right, or any interest in real property.”¹⁵³ Analogously, California and Congress have respectively said carbon credits and federal acid rain program allowances are not property rights.¹⁵⁴ Conversely, a Louisiana District Court has held that the rights associated with carbon credits are among the “bundle of rights” included in property ownership.¹⁵⁵ Clarifying the property status of credits can help avoid disputes when agencies might need to increase or decrease available credits. Clarifying property status may also help clarify the financial accounting treatment of credits.

152 See, e.g., 40 C.F.R. § 122.41(g); Minnesota Admin. Rules § 7001.0150(3)C (2014), available at <https://www.revisor.mn.gov/rules/?id=7001.0150> (“The permit does not convey a property right or an exclusive privilege.”); and Florida Department of Environmental Protection, *Water Quality Credit Trading: A Report to the Governor and Legislature*, pp. 5-6, (2006), available at http://www.dep.state.fl.us/water/watersheds/docs/WQ_CreditTradingReport_final_December2006.pdf. (“Thus, water quality trading in Florida does not involve—and does not imply—the trading of pollution ‘rights.’”).

153 Florida Admin. Code § 62-330.405(3) (2014), available at <https://www.flrules.org/gateway/ruleNo.asp?id=62-330.405>.

154 California Code of Regulations Title 17 § 95820(c) (2014), available at http://www.arb.ca.gov/cc/capandtrade/ct_rf_april2013.pdf. (stating that a compliance instrument “does not constitute property or a property right”) and 42 U.S.C. § 7651b(f) (an emission allowance used in the Acid Rain Program “does not constitute property right”).

155 *Roseland Plantation LLC v. U.S. Fish and Wildlife Service*, 2006 U.S. Dist. LEXIS 29334 (W.D. La 2006).

B) What Type of Asset is a Credit?

Trading program participants need to know how to account for the value and expenses associated with generating and/or purchasing credits. The accounting treatment of credits is often not within the control of states or trading programs. The Governmental Accounting Standards Board (GASB) and Financial Accounting Standards Board (FASB) provide guidance to public and private utilities on the treatment of different asset types, but have not issued specific guidance on credits.

C) How Are Credit Sales Treated for Tax Purposes?

There is little explicit guidance from trading programs or other sources as to whether credit sales should be treated any differently than other types of income. The tax treatment of credits is an important consideration for sellers to consider.

D) Interaction with Farm Bill Programs

According to initial conversations with USDA,¹⁵⁶ revenue from selling credits will not count toward a farmer's overall cap on Farm Bill payments. Credit sales should not impact a farmer's eligibility for Farm Bill programs in most circumstances; however, where WQT overlaps with Farm Bill programs, it is important for trading participants to work closely with USDA in order to understand any possible implications of trading on Farm Bill program participation.



While credit sales should not impact a farmer's eligibility for Farm Bill programs in most circumstances, it is important for trading participants to work closely with the USDA especially where there is overlap with Farm Bill programs to understand any possible implications of trading on Farm Bill program participation. Photo courtesy of USDA / Creative Commons.

156 Chris Hartley, USDA Office of the Chief Economist, personal communication (August 28, 2014).

7 PROJECT IMPLEMENTATION & ASSURANCE

This section describes the standards that ensure the projects seeking credits were implemented to a high standard, do not create unanticipated environmental impacts, and are maintained in a way that achieves the credited water quality benefits for as long as the project is valid. The section also discusses how to document important project aspects, such as baseline and other eligibility criteria, quantification method inputs, and what kind of legal protections and maintenance funds for projects are needed and for how long.

7.1 Project Site Screening

Project site screening is the process of vetting proposed projects for program eligibility, also referred to as site validation. Conducting a project site screening early in the crediting process can mitigate some later risk of wasted time or costs spent on ineligible projects by giving the project developer, regulatory agency, and NPDES permittee an idea of whether a site will meet established eligibility criteria. On the other hand, project site screening may add unnecessary costs for commonly applied and standardized BMPs (e.g., cover crops).

If a project site screening process is used, and the project meets relevant eligibility criteria, the screener provides a written notice of eligibility. If the screener determines that a proposed project fails to meet eligibility criteria, the screener would notify the project developer with recommendations for revision and instructions for resubmission of the project plan. The considerations around which entity (e.g., state agency, third party, permittee, or project developer) can and/or should provide this screening function are discussed in **Section 11**.

A decision frequently faced by those designing trading guidance, frameworks, and plans is whether to make project site screening mandatory, voluntary, or use the standards and eligibility criteria for pre-approved BMPs so a project site screening is not needed. National Network participants expressed that site screening is important for providing certainty to all stakeholders. Some participants preferred to make site screening an optional step, and others preferred it to be mandatory. There are several options to consider for site screening.



*A credit process may reduce the risks of spending time and money on a project that will not generate credits.
Photo courtesy of American Farmland Trust.*

Table 7.1 Site Screening

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Project site screening is required</p> <p>All projects intended to generate credits must go through site screening process before they can be verified.</p>	<p>Project site screening provides the program administrator with a chance to become familiar with and ask questions about a project early on, potentially guiding project design or implementation in ways that best fit trading objectives. Requiring project site screening ensures that program administrators are brought in before significant investments are made.</p>	<p>Projects generating credits under the OR City of Medford permitⁱ go through initial project site screening using Willamette Partnership’s Ecosystem Credit Accounting System.ⁱⁱ</p> <p>In the Ohio River Basin trading project, SWCDs discuss BMP options with landowners, conduct site visits, make a determination of eligibility based on baseline requirements, and develop a preliminary design for proposed BMP(s).ⁱⁱⁱ</p>
<p>Option B:</p> <p>Project site screening is voluntary</p> <p>Project site screening is performed at the project developer’s discretion.</p>	<p>The project developer is the main beneficiary of this phase, so whether or not to incur the additional costs of screening should arguably be their decision. Project site screening also does not guarantee that credits will later be approved by a program administrator after projects are implemented, so it is a risk evaluation that project developers may ultimately be best suited to make.</p> <p>For routine project types, eliminating a required project site screening can provide cost savings for both developers and program administrators.</p>	<p>The authors are not aware of any trading programs that explicitly offer validation as a voluntary step.</p>
<p>Option C:</p> <p>Project site screening is not done</p> <p>In some scenarios, project site screening may not be necessary, especially when project developers are already familiar with the eligibility requirements.</p>	<p>Project site screening may not be necessary for project developers who are highly familiar with the eligibility requirements. It may also not be necessary if there are clear eligibility criteria, standardized BMPs, and common application of those BMPs. Some National Network participants expressed that this is viable for routine BMPs, but also expressed that forgoing a site screening could generate uncertainty and be a source of future disputes.</p>	<p>FL DEP’s proposed rule on WQT and its pilot project in the FL Lower St. John’s River do not provide for an initial screening of the project site, but instead jump directly to generating and registering the credits.^{iv}</p>
<p>i OR Medford Permit 2011, <i>supra</i> note Table 6.1.1(iv).</p> <p>ii Willamette Partnership ECAS 2013, <i>supra</i> note 107, at pp. 9 & 13.</p> <p>iii EPRI 2012, <i>supra</i> note 65, at p. E-6.</p> <p>iv Florida Admin. Code, <i>supra</i> note Table 1.1.1(vi), at §§ 62-306.500 – 700. <i>See also</i> FL DEP 2010, <i>supra</i> note Table 2.2(ii). Note that these documents use the term “validation” in a post-credit timeframe, as opposed to validation of the site prior to project implementation.</p>		

In some scenarios, project site screening may not be necessary, especially when project developers are already familiar with the eligibility requirements.

7.2 BMP Guidelines

Most credit calculations are quantified assuming BMPs are being operated and maintained in a way that reflects the assumptions and information modeled in the credit calculation. Developing BMP guidelines that set design, installation, maintenance, and performance standards can help to ensure that BMPs are performing as anticipated. BMP guidelines may be an avenue for encouraging on-the-ground actions to enhance ecosystem function, health, and resiliency. For example, the BMP guidelines for a riparian forest could require that plantings be composed of native species instead of non-native hybrids, or BMP guidelines for an animal exclusion fencing project could suggest that implementers consider wildlife-friendly design components.

BMP guidelines may be built from existing urban, agriculture, or forestry practice documents, and adapted for local conditions, or developed for a specific region. Practitioners, stakeholders, and experts are often engaged in developing these guidelines. BMP guidelines that use numeric standards can be more predictable and easier to assess than broad, narrative standards. This creates clear expectations for project developers and verifiers on whether a project meets program requirements. However, clarity must be balanced with the flexibility to tailor a project to local conditions (e.g., allowing project developers to respond to changing agriculture practices and seasonally-specific BMPs).



BMP guidelines help ensure that the practice is performing as anticipated. They are also a useful way to encourage BMP design that results in ancillary benefits such as ecosystem function and resiliency. For example, BMP guidelines for an animal exclusion fencing project could suggest that implementers consider wildlife-friendly design components. Photo courtesy of Chesapeake Bay / Creative Commons.

Trading program developers should consider writing the following components of BMP guidelines for practices eligible for trading:

- **Basic information**
 - Description of the BMP, how it works, its typical location on the landscape, and its suitability for the watershed.
- **Quantification method** (see **Section 4** on quantifying water quality benefits)
 - Technical analysis of predicted BMP effectiveness;
 - Technical summary of quantification method, as described in **Section 4** on quantifying water quality benefits;
 - Procedures for applying and documenting application of the quantification method; and
 - Documenting Information on who completed the quantification of water quality benefits.
- **BMP quality standards**
 - Description of where the BMP should be applied (appropriate site conditions);
 - Potential side effects and ancillary benefits;
 - Specifications for BMP design, installation, operation, and maintenance; and
 - Monitoring requirements and performance standards.
- **Project documentation and review requirements**
 - Procedures for project site screening;
 - Documentation required for confirming project implementation during project review;
 - Minimum project length; and
 - Credit release schedule, if applicable.

Even within these components, trading guidance, frameworks, and plans may provide different ranges of flexibility within their BMP guidelines. Some might allow for a lot of flexibility to customize BMPs to site conditions, and others might be more prescriptive. There are many sources to draw from when developing BMP guidelines, including NRCS Practice Standards.¹⁵⁷ Additional detail on recommended components of BMP guidelines are provided in **Table 7.6b**. There are several options for how to determine the quality of a particular BMP.

¹⁵⁷ See U.S. Department of Agriculture, Natural Resources Conservation Service, *National Conservation Practice Standards*, (undated), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/>.

Table 7.2 Determining BMP Quality

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Utilize BMP guidelines</p> <p>Under this approach, all projects must meet guidelines for basic information, credit quantification, BMP quality standards, and project review as outlined in pre-approved BMP guidelines. Where site-specific considerations necessitate a different design or performance standard, the project developer would need to work with the state water quality agency or their designee for approval of a site-specific BMP guideline.</p>	<p>BMP guidelines provide certainty and dependability of project quality and the assumptions in quantification methods. Guidelines increase participants’ confidence that BMPs in the trading program are a viable and robust approach for complying with permit limits.</p> <p>Trading programs utilizing BMP guidelines should be careful to achieve a balance between clear criteria that provide clarity around program expectations to project developers and verifiers, while still making standards flexible enough so that local conditions can be taken into account during BMP design, installation, and operation. In cases where site-specific considerations necessitate a different design or performance standard, the project developer would need to work with the state water quality agency or their approved third party for approval of a site-specific BMP guideline.</p> <p>Some National Network participants favored this approach because of the certainty it provided for BMP performance in a regulatory context. Some also said pre-approved BMP guidelines could reduce project review costs during operations.</p>	<p>Willamette Partnership has many of these components in place for riparian restoration for generating shade.ⁱ</p> <p>The Ohio River Basin trading project requires that all credit-generating BMPs be designed and installed using the appropriate State NRCS Practice Standards (“Standards”), available through the local Field Office Technical Guide.ⁱⁱ</p> <p>WI DNR provides technical standards for stormwater management and agriculture practices based on NRCS practice standards.ⁱⁱⁱ</p>
<p>Option B:</p> <p>Qualified professionals to submit BMPs that have not been pre-approved</p> <p>Credits may be issued if the project has been overseen and designed by a qualified professional (e.g., a NRCS Technical Service Provider or other certified professional), and has the information needed to determine credit quantities and performance standards.</p>	<p>For BMPs without pre-approved guidelines, WQT program developers can choose to allow qualified professionals to submit other types of projects. This could be important for innovative or new BMPs with some level of uncertainty. This approach provides some flexibility, but ties project design to qualified professionals. Existing accreditations may not include training on the specifications needed for credit-generating projects, so qualified professionals may not be available. Not using BMP guidelines may subject the program to less assurance and certainty, but also gives rise to greater flexibility.</p>	<p>The MDE and MDA trading program allows new or innovative BMPs to be analyzed by a standing technical review panel that assigns temporary efficiencies and an appropriate uncertainty ratio.^{iv} These projects are monitored with the goal of eventual adoption into the Bay Program nutrient loading and water quality models.^v</p> <p>PA DEP also convenes a group of technical experts to review a credit application that includes any new or innovative BMPs.^{vi}</p>

*(continued)***Table 7.2 Determining BMP Quality**

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>Review BMPs on a case-by-case basis</p> <p>Flexibility to customize particular BMPs for specific sites is important, so there are no explicit requirements developed for individual BMPs.</p>	<p>This approach does not provide assurance that BMPs are being implemented and maintained over time in a consistent manner. A case-by-case approach may create greater uncertainty regarding quantifying environmental benefits of BMPs and/or verifying BMPs over time, which also could create regulatory risks for credit purchasers. It does, however, provide greater flexibility in how BMPs are designed, maintained, and implemented, which may be important for BMPs that need to be customized to each particular site and situation.</p> <p>Some National Network participants preferred this approach because of the flexibility needed to fit particular BMPs to different conditions. Other Network participants expressed that this option was not viable due to the uncertainty and transaction costs it creates.</p>	<p>The BMP guidelines used by different programs vary in their length, depth, and specificity, but the authors are not aware of any programs that have no guidelines whatsoever.</p>

i Willamette Partnership, *Water Quality: Water quality credit tools and rules*, (2014), available at <http://willamettepartnership.org/market-tools-rules/water-quality/>.

ii EPRI 2012, *supra* note 65, at p. E-5.

iii WI DNR 2013a, *supra* note Table 1.1.1(xii), at p. 42.

iv MDA 2008b, *supra* note Table 3.2.2(ii), at pp. 9-10.

v See Thomas Simpson & Sarah Weammert, *Developing Best Management Practice Definitions and Effectiveness Estimates for Nitrogen, Phosphorus and Sediment in the Chesapeake Bay Watershed (Final Report)*, Mid-Atlantic Water Program, University of Maryland, (2009), available at http://archive.chesapeakebay.net/pubs/BMP_ASSESSMENT_REPORT.pdf.

vi Jay Braud, PA DEP, personal communication (February 20, 2015).

7.3 Project Design & Management Plans

Project design refers to the proposed actions, restoration goals, and anticipated risks in project performance. Project management is how the project developer plans to keep the practice in place and consistent with BMP guidelines (e.g., maintaining fences, controlling weeds in riparian buffers, and other actions for the life of a credit). Project design and management elements are typically recorded in a project design and management plan (or operation and maintenance plan). These plans may make more sense for certain BMPs than for others. For example, a seasonal cover crop using an NRCS practice standard may not need a project design plan. Plans make more sense for structural BMPs with long project lives. WQT program developers may choose whether to require these documents and if so, whether they must be submitted following a standard template. There are several options for whether project design and management plans are required or not.

Table 7.3 Use of Project Design and Management Plans

OPTION	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Project design and management plans are required and follow standard templates</p> <p>In this approach, project developers must develop both project design and management documents, following standardized templates, and to submit them to program administrators. This option is the most rigid, but provides the greatest amount of required details.</p>	<p>This approach ensures that program administrators, verifiers, and the public receive the same types of information in the same format for every project. It provides a level of certainty that project documentation will be complete.</p> <p>For projects with a very short duration (e.g., changes to tillage practice), this level of paperwork documentation may be onerous and not necessary.</p> <p>In some cases, a simple reference to pre-existing plans (e.g., NRCS guidelines or NPDES permit trading plans) is sufficient and can cut costs.</p>	<p>Project developers are expected to cover all the components included in the Project Design and Management templates provided in Willamette Partnership's Ecosystem Credit Accounting System, though they are not required to use that specific form.ⁱ</p> <p>The OH Great Miami program requires that a Management Practice Contingency Plan be developed and maintained in collaboration with OH DNR. The Plan assures a timely and coordinated response to the failure of a management practice.ⁱⁱ</p>
<p>Option B:</p> <p>Project design and management plans are required, but instead of needing to follow standard templates, they must adhere to some minimum standards</p> <p>Although project design and management plans are required in this approach, they need not conform to standard templates. This approach allows for more descriptive flexibility, but could lead to greater document and detail variability and subsequent confusion for the public seeking to understand the program.</p>	<p>For new programs or new BMPs, trading program developers may not yet have a clear sense of what should be included in the project design and management plans. This approach gives more flexibility to program developers to document the most relevant information for their project.</p> <p>However, it may be more difficult for the public to understand the activities being implemented if the information and format for each project are not standardized. Also, there is a chance that useful project information will be forgotten or otherwise not included in the public record.</p>	<p>In the Ohio River Basin trading project, participating landowners will work with the SWCD to complete an application, including design specifications and plans. The project uses a consistent document workflow to ensure that all applications follow a standard format.ⁱⁱⁱ</p>
<p>Option C:</p> <p>Project design and management plans are not required</p> <p>This approach does not establish a public track record of the site design and management.</p>	<p>For some BMPs that are consistent and seasonal, and have clear BMP guidelines, project design and management plans may not be necessary.</p> <p>However, this approach provides no comprehensive public documentation record of the specific actions taken or intentions for management. Enforcement could not rely on documentation, just a visual inspection that BMPs are present.</p>	<p>The authors are not aware of any programs that do not require any documentation of project design and maintenance.</p> <p>WI DNR does not specify that design or management plans are required for individual projects, however, they do require that projects be installed and maintained in accordance with applicable technical standards, and that project maintenance be documented in annual reports submitted to the WI DNR.^{iv}</p>

i Willamette Partnership ECAS 2013, *supra* note 107, at pp. 15-16.

ii MCD 2005, *supra* note Table 2.3(v), at pp. 9-10.

iii EPRI 2012, *supra* note 65, at p. E-6.

iv See WI DNR 2013a, *supra* note Table 1.1.1(xii) and WI DNR 2013b, *supra* note Table 1.1.1(xii).

7.4 Documenting Pre- & Post-Project Site Conditions

This section discusses how to develop and document the information necessary to quantify water quality benefits (i.e., the data and documentation that establish current conditions on a credit project site and forecast future conditions to predict water quality improvements) (for quantification methods, *see* **Section 4**). This discussion assumes that pre-project site conditions are assessed at the base year (*see* **Section 3.2.5** for discussion of setting the trading program's base year).

7.4.1 Documentation of Pre-Project Site Conditions

To quantify credits, a project developer needs access to information about on-site operations and current conditions. Operations and conditions in the recent past are pieces of the “pre-project site assessment.” For example, annual practices like crop cover may only be implemented for one crop inside of a three-year crop rotation. That year-to-year variance can be covered by looking back over the last 3-5 years to establish a “pre-project” pattern of crop rotation. A farmer may also need to document how much fertilizer has been used each year over the last three years or more to establish typical application rates and usage patterns. This information is then used to determine whether the site has met baseline requirements (*see* **Section 3.2**) or as an input into models that will later quantify credits. The information for documenting current conditions will vary depending on both the BMPs being proposed for credits and the type of pollutant credit being targeted. **Box 7.4.1** provides an example of the type of information collected to document pre-project conditions for a farm seeking to generate nutrient credits.

Box 7.4.1 Example of Information Documenting Pre-Project Site Conditions

The Ohio River Basin trading project requires that farmers make the following records for three years of farm practice history available upon request:

- Crop rotation sequence;
- Crop residue management: Each crop within the rotation for each field; yield/acre year and units, date of planting, date of harvest, and whether residue is removed from field; if a perennial hay crop is grown, provide typical seeding date, number of cuttings, and yield/acre; for tree crops, provide month and year of establishment;
- Field operations: Provide tillage information for each field including equipment used, soil penetration depth, and type of residue management;
- Crop nutrient input: Provide field identification; crop and yield goal, date of application; formulation of material applied; method of application; and actual lb/ac of N, P, and K applied;
- Irrigation water management (if BMP involves irrigation improvements);
- Tile drainage improvements;
- Location and type of conservation practices (buffer strips, filter strips, structural conservation practices such as terracing); and
- If operations include livestock, then: 1) livestock inventory; 2) grazing system documentation; 3) manure handling; and 4) location of barns/feeding areas/drainage.

In many cases, particularly where trading programs and their requirements are new, landowners will not have been tracking this kind of information and WQT programs developers may need to consider whether and how to accept incomplete or undocumented pre-project information. For all information, complete or not, it may often make sense for project developers to sign and attest to the accuracy of information being provided. There are several options for how to document pre-project site conditions.

Table 7.4.1 Required Pre-project Documentation

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Documentation based on what most landowners will have available</p> <p>Here, program developers may survey landowners or agriculture professionals to get a realistic picture of the kinds of information retained and most readily available. This availability practically informs the documentation required by the trading program.</p>	<p>This option will maximize the number of landowners that are able to participate. Project developers can sign and attest to the accuracy of information being provided without documentation.</p> <p>However, it may mean that quantification and assessments of additional water quality benefits can only look back a few years or less, reducing the thoroughness of those assessments.</p> <p>Network participants from environmental groups did not believe this option was viable because it did not provide the confidence that quantified credits were accurate.</p>	<p>The authors are not aware that any programs developed their standards for documentation with this specific intention.</p>
<p>Option B:</p> <p>Documentation based on eligibility criteria and quantification method needs</p> <p>Required documentation is based on the information needed to quantify credits and demonstrate eligibility.</p>	<p>This option provides the highest level of certainty that credit-generating projects make progress toward water quality objectives and that credit calculations are completed accurately.</p> <p>It will likely be difficult to find eligible participants in the first couple years until the expectations of pre-project documentation are widely understood and implemented.</p> <p>Several Network participants recognized that there are often data gaps in the first few years of a program that could make this option challenging.</p>	<p>Willamette Partnership, the Ohio River Basin trading project, and many other programs set documentation requirements to support quantification efforts and ensure additional water quality benefits.ⁱ</p>
<p>Option C:</p> <p>Allow for flexibility as the program gets started</p> <p>In this approach, there are documentation standards similar to Option B, but the program allows for flexibility in the early stages of a trading program. Few landowners are likely to have been tracking complete information, so the program provides a grace period for projects to gather the needed information.</p>	<p>This option sets an aspirational standard for documenting pre-project conditions, yet still allows more landowners to participate. Without some flexibility, trading programs may have a very limited number of eligible participants.</p> <p>However, utilizing anecdotal or undocumented information also presents a great risk that pre-project site conditions are misrepresented, which may result in an incorrect assessment of how additional water quality improvements achieved.</p>	<p>The Ohio River Basin trading project asks for 3 years of farm records for participation in the pilot trading programⁱⁱ and is willing to work with landowners who have incomplete records as the program gets going. In many cases, absence of practices can be established by remote sensing, including aerial and satellite imagery. Where this isn't possible, farm records and Farm Service Agency maps/data may be useful.</p>
<p>i Bobby Cochran, Willamette Partnership, personal communication (March 6, 2015).</p> <p>ii EPRI 2012, <i>supra</i> note 65, at p. 4.</p>		



A project developer will need access to information documenting current condition depending on both the BMPs being proposed for credits and the type of pollutant credit being targeted to quantify credits. A project developer should also have access to the BMP and associated information needed to confirm the project continues to perform. Photos of a sample project site courtesy of Willamette Partnership.

7.4.2 Documentation of Post-Project Site Conditions

To complete the quantification of water quality benefits, project developers also need to document post-project site conditions after a BMP is installed. For BMPs that become fully effective upon installation (e.g., tillage management), the post-project site condition is the presence or absence of that BMP operating properly at a site. For BMPs that take longer to mature (e.g., grass buffers to reduce nutrients), project developers may need to forecast post-project site conditions in order to calculate the final post-project site performance and estimate the anticipated water quality benefit. Ultimately, this information will likely become part of the project record that is reviewed (*see Section 8.1*) and may be part of the records linked to a registry (*see Section 8.5*).

Programs should consider providing guidance on how to characterize the post-project condition for those cases where there is a time lag between the installation of project actions and realization of water quality benefits. Despite a delay in structural BMP performance in some cases, some programs have chosen to release credits upfront while requiring additional performance measures, while others account for the time lag by releasing credits in phases based on performance criteria. Programs could also consider the use of permit compliance schedules to address time lags in BMP performance. Additional discussion of the options and considerations around credit release schedules is included in **Section 8.4.1**.

7.5 Project Protection & Stewardship Requirements

The time period over which a BMP is anticipated to function, and for which it is legally protected, is known as the project life. Practice- or management-based BMPs (e.g., cover crop) may only produce water quality benefits for a period of months to a few years, whereas structural BMPs (e.g., irrigation upgrades, riparian forest restoration) may produce water quality benefits for years, decades, or longer.

At a minimum, project developers should have access to the BMP and associated information needed to confirm the project continues to perform over time. Often, trading programs further require that a project protection agreement be in place as a layer of assurance that BMPs will be kept in place for the life of the project. These are legal instruments (e.g., contracts, leases, easements) that contain protections for the project

activities for a given amount of time (the project protection period). The project protection agreement can be between a project developer and a landowner, a point source buyer and the landowner/project developer, or the agreement can be held by a third party. WQT program developers will need to determine whether project protection agreements are required, whether to use minimum protection periods, and whether the agreements should pass with property titles to future owners (i.e., run with the land).

7.5.1 Requiring Project Protection

Project protection is typically required for the duration of the project life. There are several options for whether project protection agreements are required or not.

Table 7.5.1 Legal Protection of Crediting Projects

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>All projects need legal agreements protecting the land used for projects</p> <p>In this approach, legal documents would contain a defensible and enforceable mechanism to help protect the project from future changes in ownership or land uses.</p>	<p>This option provides a legally defensible and enforceable mechanism to protect project activities. However, legal agreements would need to be developed and negotiated, adding time and cost to each project site.</p>	<p>WA DOE’s draft framework states that any credited water quality benefits must be secured using binding legal instruments between any involved parties for the life of the credit.ⁱ</p> <p>The Ohio River Basin trading project requires that all credit arrangements be formalized through agreements that require implementation of the practices that are identified, as well as independent monitoring, inspection, and project review of those practices. The agreements will describe the credit accounting process, availability of and access to records, schedule, and consequences if practices fail.ⁱⁱ</p>
<p>Option B:</p> <p>Projects <u>do not</u> need legal agreements protecting project activities</p> <p>Projects would not need to obtain legal documents, but would be at greater risk.</p>	<p>This option makes sense where credits may be verified annually, and for BMPs where long-term management is not as important to ensure.</p> <p>This option may have lower transaction costs but does not provide a guarantee the projects will remain in place for the project life.</p> <p>Some National Network participants viewed this option as viable for annual or seasonal BMPs. Others expressed that it was not viable because it did not provide the confidence needed to ensure BMPs would be in place for the life of the project.</p>	<p>Pennsylvania’s state policy calls for credits to be verified annually but does not include requirements for project protection.ⁱⁱⁱ</p>

i WA DOE 2010, *supra* note Table 1.1.1(xv), at p. 7.

ii EPRI 2012, *supra* note 65, at p. 5.

7.5.2 Minimum Project Protection Period

Where project protection is required (Option A from **Section 7.5.1**, above), WQT program developers may wish to define when and for how long that protection needs to be in place as a way to ensure that it coincides with the time period when the credit-generating BMP is functioning. One way to do this is by setting a minimum project protection period. Farmers may prefer short-term projects (e.g., cover crops or residue management) that preserve flexibility in farm operations.

However, reviewing and approving one-year or two-year contracts can increase administrative activities, and buyers may prefer long-term contracts that match their five-year permit cycle or longer-term

facility planning cycle. Minimum project protection periods should be considered in light of the types of BMPs needed within a watershed. There are several options for a minimum project protection period.



Each BMP will likely have different stewardship and maintenance needs to keep it functioning over time. Photo of nutrient management courtesy of EPRI.

Table 7.5.2 Minimum Project Protection Period

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Minimum project protection period is tied to credit life</p> <p>Here, the project must be protected for the entire credit life. For example, if a cover crop is generating annual nitrogen credits, then the land use on which the crop grows must be protected for a full year, even if the crop itself is only in place for 3 months.</p>	<p>Keeping the project protection period consistent with the credit life gives administrators fewer timelines to track, but may still create inefficiencies since credit life is also typically short (e.g., annual).</p> <p>Trading programs can set projects to renew automatically for longer periods (e.g., up to 5 years), unless the project developer, buyer, landowner, or other party to the contract opts out.</p>	<p>For seasonal practices, the Ohio River Basin trading project uses 5 year agreements with participating landowners. Project protection under these agreements renews on an annual cycle (consistent with 1 year credit life) unless either party opts out.</p>
<p>Option B:</p> <p>Minimum project protection period is tied to when the BMP is functioning</p> <p>The project protection agreement may be shorter than the credit life if it covers the time period over which BMP performance is anticipated. For example, if credits are being generated from planting a cover crop, the cover crop could be protected only during the months that the plants and resulting residue are actually in place even if the credit life is a full year.</p>	<p>This approach provides the maximum flexibility for project developers or aggregators to react to changes in market demand for credits. It also provides the maximum flexibility for landowners, who can change farm practices to respond to market demand for agricultural products.</p> <p>Conversely, this approach may create the greatest administrative burden. Moving a project through the crediting system has fixed time and cost needs, which may be more efficiently utilized on projects lasting longer than a couple months.</p>	<p>The authors are not aware of any programs that take this approach.</p>

(continued)

Table 7.5.2 Minimum Project Protection Period

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>Minimum project protection period is set for each program, BMP, or class of BMPs and may be longer than credit life</p> <p>The trading program may set an overall minimum project protection period. Under this approach, the program could set one minimum duration for all projects (e.g., 5 years) or determine a minimum time commitment by the BMP or classes of BMPs (e.g., 5 years for management-based BMPs, 20 years for structural BMPs). Under this scenario, the project protection agreement can cover more than one BMP. For example, the program can require a pollution management plan spanning a period of years that includes a set of BMP scenarios that achieve predictable pollution reductions each year (e.g., fixed crop rotations and scenarios for fertilizer applications).</p>	<p>There may be significant learning curves and costs involved in the first year of a project generating credits, and a program that incentivizes longer terms of enrollment may be more effective in generating long-term pollution reductions.</p> <p>Additionally, this approach may prevent inefficient transactions. Longer protection periods can spread the fixed costs associated with developing or issuing credits (e.g., landowner recruitment, project site screening, project review, and registration) over time as BMPs continue to generate credits.</p> <p>However, the costs of such transactions may be a sufficient deterrent for project developers, and landowners may be more hesitant to make any commitments knowing that they and their future property buyers will be restricted from responding favorably to changes in crop prices, water availability, or other conditions.</p>	<p>Willamette Partnership’s Ecosystem Credit Accounting System has a 20 year minimum project protection period for “structural BMPs” (e.g., fencing, irrigation upgrades, and forest restoration). The minimum protection period for management- or practice-based BMPs (e.g., nutrient management, grassed buffer) is 5 years.ⁱ</p>

i Willamette Partnership ECAS 2013, *supra* note 107, at p. 16.

7.5.1 Do Project Protection Agreements Need to Be Recorded with the Property?

Sometimes, trading programs provide additional guidance regarding the form the project protection should take, namely whether or not the agreement needs to be recorded against the property and “run with the land” (i.e., encumber the land regardless of all current and future owners of the property). There are several options for whether project protection agreements need to run with the land include.

Table 7.5.3 Project Protection that Runs with the Land

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Protection does not need to run with the land</p> <p>When the property changes hands through sale or other acquisition, the agreements associated with the project do not remain enforceable with the new owner.</p>	<p>This approach is most appropriate for shorter-term BMP contracts, where the processes to negotiate and execute such an agreement will comprise a larger relative transaction cost and where there is no property interest at stake (as with easements and leases). If the agreement does not transfer with the property, there is less assurance that the project will remain in place for the anticipated time period. However, even short-term contracts could include stipulations that future owners will be held to the agreement.</p>	<p>WA DOE’s draft WQT framework states that a legal instrument is necessary to protect the pollution controls that are the source of credits for the time period for which offsets are needed.ⁱ</p>
<p>Option B:</p> <p>Protection must run with the land</p> <p>The agreements associated with the project attach to the land and remain in place even though the property may change hands.</p>	<p>This provides a high level of assurance that the project will remain in place over the duration of the credit life, but represents a transaction cost that may not be appropriate or applicable for short-term contracts.</p> <p>Some National Network participants generally said the decision on which option to choose depends on the BMP.</p>	<p>Willamette Partnership requires that easements and leases run with the land for projects with 20-year periods or permanent project protection periods.ⁱⁱ</p>
<p>i WA DOE 2010, <i>supra</i> note Table 1.1.1(xv), at p. 7.</p> <p>ii Willamette Partnership ECAS 2013, <i>supra</i> note 107, at p. 16.</p>		

7.6 Project Stewardship Funds

Many BMPs will require ongoing action to operate and maintain (e.g., repairs to an irrigation system, control of invasive species in restored areas), but others will not (e.g., cover crops and tillage). Project developers may be asked to demonstrate that they have adequate funding to steward project sites for the duration of the project life to safeguard the project’s full function and to prevent BMPs from failing. Evidence of adequate funding might be shown through performance bonds, restricted or separate accounting, insurance, or other similar documentation. Programs may also supplement or alternatively address these risk mitigation approaches with mechanisms to address BMP failure once it has occurred (e.g., credit insurance pools, true-up periods). This is discussed further in **Section 5.2**. There are several options for when stewardship funds must be in place.



For BMPs that need ongoing maintenance, there needs to be a plan for when stewardship funds need to be in place. Photo courtesy of USDA / Creative Commons.

Table 7.6a When Stewardship Funds Need to be in Place

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Stewardship funds required for project approval</p> <p>Under this approach, the project developer makes an assessment of the funds necessary to provide adequate stewardship activities, including project operation, maintenance, and monitoring as applicable, for the life of the credit. The funds must be available, documented, and set aside at the time the project is verified.</p>	<p>This approach provides the greatest level of certainty that BMP operations and maintenance will occur as planned.</p> <p>Requiring funds to be in place up front may present a cash flow issue for project developers if there is any time lag between implementing BMPs and selling credits.</p> <p>Some National Network participants expressed that this option could create high transaction costs and that it wasn't necessary for most on-farm BMPs.</p>	<p>Willamette Partnership's Ecosystem Credit Accounting System requires that stewardship funds be in place for all compliance-grade projects.ⁱ</p>
<p>Option B:</p> <p>Strategy or plan for acquiring the stewardship funds required for project approval</p> <p>Here, the project developer could go through project approval and credit issuance without necessarily having funds for stewardship activities in hand, provided that they could outline an adequate strategy or plan for acquiring funding or otherwise providing for maintenance and stewardship over the life of the credit.</p>	<p>This approach provides flexibility to raise money for project stewardship after the project has been approved and credit issued. However, it presents a higher risk that BMP maintenance will not be fully funded and thus will not continue functioning as predicted in the quantification.</p>	<p>Willamette Partnership's Ecosystem Credit Accounting System does not require stewardship funds to be in place for voluntary credits. Project developers of voluntary credits need to demonstrate stewardship costs and their plans for providing those funds to cover project maintenance for the life of the credit.ⁱⁱ</p>
<p>Option C:</p> <p>Demonstration of stewardship funds or a fundraising plan is unnecessary given other program protections for project failure</p> <p>Some BMPs and some trading programs may not require demonstration of adequate funds to maintain credit-generating projects. A cover crop or grassed buffer may only be in place for one year or may not require much maintenance. In addition, programs may have provisions (e.g., insurance pools or true-up periods) that make documentation of stewardship plans and funds unnecessary.</p>	<p>This is most appropriate for BMPs that do not have ongoing operations, maintenance, and monitoring needs. It may also be appropriate where trading programs have other provisions in place to manage project failure.</p> <p>For BMPs that do require ongoing maintenance and monitoring to function, however, this option presents the highest risk that BMP maintenance will not be fully funded and will not continue functioning as predicted in the quantification.</p> <p>Some National Network participants expressed that this option did not provide adequate assurances that BMPs, especially structural BMPs, would be maintained.</p>	<p>WI DNR's requirement to list particular projects and specifications in a permit's Trading Plan makes it unnecessary to have a specific financial plan for project approval.ⁱⁱⁱ</p> <p>The Ohio River Basin trading project does not require documentation of stewardship funds for approval of projects or credits. They do, however, withhold annual payment until project installation has been confirmed.</p>

i Willamette Partnership ECAS 2013, *supra* note 107, at pp. 16-17.

ii *Id.*

iii See WI DNR 2013a, *supra* note Table 1.1.1(xii), at pp. 50-51 and WI DNR 2013b, *supra* note Table 1.1.1(xii), at pp. 36-37.

Table 7.6b Example Components of a BMP Guideline

CATEGORY		COMPONENTS
Basic Information		Title and description of practice Load sources addressed by BMP
Quantification Method		Unit of measure Credit quantification approach; modeling and/or tools Technical documentation of modeling approach/tool, including assumptions and estimates of uncertainty Procedures/user guidance for consistent application of the model/tool Alternative modeling approach and/or tool (where appropriate) Effectiveness estimate, including justifications/references
BMP Quality Standards	Suitability/ Specific BMP Eligibility	Eligible land-uses and practices Locations in watershed where BMPs are applicable Potential interactions with other practices (e.g., riparian buffers with stream fencing increases combined effectiveness) Identification of ancillary benefits or consequences (e.g., increased/reduced air emissions) Description of conditions where or when the BMP will not work (e.g., large storms) Any negative results (e.g., relocated pollutants, negative pollutant reduction data)
	Design criteria	Installation instructions/guidance (e.g., installation according to manufacturer standards and/or NRCS standards) Verifiable criteria for installation, including: Quantitative criteria (e.g., 2600 stems/acre planting density, 100 ft. minimum buffer width, 30% residual residue, 2 hour inflow water capacity, 100 ft. from surface water) Qualitative criteria for installation (e.g., watering hole outside riparian zone, fence/pipe material type)
	Management criteria	Management instructions/guidance (e.g., seeding rate, tillage plan, crop list, water application rates and method, fertilizer application rates and methods)
	Monitoring	Operation and maintenance requirements and how neglect alters performance Description of how the practice will be tracked and reported (e.g., noting signs of erosion, measurement of vegetative cover, monitored irrigation systems)

*(continued)***Table 7.6b Example Components of a BMP Guideline**

CATEGORY		COMPONENTS
Credit Issuance Procedures	Performance standards	<ul style="list-style-type: none"> • Verifiable criteria for performance (e.g., no rills or gullies, stem density of 1600 stems per acre or greater, no more than 20% cover invasive species, at least 10 inches crop stubble height)
	Contract Duration and Credit Disbursement	<ul style="list-style-type: none"> • Cumulative, annual, or seasonal practice • Useful life; effectiveness of practice over time • Factors affecting temporal performance of the practice, including lag time between establishment and full function
	Validation of Credit Calculation Procedures	<ul style="list-style-type: none"> • Documentation that must be submitted to determine eligibility during a project screening/site validation • Procedures for reviewing project consistency with eligibility criteria • Applicable baseline requirements • Guidelines for applying methodology to pre-project site conditions • Guidelines for defining/predicting the future condition (for BMPs that take time to mature) • Guidelines for documenting assumptions and data included in the credit calculation
	Confirming Project Implementation	<ul style="list-style-type: none"> • Procedures for documenting pre- and post-implementation circumstances (e.g., farm records for 3 years prior, photo points documenting baseline condition, site visit after installation) • Procedures for reviewing consistency of pre- and post-implementation conditions with quality standards (e.g., no more than 15% discrepancy between reported and verified values)

8 PROJECT REVIEW, CERTIFICATION, & TRACKING

This section discusses the stages of confirming a credit-generating project's implementation and performance through project review, certification, and tracking of credits. A project is one or more BMPs or other activities that, taken together, are proposed for generating credits on a single site. **Section 10** discusses review and processes for improving WQT programs. Figure 8.0 provides an example of how project review, certification, and tracking might fit in the overall process of credit generation and sale.

Figure 8.0 Example Overview of the Process for Credit Generation and Sale



Project review is often called verification, but trading programs use the term verification differently. In some programs, verification refers to all components and phases of review; in other cases, it refers to a precise step of review, such as site inspections. The authors have chosen not to use verification as a term for this document to avoid confusion based on the terminology. Instead, the authors break the review process into three main phases: project review, certification, and tracking, each with specific definitions.

Project review is the process of confirming that a credit-generating project has completed certain elements that should help ensure the project provides the water quality benefits it promises. The process includes “initial” and “ongoing” (for the project life) reviews. Certification of a credit-generating project is the final administrative check and subsequent approval of the project if all criteria for review have been met. Certification has also been used to refer to the agency approval of a trading plan tied to a permit, or where the term “certify” is used synonymously with “attest” (e.g., WI DNR asks permittees to certify that a trading plan or practice is in place),¹⁵⁸ but for the sake of clarity, this document will use certification to refer to approval of individual projects, not overall trading plans or programs. Tracking is the process of following the status and ownership of credits as they are issued, used, retired, suspended, or cancelled.

Project review, certification, and tracking are important steps in point-nonpoint trading programs because credits for a single point source are often generated by numerous, dispersed nonpoint source

158 WI DNR 2013a, *supra* note Table 1.1.1(xii), at p. 35-36, 41.

projects. Sometimes credits will be generated from multiple types of BMPs, each with its own eligibility and quality standards. Projects are reviewed and certified to provide regulators with the confidence that the monitoring and reporting systems are in place to track project performance.

The entity conducting project review, certification, and tracking may be an agency, permittee, or third party (see **Section 11** for more discussion on roles in trading program administration). Project review, certification, and tracking are not intended to provide confirmation that a trading program is achieving its overall goals, but instead are confirmation that projects are meeting the requirements embedded within a trading plan, framework, or guidance.

To achieve a level of accountability comparable to current NPDES permit monitoring practices, WQT program developers should set project review and certification guidelines that define:

- What project information is reviewed;
- How and when credits receive final approval;
- How disputes will be resolved;
- Intervals at which multi-year projects are reviewed and approved;
- Mechanisms for tracking credits through their lifecycle; and
- Opportunities for public engagement in the project review and approval process.

WQT program developers will need to appropriately balance the costs that each step creates for trading program administrators and project developers against the scrutiny necessary to ensure practices are generating water quality improvements and meeting all relevant CWA requirements.

8.1 Project Review (Initial) & Certification

Credit-generating projects are typically reviewed in the first year of project implementation, a process referred to as initial project review, and in subsequent years of the project life, referred to as ongoing project review. Each stage of review is followed by final approval, or certification, of the project.

Project review (initial and ongoing) can be divided into three main components:

1. **Administrative review;**
 - a. Completeness – documentation is complete
 - b. Correctness – documentation conforms with standards
2. **Technical review** – quantification is complete and accurate; and
3. **Confirmation of project implementation and/or performance.**



A site visit is one way to confirm project implementation and/or performance during project review. Photo courtesy of Willamette Partnership.

The timing and content of initial and ongoing review may vary by state and watershed depending on preferences and capacities within state agencies, permittees, and third parties.

8.1.1 Required Components of Initial Review

Greater breadth and depth of information covered in initial project review will increase both the cost and the level of confidence that trading program administrators can have about the delivery of suitable water quality benefits from each project. The complexity of the project, its requested documentation, and the distance that the reviewer must travel for an in-person site inspection are three major drivers of cost. There are several options that seek to balance cost and accountability for what gets reviewed initially.

Table 8.1.1 Balancing Cost and Accountability of Initial Project Review

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>All projects receive a comprehensive initial review, including administrative and technical review and confirmation of project implementation</p> <p>A comprehensive, intensive, and rigorous approach to initial review.</p>	<p>This is the most comprehensive, intensive, and costly approach to initial project review. All aspects of the proposed project are substantiated, quantification methods are re-performed, and implementation is confirmed for all projects in Year 1. Essentially, a second set of eyes scrutinizes aspects of the project. Time, labor, and administrative costs associated with preparing and providing project documentation may be significant and/or duplicative, and absent a specific permit requirement, it may be difficult for some buyers of credits to justify the costs. However, this approach provides the public and regulated entities with the highest level of certainty about project implementation.</p>	<p>Willamette Partnership's Ecosystem Credit Accounting System utilizes this approach.ⁱ</p> <p>MDA does a full administrative and technical review of all projects before they are approved.ⁱⁱ</p> <p>The Ohio River Basin trading project requires the state agriculture agency to complete a "verification" form based on on-site inspection.ⁱⁱⁱ</p>
<p>Option B:</p> <p>All projects receive administrative review and on-site confirmation of implementation, but not technical review</p> <p>Initial review for all projects includes an administrative review for consistency with BMP design criteria and adequate maintenance and an on-site confirmation of project implementation. Technical review of credit quantification is not included.</p>	<p>This approach is less costly than Option A, and can work well when a trading program uses standard quantification methods (e.g., set BMP efficiency rates or highly repeatable models run by the program administrator) and can do simple screening for eligibility. This option does not have a formal check that credit quantification was done accurately or documented completely.</p>	<p>If credit calculations are conducted by WI DNR or a county Land and Water Conservation Department, not all projects require a technical review, but WI DNR can choose to audit projects.^{iv}</p>

*(continued)***Table 8.1.1 Balancing Cost and Accountability of Initial Project Review**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>A subset of projects receive initial review</p> <p>A variation on either Option A or B, this approach uses sampling to guide the selection of projects for initial review. Sampling can be random and/or designed to produce statistically significant results. Sampling can also be used for just the administrative review or just the technical review.</p>	<p>A subsampling approach, similar to an audit or specialty certification program, can provide a lower-cost option while still providing the public with the certainty that comes from an independent review. Subsampling makes sense where trading activity includes a large number of BMP projects using similar, well-understood BMPs (i.e., activities are similar enough to build a representative sample). Limited budget or staffing constraints for project reviewers might also make a subsampling approach a more viable option.</p> <p>External stakeholders may not feel as comfortable with a subsample approach for initial project review, particularly in a program's early years. Sampling may not provide the certainty of NPDES permit compliance if every BMP has not been reviewed and confirmed after implementation.</p> <p>Alternatively, all projects might undergo an administrative review with a subsample also selected for technical review.</p> <p>Some National Network participants expressed that this option may not provide the needed confidence in trading programs.</p>	<p>The Farm Service Agency allows farmers to self-verify under the Conservation Reserve Program, but then conducts spot checks on a subset.^v</p>

i Willamette Partnership ECAS 2013, *supra* note 107, at § 2-3 (referred to as “verification”).

ii MDA 2008a, *supra* note Table 2.1(vii), at p. 10.

iii EPRI Testimony 2014, *supra* note Table 2.3(vi), at p. 4.

iv WI DNR 2013b, *supra* note Table 1.1.1(xii), at pp. 40-41.

v U.S. Department of Agriculture, Natural Resources Conservation Service, *General Manual, Title 450, Part 407, Subpart C: Spot Checking Policy* (GM-450-407), (2009), available at <http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=16990>.

8.1.2 Confirming Project Implementation

There are multiple ways that a program can confirm whether a project is implemented and meeting BMP guidelines and/or quality standards. There are several options for how to review project implementation.

Table 8.1.2 Confirming Project Implementation

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Onsite inspection</p> <p>This includes a site visit and inspection by the entity responsible for project review or an independent, trained third party.</p>	<p>This is the most common way to confirm project implementation, and may be the only way for some types of projects. Onsite inspections can also be more costly than other options, requiring time and travel.</p>	<p>OR Medford permitⁱ and OR CWS permitⁱⁱ require some form of onsite inspection as part of initial project review.</p> <p>MN Rahr Malting's 1997 permit required the permittee to submit documentation for each project to Minnesota Pollution Control Agency (MPCA) staff.ⁱⁱⁱ MN SMBSC used professional staff to report on cover crop practices.^{iv} MPCA staff also follow up with onsite inspections.</p>
<p>Option B:</p> <p>Self-reporting</p> <p>The project developer (i.e., a permittee or landowner), provides a report with the information needed to confirm project implementation without the need for a site visit.</p>	<p>For some projects, a report from the project developer may provide the information needed to confirm project implementation (e.g., photo points for a grassed filter strip). Onsite inspections may not be necessary in these cases, reducing costs of confirming project implementation.</p> <p>Some programs might use a combination of self-reporting and onsite inspections for a subsample of projects. This might make sense where programs are aggregating large numbers of contracts for similar BMPs (e.g., cover crops).</p>	<p>At the project approval stage, PA DEP asks developers to submit a detailed description, including a map and verification plan. At project implementation, the agency requires confirmation that the project review plan was followed.^v Site visits are conducted for new or unique practices and county conservation districts also verify a certain percentage of practices to support reporting from aggregators.^{vi}</p>
<p>Option C:</p> <p>Project implementation is verified by remote sensing, where applicable</p> <p>The entity responsible for project review uses photographic, video, aerial and/or LIDAR images to determine the presence or absence of the credited project activities and offers information about the quality of installation. No in-person site visit is required.</p>	<p>Where remote sensing data is available and/or for projects suited to confirmation through aerial photographs or satellite images, this approach can be less costly than Option A or B. Remote sensing may identify the presence and extent of some projects. However, remote sensing cannot verify eligibility or compliance with installation and maintenance plans, and thus may not be a suitable substitute for a site visit in some cases.</p> <p>Some National Network participants noted this option was not always distinct from Options A and B.</p>	<p>The authors are not aware of any water quality trading programs that currently take this approach. The Chesapeake Bay program cites remote sensing as an example of ways in which new technologies may improve project review procedures in the future.^{vii}</p>

i Medford Regional Water Reclamation Facility, *Thermal Credit Trading Program*, pp. 4, (2011), available at <http://www.deq.state.or.us/wq/trading/docs/MedfordThermalTrading.pdf>.

ii Clean Water Services, *Revised Temperature Management Plan*, pp. 31, (2005) (hereafter "CWS 2005"), available at <http://www.deq.state.or.us/wq/wqpermit/docs/individual/npdes/ph1ms4/cws/tmp/plan.pdf>.

*(continued)***Table 8.1.2 Confirming Project Implementation**

OPTIONS	CONSIDERATIONS	EXAMPLES
iii	MN Rahr Malting Permit, <i>supra</i> note Table 1.1.1(iv).	
iv	James Klang, Kieser and Associates, personal communication (Aug 28, 2014).	
v	Pennsylvania Code, <i>supra</i> note Table 1.1.1(ix), at Title 25 §§ 96.8(e)(2), (e)(5), (e)(6), & (f).	
vi	Jay Braund, Pennsylvania Department of Environmental Protection, email communication (Mar 4, 2014).	
vii	Chesapeake Bay Program, Chesapeake Bay Program Partnership BMP Verification Review Panel’s Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions, pp. 4 & 20, (2013), available at http://www.chesapeakebay.net/channel_files/21132/attachment_a_cbp_bmp_verif_review_panel_recommendations_2.pdf .	

8.1.3 Sample Project Documentation a Trading Program Could Require

Review of project documentation is a major component of initial project review. Table 8.1.3 below provides an example of the type of documentation a trading program might want to require prior to issuing credits.

Table 8.1.3 Sample Project Documentation

CREDIT GENERATION PHASE	SUPPORTS	DOCUMENTATION (PROVIDED BY PROJECT DEVELOPER)	DOCUMENTATION (PROVIDED BY “PROJECT REVIEW ENTITY”)
Project Site Screening (Site Validation)	Eligibility Criteria	Validation Checklist	Validation Notice
		(50%) Project Design	Agency Pre-Approval Notices
		Proof of Ownership	
		Proof of Rights to Credits	
		Land Protection Documents	
Calculation	Credit Calculation	Credit Estimate Report	See below
Project Review	Credit Calculation	Baseline Maps & Data	Report on Initial Project Review
		Pre- and/or Post-project Photo Points	
		100% Design and permits - if applicable	
		As-built Project Design	
		As-built Maps & Data	
	Service Area	Accounting Area Map	
		Service Area Map	
Eligibility Criteria	Other Agency Approvals		
	Stewardship and Monitoring Plan		
Certification	Certification		Certification Report
Ongoing Project Review, Tracking, and Transfer	Ongoing Project Review	Monitoring Report	Report on Ongoing Project Review
	Transfer	Proof of Sale	Approval of Sale

8.2 Project Review (Ongoing) & Certification

Where the project life is greater than one year (*see Section 7.5* on project life), trading programs should include a system for corroborating the continued existence and performance of credited projects, referred to as ongoing project review. Similar to the scenarios described in **Section 8.1**, deciding the frequency at which ongoing project review is conducted may factor in an evaluation of the associated costs of each of these steps versus secondary confirmation of the validity of the program's credited water quality benefits. The frequency of ongoing project review may be tied to the type of credit and the nature of the land use on which the project is located (i.e., how likely are the uses of the land, irrigation/hydrology, and weather to change, and how much will any changes affect project performance).



Program designers may want to tie the frequency of ongoing project review to the type of credit and the nature of the land use on which the project is located. Photo courtesy of Willamette Partnership.

In developing guidelines for ongoing project review, a trading program will need to determine: A) how and how often project implementation is re-reviewed; B) if all projects are reviewed every year; C) what ongoing project components are reviewed; and D) when the project may cease ongoing review.

8.2.1 Ongoing Review of Project Implementation

For ongoing project review, there is often little need to repeat the detailed administrative review of project eligibility and technical review of credit calculations. Instead, ongoing project review centers on the collection and review of project monitoring reports tracking project performance relative to criteria for the BMPs implemented. Ongoing project review may also include additional onsite, self-reporting, or remote sensing visits, described in **Section 8.1.2**. Project review requirements may vary by project type and/or status. Options selected for ongoing project review must also comply with applicable CWA regulations.¹⁵⁹ There are several options for what gets reviewed on an ongoing basis.

¹⁵⁹ For example, 40 C.F.R. § 122.41(h) provides permittees have a duty to furnish any information the agency may require to determine permit compliance; § 122.41(i) requires permittees to allow inspection and entry to the facility, equipment, practices, or operations at any time by the agency or its authorized representative; § 122.41(l) confers an affirmative duty on permittees to notify the agency of planned changes and anticipated noncompliance, furnish the agency with monitoring reports and compliance schedules, and report any dangerous noncompliance within 24 hours of becoming aware of the problem. Under these regulations, regulators may require that a permittee provide the necessary information on project performance and provide access to project sites. Permittees may consider building reporting needs into contracts with project developers or landowners.

Table 8.2.1 Frequency of Ongoing Project Review

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Full review of all project components on an annual cycle</p> <p>Administrative and technical review, as well as confirmation of project performance (via onsite inspection or other methodologies) occurs every year the project is generating credits.</p>	<p>This approach is the most time and cost intensive cycle of review and works best for BMPs that can change annually (e.g., cover crop or nutrient management). It provides the greatest level of assurance that projects are in place and performing as expected.</p>	<p>OH EPA requires BMPs that generate credits to be inspected at least annually.ⁱ MDAⁱⁱ verifies credits annually. The Ohio River Basin trading project requires project review at least annually during the pilot.ⁱⁱⁱ</p>
<p>Option B:</p> <p>Annual review of ongoing monitoring report and confirmation of implementation on a regular schedule</p> <p>Here, project developers collect technical and site performance data and submit monitoring reports for review annually. Implementation is confirmed on a regular cycle (e.g., every other year, every 5th year) with onsite visits or other methodologies. This might include a cycle of sampling a certain number of projects, rotating through each year.</p>	<p>Under this approach, all projects receive some level of annual review, but not all projects are physically inspected by agencies or third parties every year. Costs are reduced because reviewers do not conduct onsite inspections every year.</p> <p>A regular schedule could include a cycle of sampling a portion of projects to conduct onsite visits for ongoing review of project implementation each year. The project developer would still collect and self-report on data each year for each site.</p> <p>This approach may work best where trading plans are using a large number of BMP projects of a similar type, using well-understood design and maintenance criteria.</p>	<p>Willamette Partnership's Ecosystem Credit Accounting System calls for annual review of monitoring reports with site inspections on a 5-year cycle.^{iv}</p>
<p>Option C:</p> <p>Annual review of monitoring report; confirmation of implementation stops when project consistently performing</p> <p>Similar to Option B, monitoring reports are reviewed annually, project implementation is confirmed regularly, but after a consistent period of performance, projects are assumed to be performing as promised.</p>	<p>This approach seeks to reduce the costs tied to ongoing project review. The underlying assumption is that after a project is established and performing consistently, it is appropriate to reduce the frequency and depth of review.</p>	<p>The authors are not aware of any water quality trading programs that utilize this approach.</p>

*(continued)***Table 8.2.1 Frequency of Ongoing Project Review**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option D:</p> <p>Regular, but not annual, review of both monitoring reports and project implementation</p> <p>Site inspections (on site, self-reported, or remote) <u>and</u> ongoing monitoring reports for all projects are reviewed on a given cycle (e.g., 5 years), but not annually. The cycle repeats for the life of the project.</p>	<p>This approach reduces costs in interim years, but limits a program's ability to catch problems that may arise in intervening years. Projects could go multiple years under this approach without independent confirmation of performance.</p>	<p>The authors are not aware of any water quality trading programs that utilize this approach.</p>
<p>Option E:</p> <p>No ongoing project review</p> <p>After initial administrative review and confirmation of project implementation, no ongoing review is conducted (this option has limited applicability).</p>	<p>This approach can make sense for some types of projects, such as structural BMPs that perform their full function immediately and require little to no maintenance (e.g., system hookups to sewer) or single season BMPs (e.g., cover crops).</p> <p>Some National Network participants expressed that this approach could be problematic for project types that need active maintenance, can change quickly, or have a project life longer than a single season or year.</p>	<p>The authors are not aware of any water quality trading programs that utilize this approach.</p>
<p>i Ohio Admin. Code, <i>supra</i> note Table 1.1.1(x), at § 3745-5-04(I).</p> <p>ii MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at p. 11 <i>and</i> MDA 2008a, <i>supra</i> note Table 2.1(vii), at pp. 9-10.</p> <p>iii EPRI 2012, <i>supra</i> note 65, at p. E-7.</p> <p>iv Willamette Partnership ECAS 2013, <i>supra</i> note 107, at § 2-5.</p>		

8.2.2 Ongoing Review of Eligibility & Credit Calculation

Trading programs should also define whether and how eligibility criteria and the credit quantification are evaluated during ongoing project review. This section assumes that eligibility requirements remain unchanged. Where eligibility requirements do change as new rules or ordinances come into effect, or as program improvement processes are implemented, *see Section 10* for considerations around changing program standards and phasing in new requirements. There are a couple of options for whether and how to include eligibility and credit calculation in ongoing review.

Table 8.2.2 Eligibility and Credit Calculations Are Reviewed

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Project performance, eligibility, and credit quantity are included in ongoing project review</p> <p>Ongoing project review re-evaluates all aspects of the project.</p>	<p>Ongoing project review re-evaluates credit quantity if the project performance or program standards change from the assumptions made in the initial project review. This means the number of credits available for sale could decrease or increase through the life of the project and once-eligible projects may become obsolete. Full costs of initial project review may again be incurred. This will introduce uncertainty for project developers and credit buyers.</p>	<p>Project performance is evaluated annually in Willamette Partnership's Ecosystem Credit Accounting System. Eligibility criteria and credit quantification are revisited on a 5-year cycle.ⁱ</p>
<p>Option B:</p> <p>Neither eligibility nor credit quantification are included in ongoing project review</p> <p>Ongoing project review focuses solely on project performance.</p>	<p>Ongoing project review is focused on project performance and, unless required by law or regulation, does not revisit the other information confirmed in the initial project review.</p>	<p>For MDE and MDA's trading program, ongoing review is only used to confirm that practice continues to be implemented and maintained — they do not re-run calculations, which are grandfathered for the life of credits sold.ⁱⁱ If changes to baseline, TMDLs, BMP efficiencies, or other significant program changes are made in Maryland, unsold but certified credits could be subject to re-calculation. Clear violations of landowner eligibility identified during inspection would likely be investigated and could result in credit calculations being re-run or de-certification of credits.</p>
<p>i Willamette Partnership ECAS 2013, <i>supra</i> note 107, at § 2-5.</p> <p>ii MDA 2008a, <i>supra</i> note Table 2.1(vii), at pp. 9-10.</p>		

8.2.3 Failure to Meet Performance Standards

For projects that fail to meet performance standards during ongoing project review, trading programs often include protocols or a process by which project developers can correct these deficient situations. For instance, when a deficiency is noted as part of ongoing review, the reviewer notifies the program administrator, project developer, and/or buyer. Typically, a window of time is available to remedy the issue before credits are cancelled (*see Section 8.4.5*). Where legally binding agreements exist between buyers and project developers or other program participants, additional provisions may apply.

8.3 Dealing with Differences of Opinion during Project Review

Differences in opinion are bound to occur during project review between project developers, program administrators, and/or regulatory agencies. These disagreements might involve the adequacy of documentation, whether the project was installed correctly, whether credits were quantified accurately, or whether a project developer is planning well enough for ongoing performance costs. How these disputes are resolved is likely to depend on which entity acts as the reviewer (*see Section 11*). Where the agency conducts project review, disputes would likely be handled through administrative and dispute resolution processes at that agency. Where a third party conducts project review, dispute resolution processes should be determined

ahead of time and incorporated into the contract for project review services. Often, the state regulatory agencies may be the authority that deals with disputes that cannot be resolved. Costs of each may vary.

Trading program administrators may choose to set up internal processes to deal with some disputes. They can also develop protocols around when differences of opinion are significant (or “material”), to reduce the number of individual disputes needing resolution. Either way, it is important for trading programs to be clear about how different disputes will be resolved.

8.4 Tracking & Credit Issuance

Once a project is formally certified, credits are issued and tracked. Credit issuance is like the minting of a currency. Once credits are issued, they are ready for a permittee to use or a project developer to sell. Tracking is the process of following the status and ownership of credits as they are issued, used, retired, suspended, or cancelled. To facilitate tracking, credits are serialized and accounted for using a ledger or registry. There may also be some public disclosure around credits.

8.4.1 Timing of Credit Issuance

Once credits are issued, they are ready for sale and use. Credit issuance may take place at different times depending on when project review occurs, or for different BMPs. **Figure 8.4.1** below depicts the options for when credits might be issued relative to the credit issuance process for a project developer (light blue) and a program administrator (dark blue).

Figure 8.4.1 Options A, B, C, and D for the Timing of Credit Issuance as It Relates to the Credit Issuance Process for Project Developers (light blue) and Program Administrators (dark blue). (Note that Option B is most relevant where Initial Project Review occurs prior to project implementation.)

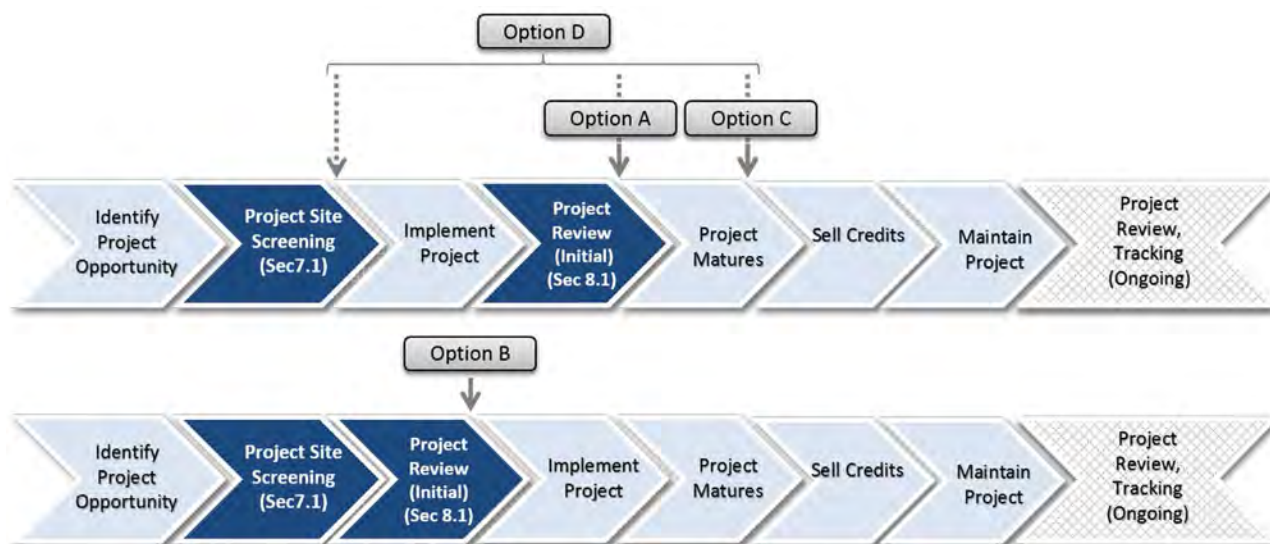


Table 8.4.1 Timing of Credits Issuance

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Issuance occurs after implementation and all stages of initial review</p> <p>Immediate certification of credits occurs upon project review of the BMP.</p>	<p>Immediate certification of credits upon project review of the BMP reduces the burden on project developers to carry any up-front capital costs for credits.</p> <p>This is appropriate for projects that are fully functional upon installation. For projects that take time to mature and are not fully functional upon installation, there is a time lag to account for between when the BMP is installed and when the water quality benefit arises. If credits are issued and made available for use upon installation, there will be unmitigated impacts, ranging from miniscule to significant, to the waterbody during the time lag. Ratios, other analyses, or permit compliance schedules can help account for the time lag, and address public distrust and uncertainty.</p>	<p>OR DEQ guidance,ⁱ the OR CWS permit,ⁱⁱ and the OR Medford permitⁱⁱⁱ allow for immediate release of credits from riparian forest restoration projects upon project installation and initial review. The time lag between project installation and full functionality is accounted for as part of the 2:1 trading ratio.^{iv}</p>
<p>Option B:</p> <p>Credits can be issued before implementation</p> <p><i>Ex ante credits</i> are those credits issued to projects that are not yet implemented but have been approved based on the project plans. This approach allows project developers to sell credits after going through administrative review, technical review, and certification but before BMPs are installed and confirmed.</p>	<p>Ex ante credits are advantageous in allowing project developers with limited access to capital to participate in trading. However, ex ante credits released represent only a <i>potential</i> reduction in load at an equivalent time, location, and quantities as the point source discharging to a waterbody — not an actual load reduction. The buyer may therefore experience perceived greater uncertainty or risk of noncompliance. Restrictions on the use of ex ante credits can protect against impacts to the waterbody if the project is not successfully verified.</p>	<p>Maryland issues ex ante credits to project developers who certify projects prior to implementation. Project developers are given one year in which to implement the project. Ex ante credits can be traded, but cannot be used towards regulatory compliance until credit status is changed to ex post. Credits are ex post when the project has been implemented and verified.^v</p>

*(continued)***Table 8.4.1 Timing of Credits Issuance**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option C:</p> <p>Credits are issued after a project is installed and fully functioning</p> <p>Some BMPs begin reducing water pollution as soon as they are installed (e.g., cover crops, manure management, and flow augmentation) while other BMPs may take time to mature before their full water quality benefits begin to accrue (e.g., riparian forest, grassed buffers, and animal exclusion to reduce stream bank erosion). Using this approach, projects must reach full functionality and provisioning of water quality benefits before certification and issuance can occur.</p>	<p>This approach ensures BMPs are providing their full pollution reduction before credits are released.</p> <p>However, for BMPs that take time to mature, project developers and buyers will need to carry the up-front capital costs for a longer period of time, increasing the cost and providing a disincentive for those types of BMPs. There is further disincentive for permittees that need credits sooner than the time period required for the BMP to fully mature — this delay between the effective date of a credit and required compliance milestones may expose permittees to potential liability for noncompliance unless a permit includes an appropriate compliance schedule.</p> <p>In some situations this can be problematic because the BMPs that take time to mature may be the same actions linked to changing the ecological processes that drive water quality (e.g., stream geomorphology, or wetland hydrology improved connections to hyporheic or interstitial flow) and are therefore a high priority for restoring watershed function. Therefore, combining trading with the use of compliance schedules and variances in permits can help account and/or expressly allow for these time lag issues (<i>see Section 1.3</i>).</p> <p>Many National Network members expressed that this approach was viable, and it was preferred by two participants. A few expressed that the approach was viable, but not preferred.</p>	<p>The Ohio River Basin trading project requires all projects to be installed, verified, and certified before any credits are issued.^{vi}</p>
<p>Option D:</p> <p>Allow for phased credit releases</p> <p>In this approach, credits for those BMPs that take time to mature can be issued in phases based on achieving pre-defined, milestone performance standards. Sometimes these BMPs not only provide the specifically needed pollution reduction, but also contribute to ecological benefits supportive of designated uses in an impaired watershed, accelerating progress toward water quality standards attainment.</p>	<p>This approach is similar to wetland mitigation banking and strikes a balance between options A, B, and C.</p>	<p>VA DEQ is proposing phased release of credits from land-conversion: 25% of credits released upon certification and the remaining 75% of credits released only after performance criteria for project implementation plan have been met.^{vii}</p> <p>MN SMBSC permit used a phased release schedule early on of 45% on approval of a project, 45% on construction, and 10% on establishment of vegetation. Phased releases are no longer used.^{viii}</p>

*(continued)***Table 8.4.1 Timing of Credits Issuance**

OPTIONS	CONSIDERATIONS	EXAMPLES
i	OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at p. A-7.	
ii	See OR CWS Permit 2005, <i>supra</i> note Table 6.1.1(v).	
iii	See OR Medford Permit 2011, <i>supra</i> note Table 6.1.1(iv).	
iv	OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at p. A-6.	
v	MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at p. 9.	
vi	EPRI Testimony 2014, <i>supra</i> note Table 2.3(vi), at p. 4.	
vii	Virginia Department of Environmental Quality issued a draft version of Virginia Admin. Code Title 9 § 25-900 (“Certification of Non-Point Source Nutrient Credits”) on September 25, 2013 (hereafter “VA Draft Certification Rule”). See § 25-900-100.B for the draft rule on phased credit releases, <i>available at</i> http://townhall.virginia.gov/l/viewchapter.cfm?chapterid=2871 . Regulatory Advisory Panel meeting notes of September 25, 2013 give the draft rule context, <i>available at</i> http://townhall.virginia.gov/L/GetFile.cfm?File=C:%5CTownHall%5Cdocroot%5CMeeting%5C103%5C20347%5CMinutes_DEQ_20347_v3.pdf .	
viii	2007 U.S. EPA Toolkit for Permit Writers, <i>supra</i> note 19, at p. A-51 in Appendix A.	

8.4.2 Serialization of Credits upon Issuance

Serialization of credits is analogous to putting a license plate on a car. It provides each unit of environmental benefit with a unique identifier. Serialization often indicates that credits have been issued and are considered real from an accounting perspective. There are several options for whether to serialize credits or not (the options do not refer to tracking credits more broadly).

Table 8.4.2 Using Serial Numbers to Track Credits

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>All credits are given a unique serial number and vintage year as they are issued</p> <p>The program sets up a serialization system to assign and track credits.</p>	<p>This approach is important in trading areas with more than one potential buyer and larger numbers of projects. Serialization prevents projects from being sold more than once and facilitates easier geographic and project tracking as credits are transferred from sellers to buyers, then used against permit requirements. The approach requires a basic system to assign and track unique identifiers.</p>	<p>MDA,ⁱ the Ohio River Basin trading project,ⁱⁱ and Willamette Partnership’s Ecosystem Credit Accounting Systemⁱⁱⁱ use uniquely serialized credits.</p>
<p>Option B:</p> <p>Credits are not uniquely tracked</p> <p>No program-wide system is developed for tracking credits uniquely.</p>	<p>Some programs may only have one buyer or may have a very small number of projects, removing some of the need for serialization. Not connecting a program with a structured approach to credit issuance makes it harder to scale up in volume and can lead to tracking errors.</p>	<p>The authors are not aware of a water quality trading program that uses this specific approach.</p>
<p>Option C:</p> <p>Credits are linked to the project from which they were generated, but are not tracked with unique serial numbers</p> <p>Credits generated by the same project are tracked as a group as they enter the trading system to be bought and sold.</p>	<p>Where all the credits for a given project will always be sold or used together, this approach will simplify accounting needs. However, tracking all credits from a given project together would make it difficult to split ownership or use of those credits, which may be a barrier to funding larger or more complicated projects generating many or multiple types of credits.</p>	<p>For the FL Lower St. Johns River pilot program, FL DEP tracks credits according to project, including info on buyers, sellers, permits, and price.^{iv} In practice, however, not all information is available publicly.^v</p>

i MDA 2008b, *supra* note Table 3.2.2(ii), at p. 13.

ii EPRI 2012, *supra* note 65, at p. E-8.

iii Willamette Partnership ECAS 2013, *supra* note 107, at § 2-4.

iv Florida Admin. Code, *supra* note Table 1.1.1(vi), at § 62-306.700.

v *See id.* at § 62-306.700(1). The regulation directs an interested party to this website, <http://www.dep.state.fl.us/water/watersheds/>, which then requires selecting “Water Quality Credit Trading Information” to view the credit registry information available publicly.

8.4.3 Information Tracked for Each Credit

WQT program developers must also decide what information should be tracked along with each credit. Tracking additional information adds cost and complexity, but it also creates a more robust record of activity. Program developers should consider tracking several pieces of information:

- **Ongoing project status/project reviews (validated, under review, ongoing review).** Each credit is tied to a particular project. Tracking the status of the project along with the credit makes that connection back to the action from which they were generated.
- **Trades.** Tracking the movement of credits between owners.
- **Ongoing credit status (ex ante, ex post, active, retired, suspended, cancelled).** The status of credits is fundamental information for program tracking system. This includes noting whether credits are issued prior to BMPs being implemented (ex ante) after BMPs are implemented, verified, and certified (ex post). For most programs it includes noting whether the credits are “active” (available for use), “retired” (meaning they cannot be used again), “after use” (for conservation benefit), “suspended,” or “cancelled.” Noting credit status may not be relevant where only active credits are tracked.

The screenshot shows a web application titled "AGRICULTURAL PROJECT WORKSHEETS". The breadcrumb trail is "Home > Projects > Demo Farm > Fields > 2". There are several tabs: "General", "Confined Area Management", "Requirements", "Current BMPs", "Current Nutrient Load", "Future BMPs", and "Future Nutrient Load". The "Current BMPs" tab is active. The page is titled "BMPs" and contains instructions: "Check the boxes next to all of the BMPs that are currently in place in the animal confinement area." and "Click here to show BMP descriptions (PDF format)". Below this is a section titled "LIVESTOCK BMPs" with the instruction "Select all livestock BMPs that are in place." and "Livestock Animal Waste Management System". A list of BMPs follows, each with a checkbox: "Animal waste management system:" (checked), "Mortality composting:" (checked), "Livestock Ammonia Reduction BMPs", "Plastic permeable lagoon cover:" (checked), "Phylase:" (unchecked), "Dairy precision feeding:" (unchecked), "Livestock Runoff Reduction BMPs", and "Barnyard runoff controls / loafing lot management:" (unchecked). A "Save and Continue" button is at the bottom.

Chesapeake Bay Nutrient Trading Tool collects information regarding the management activities and BMPs relevant for credit generation. Photo courtesy of Chesapeake Bay Nutrient Trading Tool, User Manual 6/4/2014.

8.4.4 Timing of Credit Retirement

During a project's life (e.g., 20 years), there will likely be several cycles of credits issued (e.g., each year). Credits should be retired at the end of their credit life so that administrators can ensure that they are not resold. The concept of credit retirement differs from the timing associated with project renewal (see Section 6.1.3.). In some cases, once credits are traded, it is safe to assume that they are used towards a permit and retired at the end of their lifecycles. In other cases, there may need to be a more formal notice of use submitted by the project developer or buyer indicating the credits were used for permit compliance. In this case, any un-used credits may technically be re-sold by the buyer. There are several options for when credits are retired.

Table 8.4.4 Retiring Credits

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Credits are considered used/retired when sold</p> <p>Credits are immediately retired following their sale.</p>	<p>Once a transaction of credits is initiated, the credits are either immediately retired or considered used by the buyer of the credits and then retired upon conclusion of the credits' lifecycle.</p>	<p>Credits transferred into the registry account for the City of Medford, OR are assumed to be in use by the facility and are not available for use elsewhere. However, there are no specific restrictions preventing the City of Medford from transferring valid credits.</p>
<p>Option B:</p> <p>Credits are not considered used/retired until a formal notice of use is provided</p> <p>A notice of use is a formal document indicating that credits are being used by a particular discharger.</p>	<p>A registry requires a formal notice of use prior to retiring credits against a permit obligation. This option may allow for the buyer to re-sell any unused credits.</p>	<p>In the air quality context, the Texas Commission on Environmental Quality requires a Notice of Use form submitted prior to using emission credits.ⁱ</p>
<p>Option C:</p> <p>No formal credit retirement</p> <p>Credits are not retired automatically or through documentation, and instead are assumed to be out of circulation without any specific guidelines to that effect.</p>	<p>If credits are not formally retired, the program runs the risk of not being able to formally track credits against permit obligations, as well as the risk that credits used against permit requirements will be re-sold in the market.</p> <p>Some Network participants expressed this approach could help avoid unnecessary administration.</p>	<p>The authors are not aware of any water quality trading programs that utilize this approach.</p>
<p>ⁱ Texas Admin. Code Title 30 § 101.376(e), (2014), available at http://texreg.sos.state.tx.us/public/readtac\$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=30&pt=1&ch=101&rl=376. See also Texas Commission on Environmental Quality, <i>Form DEC-3 - Notice of Use of Discrete Emission Credits</i>, (Dec. 2007), available at http://www.tceq.texas.gov/airquality/banking/derc_program.html.</p>		

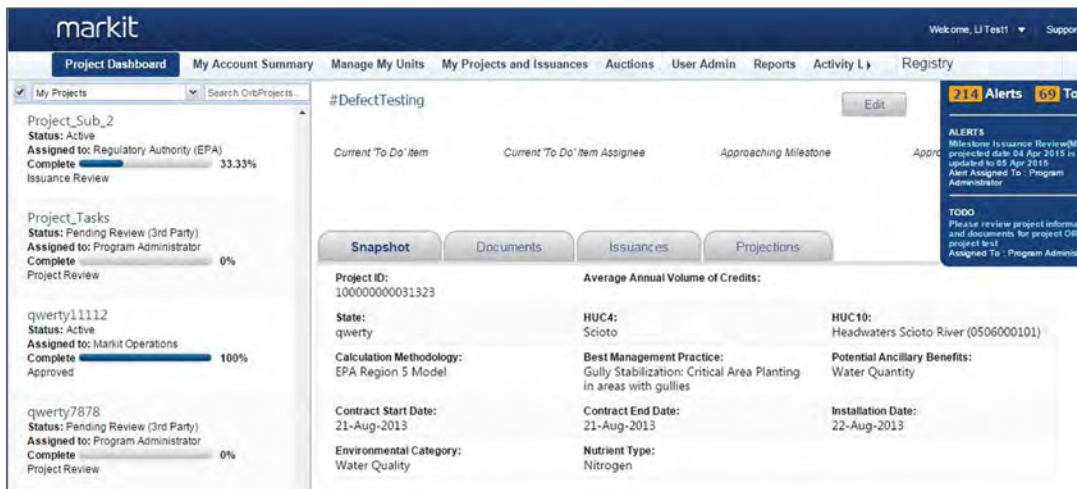
8.4.5 Suspending or Canceling Credits

There may be instances in which issued credits need to be cancelled or suspended pending additional actions from the credit seller. For example, in the event of project failure, the associated credits may be suspended pending corrective actions on the part of the seller. If corrective actions are not taken, then the project and all associated credits may be cancelled. Typically, credits can also be revoked by the state agency and/or the trading program administrator at any time for non-performance. In some programs, before revoking credits, credits will be suspended to allow the project developer a chance to fix any problems.¹⁶⁰ Programs should have a process in place that allows for projects and their credits to be suspended or cancelled in these instances.

¹⁶⁰ See VA Draft Certification Rule, *supra* note Table 8.4.1(vii), at § 25-900-190.

8.5 Credit Ledger/Registry & Public Information

Accounting for credits is much like the accounting for other asset classes, which typically utilize a ledger system to summarize account credits, debits, and balances. Simple accounts may be managed using a spreadsheet (e.g., Microsoft Excel), while more complicated accounts are better handled with a database/accounting system (e.g., MS Access or Intuit QuickBooks) or registry platform (e.g., NutrientNet or Markit Environmental Registry). This section describes what format the ledger might take and what pieces of information can be provided to the public. The term “ledger” is used to refer to accounting summaries that cover primarily transactional information. “Registry” is used where project-specific information for credits is also included. Often, the program decision described below could apply to either a ledger or registry, in which case, both terms are used.



*How a credit ledger/registry is maintained and what form it takes is important for tracking credits, debits, and other information associated with credit-generating projects. This can be an internal or public system depending on overall WQT program objectives. This image is a screenshot from **Markit Environmental**, an environmental credit registry. Photo courtesy of Markit.*

8.5.1 Format for the Ledger/Registry

As WQT program developers decide how best to track credits, debits, and other information associated with credit-generating projects, they should consider how a credit ledger/registry is maintained and what form it takes (see **Section 11.1.5**, which talks more about who might manage a ledger). There are several options for the format of a ledger/registry.

Table 8.5.1 Using Ledgers to Track Credits

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Centralized ledger/registry</p> <p>A centralized ledger or registry keeps track of all program credits in one place, available upon request.</p>	<p>Where there are multiple entities trading in the same watershed and/or under the same trading program, utilizing a single ledger/registry system reduces the chance that credits will be sold more than once. This function is most effective when it can be linked or crosschecked with registries for other crediting programs (e.g., carbon credit registries).</p> <p>Having information on all trades consolidated in a local database where information is made available to the public upon request will make it easier for the regulatory agencies or program administrator to assess and/or monitor trading activity under the program. However, where transaction volumes are low, the costs of maintaining a centralized registry may be high relative to the transparency value it provides to permittees, the public, and agencies.</p>	<p>ID DEQ's policy includes review and tracking of all trades at ID DEQ, and information is made publically available.ⁱ</p>
<p>Option B:</p> <p>Centralized <u>web-based</u> ledger/ registry</p> <p>The centralized ledger or registry may be placed on the internet, available to program participants and/or the public.</p>	<p>In addition to Option A, trade information from the ledger/registry can be made available on the web, which makes the information easily accessible and may make it easier for project developers, buyers, sellers, and the entity managing the ledger to interact efficiently when transactions need to be processed. However, a web-based ledger/registry can be costly to develop and maintain. Security may also be a concern if the website serves as the main accounting tool.</p>	<p>FL DEP tracks all credits generated and posts information about them on the agency website as a PDF.ⁱⁱ MDE and MDA use an electronic registry and web-based system to support tracking and publicize trading.ⁱⁱⁱ</p>
<p>Option C:</p> <p>Buyer maintains internal ledger/registry</p> <p>Instead of a centralized ledger or registry, the buyer maintains their own ledger/registry.</p>	<p>This option places the ledger responsibility with the permittee who is liable for their own permit compliance. There will likely be some level of state oversight in these cases, but the ledger is not actively put onto the web or other accessible location. This option may make sense for single-permit programs and can be the least costly. It also may be the most secure. This option may not provide the same level of easily accessible information to the public that other options provide.</p>	<p>The authors are not aware of water quality trading programs that maintain an internal ledger and do not at least provide an annual report to the agency that is available upon request to the public.</p>
<p>Option D:</p> <p>Buyer maintains internal ledger/registry and <u>actively provides public account summaries</u></p> <p>Although the buyer maintains a personal ledger or registry, there is a publicly available summary of the accounts.</p>	<p>This option does not provide real-time transaction information, but it does avoid the additional expense and security concerns of a web-based ledger/registry while still maintaining public accessibility of information on trades (with buyers providing ledgers via website or on request). Permittees may not want to take on one more reporting task in addition to other permit-related reporting.</p>	<p>OR CWS permit does not require a public ledger or registry.^{iv} Clean Water Services tracks credits internally and releases annual reports on credit-generating projects.^v</p> <p>MN SMBSC permit requires annual trade summaries to Minnesota Pollution Control Agency.^{vi}</p> <p>WI DNR posts all approved trading plans on its website.^{vii}</p>

*(continued)***Table 8.5.1 Using Ledgers to Track Credits**

OPTIONS	CONSIDERATIONS	EXAMPLES
i	ID DEQ 2010, <i>supra</i> note Table 1.1.1(xiv), at p. 22.	
ii	Florida Admin. Code, <i>supra</i> note Table 1.1.1(vi), at § 62-306.700.	
iii	MDE 2008, <i>supra</i> note Table 2.1(iii), at p. 22 and MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at p. 13.	
iv	CWS 2005, <i>supra</i> note Table 8.1.2(ii), at p. 34.	
v	OR CWS Permit 2005, <i>supra</i> note Table 6.1.1(v), at pp. 44-45.	
vi	2007 U.S. EPA Toolkit for Permit Writers, <i>supra</i> note 19, at pp. A-51, A-52, A-56, & A-57 in Appendix A.	
vii	WI DNR 2013a, <i>supra</i> note Table 1.1.1(xii), at p. 17.	

8.5.2 Public Availability of Information on Projects

The public needs to have access to information about the projects underlying trades. The ability of the public to ensure consistency with the Clean Water Act is an important part of the NPDES program.¹⁶¹ Yet, some personal and business information needs to be kept private. Trading programs need to strike a balance between the level of transparency needed to maintain a trusted system and comply with the CWA, and providing the level of confidentiality that some businesses and individuals need in order to engage in such programs. Disagreements over which information is confidential can arise as a program is being designed or in relation to a specific project. Many of the same dispute resolution issues discussed in **Section 8.3** apply to public availability of project information.

When agencies collect and review project information, the CWA, the Freedom of Information Act, and state privacy laws will be the primary drivers in determining what information and documents may be publicly available. Many programs may have chosen to proactively share additional project-specific information that goes beyond CWA requirements. Creating transparency up front provides assurance to stakeholders that credits come from eligible restoration projects that are accurately quantified and independently verified. This section discusses the type and volume of information a trading program might choose to proactively disclose via a ledger/registry. **Table 8.5.2a** summarizes the sources of information generated for each project that most often trigger privacy concerns.

¹⁶¹ All NPDES permits must include conditions requiring permittees to monitor, record, and report certain information specified in the regulations or requested by the relevant regulatory agencies. *See* 40 C.F.R. § 122.41(h), (j), & (l). The CWA and federal regulations require substantial public notice and public participation in the NPDES permitting process. *See, e.g.*, 33 U.S.C. § 1342(j) and 40 C.F.R. §§ 124.10-14.

Table 8.5.2a Summary of Project Information and Privacy Concerns

CONTACT INFORMATION (PHONE, ADDRESS, EMAIL)	Providing contact information for project developers and project reviewers would give the media and other concerned groups the ability to conduct inquiries into a given project. Project developers and reviewers may prefer not to provide any contact information to reduce the time spent addressing outside inquiries. Some documents created in the credit generation process may also contain private landowner contact information.
PROJECT LOCATION	Providing specific project location information (e.g., maps, addresses, watershed, stream reach, or lat/long) creates privacy concerns for participating landowners, even where landownership information is not displayed and projects are not open to public visitation. Conversely, when specific project locations are disclosed, it provides a feeling of security to the public that the project is real and exists on the ground. Location information is also particularly important to demonstrate how a collection of BMPs in a watershed are contributing to improving water quality.
PROJECT DESIGN, PRELIMINARY AND AS-BUILT	Project design documents (design documents) typically provide a narrative and visual description of the project activities, which can be reviewed to evaluate whether the project meets minimum design criteria. Where available, the public can also compare monitoring reports to design documents to evaluate whether project sites are functioning properly and adequately maintained. Design documents that are publicly disclosed may also be used as a template by others to develop or inform their own project planning (thereby posing potential work product or intellectual property privacy concerns). Furthermore, in tandem with publicly disclosed project locations, stakeholders may be able to investigate project design baseline and current conditions on their own from public areas, such as adjacent navigable waterways.
LAND PROTECTION AGREEMENT	The legal agreements that protect a project over the life of the credit contain information about ownership of the credit and detail how and where access to the project will occur for project monitoring and maintenance. These details are undoubtedly important to stakeholders, but these agreements may also contain personal, financial, and business information that are considered sensitive or confidential by individual landowners and project developers.
STEWARDSHIP AND/OR MONITORING PLAN	These documents contain information that provides assurance the project will be maintained over its credited lifespan. However, if these plans detail financial or endowment levels used by project developers to maintain projects and develop credit prices, then disclosure of these types of information may provide other project developers with cost breakdowns of anticipated project site work and offer a competitive advantage in the market place.

There are a few approaches available to strike the balance between accountability and confidentiality when determining how much information to proactively disclose via the program registry or website. There are several options for what information is kept confidential for a project.

Table 8.5.2b Withholding Personal Information from Public Discourse

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Withhold personal contact and confidential business information</p> <p>Personal and confidential information, as defined by federal or state law or regulation, are withheld in the public registry or website.</p>	<p>This information provides a maximum level of transparency, but some landowners may not be willing to provide this detail of information, which would constrain trading program participation. Alternatively, this information may all be gathered and reviewed during project review, but not posted to the ledger/registry.</p>	<p>FL DEP requires disclosure of information about both sellers and buyers,ⁱ ID DEQ makes the trade-tracking database publicly available,ⁱⁱ and WA DOE would provide public access to trading programs and public participation during development and implementation.ⁱⁱⁱ Each of these states may have different approaches to how confidentiality is addressed.</p> <p>The Ohio River Basin trading project releases all information on their registry except for confidential business information.^{iv}</p>
<p>Option B:</p> <p>Withhold exact project location from publicly available sites</p> <p>Information regarding the exact project location (e.g., longitude and latitude) is not available on public sites.</p>	<p>Project location may be important information for program administrators to track, but it does not need to be made public in the ledger/registry. However, withholding project locations may raise significant concerns by external stakeholders if the program administrator is not fully trusted.</p>	<p>The Ohio River Basin trading project maintains project review records and makes non-confidential information publicly available on its website with project location and site photos at the HUC 10 level.^v</p>
<p>Option C:</p> <p>Withhold all information but project name and credit quantity</p> <p>Only the project's name and credit quantity are available on public sites.</p>	<p>This is the simplest reporting for project developers and buyers. However, it provides the least amount of transparency and accountability to the public.</p> <p>Under this approach, it's unclear how the public is supposed to know whether water quality benefits are actually provided, which may translate into less trust and less accountability.</p>	<p>The authors are not aware of any WQT programs that only share project name and credit quantity.</p>
<p>i Florida Admin. Code, <i>supra</i> note Table 1.1.1(vi), at § 62-306.700.</p> <p>ii ID DEQ 2010, <i>supra</i> note Table 1.1.1(xiv), at p. 22.</p> <p>iii WA DOE 2010, <i>supra</i> note Table 1.1.1(xv), at p. 2.</p> <p>iv Jessica Fox, Electric Power Research Institute, personal communication (Mar 5, 2015).</p> <p>v EPRI 2012, <i>supra</i> note 65, at p. 5.</p>		

8.6 Public Notice & Comment during the Credit Lifecycle

Public notice and comment is an essential part of the CWA and the NPDES program, thus it is also an important component of trading plans — the parts of a permit that describe a permittee’s approach to trading. State regulatory agencies and U.S. EPA play an important role ensuring the public participation and enforcement provisions tied to trading meet the requirements of the CWA. **Section 1.1.2** describes the role of public notice and comment during development of a permit and the other documents that contain the details of how trading will work (e.g., trading rule, guidance, and/or framework or its associated trading plans). This section discusses options around the public notice and opportunity to comment on individual credit-generating projects. Notice and comment, the content and specificity of the permit, reporting, and information around individual projects are all interrelated. National Network participants expressed that while these issues are often dealt with piecemeal, it is the full permit record that must be able to show what was done to meet “compliance obligations.”



Processes for public notice and comment can occur at different stages during trading. For example, public notice and comment may occur during all stages or just during certification and trade/use. In other cases, public notice may occur, but a formal comment period may not be provided. Photo courtesy of Chesapeake Bay Program / Creative Commons.

Agencies will need to follow their state’s procedural laws on what types of actions require public notice and comment. In some of the examples below, state proceedings comply with their laws on public notice and comment and, therefore, may not necessarily reflect a decision made based on any one or more of the factors below. There are several options for when public notice and comment occur.

Table 8.6 Public Notice and Comment

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Public notice and comment during all stages (site screening, review, certification, trade, and use)</p> <p>Opportunities for public notice and comment occur at site screening, review, certification, trade, and use.</p>	<p>This approach will likely add tremendous cost and time to generating credits. It provides the maximum level of transparency and opportunity for the public to comment, however. This approach is analogous to providing for public comment on the choice of treatment technology, selection of a supplier of that technology, and again on the ongoing monitoring of the performance of that technology.</p> <p>Four National Network participants expressed that this option was viable, five noted it was viable but not their favorite, and two said the approach was not viable.</p>	<p>The authors are not aware of any water quality trading programs that specify this approach.</p>

(continued)

Table 8.6 Public Notice and Comment

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option B:</p> <p>Public notice and comment during certification and trade/use</p> <p>Opportunity for public notice and comment occurs only during certification, trade, and use; the public is not able to comment on other stages.</p>	<p>This approach could be helpful where a permittee does not have specific standards for credits built into a trading plan tied to its permit and where standards do not exist in law or guidance. Without assurances on the types of eligible BMPs and the quality standards for those BMPs, comment during credit certification and use may be the only opportunity the public has to shape trades. A comment period post-project implementation could pose a significant fiscal risk to project developers, however, as it opens up a possibility that individual projects and credit sales could be delayed, increasing risks for both credit buyers and sellers.</p> <p>National Network participants viewed this approach similarly to Option A.</p>	<p>WI DNR sends out all trading plans, which include lists of projects, for public notice and comment.ⁱ PA DEP provides public notice and opportunity for informal comment after an administratively complete proposal is submitted.ⁱⁱ</p>
<p>Option C:</p> <p>Public notice during certification and trade/use (no comment)</p> <p>Although the public gets notice about certification, trade, and use, there is no opportunity to comment on individual projects.</p>	<p>This approach lets the public know when a credit is about to get issued and used (e.g., via an email from the registry), but does not provide a formal comment period.</p> <p>National Network participants viewed this approach similarly to Option A, however more participants felt that it was not viable because providing public notice without the opportunity to comment defeats the purpose of public notice.</p>	<p>The authors are not aware of a trading program that uses this approach.</p>
<p>Option D:</p> <p>Public notice and comment only where trades occur outside an approved plan</p> <p>The public is not given notice or an opportunity to comment when trades are occurring as part of an already approved plan, but public notice and comment does occur when new trades arise outside of that approved plan.</p>	<p>This approach pushes for programmatic approval of credit standards and processes within the permit. It does not give the public an opportunity to comment on an individual project if that approved plan exists.</p>	<p>Individual trades that fall within the conditions detailed in the MN Rahr Malting and the MN SMBSC permits do not go through public notice and comment. Trades outside of the permitted conditions would trigger the need for a permit modification (and therefore trigger the need public notice and comment on the modification).ⁱⁱⁱ</p>

i WI DNR 2013a, *supra* note Table 1.1.1(xii), at p. 17.

ii Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(e)(9)(ii).

9 COMPLIANCE & ENFORCEMENT

This section offers options on how to determine point source permit compliance, and to map out regulatory enforcement changes under a trading scenario. In the trading context, determining whether a permittee is in compliance requires either a simple check of credit balance, or could require an additional check on the components of the trading plan itself. State agencies can explore whether typical enforcement works for permit violations resulting from trades, or whether enforcement methods specific to WQT are needed. The CWA's provisions for citizen enforcement¹⁶² also need to be considered in the trading context (*see Sections 7 and 8* for the various contractual obligations of a credit seller).

9.1 Compliance Determination

Trading distributes pollution reduction activities from the end-of-pipe to locations across the watershed, raising questions about how to ascertain compliance. Many of these questions can be addressed by the instruments described in **Section 1** on policy and regulatory instruments. A trading program must address issues such as the contents of a Discharge Monitoring Report, required limits at the point of discharge with or without credits, and what happens if credit-generating projects fail. Yet, there seems to be little difference between compliance determinations for trading and for other treatment processes.



The Minnesota River Basin General Phosphorus Permit - Phase I ties compliance to meeting permit limits as reported in a monitoring report. This approach demonstrates that a permittee has secured and continues to hold an adequate credit balance to meet its established effluent limits through the monitoring report. Photo courtesy of Minnesota Pollution Control Agency.

National Network participants strongly expressed that state regulatory agencies and the public need to be confident that individual projects are implemented and performing as promised. Much of the discussion on how to determine compliance centered on how much detail on BMP project types, design criteria, and maintenance standards was provided in trading guidance, framework, or permit documents (*see Sections 7 and 8*). If there was adequate detail, participants felt more comfortable basing the compliance determination on a permittee's active credit balance based on credits verified by either agencies or third parties. If there was not adequate detail in relevant trading guidance, framework, or permit documents, several participants stated that there should be opportunity for the public to review and comment on individual projects within a trading program. There are a couple of options for how a permittee might demonstrate compliance with its permit effluent limits, reporting requirements, and special conditions.

162 33 U.S.C. § 1365.

Table 9.1 Compliance Review

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Compliance based on permittee’s active credit balance</p> <p>Compliance is ascertained through the permittee’s demonstration that it has secured and continues to hold an adequate credit balance to meet its established effluent limits via its Discharge Monitoring Reports and other reporting requirements (e.g., for an MS4 permit). In addition, a permittee must comply with all other reporting requirements and special conditions of its permit. This includes all enforceable aspects of its attached trading program plan and project review requirements (if not included in the permit).</p>	<p>This approach ties compliance to meeting permit limits as reported in a permittee’s Discharge Monitoring Reports or similar reporting requirement. It keeps the compliance determination aligned with current processes and systems in most agencies.</p> <p>However, it also relies on mechanisms such as permittee, sister agency, or third party project review to ensure that the credits reported by a permittee in fact exist and are valid. These mechanisms would need to mimic the opportunity for public oversight currently provided by online compliance monitoring tools.ⁱ</p>	<p>This is the approach utilized in the OR City of Medfordⁱⁱ and OR CWS permits.ⁱⁱⁱ</p> <p>The Minnesota River Basin General Phosphorus Permit - Phase I also uses this approach.^{iv}</p>
<p>Option B:</p> <p>Compliance determinations include review of credit validity</p> <p>Compliance is determined both by confirming an adequate balance of credits and that those credits meet the stipulations included in the trading plan or trading framework under which they are generated. For example, under this approach, an agency compliance officer would confirm that the project meets eligibility standards and that credits were calculated correctly — similar to the steps conducted in project review (see Section 8).</p>	<p>This approach extends the compliance determination to check the actual validity of each of the permittee’s credits, not just the permittee’s representation that it has an adequate balance. This approach may require a state regulatory agency to verify each individual credit-generating project. For programs that have adequate credit registration and tracking procedures as well as ongoing project review that includes confirmation a project is performing, it may be unnecessary for an agency compliance officer to confirm validity of credits with every trade.</p> <p>There may be a difference between a state regulatory agency reviewing and/or certifying credit-generating projects and the formal compliance determination of a permittee. State regulatory agencies need to clarify when their review of individual projects is or is not the same as a compliance review.</p>	<p>Many programs engage state agencies in reviewing or certifying credits (e.g., Ohio River Basin trading project,^v OH Great Miami,^{vi} MDA^{vii}).</p> <p>In the Ohio River Basin trading project, the state regulatory agency reviews the agriculture agency’s opinion, but does not conduct site visits.^{viii}</p>

i For example, U.S. EPA maintains a website entitled “Enforcement and Compliance History Online” (ECHO), (undated), available at <http://echo.epa.gov>, where anyone may analyze the compliance history of CWA permits.

ii OR Medford Permit 2011, *supra* note Table 6.1.1(iv), at pp. 10-11 (§ B.3.b) & 16 (§ C.1).

iii OR CWS Permit 2005, *supra* note Table 6.1.1(v), at p. 44 (§ D.7.h(1)).

iv Minnesota Pollution Control Agency, *Minnesota River Basin General Phosphorus Permit Phase I*, p. 7 (§ 5.4.a) & Appendix I, (2005), available at <http://www.pca.state.mn.us/index.php/view-document.html?gid=5997>.

v EPRI 2012, *supra* note 65, at pp. E-7 – E-8 in Appendix E.

vi MCD 2005, *supra* note Table 2.3(v), at § 4.7.

vii MDA 2008a, *supra* note Table 2.1(vii), at pp. 9-10 (MDA reviews and approves trades with non-permitted buyers and conducts a site visit before approval).

viii EPRI Testimony 2014, *supra* note Table 2.3(vi), at p.4.

9.2 Using a “True-up” Period for Compliance

Permits will include specific compliance time periods that delineate when credits must be held by permittees. This section discusses the timing of the permittee’s demonstration that it holds an adequate quantity of credits to offset its actual impact. Permittees often design their technology solutions or the amount of credits they buy thinking about their maximum possible discharge under the environmental conditions where their discharge has the greatest impact. It is very rare that a point source needs a true-up period, also called a reconciliation period in the 2003 U.S. EPA Policy.¹⁶³ This is a brief period of time after a certain discharge date to purchase additional credits to meet its needs or access a reserve pool of credits (*see Sections 5.1.3 & 5.2.2*). A true-up period assumes that unpurchased credits for water quality improvements exist for the same time period as the discharge, though there may be an occasional need for a permittee to acquire credits to account for unexpected environmental conditions (e.g., low river flows) or discharges (e.g., higher volume of discharge) than the current holdings of credits could offset. A true-up period also assumes that discharges do not cause or contribute to a violation of water quality standards. Two options exist for how a program uses a true-up period, and National Network participants expressed that programs may employ either of these options.

Table 9.2 Using a “True-up” Period

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Credits need to be in hand prior to any compliance date in a permit with no true-up period</p> <p>Without a true-up period, permittees need to purchase a sufficient number of credits to cover even worst case scenarios (and in doing so, may end up purchasing more credits than they need) to ensure compliance.</p>	<p>The approach is most consistent with standard permitting processes, but it does not allow for a brief period to balance effluent discharges with credit balances. As a result, permittees will purchase enough credits to cover a “worst case” scenario, and may end up purchasing more credits to ensure compliance than they need in some years. Many permittees already design their compliance strategies (both with technology and credits) to meet the worst case scenario.</p> <p>Permit effluent limits are established based on “worst case” scenarios (e.g., lowest flow conditions in 10 years), so true-up periods may not be necessary.</p>	<p>This is the approach utilized in the OR City of Medfordⁱ and OR CWS permits.ⁱⁱ</p>
<p>Option B:</p> <p>Credits need to be in hand before the end of a true-up period as identified in the permit or the attached trading plan</p> <p>Permittees are allowed time via an identified true-up period in the permit or the attached trading plan to purchase additional credits with credit lives still valid during the permit’s critical period needed to offset unforeseen, future discharges that exceed its existing credit balance.</p>	<p>This approach provides a mechanism for permittees to acquire more credits to balance predicted discharges with actual discharges. A permit may include provisions allowing for a true-up period, but credits still need to be purchased within the same time periods identified within the permit. A true-up period may be less appropriate when credits are meant to offset planned, future growth.</p>	<p>VA Nutrient Credit Exchange Programⁱⁱⁱ and PA DEP Programs provide a true-up period after the end of each compliance year.</p> <p>The ID Boise River Framework used a true-up period to allow time for lab results to come back from measured NPS reductions.^{iv}</p>
<p>i OR Medford Permit 2011, <i>supra</i> note Table 6.1.1(iv), at pp. 16 & 21-23.</p> <p>ii OR CWS Permit 2005, <i>supra</i> note Table 6.1.1(v), at p. 44 (§ D.7.h).</p> <p>iii Code of Virginia, <i>supra</i> note Table 1.1.1(i), at § 62.1-44.19:18.A.</p> <p>iv Lower Boise Framework 2000, <i>supra</i> note Table 3.2.2(iv), at § 2.2.9.</p>		

163 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612 (“EPA also recommends that states and tribes consider providing periodic accounting and reconciliation periods...”).

9.3 Enforcement

Insufficient credit balances or failure to meet other permit conditions (e.g., submitting incomplete monitoring reports) would generally trigger a non-compliance event in a trading context. A state may then take enforcement actions against the permittee. In the trading context, state regulatory agencies may choose either. There are several options for whether states need enforcement provisions specific to trading.

Table 9.3 Trading-Specific Enforcement Provisions

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>State regulatory agencies may choose to use the same enforcement provisions for trading violations as for other violations</p> <p>States may employ existing enforcement options used in other aspects of pollution control and may tailor these tools to the WQT context.</p>	<p>This approach is most consistent with existing state and U.S. EPA provisions for enforcement. States may use their discretion, which might include a warning or assessment of civil penalties depending on the severity of the violation (e.g., an insufficient credit balance of 1 or 2 credits versus a 50% deficiency).</p> <p>States may choose to provide additional guidance to enforcement staff on how to guide corrective action in a trading context. That guidance can include looking to permit or trading program provisions such as true-up periods, insurance pools, and other mechanisms for dealing with credit loss due to project failure.</p> <p>National Network participants generally expressed that trading worked best when enforcement provisions were similar across different types of permit compliance. They also expressed that there may need to be some trading-specific provisions developed over time.</p>	<p>Since NPDES permit liability remains with the permittee, most states are using their current enforcement provisions for NPDES permits with trading.ⁱ</p>
<p>Option B:</p> <p>Agencies develop trading-specific enforcement</p> <p>States may instead update their enforcement guidelines to address situations specific to WQT where existing enforcement provisions are not appropriate. At a minimum, any enforcement guidance tailored to a trading context must comply with the CWA and enable section 505 citizen enforcement.</p>	<p>States may decide that they want to update their enforcement guidelines to address situations where point sources are using nonpoint source reductions spread across a landscape to offset point source discharges. The larger number of sites, stakeholders involved, and variability in environmental conditions might affect how agencies want to enforce permit violations.</p> <p>Conversely, creating enforcement guidelines specific to trading may be overly onerous and create inconsistencies across different treatment approaches within the NPDES program.</p>	<p>The authors are not aware of any states with specific enforcement guidelines for trading.</p>

ⁱ See, e.g., WI DNR 2013b, *supra* note Table 1.1.1(xii), at §§ 3.2.3 & 3.2.5; MT DEQ 2012, *supra* note Table 2.3(ii), at § III.3; OR DEQ 2009, *supra* note Table 1.1.1(xiii), at § 4.5; MDE 2008, *supra* note Table 2.1(iii), at § 3.4; and Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(h). See generally WRI Comparison Tables 2011, *supra* note 23, at pp. 13-14.

10 PROGRAM IMPROVEMENT & TRACKING

Watersheds are dynamic and water quality challenges are significant. Like other watershed-based approaches, trading programs operate within complex ecological and social systems and trading program developers often wrestle with difficulties in providing proof of the effectiveness and efficiency of their dispersed activities. Trading programs need to move forward based on the best information available, and include processes to collect and incorporate new information so that each program can improve over time.¹⁶⁴

In assessing their progress toward those goals, trading programs are most likely to focus on: 1) improving trading program standards, protocols, and process (*see* **Box 10.0** for more definitions); 2) generating new or feedback information on quantification methods used to model water quality improvement; 3) incorporating changes in trading program protocols or quantification methods; 4) incorporating new project types as eligible credit-generating actions; and 5) evaluating whether water quality improvement actions have been effective at helping to meet overall water quality goals for the watershed, not just for NPDES permits.

These decisions can be based on an authorized, prescribed plan for managing information or may proceed on a case-by-case basis. Finally, administrators should consider evaluating program effectiveness over time to ascertain whether the program is achieving its ultimate goals and/or is meeting water quality standards.

For a discussion on which kinds of entities are suited to develop and implement these processes, *see* **Section 11**. In this section, discussion of trading program improvements and tracking is not intended to affect or assess individual permit compliance. Rather, improvement and tracking is intended to evaluate how to adapt trading programs over time to better make progress toward watershed goals. Mechanisms for tracking permit compliance are discussed in **Section 9**.

Box 10.0 Program Improvement Definitions

Trading program standards are those criteria or specifications that a project must meet to participate and generate credits. This includes eligibility criteria (*see* **Section 3**), BMP quality and performance standards (*see* **Section 7.2**), and requirements around project review, approval, credit issuance, and tracking (*see* **Section 8**).

Protocols are step-by-step manuals and guidelines describing the actions, sequencing, and documentation necessary to generate credits from an eligible project type or credit-generating activity.

Administrative process refers to the steps taken by program administrators to move projects through from site screening to credit issuance.

¹⁶⁴ In this document, the authors have chosen not to use the term “adaptive management” to avoid confusion with Wisconsin’s adaptive management approach. In Wisconsin, adaptive management is a phosphorus compliance option involving both point and nonpoint sources. Point sources are compliant under this program if their receiving water meets quality standards. For information on Wisconsin’s adaptive management approach to water quality, *see* Wisconsin Department of Natural Resources, *Wisconsin’s adaptive management*, (Aug 27, 2014), available at <http://dnr.wi.gov/topic/surfacewater/adaptivemanagement.html>.

10.1 Improving Program Standards, Protocols, & Process (Discussion)

Those administering a trading program oversee the program's standards, protocols, and administrative process. (see **Box 10.0**). The data and information needed for ongoing improvement of these pieces of a trading program come from the administrator's experience in tracking comments, questions, and feedback from project developers and program participants.

Following are program components that may be suitable for feedback loops.

- *Accountability.* Are current standards sufficient to assure that water quality benefits are being delivered from credit-generating BMPs and that the trading provisions of a regulatory instrument are enforceable?
- *Clarity of guidance and protocols.* Do project developers, project reviewers, and other market participants clearly understand the operating procedures and standards that must be met?
- *Repeatability.* Can the current protocols, credit quantification methods, and overall program elements be reasonably replicated even when performed by different people and entities?
- *Cost to deliver services.* Are existing funding sources or fees for services sufficient to sustain needed program administration services? What are the transaction costs associated with current standards? Are the costs to collect field measurements and data for modeling inputs to estimate credits justified by the additional accuracy gained through these additional steps?
- *Easy to use forms and systems for submitting documentation.* What is the clearest and most efficient way for program participants to exchange needed information?
- *Quality and performance standards.* Are the right metrics being used to evaluate BMP quality and performance? Are the monitoring costs associated with the performance criteria reasonable and justified given the extent to which the metric can indicate project function? Are BMPs performing as expected?

Trading program administrators should consider the following questions when developing a program improvement plan.

- *Information tracking.* How will the trading program track and gather the information needed to evaluate the program components above? How frequently will this information be evaluated?
- *Decision making.* What is the process for changing the standards and protocols? Who will make those decisions?
- *Decision making authority.* Which entity will implement the program improvement plan? The water quality agency, permittee, or a third party?
- *Version control.* When and how will changes be incorporated into the program? How will new or revised versions affect current and future trades? What would trigger the release of a new version of a quantification method or trading program standard? Will past projects be grandfathered in and how?

There are several options for how WQT programs manage program improvement.

Table 10.1 Improving the Trading Program over Time

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Develop a program improvement plan to manage changes to program standards, protocols, and processes</p> <p>The trading program includes a Program Improvement Plan, which may detail answers to some of the above questions, including how information will be tracked, how decisions will be made, and how version control of quantification methods will be managed.</p>	<p>A deliberate approach to trading program changes may give stakeholders the confidence to proceed with trading despite the fact that programmatic uncertainty may exist at the outset. It may also help program participants anticipate and understand when and how changes will be made, providing a needed degree of certainty to engage in the market.</p> <p>National Network participants expressed that it was “better to have a plan” to adapt programs, but also recognized the importance of being flexible as new information might demand more immediate changes.</p> <p>However, with additional systems and processes comes additional cost. Tracking and evaluating information and coordinating a decision-making process will require personnel and administrative resources. It is important to identify which entities and staff will do this work.</p> <p>In most cases, the funding or staff capacity to do this work may not be initially available. Agreeing to a plan for improvements without later following through with those plans would likely erode trust with stakeholders.</p>	<p>Willamette Partnership’s Ecosystem Credit Accounting System lays out a system for managing program improvements. The plan covers decision making systems, frequency and extent of program review, and tracking of research needs.ⁱ</p> <p>The OH Alpine Cheese permit states that the trading plan will be evaluated and modified as required every 6 months.ⁱⁱ</p> <p>The Ohio River Basin trading project has committed to an annual audit for environmental and economic effectiveness, as well as to ensure that the BMPs’ reports and data generated under the program are complete and accurate. The audit results will be made available to the public and serve as a basis for validating or amending the plan in the future.ⁱⁱⁱ</p>
<p>Option B:</p> <p>Program administrator manages changes to the program on a case-by-case basis</p> <p>Alternatively, program developers may make changes and updates to standards, protocols, and process on an ad hoc basis, determining the appropriate course of action based on circumstances as they arise.</p>	<p>Choosing not to include a program improvement plan with program development eliminates the upfront time spent to develop and implement such a plan. In this case, program developers can develop a plan later once experience and a sense of the issues they are most likely to face are gained.</p> <p>However, it may be more difficult to get stakeholders to support the program without a clear plan to gather and address areas of refinement and ongoing improvement.</p> <p>Most National Network participants expressed that this approach was viable, and several preferred it.</p>	<p>Willamette Partnership’s Ecosystem Credit Accounting System did not have specific adaptation processes in place in the first version of their General Crediting Protocol.^{iv} The selected stakeholder group who were engaged during the program development phase became a decision making body before the process was more formally described in Version 2 of the Ecosystem Credit Accounting System General Crediting Protocol.</p> <p>The authors are not aware of any state policies that explicitly mention or require a structured program improvement process.</p>

i Willamette Partnership ECAS 2013, *supra* note 107, at § 4.

ii OSU, HSWCD, & Alpine Cheese Co. 2006, *supra* note Table 2.5(ix), at p. 7.

iii EPRI 2012, *supra* note 65, at p. 9.

iv See Willamette Partnership, *Ecosystem Credit Accounting: Pilot General Crediting Protocol: Willamette Basin Version 1.1.*, (2009) (hereafter “Willamette Partnership ECAS 2009”), available at <http://willamettepartnership.org/wp-content/uploads/2014/09/General-Crediting-Protocol-V1.1.pdf>. Compare to Willamette Partnership ECAS 2013, *supra* note 107, at § 4.

Table 10.2.1 Improving Quantification Methods

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Develop a deliberate upgrade schedule and plan for collecting new data</p> <p>Where the quantification method was developed by a state agency (e.g., HeatSource or other models used for TMDL development), agency staff working with other public entities (e.g., USGS, universities, and other agencies) are likely best suited to manage improvements, revisions, and the release of new versions. For quantification methods developed by third parties (e.g., NRCS's APEX modelⁱ), the trading program or state agency may require that a quantification method's management plan be submitted, reviewed, and approved by the state agency before the method is accepted for the trading program. This could include protocols for version control and a monitoring plan that supports ongoing improvements to the method (e.g., calibration and validation). Agencies could then discontinue acceptance of a previous method version, particularly if a monitoring plan produces sizable variations from expected outcomes, the technical analysis approach is no longer considered sufficient, or better methods have become available.</p>	<p>This approach provides more certainty that the program will continue to rely on best available science. Similar to a program improvement plan (<i>see Section 10.1</i>), a deliberate approach to improving quantification methods may give stakeholders the confidence to proceed with trading despite programmatic uncertainty that may exist at the outset. A timeline for method updates will also help program participants anticipate and understand when changes will be made, providing a needed degree of certainty to engage in the market.</p> <p>However, with additional systems and processes comes additional cost. The entity or entities managing revisions to the method will need resources to perform study design, monitoring, and quality control. Regardless of who manages the updates, agency staff will also require resources to review and approve new versions as they become available. In most cases, the funding to do this work may not be available initially or at all. Developing a plan for improvements without later following through with those plans would likely erode trust with stakeholders.</p>	<p>MDA's online calculation tool is updated as necessary (e.g., release of new local TMDL, change to BMP efficiency rates).ⁱⁱ Scheduled modifications are announced online.ⁱⁱⁱ</p>

(continued)

Table 10.2.1 Improving Quantification Methods

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option B:</p> <p>Ad hoc improvements to quantification methods when additional information becomes available</p> <p>In this scenario, trading program administrators and/or regulatory agencies would evaluate new data and versions of quantification methods s needed without developing a program-specific strategy. These efforts often rely heavily on participation by external parties, literature, and collected water quality data to improve quantification methods.</p>	<p>Regulators or others who manage trading programs may determine that it is not necessary to invest in method-specific monitoring and improvements where:</p> <p>(i) application of a given quantification method is widely supported by multiple efforts and/or is limited in scope or time, or (ii) where the state of science has remained constant over a reasonable period of time. This option also eliminates time and resources spent to develop and implement quantification method improvement plans. New information can still be incorporated as it becomes available through other ad hoc avenues.</p> <p>This method provides a cost-effective approach if the watershed and nonpoint source data collection is concurrently being improved and collected through multiple efforts. Conversely, if the data is not being sought by other entities, this approach does not provide certainty that the program will continue to use the most up-to-date science. Furthermore, if policies are not in place to grandfather in projects using previous method versions, this approach may create market uncertainty for buyers and sellers. It may also increase resistance from stakeholders with concerns that the science behind the model is accurate and up to date.</p>	<p>By its nature, an ad hoc approach is not planned. As such, the authors are not aware of any programs that explicitly document their use of this approach.</p>

i See Texas A&M AgriLife Research, *EPIC & APEX Models*, (undated), available at <http://epicapex.tamu.edu/>.

ii Susan Payne, Maryland Department of Agriculture, personal communication (November 13, 2014).

iii See Maryland Nutrient Trading, *Welcome to the Maryland Nutrient Trading Program...*, (2014), available at <http://www.mdnutrienttrading.com/>.

10.3 How Changes Are Incorporated

When new protocols, standards, and versions of quantification methods (collectively, "trading program components") become available, WQT program developers will need to determine how best to incorporate them. Trading program components may change when: 1) newly promulgated rules or ordinances make the credit-generating practice mandatory; or 2) local "hot spots" emerge and using trading itself "causes or contributes" to that water quality violation. A new TMDL or changes to formal water quality standards may also result in adjustments to the credit obligations for permittees.

Mechanisms for incorporating new trading program components need to balance the following considerations: A) integration of the most up-to-date information as quickly as possible; B) consistency with regulatory process (i.e., water quality standards, TMDLs, permitting); C) providing certainty for permittees and other market participants about which requirements they need to meet in order to generate credits given the often-significant financial investments made through past project purchases; and D) the additional costs associated with updating existing projects to meet new requirements.

Trading program components included in an NPDES permit (*see Section 1.3*) are likely to remain fixed for the duration of the permit cycle. New trading program components are more likely to be incorporated in subsequent permit cycles or through a later permit modification. The options for how to incorporate updated trading program components are listed below. All options assume that in the event new information reveals severe flaws in a credit quantification methodology, agencies should include a general reopener clause in the permit and program language to allow them to exercise the full flexibility and control already delegated to them.

All approaches that "grandfather" in provisions that lead to discharges that cause or contribute to water quality violations across permit cycles will not be consistent with the CWA. Trading programs that incorporate the most current science and are diligent about planning for change can help limit the significance and frequency of changes. There are several options for when program improvements take effect.

Table 10.3 Options and Considerations for When Program Improvements Take Effect

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>New program components are updated for <u>all</u> existing projects when the permit is renewed</p> <p>Standards and quantification methods would be updated during a permittee's permit renewal and all active projects that generate credits to be used under the new permit would need to rerun credit calculations using the new method and meet any new standards to remain valid.</p>	<p>This approach ensures that the trading program is using the most up to date information to understand and track the water quality benefits of individual BMPs.</p> <p>However, this approach presents a significant risk to project developers that their project investments may change in value periodically upon permit renewal. If quantification methods or versions change in a way that reduces the credit value of a given BMP, or more stringent standards are put in place, the project developer will have fewer to sell, and buyers may have insufficient credit quantities. This kind of risk may cause project developers to avoid investing in BMPs with longer credit lives (e.g., irrigation upgrades, riparian forest restoration) to minimize their financial exposure. In this situation, the cost of credits may also rise. Often facilities plan in 20-year horizons and having only one permit cycle of certainty and predictability in costs for a trading compliance option could reduce demand or investment in these projects.</p>	<p>The authors are not aware of any water quality trading programs that use this approach.</p>

*(continued)***Table 10.3 Options and Considerations for When Program Improvements Take Effect**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option B:</p> <p>New trading program components are updated for <u>new</u> projects when the permit is renewed. Existing projects are valid as-is <u>for the life of the project protection contract</u></p> <p>In this approach, existing projects initiated under the prior permit can continue generating credits using the older version of the quantification method.</p>	<p>This approach gives certainty for project developers and buyers about the credit number and value of a given BMP through the credit lifecycle. It does not, however, provide any greater ability to accurately estimate the costs of trading as a compliance option in long term facilities planning. It allows for the use of outdated methods ranging from a few years to more than a decade for projects with longer life cycles. Permittees may have to adjust existing projects or obtain additional credits if the status quo will violate their permit by violating water quality standards.</p> <p>A majority of National Network participants preferred this option.</p>	<p>Trading program components are grandfathered in for the life of the credit contract in the MN Rahr Malting permit.¹</p>
<p>Option C:</p> <p>New trading program components are updated for <u>new</u> projects when the permit is renewed. Existing projects are valid as-is <u>for one or more contract renewals</u></p> <p>All existing projects can continue to generate credits using the older version of the quantification method, <u>even if the credits generated under the project are renewed for another lifecycle</u>. New projects developed for use under that permit must use the new trading program components.</p>	<p>Considerations for this approach are the same as Option A, with slightly greater certainty for project developers and buyers and slightly greater risk to water quality when outdated methods continue to be used.</p>	<p>The authors are not aware of any water quality trading programs that take this approach.</p>
<p>Option D:</p> <p>Established and approved projects are grandfathered in for the period covered by the facilities plan</p> <p>New trading program components are not applied to existing credits in the renewal of existing permits during the period covered by the Facilities Plan (e.g., 20 years).</p>	<p>This gives the most certainty to project developers and point sources, allowing them to build confident, long-term risk assessments of their participation in trading programs. This option is likely to have the lowest cost.</p> <p>It also provides the greatest chance that outdated science and outdated estimates of water quality benefits generated by certified projects may be perpetuated.</p>	<p>The authors are not aware of any water quality trading programs that take this approach.</p>

10.4 Standard Process for Approving New & Modified BMPs

After a trading program has been established, new BMP guidelines may be proposed and developed by any number of parties. As new BMPs are developed, the program administrator will need to evaluate these new BMPs to determine whether they are eligible for incorporation into the trading program. These new BMPs may be developed by agencies, credit sellers, permittee buyers, or other interested stakeholders. An approval process for new or modified BMPs can include steps for screening/pre-proposal, practice review, and approval. These steps can be more or less formal, inclusive of broad stakeholders, and may vary in intensity based on available resources, preferences of the trading program, and understanding of the BMP involved. Resource constraints at the state or watershed level may necessitate a process that combines steps for efficiency or requires a greater, more certain level of information needed to approve BMPs for credit generation.



New BMPs may be considered for inclusion in a trading program through an approval process, which can be more or less formal. Photo of algal mats treating ditch water courtesy of American Farmland Trust.

- **Screening/pre-proposal.** This phase provides an opportunity to filter out inappropriate proposals and prioritize requests so that the most effective BMPs are identified and considered for use. BMPs that are inconsistent with broader watershed goals, that lack the science to support reliable credit quantification, that do not create a net positive impact (e.g., load of the target pollutant moves elsewhere or loading of another pollutant increases), or that lack complete information may be rejected at the screening/pre-proposal phase.
- **Practice review.** In this next phase, the trading program administrator evaluates information about the proposed BMP. In most cases, information gathered for BMP review should address all the components of a BMP guideline, as described in **Section 7.2**. Sometimes, review and technical analysis may be internally conducted by the program administrator, while in others, stakeholders and outside experts may be brought in to review or conduct technical analysis. The reviewers can provide guidance that may prompt modifications, further research, and/or require field testing as necessary before the BMP is recommended for approval.
- **Approval of BMPs.** The purpose of this phase is to document the decision to approve a new BMP or modification of an existing BMP, confirm that review has occurred according to the process followed in the relevant state, and confirm that all necessary documentation is in place to support credit quantification, design, construction operation, maintenance, and projections of useful life.

Not all BMPs are appropriate for generating credits, so administrators should consider developing a system for evaluating and incorporating only the BMPs that improve water quality in a given watershed(s) and that can be reliably quantified into credits (*see Section 11* for additional considerations as to which entity should manage the trading program's administrative processes, including approving new and modified BMPs). The scale at which eligible BMPs are approved will vary. Sometimes, BMPs may be designated as eligible for trading statewide if they are known to be widely applicable for all watersheds in the state. Program administrators may also consider approving BMPs for trading at the watershed level, particularly where the applicability of available information on the BMP is limited to that specific geography. A tiered approach

would involve selecting BMPs for a specific watershed's trading program from a larger list of BMPs approved for trading at the statewide level. Review bodies may differ across states. There are several options for incorporating new and modified BMP information into trading programs.

Table 10.4 Approving New and Modified BMPs

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Develop a standard process for incorporating new or modified credit-generating BMPs</p> <p>Trading program administrators develop a standard process for evaluating and incorporating new BMPs or modifications to existing approved BMPs</p>	<p>Trading programs evolve and improve by incorporating new and modified BMPs. Documenting this process provides transparency to stakeholders about the level of scrutiny that practices will undergo before being approved for trading. Trading programs can use BMP-approval processes already in place with other organizations (e.g., NRCS or state regulatory agencies).</p> <p>National Network participants generally favored a structured process for incorporating new types of BMPs.</p> <p>Similar to other program improvement processes, these plans or strategies will create additional cost to running and maintaining the trading program. Gathering or generating the needed information and facilitating review can require significant staff and research resources. A structured process may be much less important for smaller trading programs.</p>	<p>The Chesapeake Bay Program provides for review of new BMPs or existing BMPs when new information or inaccuracies arise.ⁱ Willamette Partnership reviews new BMPs, as well as existing BMPs, as part of a regular iterative process.ⁱⁱ ID DEQ allows anyone to nominate a new or improved BMP by submitting a package containing a description and calculation information.ⁱⁱⁱ</p>
<p>Option B:</p> <p>Evaluate new or modified BMPs on a case-by-case basis</p>	<p>Choosing not to include a BMP review and approval process at the outset of trading program development eliminates or delays the time spent to develop and resources to implement such a review and approval plan. New information can still be incorporated if it becomes available through other avenues.</p> <p>Most National Network participants expressed that a case-by-case approach was viable, but some participants did not believe this approach was viable.</p> <p>However, this option is less transparent and does not demonstrate a clear, upfront commitment to the development of new and more effective BMPs.</p>	<p>Willamette Partnership's Ecosystem Credit Accounting System did not have specific adaptation processes in place in the first version of their General Crediting Protocol.^{iv} Maryland policies define "Other Innovative BMPs" which allows innovative BMPs to be evaluated using the same protocols as the Chesapeake Bay Program.^v</p>

i Chesapeake Bay Program, Water Quality Goal Implementation Team, *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model*, (2014), available at http://www.chesapeakebay.net/documents/Nutrient-Sediment_Control_Review_Protocol_v7.14.2014.pdf.

ii Willamette Partnership ECAS 2013, *supra* note 107, at §§ 4-2 & 4-3.

iii ID DEQ 2010, *supra* note Table 1.1.1(xiv), at § 7.4.

iv Willamette Partnership ECAS 2009, *supra* note Table 10.1(iv). Compare to Willamette Partnership ECAS 2013, *supra* note 107, at § 4.

v MDE 2008, *supra* note Table 2.1(iii), at § 5.4.6. See also MDA 2008b, *supra* note Table 3.2.2(ii), at § 4.5.

10.5 Evaluating Programmatic Effectiveness

Ultimately, many will want to know whether trading is fulfilling the obligations of point sources and moving toward water quality standard attainment. However, detecting changes in ambient water quality causally attributable to trading will often be difficult, especially in watersheds where the impacts of point sources (i.e., those buying the credits from trading projects) are relatively small compared to the overall pollutant issues in a waterbody. Nonetheless, as part of overall watershed tracking, trading could be the impetus for establishing an effectiveness monitoring program, or could be tied into an overall watershed or TMDL effectiveness monitoring effort.

Effectiveness monitoring involves systematic data collection and analysis to determine progress of a given water quality trading program (or other implementation strategies) toward the achievement of water quality standards or other program goals. Effectiveness monitoring provides the basis for program improvement. This differs from monitoring conducted for permit compliance or consistency with credit-generating obligations, which is designed to indicate whether an entity is meeting the conditions in a permit or contract.



As possible, effectiveness monitoring should not only include measures of reductions in loading, but also marketplace actions and ancillary environmental and social benefits as a result of implementing land-based BMPs. Photo courtesy of Willamette Partnership.

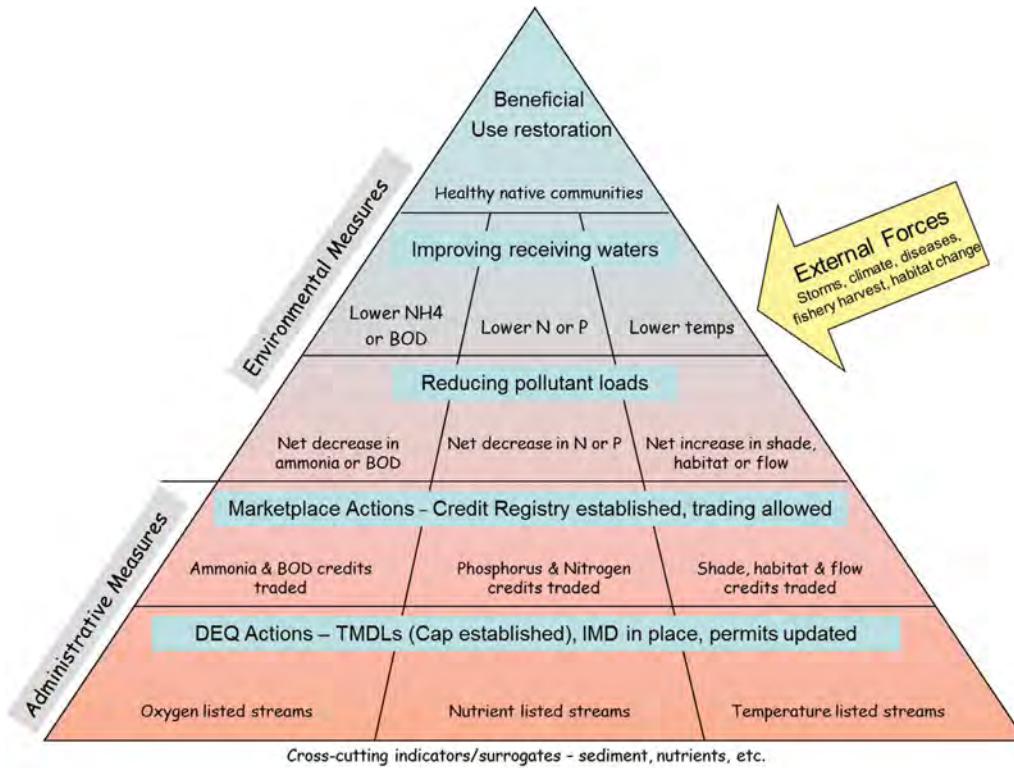
10.5.1 Developing an Effectiveness Monitoring Framework

Those developing an effectiveness monitoring framework should consider including the following elements:

1. Identification of the questions that need to be asked and answered for the overall watershed and for a trading program;
2. The data and data collection methods (both intensive and extensive methods) necessary to answer those questions;
3. Prioritization of data requirements and methods; and
4. Identification of the different tiers of effectiveness monitoring, and the timing and metrics used to evaluate each tier.

Figure 10.5.1 (provided by OR DEQ) provides an example of a monitoring hierarchy, in which the program's ultimate goals, attainment of the water quality standard and support for the designated use, are at the top. A single trading program alone may not achieve these ultimate goals nor may it be possible to isolate and measure the impact of a trading program. However, the lower layers of the pyramid identify surrogate measures that can be used as interim effectiveness benchmarks. Moving down the pyramid, the metrics become increasingly easy to measure relative to a given trading program, but increasingly removed from a scientific understanding of whether the program is helping to achieve designated use and water quality standards. Besides measuring reductions in loading, trading program effectiveness monitoring should consider tracking marketplace actions and ancillary benefits (environmental and social) as a result of implementing land-based BMPs.

Figure 10.5.1 Hierarchy of Monitoring Metrics



Source: Doug Drake and Ranei Nomura, OR DEQ, 2008

Note: "IMD" on the lower level of the pyramid is Oregon's Internal Management Directive on trading

National Network participants recognized the importance of effectiveness monitoring, particularly having a clear strategy for effectiveness monitoring. Yet, they also noted how trading is one small part of a water quality strategy and how hard effectiveness monitoring is to do. There are several options for developing an effective monitoring framework.

Table 10.5.1 Developing a Program Effectiveness Monitoring Strategy

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Develop and implement effectiveness monitoring strategy</p> <p>Trading program administrators could develop a strategy to monitor programmatic effectiveness, including some or all of the components described above, as a way to examine the success of water quality trading.</p>	<p>Implementing an effectiveness monitoring strategy to understand the contribution of trading programs to the watershed and to water quality demonstrates a higher level of commitment on the part of a trading program to water quality achievement. This kind of a program can deliver valuable information on the success of the program or ways to improve. However, it is likely to be costly and may take years to gather sufficient data in order to deliver meaningful results.</p>	<p>The OR CWS permit's Temperature Management Plan describes 54 in-stream monitoring stations with temperature data summarized every 5 years. That data is not used for permit compliance, but to evaluate watershed status and trends.ⁱ</p>
<p>Option B:</p> <p>Evaluate effectiveness based on other sources of information (e.g., agency monitoring), as available</p> <p>Other sources of information (e.g., agency monitoring, public data) may be analyzed to understand programmatic effectiveness.</p>	<p>Resources for this kind of long term monitoring effort can be difficult to obtain. Looking to existing information collection efforts for data is a way to reduce costs. However, data collected for other purposes may not be sufficient or appropriate for evaluating whether the trading program is having a measurable effect on water quality. Without measureable results, program skeptics may have concerns about the efficacy of trading as a way to help achieve water quality standards.</p>	<p>ORSANCO completes an assessment and report of Ohio River water quality conditions every two years, otherwise known as the "305b Report."ⁱⁱ</p>

i CWS 2005, *supra* note Table 8.1.2(ii), at pp. 34.

ii Ohio River Valley Water Sanitation Commission, *Water Quality Assessment*, (2015), available at <http://www.orsanco.org/water-quality-assessment>.

11 ROLES, RESPONSIBILITIES, TRANSACTION MODELS, & PUBLIC PARTICIPATION

A water quality trading program brings together parties with diverse interests, including federal and state agencies, project developers, buyers and sellers, project reviewers, and the public. Each party has the potential to play various roles and take on different responsibilities. This section explores the different functions comprising a trading program's administration, the available transaction models, and how state regulatory agencies might formally partner with third parties to administer aspects of a trading program. The selection of a water quality program transaction model will invariably analyze the approaches that work best, considering capacities, stakeholders, and the roles, costs, time, legal constraints, and responsibilities that each entity is willing to invest and take on.

11.1 Roles & Responsibilities in Trading Program Administration

The different tasks associated with administering a trading program require different capacities, costs, and authorities, which may be performed by some combination of state agencies, permittees, and third parties. This section focuses on selecting an entity to perform program administration functions.

There are four phases of the credit issuance process where an administrator can review and approve trading project documentation: site screening (*see Section 7.1*), initial project review and certification (*see Section 8.1*), ongoing project review (*see Section 8.2*), and credit tracking (*see Section 8.4*). In addition, a fifth step — protocol development — underlies each of these phases and provides the direction needed by permittees and others to understand the requirements of trading program participation. Agencies and trading program developers need to consider the following when determining which entity should administer each phase:

A) Skills/expertise required to perform each function

Some functions are largely “administrative” (e.g., paperwork review), whereas others might require familiarity with ecology and land management practices (e.g., identification and evaluation of on-the-ground actions);

B) Administrative time and costs

Water quality trading is a market-based environmental program, and keeping administrative transaction costs as low as pragmatically possible frees up capital to invest more directly in environmental benefits and spurs additional potential growth of the program;



Water quality trading brings together private landowners, federal and state agencies, and businesses to improve watershed health. Trading program design should include consideration of how information is shared among these parties and the public. Photo courtesy of USDA / Creative Commons.

C) Collaboration with third parties for administrative tasks

States may use a third party to perform many of the functions that are key to the day to day operations of trading, even when trading is a regulatory compliance tool. If the decision is made to allow others to perform these tasks, the state should consider whether formal delegation, assignment, contractual agreement, or another form of written authority may or should be given to those third parties (see **Section 11.3**); and

D) Access to information and privacy

Water quality trading also brings private landowners, federal and state agencies, and businesses to the table to improve watershed health in a collaborative way that has not really occurred in the past at this potential scale. Each entity has been traditionally subject to different regulations and laws, but as these entities conduct business together in new WQT programs, federal and state agencies will need to consider the types of information generated and shared among these parties and the public availability of trading-related documents. Another layer of complexity is added to these decision points where third parties will gather and review information as part of the trading program. In particular, agencies will likely need to determine whether records maintained by independent, third parties in trading programs qualify as “public records.”¹⁶⁵ Assuming a document is a public record for the purposes of trading programs, agencies will likely need to determine if all or part

165 See the *Freedom of Information Act* (FOIA) at 5 U.S.C. § 552(f)(2)(A)-(B).

of that information is exempt from public release.¹⁶⁶ In particular, agencies should consider what information must be shared consistent with CWA and state public disclosure rules.¹⁶⁷ To date, public accessibility of records related to trading is less well-defined than states' existing public records guidelines.

Overall, National Network participants expressed that any qualified entity (agency, permittee, project developer, or third party) could screen sites for eligibility if there was appropriate, publicly available information and some oversight by the state regulatory agency. There was less comfort with permittees and project developers conducting project review, tracking, and program improvement over time. National Network participants also tended to favor a stronger role for state regulatory agencies in maintaining a registry and managing program improvement.

11.1.1 Site Screening for Eligibility

Screening a project for eligibility (“site screening”) early in the process can identify issues or concerns about project eligibility before significant funding is expended in implementation. In nascent programs where standards are established, but eligibility criteria are not as specifically defined, it may be more difficult for permittees to accurately assess individual project sites. The task requires comprehensive knowledge of the relevant trading plan(s) and standards, an understanding of the proposed credit-generating action, and the protocols for applying the credit quantification method. The entity screening sites must know of these technical tasks and be able to quickly respond to requests for site screening. Differences of opinion between project developers and the entity screening sites at this phase can be referred to agencies for resolution if the agency itself is not screening for eligibility. There are several options for who does site screening.

¹⁶⁶ *Per* 5 U.S.C. § 552(b)(4), “trade secrets and commercial or financial information obtained from a person and privileged or confidential” can be excluded from public disclosure. EPA regulations at 40 C.F.R. § 2.208 more specifically outline the substantive criteria to be used in determining matters of confidentiality: a business must assert a claim, take reasonable measures to protect confidentiality, and the information must be generally unavailable elsewhere. In addition, disclosure of the information must not be compulsory elsewhere under statute, and the business must also show that disclosure of the voluntarily-provided information would hinder an agency’s ability to obtain information in the future, or that disclosure of such information would cause substantial competitive harm.

¹⁶⁷ *See, e.g.*, 40 C.F.R. § 124.6(e), stating that “[a]ll draft permits prepared by EPA under this section shall be accompanied by a statement of basis (§ 124.7) or fact sheet (§ 124.8), and shall be based on the administrative record (§ 124.9), publicly noticed (§ 124.10) and made available for public comment (§ 124.11). The Regional Administrator shall give notice of opportunity for a public hearing (§ 124.12), issue a final decision (§ 124.15) and respond to comments (§ 124.17).”

Table 11.1.1 Site Screening Options

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Regulatory agency conducts site screening</p> <p>Agencies, as the permitting authority, assess which sites are eligible to generate credits.</p>	<p>Managing site screening gives agencies more direct control over confirming project eligibility at the project level. If agencies choose to conduct site screening, they need to have staff flexibility to manage the ebb and flow of trading activity over time.</p>	<p>WA DOE will screen proposals through a consultation process.ⁱ</p>
<p>Option B:</p> <p>Permittees or project developers conduct site screening</p> <p>Permittees are responsible for overseeing the role of screening their own sites.</p>	<p>Since the NPDES program is traditionally a self-reporting system, one might argue that permittees should decide whether they have the capacity (both skill and availability) to self-screen projects or whether they should work with an agency or approved third party to fulfill this role.</p> <p>Permittees or project developers may wish to screen their own projects because they are most familiar with them and can be held accountable through contractual liability. However, both permittees and project developers have potential conflicts of interest when screening their own projects.</p> <p>When permittees or project developers elect to screen their own credit-generating projects, agencies may choose to audit a portion of credit-generating projects to ensure the permittee has consistently complied with eligibility criteria.</p>	<p>Clean Water Services in Oregon is responsible for ensuring that enrolled projects are eligible to generate credits under their permit. They work with a wide variety of partners, including local governments in the urban area and the Tualatin Soil and Water Conservation District to recruit agriculture landowners and implement projects.ⁱⁱ</p>
<p>Option C:</p> <p>Third parties or non-regulatory government agencies conduct site screening</p> <p>Third parties are given the authority to conduct site screening.</p>	<p>If third parties conduct site screening, a clear process should be established to identify, avoid, or mitigate any conflicts of interest. Third parties may have the ability to grow and shrink more rapidly in response to larger or smaller transaction volumes. If trading participants are to be required to use a third party, there may need to be some formal assignment of responsibility from the relevant agency.</p>	<p>Willamette Partnership conducts site screening for credits used in the OR City of Medford permit and other programs utilizing their Ecosystem Credit Accounting System. Project developers submit a site validation checklist providing relevant eligibility information.ⁱⁱⁱ</p> <p>MDA or its agent performs a visit to the site prior to project certification and implementation.^{iv}</p> <p>The Ohio River Basin trading project uses state SWCDs and ag agencies to screen sites.^v</p>

i WA DOE 2010, *supra* note Table 1.1.1(xv), at p. 6.

ii Bobby Cochran & Charles Logue, *A Watershed Approach to Improve Water Quality: Case Study of Clean Water Services' Tualatin River Program*, *Journal of the American Water Resources Association* 47(1): 29-38, 34, (2011), available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2010.00491.x/abstract>.

iii See Willamette Partnership ECAS 2013, *supra* note 107, at § 2-1 and Willamette Partnership, *Annual Report 2012-2013*, p. 7, (undated), available at http://willamettepartnership.org/wp-content/uploads/2014/09/2012-2013-WP_Annual-Report_Final1.pdf.

(continued)

Table 11.1.1 Site Screening Options

OPTIONS	CONSIDERATIONS	EXAMPLES
iv	MDA 2008b, <i>supra</i> note Table 3.2.2(ii), at § 4.7.	
v	Electric Power Research Institute, <i>Request for Proposals for Producer Funding under the Ohio River Basin Water Quality Trading Pilot Project: Released to Eligible Soil and Water Conservation District</i> , p. 3, (2013), available at http://wqt.epri.com/pdf/reference-shelf/Farmer-Request-for-Proposals.pdf .	

11.1.2 Initial Project Review & Certification

Initial project review and certification confirms key elements of the credit-generating project to ensure that it will provide the water quality benefits promised. This may include review of site and stewardship documentation (administrative review), review of a site’s credit calculation amount (technical review), and confirmation of proper standards implementation and/or performance of credit-generating actions. Some programs review every project, while others choose to audit project performance for a sample of projects (see **Section 8**).

Initial project review and certification requires the most time, skill, and autonomy of all steps discussed above in **Section 11.1.1**. Across the country, an array of parties have performed the initial review and certification steps, including state agencies, third parties, and permitted point source buyers.

Initial project reviewers need to have the same ability to understand, interpret, and decide about eligibility standards as the entity entrusted with site screening. Initial project review and certification requires additional familiarity with quantification methods and tools, typically similar or equal to the level required to run the credit calculation process or model. This may require technical knowledge and capacity to use GIS and nonpoint source load estimation tools. Initial project review and certification also requires familiarity with the specific BMPs being reviewed. Reviewers performing in-person inspections should also be able to visually assess sites for proper implementation and/or performance in accordance with quality standards.

Trading programs need to identify who will be responsible for the various steps involved in the initial project review and certification, what qualifications the reviewers need to possess, and how to formally assess and confirm such qualifications. There are several options for who completes initial project review and certification.

Table 11.1.2 Initial Project Review and Certification

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Agencies conduct project review and certification</p> <p>Agencies retain oversight over the initial stages of a project review.</p>	<p>Conducting the initial project review and certification lets agencies retain more control over their water quality program, and agency staff are usually already familiar with BMPs and the trading program standards they set.</p> <p>However, many landowners may not like the idea of agency staff visiting their projects or properties (if in-person initial project review is performed). Further, some agencies may have limited capacity to perform onsite inspections, especially if agency budgets fluctuate or trading volume jumps quickly.</p>	<p>MDE is responsible for initial project review and certification of all non-agricultural projects.ⁱ MDA staff performs an administrative and technical review and conducts an onsite visit of all proposed agricultural projects before approving and certifying the project.ⁱⁱ</p> <p>WA DOE prefers to conduct administrative and technical review; they also reserve the option to conduct pre- and post-project site inspections.ⁱⁱⁱ</p>

*(continued)***Table 11.1.2 Initial Project Review and Certification**

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option B:</p> <p>Permittees or project developers conduct initial project review and certification</p> <p>Permittees are responsible for overseeing these preliminary roles in the process in line with NPDES permitting processes' traditional self-reporting system. Project developers may also self-report on the status of their projects.</p>	<p>Since the NPDES program is traditionally a self-reporting system, permittees may wish to decide for themselves whether they have the capacity to review and certify projects or whether they should work with a third party to fulfill this role.</p> <p>Project developers themselves could also be responsible for reporting for an initial project review, perhaps with technical assistance (e.g., conservation districts helping a farmer report on status of a project).</p>	<p>Clean Water Services conducts initial review and certification for thermal credit projects, as allowed under their permit.^{iv}</p> <p>ID DEQ has dischargers certify credits by submitting a Reduction Credit Certificate.^v</p>
<p>Option C:</p> <p>Third parties conduct initial project review and certification</p> <p>In this option, third parties, such as a Conservation District or other trained professionals, are approved to conduct initial project review and certification.</p>	<p>Conservation district staff and other resource or agriculture professionals often work closely with landowners to understand how BMPs should be implemented to maximize water quality improvements, which helps them correctly evaluate projects and gain feedback information to improve overall program requirements. Third parties may more easily charge fees (compared with state agencies).</p> <p>Third parties may have more flexibility to avoid conflicts of interest and may have the ability to grow and shrink more rapidly in response to larger or smaller transaction volumes. If trading participants elect to use a third party, there may need to be some formal assignment of tasks from the relevant agency and inclusion of this use in the permit, trading plan, or private contract, as third parties may not have enough formal authority to certify credits.</p>	<p>The OR City of Medford permit^{vi} and their project developer, The Freshwater Trust, works with Willamette Partnership as a third party project reviewer and certifier for credits generated toward this permit.^{vii}</p> <p>WI DNR has permittees submit their WQT Management Practice Registration forms to a wastewater engineer/specialist for initial project review who provides those reports to WI DNR or county Land and Water Conservation Departments.^{viii}</p> <p>PA DEP allows permittee or third party review but final approval is always done by a PA DEP Program Specialist after review.^{ix}</p> <p>CDPHE's policy specifies that inspections should be conducted by a qualified third-party inspector, which may include a professional engineer, certified crop consultant, or certified erosion and sediment control professional or other similarly qualified inspector.^x</p>

(continued)

Table 11.1.2 Initial Project Review and Certification

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option D:</p> <p>Responsibility for initial project review and certification is split between multiple entities</p> <p>Some combination of an agency, permittee, and third party share the role of conducting initial project review and certification.</p>	<p>Where a third party or other agency is assigned to perform initial project review, agencies may wish to perform certification as a way to stay informed about project development. This may serve to increase certainty on credit validity and provide some distance for landowners concerned about agency onsite inspections. For example, if a permittee conducts the initial project review and an agency certifies each project, both organizations are likely to repeat much of the same work (e.g., reviewing eligibility documentation, credit calculations, project design, and management plans). However, separating certification from initial project review can lead to redundant processes — perhaps doubling transaction costs, and also creating more opportunity for disputes.</p>	<p>In the Ohio River Basin trading project, state agencies retain the authority to certify a credit after review.^{xi}</p>

- i MDE 2008, *supra* note Table 2.1(iii), at §§ 6.2 & 7.
- ii MDA 2008b, *supra* note Table 3.2.2(ii), at § 4.7.
- iii WA DOE 2010, *supra* note Table 1.1.1(xv), at pp. 6-8.
- iv CWS 2005, *supra* note Table 8.1.2(ii), at pp. 25.
- v ID DEQ 2010, *supra* note Table 1.1.1(xiv), at § 7.1.
- vi *See* OR Medford Permit 2011, *supra* note Table 6.1.1(iv).
- vii *Id.* and Willamette Partnership ECAS 2013, *supra* note 107, at §§ 2-3 & F-4 (in Appendix F).
- viii WI DNR 2013a, *supra* note Table 1.1.1(xii), at pp. 50 & 52.
- ix Pennsylvania Code, *supra* note Table 1.1.1(ix), at Title 25 § 96.8(e)(5).
- x Colorado Department of Public Health and the Environment, *Colorado Pollutant Trading Policy*, p.14, (2004) (Hereafter “CDPHE 2004”), available at https://www.colorado.gov/pacific/sites/default/files/WQ_Pollutant-Trading-Policy.pdf.
- xi *Id.* at p. E-8.

11.1.3 Ongoing Project Review

After a project has undergone initial project review and certification, it may be subject to ongoing project review to ensure that the project remains in place and is maintained properly throughout its life. The frequency and content of ongoing review, as well as the use of auditing approaches to confirming ongoing performance, are discussed in **Section 8.2**. These ongoing reviews may be conducted by the same parties/agencies that perform the initial project review or may fall to other parties. For instance, the state agency may perform all steps of the project review and certification, but the program may allow for qualified third parties to conduct ongoing project reviews. There are several options for who conducts ongoing project review.



A project site may undergo ongoing project review to provide assurance that the project is maintained throughout its life. Photo of planting courtesy of Willamette Partnership.

Table 11.1.3 Ongoing Project Review

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Regulatory agency conducts ongoing project review</p>	<p>Similar to initial project review and certification, agencies' performance of ongoing project review gives them more control over how the trading program is operated. It also creates additional cost and administrative burden. It may be difficult for agencies to keep up with duties for ongoing project review if budgets fluctuate or trading activity rises quickly.</p>	<p>VA DEQ is currently conducting ongoing project review either through site visits or using remote sensing to verify that land use conversion is unchanged.ⁱ</p>
<p>Option B:</p> <p>Permittees or project developers conduct ongoing project review</p>	<p>Project developers may also wish to conduct ongoing project review for their own projects, since they are most familiar with them and can be held accountable through contractual liability. Both permittees and project developers have potential conflicts of interest when reviewing their own projects, however.</p> <p>Where permittees or project developers elect to review their own credit-generating projects, agencies may choose to audit a portion of credits to ensure the approved trading plan is executed in conformance with standards.</p>	<p>OR Clean Water Services conducts ongoing project review for their thermal credit projects.ⁱⁱ</p> <p>The CO Cherry Creek Basin program requires annual reports from permittees.ⁱⁱⁱ</p>
<p>Option C:</p> <p>Third parties conduct ongoing project review</p>	<p>If third parties conduct ongoing project review, there should be a clear process to identify, avoid, and/or mitigate any conflicts of interest. Third parties may have more flexibility to avoid conflicts of interest and may have the ability to grow and shrink more rapidly in response to larger or smaller transaction volumes. If trading participants are to be required to use a third party, there may need to be some formal assignment of tasks from the relevant agency. Some groups have indicated that this option causes concern unless state regulatory agencies retain ultimate responsibility for ensuring compliance.</p>	<p>The City of Medford, OR's project developer, The Freshwater Trust, chooses to use Willamette Partnership as a third party reviewer.^{iv}</p> <p>Ohio River Basin trading project requires ongoing project review by the relevant State Agency or an EPRI-approved third party.^v</p>
<p>Option D:</p> <p>A non-regulatory state agency conducts audit of others' review</p>	<p>State agencies may choose to audit ongoing project review conducted by permittees or third parties. Generally, agencies retain the right to review projects, but this option would require more regular and structured review.</p> <p>Third parties might conduct ongoing review in less frequent intervals with permittees responsible for ongoing review in intervening years.</p>	<p>MDA policy stipulates that all certified projects will be reviewed annually (or on a schedule determined by MDA) by certified third parties. MDA will conduct an additional review of 10% of agricultural nonpoint source projects annually.^{vi}</p>

i Alan Brockenbrough, Virginia Department of Environmental Quality, personal communication with Mindy Selman (Jan 6, 2015).

ii See OR CWS Permit 2005, *supra* note Table 6.1.1(v), at § D.7.i (pp. 44-45). See generally OR DEQ 2009, *supra* note Table 1.1.1(xiii).

iii CCBWQA 1997, *supra* note 144, at p. 8.

iv See Willamette Partnership, USDA Office of Environmental Markets, Pinchot Institute for Conservation, & World Resources Institute, *In It Together: A How-To Reference for Building Point-Nonpoint Water Quality Trading Programs: Case Studies* (Part 3), § 2.2.5-6 (p. 23) (2012) (hereafter "In It Together (Part 3)"), available at <http://willamettepartnership.org/publications/>.

v EPRI 2012, *supra* note 65, at p. E-7 in Appendix E.

vi MDA 2008a, *supra* note Table 2.1(vii), at pp. 9-10.

11.1.4 Reviewer Qualifications

The entity or individuals conducting initial project review, certification, and/or ongoing project review will need to understand the trading program’s eligibility requirements, protocols, quantification approaches, BMP guidelines and quality standards, and review procedures. This section discusses methods through which a trading program can set standards to guarantee that reviewers will be qualified to review projects. What “qualified” means could be varied according to individual locations and project requirements. There are several options for determining qualifications for project reviewers, particularly when third parties are leading review.

Table 11.1.4 Project Reviewer Qualifications

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Reviewers must be accredited for a given location and given BMP</p> <p>In this approach, individuals must hold an accreditation from an agency or trading program administrator and be qualified to review particular credit-generating BMPs in a particular area to review and certify crediting projects. Accreditation may be gained through attendance at a set of trainings and/or successful completion of an assessment covering the crediting protocol, quantification method, review procedures, and BMP quality standards used in the particular geographic area.</p>	<p>A formal accreditation system would evaluate an individual’s qualifications to review certain types of BMPs in specific geographic locations. It also provides a standard framework through which to revoke or otherwise fail to renew accreditations for reviewers who are performing inadequately. Setting up an accreditation process and running the system introduces some additional administrative costs. These costs can be recouped through accreditation fees, provided there is enough market demand that reviewers will recoup such costs through payment for their services.</p>	<p>Willamette Partnership’s Ecosystem Credit Accounting System requires that reviewers attend a training session and pass an assessment on crediting protocols, quantification methods, quality standards, and initial and ongoing project review procedures for the specific location and specific BMP for which they seek accreditation.ⁱ</p>
<p>Option B:</p> <p>Reviewer must meet a set of minimum qualifications</p> <p>No formal accreditation is needed to be a reviewer in this approach, but individuals must meet a set of criteria to be considered qualified. For instance, the program may set a minimum level of education needed in a range of applicable fields (e.g., associate’s or bachelor’s degree in an agricultural, horticultural, or conservation-related field), or a minimum level of experience (e.g., at least two years in a related field). Affiliation with a conservation or agriculture-focused organization (e.g., conservation district staff) is another way to set a minimum qualification.</p>	<p>This approach eliminates the need for more administrative systems, which can be especially important for trading programs with a low transaction volume. Even with this option, state agencies may want to host trainings to ensure reviewers understand the goals of the trading program they are supporting.</p>	<p>In the State of Ohio, a “qualified soil and water conservation professional” that conducts inspections can mean agency staff, but may also be an “equivalent professional as deemed by the director to have the education, knowledge and experience commensurate with this definition.”ⁱⁱ</p>

i Willamette Partnership ECAS 2013, *supra* note 107, at § 2-3 (p. 26).

ii Ohio Admin. Code, *supra* note Table 1.1.1(x), at § 3745-5-01(Z). *See also* §§ 3745-5-04(I) & (K).

11.1.5 Managing the Ledger/Registry

A central database may come in several forms: central registry, a simple ledger,¹⁶⁸ or a posted database. A ledger/registry serves several functions, as discussed in **Section 8.5**. It provides a program-level accounting of credits generated and provides a forum to share credit- and project-specific information for public transparency. This section focuses on which entity could maintain and administer the ledger/registry. There are several options for who manages the ledger/registry.

Table 11.1.5 Management of the Credit Ledger

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Agencies manage registry functions (credit ledger and providing project information to the public)</p>	<p>Often in other environmental markets, the ledger/registry is managed by the relevant state agency. However, state water quality agencies may not have the internal capacity to maintain a ledger/registry system.</p> <p>Most National Network participants favored agencies maintaining the registry if they had the capacity.</p>	<p>FL DEPⁱ tracks all credits generated or trades authorized on their websites.</p> <p>PA DEP tracks all credits generated and authorizes trades through an internal database or registry and posts a summary of results on their website.ⁱⁱ</p> <p>MDE & MDA use an electronic registry and web-based system to track trades.ⁱⁱⁱ</p> <p>VA DEQ^{iv} is in charge of their online registry.</p> <p>WI DNR has a wastewater engineer/specialist upload reviewed WQT Management Practice Registration forms to the state's tracking software, SWAMP.^{v, vi}</p>
<p>Option B:</p> <p>Permittees track credits</p>	<p>In trading areas with only one or two permittees, a ledger/registry housed with a permittee or its developer (if separate entities) might make sense. It would need to provide the same functionality that a system administered by an agency or others would.</p> <p>National Network participant opinion was mixed on whether it was viable for a permittee or project developer to maintain a registry given public access to information and state agency oversight.</p>	<p>OR CWS permit^{vii} requires them to track credits generated and used toward compliance.</p>
<p>Option C:</p> <p>Third parties track credits</p>	<p>Third parties may be able to adapt more quickly to the registration needs of a trading program, but they may also be only able to offer such services where multiple programs produce sufficient transaction volumes. There are fixed costs associated with creating a secure and robust registry, which may be challenging to sustain in places where trading volume is small.</p> <p>A third party registry may also not have the security and accountability built in to protect information accuracy and completeness. If a third party maintains a registry, there needs to be clear provisions for transferring data if third parties change and clear agreement on the type and amount of data collected and stored.</p>	<p>Willamette Partnership's Ecosystem Credit Accounting System requires all credits to be listed on a central registry.^{viii} Credits for OR City of Medford permit are listed using this system.^{ix}</p> <p>CDPHE's trading policy requires that all credits be registered with "an appropriate entity" which is defined to include a nonprofit established for that purpose or "volunteer" government entity.^x</p>

168 "Ledger" is used to refer to accounting summaries that cover primarily transactional information. "Registry" is used where project-specific information for credits is also included. In many cases, the program decision described below could apply to either a Ledger or Registry, in which case, both terms are used.

*(continued)***Table 11.1.5 Management of the Credit Ledger**

OPTIONS	CONSIDERATIONS	EXAMPLES
i	FL DEP 2010, <i>supra</i> note Table 2.2(ii), at p. 41.	
ii	See Pennsylvania Department of Environmental Protection, <i>Nutrient Credit Marketplace</i> , (undated), available at http://www.portal.state.pa.us/portal/server.pt/community/nutrient_trading/21451/nutrient_credit_marketplace/1548039 .	
iii	MDE 2008, <i>supra</i> note Table 2.1(iii), at § 8.	
iv	See, e.g., Virginia Nonpoint Source Nutrient Credit Registry, (Oct 13, 2014), available at http://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/NonpointCreditRegistry.pdf .	
v	WI DNR 2013b, <i>supra</i> note Table 1.1.1(xii), at §§ 3.1.3 – 3.1.6.	
vi	The System for Wastewater Applications, Monitoring, and Permits (SWAMP) is a permit-supporting software system. See Wisconsin Department of Natural Resources, <i>Chapter 21: Data Management</i> , in <i>WDNR Water Monitoring Strategy</i> , p. 21-4, (2007), available at http://dnr.wi.gov/topic/surfacewater/monitoring/strategy/Logistics%20Chapters/Ch21-Data_MonStratV3_11-6-2008.pdf .	
vii	See OR CWS Permit 2005, <i>supra</i> note Table 6.1.1(v), at § D.7 (pp. 42-45). See also OR DEQ 2009, <i>supra</i> note Table 1.1.1(xiii), at §§ 3.5, 3.6, & 4.	
viii	Willamette Partnership ECAS 2013, <i>supra</i> note 107, at p. 8. See Markit, <i>Markit Trading Services: Market Registry</i> , (undated), available at https://www.markit.com/product/registry .	
ix	In It Together (Part 3), <i>supra</i> note Table 11.1.3(iv), at § 2.2.6.	
x	CDPHE 2004, <i>supra</i> note Table 11.1.2(x), at p. 18.	

11.1.6 Trading Program Improvement Processes & Updates

Experience drives change in how credits are quantified, increases understanding of which processes provide value and which are costly, and develops a clearer idea of additional guidance needed (see **Section 10**).

This section focuses on which entity should initiate and conduct those processes. Overall, many National Network participants expressed that the state regulatory agency should ultimately be responsible for program improvements, but that it was important to have all stakeholders involved in that process. Managing program improvement is a process-oriented task that requires the ability to manage multi-stakeholder engagement. Entities that develop these processes and methods also must understand the science, policy, and economics behind trading. For ongoing program improvement, they also need to have some capacity to process new information, critiques, and requests for clarification in a timely and structured way. There are several options for who manages the program improvement process.

Table 11.1.6 Management of the Trading Processes and Quantification Methods

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Agencies update processes and methods</p> <p>In this option, agencies primarily conduct the evaluation of the program's activities and make decisions to enact any changes. Agencies may do so collaboratively, bringing in sister agencies, universities, and/or multidisciplinary teams of professional and private sector entities to assist in that review.</p>	<p>Agencies can more easily manage standard processes and methods linked to law, rule, and policy. Utilizing sister agencies or stakeholder networks can broaden the perspectives at the table in analyzing past performance and making decisions on future operations. However, an agency may not have the capacity to lead the regular adaptive management cycles needed for periodic improvement to trading programs.</p>	<p>MDA regularly convenes the Maryland Agricultural Nonpoint Nutrient Trading Advisory Committee to vet proposed policy and trading program changes and to address new or ongoing needs.</p>
<p>Option B:</p> <p>Permittees update processes and methods</p> <p>In this option, the permittee leads the program improvement process. Similar to option A, they may engage others in their efforts.</p>	<p>In some cases a permittee may be in the best position to update the overall system, with input, oversight, and/or approval from the regulatory agency. However, a permittee may not be able or interested in developing new tools and standards for the entire state or multiple permittees. Where agencies do not lead program improvement processes, they nonetheless need to be closely involved.</p>	<p>Authors are not aware of any examples where this is explicit.</p>
<p>Option C:</p> <p>Third parties update processes and methods</p> <p>This option applies where third parties are operating / administering the trading program, or where a third party or sister agency provides outside review for the agency managing the trading program.</p>	<p>Third parties may have more flexibility to coordinate program improvement, but they may not have the dedicated funding streams to support those efforts over time. If the task to develop and/or update standard processes and methods is managed by a third party, the regulatory agency should retain oversight and final decision-making and approval authority over the updated processes and methods. The processes and methods that third parties develop may not be as effective if agencies do not review and approve new versions and processes developed through this third party process.</p>	<p>In the OH Great Miami program, Miami Conservancy District facilitates an expert work group to adaptively improve the program.ⁱ</p> <p>Willamette Partnership manages program improvements for the Ecosystem Credit Accounting System,ⁱⁱ which The Freshwater Trust has chosen to use on behalf of the City of Medford.ⁱⁱⁱ</p>
<p>i MCD 2005, <i>supra</i> note Table 2.3(v), at § 4.9.</p> <p>ii Willamette Partnership ECAS 2013, <i>supra</i> note 107, at § 4.</p> <p>iii See In It Together (Part 3), <i>supra</i> note Table 11.1.3(iv), at p. 23.</p>		

11.1.7 Responsibility for Implementing Effectiveness Monitoring

If agencies decide to require monitoring to assess trading program effectiveness, it is important to determine which entity (either the state agency or the permittee) will be responsible for its implementation. There are several options for which entity manages effectiveness monitoring.

Table 11.1.7 Management of Program Effectiveness

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>State agencies manage effectiveness monitoring</p> <p>The state agency takes on the responsibility to track the overall effectiveness of the trading program.</p>	<p>If state agencies manage trading program effectiveness monitoring in addition to TMDL effectiveness monitoring, there would be an opportunity to more efficiently coordinate the two programs and minimize the potential cost of running two monitoring programs separately. Where states are not already undertaking TMDL effectiveness monitoring, it may be infeasible to add the additional study design, data collection, and analysis necessary to evaluate the impact of trading.</p>	<p>The authors are not aware of an established trading program wherein state agencies manage an effectiveness monitoring program for trading.</p>
<p>Option B:</p> <p>Permittees manage effectiveness monitoring</p> <p>Permittees are responsible for tracking their own program’s overall effectiveness.</p>	<p>If a permittee is responsible for monitoring effectiveness of its own trading program, costs are moved from the agency to the permittee. However, this approach would go beyond the current monitoring responsibilities of most permittees, which typically extends to meeting permit obligations and does not include tracking progress on the watershed scale. In addition, where TMDL effectiveness monitoring is not already occurring, effectiveness monitoring could become a large financial obligation for permittees, and may prove to be a barrier to entry for facilities wishing to engage in trading.</p>	<p>The authors are not aware of any trading programs that ask permittees to implement an effectiveness monitoring strategy.</p>

11.2 Roles & Considerations for Trading Transaction Models



The type of transaction model used in a trading program depends on several factors including supply and demand for credits and the capacity of participants involved in trading. Photo courtesy of American Farmland Trust.

There are several ways to transact credits in trading programs. Each of these transaction models clearly delineates what constitutes a credit and sets rules on buyer-seller transactions. Each of these transaction models work differently depending on A) the volume of transactions, B) the number of buyers and sellers in a trading area, C) the consistency of projects generating credits and timing of demand, and D) the capacity of participants involved in trading. National Network participants did not believe there was a set of “best” transaction models, just considerations to factor into a choice to employ one or more of these models. There are several common options for transaction models.¹⁶⁹

¹⁶⁹ Richard T. Woodward & Ronald A. Kaiser, *Market Structures for U.S. Water Quality Trading, Review of Agricultural Economics*, 24(2): 373-380 (2002), available at <http://www.tamu.edu/faculty/rakwater/research/marketstructures.pdf>.

Table 11.2.7 Program Transaction Model

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option A:</p> <p>Exchange</p> <p>Multiple buyers and sellers meet on an exchange platform, which is often a web-based platform that facilitates auctions of credits at regular intervals.</p>	<p>Works well when multiple buyers and sellers compete in a market with high transaction volumes and pattern of consistently implemented projects generating credits. There are costs associated with building, maintaining, and overseeing an exchange that may not be worth it when transaction volumes are low.</p>	<p>OR DEQ,ⁱ MDE,ⁱⁱ and WV DEPⁱⁱⁱ support both an exchange and bilateral market structure. OH Alpine Cheese permit uses bilateral, clearinghouse, and exchange.^{iv}</p>
<p>Option B:</p> <p>Bilateral negotiation</p> <p>Permittees negotiate directly with sellers (often landowners or aggregators).</p>	<p>Works well with small transaction volumes and a small numbers of buyers. Can be difficult if permittees have limited capacity to negotiate credit transactions.</p>	<p>NC Ecosystem Enhancement Program^v and ID DEQ^{vi} have a bilateral market structure.</p> <p>OR DEQ^{vii} and MDE^{viii} support both an exchange and bilateral market structure.</p> <p>VA DEQ uses bilateral structure for exchanges through the VA water quality improvement fund or outside the VA Nutrient Credit Exchange Association.^{ix}</p> <p>OH Alpine Cheese permit uses bilateral, clearinghouse, and exchange.^x</p> <p>MN SMBSC permit uses bilateral and sole-sourced offsets.^{xi}</p> <p>Clean Water Services works with the Tualatin Soil and Water Conservation District and other partners to implement credit projects in agriculture areas.^{xii}</p>
<p>Option C:</p> <p>Clearinghouse</p> <p>A third party aggregates credits from multiple sellers and brokers the sale of these credits. A clearinghouse is often a single, centralized entity administering the trading program and aggregating credits, making it different from other aggregation approaches.</p>	<p>A clearinghouse generally serves as a financial intermediary between buyers and sellers and can reduce risks and uncertainty to market participants by ensuring a consistent supply of credits. In the case of PENNVEST, the clearinghouse also bears some of the risk associated with credit default. Clearinghouses like PENNVEST have been criticized, however, for driving prices down and failing to differentiate between variability in quality of credits.</p>	<p>PENNVEST is an example of a nutrient credit clearinghouse in Pennsylvania. It holds auctions at which permitted wastewater treatment plants can purchase credits to meet their nitrogen and phosphorus permit limits. As such, the PENNVEST clearinghouse may reduce transaction costs. It also reduces risk exposure to both buyer and seller.^{xiii}</p> <p>OH Great Miami program uses the Great Miami Conservancy District as a clearinghouse.^{xiv}</p>

(continued)

Table 11.2.7 Program Transaction Model

OPTIONS	CONSIDERATIONS	EXAMPLES
<p>Option D:</p> <p>Sole source</p> <p>A permittee implements its program directly using its staff or contractors to install credit-generating projects.</p>	<p>Relies on a permittee with the capacity to find and develop credit-generating projects through BMPs they can execute on their own.</p>	<p>Clean Water Services implements its own projects for flow augmentation and urban riparian forest buffers to generate credits.^{xv}</p> <p>CA City of Santa Rosa works to implement projects with farmers to generate credits.^{xvi}</p> <p>MN SMBSC permit uses bilateral and sole-sourced offsets.^{xvii}</p>
<p>Option E:</p> <p>Fee in lieu</p> <p>A permittee pays a fee in lieu of purchasing their own credits to a program (e.g., a state agency) that spends funds to generate needed water quality improvements.</p>	<p>Fee-in-Lieu systems reduce buyer uncertainty, as permitted entities have a guaranteed option for meeting their offset obligation at a known price. On the other hand, this model has been criticized for its potential to negatively impact market dynamics. If in-lieu fees are low, they can interfere with the market's setting of credit prices, driving prices down and hindering the supply and creation of credits.</p>	<p>North Carolina's Ecosystem Enhancement Program (EEP) offers an in-lieu fee system. Developers who are required to offset their nutrient loads from stormwater can opt for a "buy-down option" in which they pay an in-lieu fee to EEP. EEP, once it collects sufficient fees to create an economy of scale, issues a request for proposals for private sector turnkey load reduction projects.^{xviii} By rule, EEP is required to review and potentially adjust its offset prices at least quarterly to reflect actual costs of achieving the reductions, which helps to reduce its market interference. In recent years, legislation has authorized the use of private nutrient offset banks, and even the requirement for developers to purchase private credits first if available in the watershed before using EEP.^{xix}</p>

i OR DEQ 2009, *supra* note Table 1.1.1(xiii), at § 3.5.

ii MDE 2008, *supra* note Table 2.1(iii), at §§ 4.2, 4.4, & 5.4.

iii West Virginia Department of Environmental Protection, *West Virginia Water Quality Nutrient Credit Trading Program*, §§ III.E.4.(b) & III.H, pp. 4 & 7, (2009), available at http://www.dep.wv.gov/news/Documents/NutrientTradingGuidance/WVDEP_Trading_Guidance_DRAFTDEP0815%2009.pdf.

iv See OSU, HSWCD, & Alpine Cheese Co. 2006, *supra* note Table 2.5(ix).

v North Carolina Admin. Code, *supra* note 56, at Title 15A §§ 02B.0240 & .0274.

vi ID DEQ 2010, *supra* note Table 1.1.1(xiv), at § 6.1.

vii OR DEQ 2009, *supra* note Table 1.1.1(xiii), at § 3.5.

viii MDE 2008, *supra* note Table 2.1(iii), at §§ 4.2, 4.4, & 5.4.

ix See WRI Comparison Tables, *supra* note 11, at p. 8.

x See OSU, HSWCD, & Alpine Cheese Co. 2006, *supra* note Table 2.5(ix).

xi See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at pp. A-47 – A-57 in Appendix A.

xii See OR CWS Permit 2005, *supra* note Table 6.1.1(v), at § D.7 (pp. 42-45). See also OR DEQ 2009, *supra* note Table 1.1.1(xiii), at p. A-8 in Appendix A.

xiii PENNVEST 2012, *supra* note 140. See also PENNVEST, *PENNVEST Nutrient Credit Clearinghouse Rulebook (Version 7)*, (2014), available at http://www.portal.state.pa.us/portal/server.pt/community/nutrient_credit_trading/19518.

xiv MCD 2005, *supra* note Table 2.3(v), at §§ 1.2 & 3.1.

xv See OR CWS Permit 2005, *supra* note Table 6.1.1(v), at § D.7 (pp. 42-45). See also OR DEQ 2009, *supra* note Table 1.1.1(xiii), at p. A-8 in Appendix A.

xvi Santa Rosa Offset Program 2008, *supra* note Table 3.2.5(v), at p. 6.

xvii North Carolina Admin. Code, *supra* note 56, at Title 15A §§ 02B.0240 & .0274.

xviii See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at pp. A-47 - A-57 in Appendix A.

xix North Carolina Department of Environment and Natural Resources, *Ecosystem Enhancement Program, Fee Schedule*, (undated), available at <http://portal.ncdenr.org/web/eep/fee-schedules>.

11.3 Agencies Partnering with Third Parties

Although water quality agencies maintain responsibility for all aspects of a trading program, agencies may partner with designated third parties to perform administrative tasks per the considerations regarding trading program roles and responsibilities described above. Working with third parties may be most appropriate for functions where specific expertise is required, where the entity executing the function must be flexible (i.e., able to adjust quickly to shifts in demand in funding and staffing), and where a high volume of transactions might cause agencies to spend time and money beyond what is available to those agency personnel. This discussion is intended to provide some examples where state regulatory agencies have partnered with third parties to more or less formally administer aspects of a trading program. It is not meant to suggest that agencies should assign any particular functions.

In numerous trading programs, third parties work informally to perform tasks important to the effectiveness and accountability of trades. Third parties are: A) leading site screening and initial project review; B) confirming monitoring/inspection and maintenance; C) conveying information to agencies for enforcement and compliance; and D) facilitating standards development. Where a third party is asked to lead more consequential tasks, agencies and third parties should think carefully about how formal that partnership should be and how to structure more demanding oversight requirements placed by the government body on the third party.

A list of examples of where third parties have been assigned tasks in resource management is provided in **Box 11.3**. Review of these examples was used to inform the considerations that follow.

Box 11.3 Examples of Agency Partnership with Third Parties¹⁷⁰

Pennsylvania Infrastructure Investment Authority (PENNVEST) manages a clearinghouse for nutrient credits.

Congressional delegation of management, monitoring, enforcement, and standard development authority to the Columbia River Gorge National Scenic Area Commission.

Congressional delegation of private land management responsibilities, in congressionally-designated Wild & Scenic River Corridors, to a local management council.

North American Electric Reliability Corporation (NERC) delegation to the Western Electricity Coordinating Council (WECC) to develop reliability standards and to monitor/enforce such standards.

Western Governors' Association assignment of tasks to the Western Renewable Energy Generation and Information System (WREGIS) to develop and manage online renewable energy credit certification and registration.

Indiana, Kentucky, Ohio, and Ohio River Valley Water Sanitation Commission (ORSANCO) work with the Electric Power Research Institute (EPRI).

OR DEQ assigns on-site wastewater treatment system monitoring and inspection authority to certified maintenance providers.

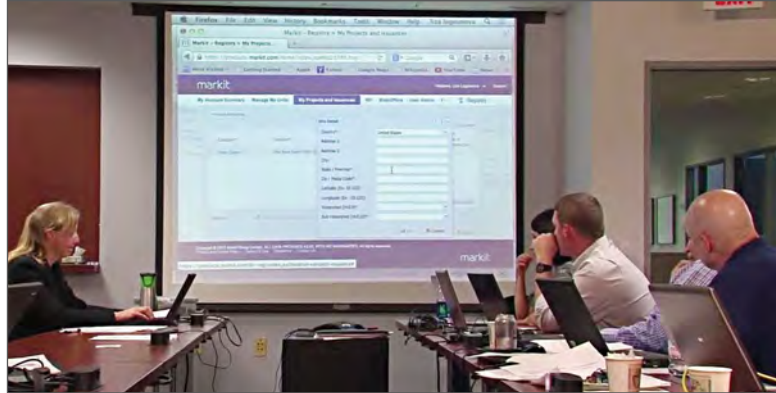
U.S. EPA assignment to American Society for Testing and Materials (ASTM) of "All Appropriate Inquiry" standards development for hazardous waste pre-purchase assessment requirements.

Local governments work with online RME (Responsible Management Entity) to manage online septic system installation and inspection reporting system.

¹⁷⁰ This section is adapted from The Freshwater Trust, *Role of State Agencies, NPDES Permittees, and Third Parties* (Discussion Guide), (unpublished), (2013), (copy on file with authors).

11.3.1 Considerations in Assigning Tasks to Third Parties

Where agencies partner with third parties to perform tasks (such that these aspects of trading can be required in permits and other enforceable documents), the following elements should be considered and accounted for, depending on the nature of responsibility afforded to the third party. The agency needs to retain oversight and final decision-making authority and the ability to resolve disputes:



Partnering with designated third parties may be most appropriate for functions where specific expertise is required. Photo courtesy of EPRI.

- The more extensive the third party's responsibilities, the more formal/extensive the agreement between the agency and third party should be; and
- Avoid conflicts of interest in the third party or agents of the third party (e.g., no financial stake in water quality credit transactions).

11.4 Stakeholder Process¹⁷¹

A successful process for building and operating a trading program largely depends on the right stakeholders fulfilling the right roles, and on cultivating trading champions during the process.¹⁷² Essential groups include representatives from state/tribal water quality agencies, point source buyers, nonpoint source sellers, environmental groups, and technical experts in areas such as water quality dynamics and farm practices. The reality of trading is that every trading program and permit presents multiple opportunities for citizens to mount legal and policy-oriented challenges, demonstrating why strong and deliberative community support is needed. A thoughtful stakeholder process design can help build better programs, sustain trust, and ensure improvements are made over time. The following questions are important to consider when designing a stakeholder process for trading. These questions can be answered in early convening conversations with stakeholders.

- What should a water quality trading program do? What should it not do?
- What will be the measure of success? Over what time period?
- How will the timing of achieving water quality improvements be incorporated into a program?
- Which organizations/individuals should be part of the discussion and when?
- What do stakeholders need in order to participate effectively and reach agreement?
- What is the right process for accomplishing those goals?

Following are criteria to consider when drafting a list of stakeholder organizations and individuals to involve in trading program design.

¹⁷¹ The following section is adapted from *In It Together (Part 2)*, *supra* note 111, which provided guidance on building processes to involve stakeholders in trading program design.

¹⁷² Selman *et al.* 2009, *supra* note 24, at p. 15.

- Which agency issues permits and TMDLs, and who else has to say ‘yes’ to a trading program design (e.g., who will be signing agreements)?
- What resources and skills does each organization/individual bring, and where are those best used?
- Is the individual in the organization positioned as a liaison to check details with technical staff, but also able to present policy decisions to directors?
- Does the organization or individual have the availability and financial resources to participate effectively in collaborative settings?¹⁷³
- Is the organization or individual trusted by others?



A good stakeholder process design will provide multiple opportunities for participation asking pertinent questions of the appropriate groups of people, given their expertise. Photo courtesy of Willamette Partnership.

Not everyone needs to be involved in all parts of program design. A good process design will provide multiple opportunities for participation asking questions of the appropriate groups of people, given their expertise. For example, it may not make sense for policy leaders to review the methods to quantify water quality improvements, or for hydrologists to develop the mechanisms to determine credit prices.

Ultimately, the collaborative process should: 1) build direct relationships between buyers and sellers of water quality credits; 2) enable business and environmental interests to have candid conversations about overall goals for their watershed; 3) safeguard the interests of the broader community and people not directly involved in the process; and 4) facilitate organizations’ adoption of agreements made by the stakeholder group. Some excellent guidance exists on the principles and practice of collaborative decision-making.¹⁷⁴ More on engaging stakeholders can be found on pages 15-19 of *In It Together, Part 2*.¹⁷⁵

¹⁷³ Judith Innes, *Consensus Building: Clarification for the Critics*, 3, pp5-20, (2004); Franklin Dukes and Karen Firehock, *Collaboration: A guide for environmental advocates*, Charlottesville, VA: University of Virginia, (2001).

¹⁷⁴ See, e.g. Rosemary O’Leary and Lisa Bingham (Eds.), *The Promise and Performance of Environmental Conflict Resolution*, Washington, DC: Resources for the Future, (2003); Lawrence Suskind and Jeffrey Cruikshank, *Breaking the Impasse. Consensual Approaches to Resolving Public Disputes*, New York, NY: Basic Books, INC., (1987); Douglas Kenney, *Arguing About Consensus: Examining the Case against Western Watershed Initiatives and other Collaborative Groups Active in Natural Resources Management*, Boulder, CO: University of Colorado Natural Resources Law Center, (2000); Daniel Yankelovich, *The Magic of Dialogue: Transforming Conflict into Cooperation*, New York, NY: Simon and Schuster, (1999).

¹⁷⁵ In It Together (Part 2), *supra* note 111.

CONCLUSION

This document represents a robust compilation of information on water quality trading. Information provided on each issue was carefully crafted, discussed, and referenced to the base of available information and experience with water quality trading from the last few decades. In reviewing all of that information, common traits emerge among many of the existing programs that represent components of a successful trading program. The National Network on Water Quality Trading built this document so new and evolving trading programs could have a shared reference from which to build and operate their programs. If the Network succeeds, we should see:

- More consistently used language and communications around trading;
- New trading programs that are well documented and clear about their decisions;
- High quality trading programs with lower start-up costs and high levels of trust amongst diverse stakeholders; and
- Faster progress toward meeting clean water goals at lower overall cost.

Just as trading will not solve all clean water challenges, this reference document will not solve all the challenges with water quality trading. There will continue to be disagreements about who is responsible for reducing what pollution by when, managing uncertainty, and how best to build trust amongst stakeholders.

This document is intended to be a living document, and moving forward, Network participants will engage with a broader set of stakeholders to build the tools and information resources needed to support water quality trading programs as they emerge and evolve.

GLOSSARY

303(d) List: The list of impaired and threatened waters (stream/river segments, lakes) that the CWA requires all states to submit for U.S. EPA approval every two years on even-numbered years.

4b Alternative: See Alternative to a TMDL Scenario.

401 Certification: As described in 33 U.S.C. § 1341(a)(1), when a federal permit or license applicant plans to undertake any activity (including facility construction or operation) that may cause any discharge into navigable waters, it must obtain a 401 certification. The certification must come from the relevant state and certify that the discharge will comply with select provisions of the CWA.

Active Trading Program: See Trading Program.

Adaptive Management: A systematic approach for improving natural resource management, with an emphasis on learning about management outcomes and incorporating what is learned into ongoing management.¹⁷⁶ Adaptive management in water quality trading programs may focus on improving program operations, quantification methods, and overall program effectiveness.

Additionality: In an environmental market, the environmental benefit secured through the payment is deemed additional if it would not have been generated absent the payment provided by the market system.¹⁷⁷

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

Alternative to a TMDL Scenario: See Total Maximum Daily Load.

Antibacksliding: As defined in CWA sections 303(d)(4) and 402(o) and 40 C.F.R. § 122.44(l), unless falling under a relevant exception, a reissued permit must be as stringent as the previous permit.¹⁷⁸

176 See Byron K. Williams, Robert C. Szaro, & Carl D. Shapiro, *Adaptive Management: The U.S. Department of the Interior Technical Guide*, pp. v & 1 (2009), available at <http://www.usgs.gov/sdc/doc/DOI-%20Adaptive%20ManagementTechGuide.pdf>.

177 Willamette Partnership ECAS 2013, *supra* note 107, at p. 48 in Appendix B.

178 See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. Glossary-1 in Glossary.

Antidegradation: As defined in 40 C.F.R. § 131.12 and relevant state rules and implementation guidelines, these policies ensure protection of existing uses and of water quality for a particular waterbody where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. Antidegradation also includes special protection of waters designated as outstanding national resource waters. Antidegradation plans are adopted by each state to minimize adverse effects on water.¹⁷⁹ *See also* Tier 2 Antidegradation Review.

Attenuation (pollutant): The change in pollutant quantity as it moves between two points, such as from a point upstream to a point downstream.

Banking (of credits): The generation of a credit in one time period with the intention that it be used to offset a discharge in another time period—without an ecological justification for doing so.

Baseline (General Nonpoint Source Control Authority): The level of pollutant reductions a state expects nonpoint source landowners to achieve, as derived from general nonpoint source control authority, prior to trading. Some states may have general, broad authority to control nonpoint source pollution,¹⁸⁰ which can be used to establish trading baseline levels for state trading guidance, frameworks, or particular trading plans.

Baseline (Regulatory Requirements): The level of pollutant load associated with specific land uses and management practices that comply with stated requirements in applicable, state, local, or tribal regulations.¹⁸¹ These regulations are typically affirmative water quality obligations or non-disturbance regulations (e.g., all farms must have nutrient management plans in place, or riparian vegetation may not be actively disturbed).

Baseline (TMDLs): The level of pollutant reductions a TMDL and/or a TMDL implementation plan expects specific nonpoint sources to achieve. A single nonpoint source's baseline requirement from a TMDL is derived from the nonpoint source's LA (if a nonpoint source falls under an aggregate LA, then a portion of that LA should be assigned to each nonpoint source).¹⁸²

Baseline (Trading): The combined pollutant load and/or BMP installation requirements that must be met prior to trading. At a minimum, all individual nonpoint sources must meet existing state, local, and tribal regulatory requirements. Where a TMDL exists and it establishes, through the TMDL and/or the TMDL implementation plans, requirements that differ from existing state, local, and tribal requirements, then the requirements stemming from TMDL LAs and/or TMDL implementation plans will supplement the existing regulatory requirements. Where general nonpoint source control authority exists in a state, a state can rely on this authority to set or supplement its trading baseline level.

Base Year: The date after which implemented BMPs become eligible to generate credits.

179 *See id.* at p. Glossary-2 in Glossary.

180 *See, e.g.,* Revised Code of Washington § 90.48.080 (2014), available at <http://app.leg.wa.gov/rcw/default.aspx?cite=90.48.080> (“It shall be unlawful for any person to throw, drain, run, or otherwise discharge into *any of the waters of this state...*”) (emphasis added). Washington Department of Ecology authority to regulate nonpoint sources under this law was recently upheld by the Washington Supreme Court. *Lemire v. Washington*, 178 Wash.2d 227 (Wash. 2013). Likewise, all dischargers are subject to regulation under California state law. California Water Code § 13260(a)(1) (2014), available at <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=wat&group=13001-14000&file=13260-13275>. On the other hand, the federal CWA definition of “point source” specifically excludes “agricultural stormwater discharges and return flows from irrigated agriculture.” 33 U.S.C. § 1362(14).

181 *See* 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. 8 in “Water Quality Trading Scenario: Point Source-Nonpoint Source Trading”.

182 *See id.* at p. 7.

Best Management Practices (BMP): BMPs include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing management activities to reduce or eliminate the introduction of pollutants into receiving waters.¹⁸³ BMPs can comprise land management practices and in-stream improvements (e.g., in-stream restoration actions or in-stream flow augmentation).

BMP Guidelines: A document that defines: A) an approved quantification method; B) the appropriate pre-project site condition to use for calculating the reduction; C) installation and maintenance quality standards; and D) ongoing performance standards to ensure that each BMP is consistently achieving the desired water quality improvements.

Buyers: Buyers of credits include any public or private entity that invests in water quality credits and other similarly quantified conservation outcomes. Buyers typically buy credits to meet a regulatory obligation. Eligibility criteria for buyers are described in **Section 3.1**.

Calibration (modeling): Adjustment of model parameters to better match local conditions, ideally using measured water quality data and BMP site performance metrics representative of the geographic area in which the model will be applied.

Clean Water Act (CWA): 33 U.S.C. § 1251 et seq.

Certification: The formal application and approval process of the credits generated from a BMP. Certification occurs after project review and is the last step before credits can be used toward a compliance obligation.

Compliance Obligation: The total number of credits that a regulated entity must hold in its compliance ledger at particular points in time. In the case of NPDES permittees, this obligation is based on a calculation on the facility's exceedance of its effluent limit, as adjusted by trading ratio(s) (and where applicable, other policy obligations, such as a reserve pool requirement).

Compliance Schedule: As defined in 33 U.S.C. § 1362(17) and 40 C.F.R. § 122.47, a compliance schedule is a schedule of remedial measures included in a permit or an enforcement order, including a sequence of interim requirements (e.g., actions, operations, or milestone events) that lead a permittee to compliance with the Clean Water Act and regulations.¹⁸⁴

Credit: A measured or estimated unit of pollutant reduction per unit of time at a specified location,¹⁸⁵ as adjusted by attenuation/delivery factors, trading ratios, reserve requirements, and baseline requirements.

Credit (Ex Ante): A credit issued based on projects that have received a favorable project site screening but have not yet been implemented.

Credit (Ex Post): A credit issued after a project has been implemented, reviewed, and certified.

Credit Contract Period: The duration of a contract between a regulated entity and a project developer (this is relevant where a regulated entity enlists an outside party to fulfill trading plan obligations).

183 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. Glossary-2 in Glossary.

184 *Id.*

185 See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. Glossary-2 in Glossary.

Credit Life: The period from the date a credit becomes usable as an offset by a permittee (i.e., its “effective” date), to the date that the credit is no longer valid (i.e., its “expiration” date).

Credit Stacking: *See* Stacking (Credit).

Critical Period: The period(s) during which hydrologic, temperature, environmental, flow, and other conditions result in a waterbody experiencing critical conditions regarding an identified impairment.

Delivery Ratio: *See* Trading Ratio (Delivery).

Designated Management Agencies (DMA): As defined in 40 C.F.R. § 130.2(n), an agency identified by a water quality management plan and designated by a state to implement specific control recommendations.

Designated Uses: As defined in 40 C.F.R. § 131.3(f) and 40 C.F.R. § 131.10, designated uses are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained. As defined in 40 C.F.R. § 131.10(a), examples of designated uses include public water supply, protection and propagation of fish, shellfish, and wildlife, recreation, agriculture, industrial, and navigation.

Designee: A person or entity officially chosen to do something or serve a particular role.

Direct Monitoring: *See* Quantification Method (Direct Monitoring).

Discharge Monitoring Report: A periodic water pollution report prepared by point sources discharging to surface waters of the United States and the various states. Point sources collect wastewater samples, conduct chemical and/or biological tests of the samples, and submit reports to a state agency or the U.S. EPA.

Discharge Point: The point at which a point source adds/discharges a pollutant (as defined in 33 U.S.C. § 1362(6)) into a navigable water (as defined in 33 U.S.C. § 1362(7)). A discharge of a pollutant is defined in 33 U.S.C. § 1362(12).

Effectiveness Monitoring: Systematic data collection and analysis to determine progress of a water quality trading program (or other implementation strategies) toward the achievement of water quality standards or other program goals. Effectiveness monitoring provides the basis for adaptive management.

Effluent Limit: As defined in 33 U.S.C. § 1362(11), an effluent limit means any restriction established by a state or U.S. EPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance. *See also* Water Quality-Based Effluent Limitation (WQBEL), and Technology-Based Effluent Limit (TBEL).

Equivalency Ratio: *See* Trading Ratio (Equivalency).

Exceedance: The difference between a facility’s load discharge and its effluent limit.

Hold the Line: *See* Interim Limits.

Hotspot: *See* Localized Impact.

Interim Limits: In a pre-TMDL scenario, some states impose more stringent limits on point sources based on the reasonable potential analysis required by 40 C.F.R. § 122.44(d)(1)(ii) (on the theory that even a miniscule addition of the pollutant causing the impairment will contribute to the continuation of this impairment). These interim limits are Water Quality Based Effluent Limits (WQBELs) and can serve as the impetus for water quality trading. If a state does not impose stricter limits in a pre-TMDL scenario, then permittees are allowed to “hold the line.”

Interim Permitting: *See* Interim Limits.

Leakage: In environmental markets, leakage means that environmental improvements are happening in one location at the expense of increasing environmental degradation somewhere else.

Ledger: A service or software that provides a ledger function for tracking credit quantities and ownership; accounting summaries that cover primarily transactional information. *See also* Registry.

Load Allocation (LA): As defined in 40 C.F.R. § 130.2(g), this is the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.

Localized Impact: A localized concentration of pollution that causes a violation of water quality standards at a particular location. In assessing potential near-field impacts, agencies should also consider whether trading will comply with the Endangered Species Act and other species and habitat protection laws; and whether or not near-field discharges addressed through trading will degrade groundwater in violation of any applicable state water quality regulations.

Location Ratios: *See* Trading Ratio (Delivery).

Look-Back Period: The time period preceding the implementation of a permittee's trading plan during which landowners may take credit for installed BMPs. A look-back period is intended to adjust for a market failure that disincentivizes early action by landowners.

Mixing Zone: As authorized by 40 C.F.R. § 131.13 and implemented according to state law, the area where wastewater discharged from a permitted facility enters and mixes with a stream or waterbody. A mixing zone is an established area where water quality standards may be exceeded as long as acutely toxic conditions are prevented and all designated uses, such as drinking water, fish habitat, recreation, and other uses are protected.

Modeling: *See* Quantification Method (Modeling).

Municipal Separate Storm Sewer System (MS4) Permit: A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created to or under state law) including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States. (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2 (As defined in 40 CFR 122.26(b)(8)).

National Pollutant Discharge Elimination System (NPDES) Permit: As defined in 33 U.S.C. § 1342.

Near-Field Impact: *See* Localized Impact.

Nonpoint Source: Diffuse sources of water pollution, such as stormwater and nutrient runoff from agriculture or forest lands. *See* 40 C.F.R. § 35.1605-4. U.S. EPA guidance describes a nonpoint source as “includ[ing] pollution caused by rainfall or snowmelt moving over and through the ground and carrying natural and human-made pollutants into lakes, rivers, streams, wetlands, estuaries, other coastal waters and ground water. Atmospheric deposition and hydrologic modification are also sources of nonpoint pollution.”¹⁸⁶

Nutrient Management Plan: Plan developed for a specific agriculture operation that outlines principles and practices for managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.¹⁸⁷

Offset(s): 1) (*noun*) Offsite treatment implemented by a regulated point source on upstream land not owned by the point source for the purposes of meeting its permit limit; 2) (*noun*) Load reductions that are purchased by a new or expanding point source to offset its increased discharge to an impaired waterbody. This second use is the more common usage of offset. (Note: U.S. EPA considers both types of offsets to be trading programs); 3) (*verb*) To compensate for.¹⁸⁸

Payment Stacking: *See* Stacking (Payments).

Permittee: Any entity with a discharge approved or pending approval under state- or federally-issued permit (e.g., NPDES permit). This document focuses on point source permittees seeking or granted permission to purchase water quality credits as a means of permit compliance.

Persistent Bio-accumulative Toxics: *See* Toxics (Persistent Bio-Accumulative).

Point of Concern: The point at which the greatest deviations from a particular water quality standard occurs, as identified through appropriate watershed-wide modeling (usually in a TMDL).

186 U.S. Environmental Protection Agency, *Nonpoint Source Program and Grants Guidelines for States and Territories*, p. 7, note 2 (2013), available at <http://water.epa.gov/polwaste/nps/upload/319-guidelines-fy14.pdf>.

187 *See* Natural Resources Conservation Service, *Conservation Practice Standard: Nutrient Management, Code 590*, pp. 6-7 (2012), available at http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046896.pdf.

188 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. Glossary-4 in Glossary.

Point Source: As defined in 33 U.S.C. § 1362(14), this means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.

Post-Project Performance: The estimated or measured pollution load associated with the post-project site conditions.

Post-Project Site Conditions: The data necessary to quantify post-project water quality benefit through an assessment of actual or anticipated site conditions after project installation. Post-project site conditions may be assessed via a site visit and/or interpretation of remote data.

Post-TMDL Scenario: *See* Total Maximum Daily Load.

Pre-Determined Pollution Reduction Rates: *See* Quantification Method (Pre-Determined Pollution Reduction Rates).

Pre-Project Site Assessment: The process of developing and documenting the information to input the needed data into water quality benefit quantification methods. This may include a site visit and/or interpretation of remote data. A pre-project site assessment includes, at the least, an assessment of pre-project conditions and an assessment of anticipated post-project conditions.

Pre-Project Performance: The estimated or measured pollution load associated with the pre-project site conditions.

Pre-Project Site Conditions: The data needed to quantify pre-project water quality benefit through an assessment of site conditions prior to project installation. Pre-project site conditions may be assessed via a site visit and/or interpretation of remote data.

Pre-TMDL Scenario: *See* Total Maximum Daily Load.

Program Administrator: The organization responsible for the operation and maintenance of a water quality trading program. Responsibilities of a program administrator may include: defining credit calculation methodologies, protocols, and quality standards; project review; and credit registration.¹⁸⁹

Project: One or more BMPs or other activities that, taken together, are proposed for generating credits on a single site.

Project Design and Management Plan (Operation and Maintenance Plan): The document that details: A) how the proposed credit-generating actions will be designed and installed to meet BMP guidelines, including a description of the proposed actions, installation practices, anticipated timelines, restoration goals, and anticipated threats to project performance; and B) how the project developer plans to maintain/steward the practice or action for the duration of the project life, keep the practice or action consistent with BMP guidelines, and report on that progress.

Project Developer: Any entity that develops credits, whether that entity is the permittee, a contractor of the permittee that develops or aggregates credits, or a landowner developing credits on a permittee's behalf.

189 *See* Willamette Partnership ECAS 2013, *supra* note 107, at p. 8.

Project Life: The period of time over which a BMP is expected to generate credits. Typically, the project life is also the minimum project protection period.

Project Protection Agreements: The enforceable agreements to protect BMPs at the project site, which may include leases, contracts, easements, or other agreements. Project protection agreements must cover the credit life and should run with the land to ensure the project will not be affected if ownership changes. Ideally, these protections will also mitigate against proximate disturbing land use activities.

Project Protection Period: The duration of the project protection agreement, which at a minimum must cover the credit life.

Project Review: The process of confirming that a credit-generating project has completed certain elements that should help ensure the project provides the water quality benefits it promises. Specifically, confirmation that project site BMPs or credit-generating activities and credits conform to the quality standards required by a program administrator or regulator. This process includes: (1) an administrative review for the completeness and correctness of documentation; (2) technical review for the completeness and accuracy of quantification; and (3) confirmation of project implementation and/or performance.

Project Review (Initial): The first project review, usually in the first year of project implementation.

Project Review (On-going): Project reviews in subsequent years of the project life.

Project Review Entity: A state regulatory body, qualified third party, or a permittee that performs the project review function.

Project Review Plan: The portion of a permittee's trading plan that describes the proposed methods of project review, what information is reviewed and when, who conducts project review, qualification requirements for project reviewers, and the project reviewer's protections against conflicts of interest. The project review plan should also clarify whether and when on-site inspection should occur.

Project Review Protocol: The document that provides the specific guidance on the review and assessment of credit-generating actions and BMPs and credit calculation methodologies under a water quality trading program.

Project Site (Project or Site): The location at which BMPs are undertaken or installed.

Project Site Screening (Site Screening or Site Validation): The initial site screening process through which project developers receive confirmation that their proposed projects are likely eligible to produce credits, based on the information available at that time.

Proportional Accounting: The generation of multiple credit types where a project site performs more than one distinct environmental benefit on non-spatially overlapping areas.¹⁹⁰ Although multiple credit values are produced, the sale of one credit has a corresponding reduction in the proportion of all other credits.

Protocols: Step-by-step manuals and guidelines for achieving particular environmental outcomes. Protocols include the actions, sequencing, and documentation needed to generate credits from eligible BMPs.

¹⁹⁰ See Willamette Partnership & The Freshwater Trust, *Draft Regional Recommendations for the Pacific Northwest on Water Quality Trading*, § 5.3, (2014) (hereafter "WP & TFT 2014"), available at http://willamettepartnership.org/wp-content/uploads/2014/09/PNW-Joint-Regional-Recommendations-on-WQT_ThirdDraft_2014-08-05_full1.pdf.

Public Conservation Funds: *See* Public Funds Dedicated to Conservation.

Public Funds Dedicated to Conservation: Funding targeted to support voluntary natural resource protection and/or restoration with a primary purpose of achieving a net ecological benefit through creating, restoring, enhancing, or preserving habitats.¹⁹¹ Examples include Farm Bill Conservation Title cost share and easement programs, U.S. EPA section 319 grant funds, U.S. Fish and Wildlife Service Partners for Wildlife Program, and state wildlife grants. Public loans intended to be used for capital improvements of public wastewater and drinking water systems (e.g., State Clean Water Revolving Funds and USDA Rural Development Funds), bond-backed public financing, and utility stormwater and surface water management fees from ratepayers, are not public funds dedicated to conservation.¹⁹² Public funds dedicated to conservation are often referred to as “cost share” and/or “matching funds.”

Publicly Owned Treatment Works (POTW): A treatment works owned by a State or municipality. This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant (As defined in 40 CFR 403.3).

Quality Standards (BMP): The specifications associated with a particular credit-generating activity or BMP that ensures that the estimated ecosystem service benefits at a project site are actually achieved through implementation.

Quantification Method: Scientifically-based method for determining the load reduction associated with a given credit-generating activity or BMP. Quantification methods can be grouped into three general types: pre-determined rates/ratios, modeling, and direct monitoring.

Quantification Method (Pre-Determined Pollution Reduction Rates): Standard modeled values based on the best available science that is used to calculate water quality improvement.

Quantification Method (Modeling): Mathematical and/or statistical representation of processes driving changes in water quality, based in science, used to estimate the water quality benefits provided by the credit-generating activities. Modeling is also frequently used to predict attenuation of pollutants.

Quantification Method (Direct Monitoring): Sampling and analysis of both water chemistry (e.g., river turbidity or temperature) and surrogates for water quality (e.g., eroding stream banks or shade from riparian vegetation) used to measure the realized water quality benefits of BMPs and credit-generating activities.

Registration (of Credits): The process of assigning a unique serial number to a verified and certified credit, and uploading the credit (and accompanying documentation) to a publicly available website, such as a registry.

Registry: *See* Ledger. A ledger that includes more project-specific information. Credit registries may act as a mechanism for public disclosure of trading project documentation.

Regulated Entities: Entities regulated under the Clean Water Act. Typically, these entities are regulated via permits, but may also be regulated under operating licenses or judicial/administrative consent decrees.

Regulatory Baseline: *See* Baseline (Regulatory Requirements).

191 *See* Oregon Interagency Recommendations on Public Funds, *supra* note Table 3.2.6(ii).

192 *See* Willamette Partnership ECAS 2013, *supra* note 107, at p. 15.

Report (Annual Compliance): Annual reports that aggregate the details of individual site performance reports into a comprehensive summary of overall trading plan performance. These reports may be required as special conditions in permits.

Reserve Pool: A collection or bank of unused credits that is available to compensate for unanticipated shortfalls in the quantity of credits actually generated.¹⁹³

Reserve Ratio: *See* Trading Ratio (Reserve).

Retirement Ratio: *See* Trading Ratio (Retirement).

Site Conditions (Post-Project): The characteristics and conditions of the project site that are measured or are anticipated to be present after implementing a BMP or action and assuming the project site continues to be managed as planned.

Site Conditions (Pre-Project): A description or measurement of site conditions prior to implementation of the BMP action, used to calculate the current input level of a pollutant (in default unit of trade) from the project site into the waterbody.¹⁹⁴

Site Performance (Post-Project): The pollutant load (measured or anticipated) that will enter a waterway, as calculated by the relevant quantification method's interpretation of post-project conditions.

Site Performance (Pre-Project): The modeled pollutant load entering a waterway, as estimated by the relevant quantification method, from a site prior to installing a BMP or action.

Site Screening: *See* Project Site Screening.

Site Validation: *See* Project Site Screening.

Stacking (Credit): The generation and sale of more than one kind of credit from the same action on the same area of land, at the same time.¹⁹⁵

Stacking (Payments): The use of multiple funding sources to support a credit-generating project. Payment stacking is most often discussed in the context of water quality trading when public funds dedicated to conservation are used to fund BMPs or credit-generating activities.

Stewardship Funds: The funding necessary to maintain project sites for the duration of the credit life. Project developers must demonstrate adequate stewardship funding is in place before credits can be verified. Stewardship funding instruments often include performance bonds, restricted accounts, insurance, or other similar documentation.

193 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1612.

194 *See* Willamette Partnership ECAS 2013, *supra* note 107, at p. 50 in Appendix B.

195 *See* WP & TFT 2014, *supra* note 190, at § 5.3.2.

Technology-Based Effluent Limit (TBEL): As described in 33 U.S.C. § 1311(b)(1)(A)-(B), a permit limit for a pollutant that is based on the capability of a treatment method to reduce the pollutant to a certain concentration. TBELs for publicly owned treatment works (POTWs) are derived from the secondary treatment regulations (40 C.F.R. Part 133) or state treatment standards. TBELs for non-POTWs are derived from national effluent limitation guidelines, state treatment standards, or on a case-by-case basis from the best professional judgment of the permit writer.¹⁹⁶

Tier 2 Antidegradation Review: As part of a Tier 2 Antidegradation program, states and tribes can identify procedures that must be followed and questions that must be answered before a reduction in water quality can be allowed [into?]to “high quality” waters—water bodies where existing conditions are better than necessary to support CWA § 101(a)(2) “fishable/swimmable” uses. In no case may water quality be lowered to a level which would interfere with existing or designated uses.

Total Maximum Daily Load (TMDL): As defined in 33 U.S.C. § 1313(d)(1)(C), and 40 C.F.R. § 130.2(i), and in relevant state regulations. A TMDL is the calculation of the maximum amount of a pollutant a waterbody can receive and still meet applicable water quality standards (accounting for seasonal variations and a margin of safety), including an allocation of pollutant loadings to point sources (waste load allocations (WLAs)) and nonpoint sources (load allocations (LAs)).¹⁹⁷

- **Alternative to a TMDL Scenario:** A regulatory environment in which a state uses alternative pollution control requirements instead of implementing a TMDL. Under this alternative, states must provide adequate documentation that the required control mechanisms will address all major pollutant sources and establish a clear link between the control mechanisms and water quality standards (e.g., a 4b rule).¹⁹⁸ A state may provide for the use of water quality trading in a 4b watershed plan or strategy.
- **Pre-TMDL Scenario:** A regulatory environment in which a waterbody has been listed as impaired but is not yet covered by an approved TMDL.
- **Post-TMDL Scenario:** A regulatory environment in which a TMDL serves as the primary structure and driver for a trading framework or plan. NPDES permits are written to meet the assumptions of the TMDL WLA, and the resulting WQBEL serves as the immediate driver for a trade. States may also have additional requirements surrounding trading in a TMDL.

TMDL Implementation Plans: The management plans designed to implement the waste load and load allocations assigned to entities in the TMDL. In some states, a TMDL implementation plan is required in order to translate LAs into baseline requirements.

Toxics (persistent bio-accumulative): Persistent bio-accumulative toxics (PBTs). PBTs are chemicals that are toxic, persist in the environment and bioaccumulate in food chains and pose risks to human health and ecosystems. PBTs include aldrin/dieldrin, benzo(a)pyrene, chlordane, DDT and its metabolites, hexachlorobenzene, alkyl-lead, mercury and its compounds, mirex, octachlorostyrene, PCBs, dioxins and furans, and toxaphene.¹⁹⁹

196 See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. 27.

197 See *id.*, at p. Glossary-5 in Glossary.

198 See 2006 Integrated Reporting Guidance, *supra* note 41, at pp. 53-56.

199 See U.S. Environmental Protection Agency, *Multimedia Strategy for Priority Persistent, Bioaccumulative, and Toxic (PBT) Chemicals*, (2011), available at <http://www.epa.gov/pbt/pubs/fact.htm>. Notable PBTs are prioritized by EPA's Canada-United States Binational Toxics Strategy. *Id.* See also 2003 U.S. EPA Trading Policy, *supra* note 2, at p. 1610 (EPA did not originally support trading of persistent bioaccumulative toxics).

Tracking: The process of following the status and ownership of credits as they are issued, used, retired, suspended, or cancelled.

Trading Area: A geographic area within which credits can be bought and sold. A trading area should be defined ecologically where a pollution reduction in one part of a watershed can be linked to a water quality improvement at a point of compliance. Trading areas can also be defined to reduce the risk of localized water quality impairments or localized impacts.

Trading Baseline: See Baseline (Trading).

Trading Guidance: A state's statute, rule, policy, guidance, or other documents articulating how WQT should occur within that state.

Trading Framework: Watershed-level documents that contain details of trading processes and standards.

Trading Plan: Permittee-level trading details. The incorporation of trading elements into a permit or other binding agreement. A permittee's trading plan may incorporate the terms of relevant state-wide trading guidance or a watershed trading framework by reference, or it may include all specific details within the permit itself.

Trading Program: The general term used to describe the approach to trading taken by a state agency and/or WQT stakeholders; the full range of policies supported by a state. Active trading programs have completed approved program designs and/or have completed transactions.

Trading Ratio: A trading ratio is a numeric value used to adjust credits for a seller or credit obligation of a buyer based on various forms of risk and uncertainty. Ratios are applied to account for various factors, such as watershed processes (e.g., attenuation), risk, and uncertainty, both in terms of measurement error and project performance, ensuring net environmental benefit, and/or ensuring equivalency across types of pollutants.

Trading Ratio (Delivery): The factor applied to pollutant reduction credits when sources are directly discharging to a waterbody of concern that accounts for the distance and unique watershed features (e.g., hydrologic conditions) that will affect pollutant fate and transport between trading partners.²⁰⁰

Trading Ratio (Equivalency): The factor applied to pollutant reduction credits to adjust for trading different pollutants or different forms of the same pollutant.²⁰¹

Trading Ratio (Retirement): The factor applied to pollutant reduction credits to accelerate water quality improvement. The ratio indicates the proportion of credits that must be purchased in addition to the credits needed to meet regulatory obligations. These excess credits are taken out of circulation (retired) to accelerate water quality improvement.²⁰²

Trading Ratio (Reserve): A type of uncertainty ratio in which credits are held in "reserve" and then used to account for uncertainty and offset failures in project performance.

200 See 2007 U.S. EPA Toolkit for Permit Writers, *supra* note 19, at p. Glossary-3 in Glossary.

201 See *id.*

202 See *id.*, at p. Glossary-5 in Glossary.

Trading Ratio (Uncertainty): The factor applied to pollutant reduction credits generated by nonpoint sources that accounts for lack of information and risk associated with BMP measurement, implementation, and performance.²⁰³

True-Up Period: NPDES permits with trading can include provisions that allow buyers a window of time at the end of the compliance period to purchase needed credits. Because a facility may not know year to year the exact amount of credits needed for compliance, a true-up period can reduce risk to regulated sources of overbuying or under buying credits in any given year. May also be referred to as a “reconciliation period”.

Uncertainty Ratio: *See* Trading Ratio (Uncertainty).

Units of Trade: The quantity of tradable pollutants, typically expressed in terms of pollutant load per unit time, at a specified location (e.g., lbs/year at the point of concern).

Validation (Model): An iterative process through which to test the capabilities of a calibrated model to reproduce system behavior within acceptable bounds; the process through which results from credit quantification methods are assessed relative to evaluation criteria. Often, validation includes the comparison of model results with measured data, sensitivity analyses, and uncertainty analyses. Validation may also include a comparison with other model outputs, literature values, and/or expert judgement.

Variance: As authorized by 40 C.F.R. § 131.13 and implemented according to state law, a variance is a time-limited change in the water quality standards for a particular regulated entity, typically limited to a three to five year duration, with renewals possible.

Verification: *See* Project Review.

Waste Load Allocation (WLA): As defined in 40 C.F.R. § 130.2(h), this is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

Wastewater Treatment Plant (WWTP): *see* Publicly Owned Treatment Works, but is not necessarily publicly owned.

Water Quality Benefit: The environmental improvement directly attributable to BMPs installed at a site. Determining water quality benefit is the first step in determining the credits available for sale (it must be reduced by applicable attenuation or modeling factors, baseline factors, or ratios). One way water quality benefit may be calculated is by subtracting the modeled post-project performance from the modeled pre-project performance.

Water Quality Criteria: As defined in 40 C.F.R. § 131.3, water quality criteria are elements of state water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.

Water Quality Standard: As defined in 40 C.F.R. § 131.3(i), Water quality standards are provisions of state or federal law which comprise a designated use or uses for the waters of the United States and water quality criteria for such waters based on such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act.

203 *See id.*, at p. Glossary-6 in Glossary.

Water Quality-Based Effluent Limitation (WQBEL): As described in 33 U.S.C. § 1312(a), a WQBEL is an effluent limitation determined by selecting the most stringent of the effluent limits calculated using all applicable water quality criteria (e.g., aquatic life, human health, wildlife, translation of narrative criteria) for a specific point source to a specific receiving water for a given pollutant or based on the facility's waste load allocation from a TMDL.

Watershed Plan: A TMDL-like regulatory strategy for managing and improving an impaired waterbody established by regulators before a TMDL is promulgated, or if a TMDL is not otherwise pursued for a watershed.

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A dialogue among diverse organizations representing agriculture, wastewater utilities, environmental groups, regulatory agencies, and the practitioners delivering water quality trading programs. The purpose of the Network is to establish a national dialogue on how water quality trading can best contribute to achieving clean water goals.

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