WILLAMETTE PARTNERSHIP

BUILDING A TOTAL MAXIMUM DAILY LOAD TO BETTER SUPPORT WATER QUALITY TRADING

A report funded by the U.S. Department of Agriculture, Office of Environmental Markets

Bobby Cochran and Tim Martin

Willamette Partnership, Portland, OR

October 10, 2014

SUMMARY

Understanding watershed dynamics is key to making water quality trading a viable, accountable, and legitimate means to improve water quality. A total maximum daily load (TMDL), at its core, is a watershed planning document that characterizes the sources of pollution in a watershed, the specific water quality goals, and what pollution reductions are needed to achieve those goals. More specifically, a TMDL is the sum of individual pollutant wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources and natural background, and a margin of safety (MOS). This report examines these concepts and provides suggestions on how TMDLs and their associated implementation documents can be developed to better support water quality trading—especially point-nonpoint source trading. This report represents the views of the authors and is not meant as any legal interpretation of TMDL requirements or as formal guidance in any way.

TABLE OF CONTENTS

I. Introduction *2*

II. What Are TMDLs? *3*

III. Building a TMDL with Trading in Mind *4*

3.1. Identification of the Water Body, Pollutant of Concern, Pollutant Sources, and Priority Ranking 5

3.2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target 6

3.3. Loading Capacity: Linking Water Quality and Pollutant Sources 7

3.4. Point Source Waste Load Allocations (WLAs) 8

3.5. Nonpoint Source Load Allocations (LAs) 9

3.6. Margin of Safety 11

3.7. Seasonal Variation 12

3.8. Reasonable Assurances 13

3.9. Public Participation and Submittal Letter 14

3.10. Monitoring Plan to Track TMDL Effectiveness 14

3.11. Implementation Plans 14

3.12. Administrative Record 17

IV. Big Picture Considerations for Trading and TMDLs *17*

V. Conclusion *18*

This content was created in part through the adaptation of procedures and publications developed by the Willamette Partnership (www.willamettepartnership.org) with support from the USDA Office of Environmental Markets, but is not the responsibility or property of the Willamette Partnership or USDA.

I. INTRODUCTION

According to the U.S. Environmental Protection Agency (U.S. EPA), water quality trading is "…an approach that offers greater efficiency in achieving water quality goals on a watershed basis. It allows one source to meet its regulatory obligations by using pollutant reductions created by another source that has lower pollution control costs."[1] In water quality trading, sources with high costs of reducing pollution can purchase equal or greater pollution reductions from sources that can reduce pollution more cost-effectively. This cost difference provides an incentive for trading to occur. There are 12 states with some form of water quality trading policy in place.[2] As of 2008, 100 permitted wastewater facilities (point sources) had participated in trading, with 80% of trades occurring in the Long Island Sound trading program.[3] For point-nonpoint source trading, at least 24 active programs exist nationally where state agencies have at least authorized trades between permitted point sources and agricultural nonpoint sources.[4]

Many water quality trading programs have struggled to get off the ground. Significant challenges for trading relate to how the concept of pollution reductions in one part of a watershed as a trade for fewer reductions in another part translates into achieving water quality standards. Understanding watershed dynamics is key to making trading a viable, accountable, and legitimate means to improve water quality. A total maximum daily load (TMDL), at its core, is a watershed planning document that characterizes the sources of pollution in a watershed, the specific water quality goals, and what pollution reductions are needed to achieve those goals. More specifically, a TMDL is the sum of individual pollutant wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources and natural background, and a margin of safety (MOS).

The elements of a TMDL provide foundational information important to water quality trading. Between 1995 and 2014, at least 65,968 TMDLs have been approved (with a peak of over 15,500 in 2013).[5] When a new TMDL is approved, its implementation often acts to drive pollution reduction, and can be a demand driver for trading. U.S. EPA's 2003 Water Quality Trading Policy ("2003 U.S. EPA Trading Policy") underscores the important role of TMDLs in trading.[6] For trading, a TMDL can:

- Reinforce a state water quality agency's intent to use trading to help meet water quality standards;
- Define a list of pollutants eligible for trading in a watershed;
- Delineate the geographic trading areas where a point source can purchase credits;
- Set a foundation for offsetting loads from new or expanded discharges by providing the required

---

[1] U.S. Environmental Protection Agency, *Notice of Final Policy: Water Quality Trading Policy*, 68 Fed. Reg. 1608, 1609 (Jan. 13, 2003) (hereafter "2003 EPA Trading Policy"), *available at* http://www.gpo.gov/fdsys/pkg/FR-2003-01-13/pdf/03-620.pdf.

[2] This includes states with legislation, policy, guidance, or draft guidance on water quality trading at the state level as of November 2013 (i.e., Idaho, Colorado, Florida, Maryland, Minnesota, Montana, Ohio, Oregon, Pennsylvania, Virginia, Washington, and Wisconsin). This does not include states with authorized individual trading programs or pilot programs.

[3] U.S. Environmental Protection Agency, *EPA Water Quality Trading Evaluation: Final Report*, p. 1-2 (2008), *available at* http://www.epa.gov/evaluate/pdf/water/epa-water-quality-trading-evaluation.pdf.

[4] *See* Willamette Partnership, U.S. Department of Agriculture 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*, Part 1, p. 6 (2012), *available at* http://willamettepartnership.org/publications/. Actual trades have not occurred in all programs.

[5] U.S. Environmental Protection Agency, *National Summary of Impaired Waters and TMDL Information*, http://ofmpub.epa.gov/tmdl_waters10/attains_nation_cy.control?p_report_type=T#tmdls_by_state (2014).

[6] *See* 2003 EPA Trading Policy, *supra* note 1, at p. 1610.

watershed analysis, implementation plans, and reserve capacity of pollutant loading;

- Articulate baseline pollution reduction expectations for nonpoint sources so that "additionality" can be calculated to determine tradable credits; state baseline expectations in a manner that can be easily translated to the field level (e.g., expected best management practices (BMPs) or loading targets that would apply to landowners with particular land use types);

- Articulate timelines and milestones for load reductions (e.g., phased implementation of load reductions to inform baseline[7]);

- Complete the watershed science needed to model attenuation of pollution between one source and another;

- Clarify sources of uncertainty and which types of uncertainty can be addressed within the TMDL and which need to be covered through a trading program; and

- Provide a watershed monitoring and adaptive management strategy a trading program can link into (e.g., particular indicators, methodologies, and an approved Quality Assurance Project Plan (QAPP)[8]).

This report examines these concepts and provides suggestions on how TMDLs and their associated implementation documents can be developed to better support water quality trading—especially point-nonpoint source trading. This report represents the views of the authors and is not meant as any legal interpretation of TMDL requirements or as formal guidance in any way.

Audience for this document
This report is designed for state water quality agencies developing TMDLs and for stakeholders (agriculture, point sources, environmental groups, and third parties) participating in designing or updating TMDLs where point-nonpoint water quality trading is a possible implementation tool. The analysis and ideas in this report are based on Willamette Partnership's experience in developing tools for water quality trading.

II. What Are TMDLs?

A TMDL defines the maximum amount of a pollutant that a water body can receive and still safely meet the state water quality standards established to support a water body's designated beneficial uses under the Clean Water Act (CWA).[9] TMDLs are often expressed as a numeric target of pollution per unit.

For example, a river's designated uses may include fish habitat (e.g., fish spawning) and swimming (e.g., water contact recreation), and yet too much algae is present in the summer to fish or swim. A state's water quality agency develops a list of waters ("303(d) List") not meeting applicable criteria or beneficial uses.[10] The state

---

[7] *See* Chesapeake Bay Environmental Markets Team, *Considerations for Baseline Eligibility Implemented Under a Chesapeake Bay Total Maximum Daily Load (TMDL)*, p. 15 (2010) (hereafter "Chesapeake Baseline Considerations").

[8] *See* U.S. Environmental Protection Agency, *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5) (2001).

[9] *See* Federal Water Pollution Control Act ("Clean Water Act"), 33 U.S.C. § 1313(d)(1)(C), CWA § 303(d)(1)(C) (hereafter "CWA"); 40 C.F.R. § 130.2(i); *and* U.S. Environmental Protection Agency, *Impaired Waters and Total Maximum Daily Loads*, http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/ (2014).

[10] CWA § 303(d)(1)(A). Each list is known as a "303(d) List."

needs to establish a TMDL for each pollutant that contributes to the failure to attain water quality standards in an impaired water body.[11] A state can attempt to avoid developing a TMDL for certain impaired waters by implementing more stringent effluent limitations or other pollution control requirements under federal, state, or local authority and then placing these water bodies in the state's "4b" Category.[12]

A TMDL is built through a multi-step process that includes understanding the watershed, gathering data, identifying pollution sources, setting numeric water quality targets, allocating allowable pollution among sources, and planning for implementation.[13] The allocation of allowable pollution among sources is often the most contentious part of a TMDL. TMDLs need to be submitted and approved by U.S. EPA, but they are generally prepared by states. In some ways, TMDLs appear straightforward. Point source pollution loads, plus nonpoint source pollution loads, plus natural background pollution, plus a margin of safety, equals the TMDL which, if met, means water quality standards are being met. Yet, there are ecological, political, legal, and economic issues tied to each part of that equation (see Section 4 below).

III. Building a TMDL with Trading in Mind

Groups building water quality trading programs get stuck on a lot of the same issues TMDL developers wrestle with. How much pollution are nonpoint sources (NPS) expected to reduce, and what mechanisms will be used to achieve those reductions (and by when)? How do we deal with uncertain science? How do pollution loads in different parts of the watershed interact? As TMDLs are developed and updated, they can be built to better support trading. This report provides some ideas and examples of how trading language has been incorporated throughout TMDLs. For example, the Chesapeake Bay TMDL sets some principles for how trading might be used to meet TMDL goals.[14] This section describes the required and recommended elements of a TMDL[15] and how those elements can support the underlying environmental goals of trading (see Figure 3 for an overview).

---

[11] CWA § 303(d)(1)(C) *and* 40 C.F.R. § 130.7(c) (the EPA regulation implementing this section of the CWA; refers to impaired waters as "water quality limited segments"). *See also* 40 C.F.R. §§ 130.7(b) & 130.2(j).

[12] Under Category "4b" of U.S. EPA's Integrated Report Categories, a state does not have to develop a TMDL for an impaired water body if the state can show that a TMDL is not necessary due to other pollution control measures. *See* U.S. Environmental Protection Agency, 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 V, pp. 53-57 (2005), *available at* http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2006irg-report.pdf (describing the requirements of Category 4b). *See also* 40 C.F.R. § 130.7(b)(1).

[13] *See* U.S. Environmental Protection Agency, Office of Water, *Guidance for Water Quality-based Decisions: The TMDL Process* (EPA 440/4-91-001), Chs. 2 & 3 (1991) (hereafter "1991 TMDL Guidance"), *available at* http://water.epa.gov/scitech/datait/models/upload/1999_11_05_models_SASD0109.pdf and http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/dec1c.cfm.

[14] U.S. Environmental Protection Agency Region 3 & U.S. Environmental Protection Agency Region 2, *Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment*, Appendix S (2010) (hereafter "Chesapeake TMDL"), *available at* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html.

[15] These requirements are derived from the CWA, the EPA implementing regulations, and relevant EPA policies. TMDLs must be submitted to and approved by the EPA. CWA § 303(d)(2). Once approved, a TMDL must be incorporated into a state's Continuing Planning Process (CPP). CWA §§ 303(d)(2) & (e). The required and recommended elements of a TMDL are listed and discussed at 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. 40 C.F.R. § 130.10(c) says "[t]he form and content of required State submittals to EPA may be tailored to reflect the organization and needs of the State, as long as the requirements and purposes of the Act, … are met."

Figure 3: Where TMDL elements can support trading design decisions

TMDL Element	Trading Design Decision
Identification of the water body, pollutant of concern, pollutant sources, and priority ranking	Eligible pollutants; Buyer and seller types
Description of the applicable water quality standards and numeric water quality target	Underlying goals of trading
Loading capacity	Tools to quantify pollutant delivery, attenuation, and equivalency for credits; Potential sources of localized pollution concentrations; Trading areas
Wasteload allocations	Intent to trade; Credit units; Credit demand
Load allocations	NPS baseline levels
Margin of safety	Need for uncertainty ratios; Room for new and expanded discharges
Seasonal variation	Credit life
Reasonable assurances	NPS baseline expectations
Public participation & submittal letter	Intention to use trading to help meet TMDL
Monitoring plan to track TMDL effectiveness	Program effectiveness and adaptive management framework; QAPP
Implementation plans	Timing of meeting baseline; Eligible BMP types; Priority areas; Project review & tracking
Administrative record	Administrative record

3.1. Identification of the Water Body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

This foundational component describes the human and environmental context in which the TMDL is being established. The TMDL should identify the water body at issue from the state's 303(d) List,[16] the pollutant for

[16] The TMDL could also state the priority ranking of the water body on the 303(d) List. CWA § 303(d)(1)(A) requires states to rank the water bodies on its 303(d) List by priority based on the severity of the pollution and the uses of such waters. A state must submit this list to the EPA Regional Administrator every two years and denote the waters targeted for TMDL development within the next two years. 40 C.F.R. § 130.7(d)(1).

which the TMDL is being established, and key assumptions made in developing the TMDL.[17] The TMDL should then identify significant point and nonpoint sources of that pollutant, determine those sources' loading quantities, and separate natural background pollutant levels when possible.[18]

To support trading: This is the section of the TMDL that can clarify pollutants eligible for trading (if not already clear in state guidance), and which types of buyers and sellers can participate in trading. For example, if a TMDL is clear on which nonpoint sectors will be covered by a load allocation (LA), which will not, and what sectors will be grouped together in a LA, then trading programs may be able to better identify which nonpoint sectors can generate credits. For example, forestry may be exempted from a TMDL LA in certain circumstances in Oregon.[19] As an example of grouping sectors, the Long Island Sound TMDL expects 10% load reductions across urban and agricultural nonpoint sources combined,[20] which may make it easier to trade between stormwater buyers and agricultural sellers in the future. If a type of nonpoint source BMP is not assumed to be in place as part of a load allocation analysis, then reductions from that type of BMP could be considered additional in a trading program. For example, the Sugar Creek TMDL in Ohio provides a list of ten example BMPs in its implementation section, but these BMPs are not assumed to be in place as part of the LA analysis.[21] The clearer this element of the TMDL is, the easier it is for point sources, agriculture, and others to assess the potential for trading to help meet TMDL goals.

3.2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL should describe the applicable state water quality standards covering the waters at issue. In the TMDL context, the term "water quality standard" includes water body uses (e.g., swimming, boating, aquatic habitat), numeric criteria (e.g., XX ppb mercury, XX mg/L nitrogen), narrative criteria (e.g., erosion controls, sand and gravel removal controls, prevention of algae, prevention of strong odors, aesthetic conditions, etc.), and antidegradation requirements.[22] Numeric water quality criteria are established such that the designated uses of that water body are achieved and protected. Narrative criteria may be used when numeric criteria cannot be established or where necessary to supplement numeric criteria.[23] However, narrative criteria must still be translated into numeric water quality targets for a TMDL.[24]

To support trading: This section can help guide the overall goals for a trading program. If the description of applicable water quality standards can articulate desired outcomes and acceptable pathways to achieve those outcomes, trading programs can better prioritize BMP selection and location, develop credit quantification methods, etc. The Great Miami River (upper) TMDL in Ohio articulated clearly how pollutant loads affected

---

[17] 2002 TMDL Guidelines, *supra* note 15, at pp. 1-2 (listing potential key assumptions).

[18] *Id.*

[19] Oregon Administrative Rule 340-042-0080(2) (2014) (hereafter "OAR").

[20] New York State Department of Environmental Conservation and Connecticut Department of Environmental Protection, *A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound*, p. 26 (2000) (hereafter "Long Island Sound TMDL"), *available at* http://www.dec.ny.gov/docs/water_pdf/tmdllis.pdf.

[21] State of Ohio Environmental Protection Agency, *Total Maximum Daily Loads for the Sugar Creek Basin: Final Report*, p. 71 (2002) (hereafter "Sugar Creek TMDL"), *available at*: http://epa.ohio.gov/portals/35/tmdl/SugarCreekTMDL_Final2002.pdf.

[22] 40 C.F.R. § 130.7(b)(3). *See also* 40 C.F.R. § 130.3 (a water quality standard "designat[es] the use or uses to be made of the water and [sets] criteria necessary to protect the uses"). *See* 40 C.F.R. § 131.12 for antidegradation requirements.

[23] 40 C.F.R. § 131.11(b)(2).

[24] *See* 40 C.F.R. § 122.44(d)(1)(vi) for guidance on creating numeric water quality targets based on narrative criteria when no numeric criteria exists. This section applies specifically to NPDES permits, but it can be used as guidance for TMDLs.

instream conditions, and differentiated where water quality concerns were caused by pollutant loads as opposed to degraded stream habitat conditions.[25]

3.3. Loading Capacity: Linking Water Quality and Pollutant Sources

The TMDL must identify the maximum amount of the applicable pollutant that the water body can assimilate and still meet water quality standards,[26] ideally expressed as a daily load in terms of mass-per-time, toxicity, or another appropriate measure.[27] This element of the TMDL should explain the analysis completed to determine loading capacity, including any models used and critical conditions considered such as specific water quality parameters, stream flow, and any unique loading situations (e.g., achieve standards during a 50-year flood event).[28] Most of the overall loading capacity is allocated amongst nonpoint sources and point sources, as described in Sections 3.4 and 3.5.

To support trading: As state agencies are analyzing loading capacity, they gather existing data, calibrate models, and put in place the tools needed to understand pollutant dynamics in a watershed. To the extent possible, these tools should also be developed with an eye toward implementation. In particular, the most helpful TMDL watershed models for trading can:

- Attenuate pollutant reduction from any one point (i.e., any farm) in the watershed to any other point (i.e., a point source discharge);
- Account for discharges and reductions between tributaries and a main stem, and/or through a lake or reservoir;
- Allow for easy input of field-scale quantification method outputs into the watershed model;
- Quantify the equivalence (if applicable) between reductions and discharges of different forms of pollutants (e.g., equivalence between nitrogen and phosphorous for dissolved oxygen issues); and
- Clearly articulate sources of error, uncertainty, and key assumptions that can help inform trading ratios and discount factors.

The Great Miami (upper) TMDL used the Qualitative Habitat Evaluation Index (QHEI) to quantify water quality and habitat conditions across the reach.[29] The QHEI is an Ohio EPA tool that uses a combination of stream condition metrics.[30] Some of the same models can also be used for field-scale calculations. The Great Miami

---

[25] State of Ohio Environmental Protection Agency, *Total Maximum Daily Loads for the Great Miami River (upper) Watershed*, p. 60 (2012) (hereafter "Great Miami (upper) TMDL"), *available at* http://www.epa.state.oh.us/portals/35/tmdl/GMRupperReport_Final.pdf.

[26] *See* 40 C.F.R. §§ 130.2(e) & (f) for the definition of "loading" and "loading capacity," respectively.

[27] 40 C.F.R. § 130.2(i). The EPA requests an explanation if a loading is expressed in terms other than a daily load, like an annual load. 2002 TMDL Guidelines, *supra* note 15, at p. 2.

[28] 40 C.F.R. § 130.7(c)(1).

[29] Great Miami (upper) TMDL, *supra* note 25, at p. 60.

[30] State of Ohio Environmental Protection Agency, Division of Surface Water, *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006), *available at* http://www.epa.state.oh.us/portals/35/documents/qheimanualjune2006.pdf. The QHEI assesses six metrics: (1) substrate, (2) instream cover, (3) channel morphology, (4) riparian zone and bank erosion, (5) pool/glide and riffle-run quality, and (6) map gradient.

(upper) TMDL creates a five percent margin of safety explicitly to account for field sampling error, imperfect model calibration, and process representation in the model.[31]

A TMDL's analysis of loading capacity can also help identify geographic areas where trades are appropriate (i.e., a trading area). Buyers and sellers must transact credits in locations that contribute to meeting water quality standards. Often, these locations are upstream of some point of concern identified in a TMDL. The TMDL can provide the analysis needed for a trading program to identify:

- If trades can occur anywhere upstream of a point of concern;[32] and
- Where the areas of concern are for localized pollution concentrations, and if there need to be some additional restrictions on trading (e.g., only trading upstream from points of discharges) to avoid those localized pollutant concentrations or "hotspots;" trading involving permitted point sources cannot create localized concentrations of pollution that violate state water quality standards.[33]

For example, the Rogue temperature TMDL identifies a "point of maximum impact" where the cumulative impacts of all upstream sources are most severe or most critical.[34] The Tualatin TMDL takes a similar approach to the Rogue TMDL for temperature, but specifically limits the opportunity for a particular point source to trade for total phosphorus due to localized pollution concerns at that particular discharge point.[35] Additionally, based on the results of modeling, the Tualatin TMDL recommends prohibiting trading in certain sections of a water body for nutrients and ammonia due both to insufficient decay of $CBOD_5$ (5-day carbonaceous biochemical oxygen demand) and lack of data to determine the rate of decay of ammonia.[36]

3.4. Point Source Waste Load Allocations (WLAs)

Waste load allocations (WLAs) state the portion of the overall loading capacity granted to existing and future point sources.[37] WLAs are developed for permitted point sources within the area covered by a TMDL. "Technology-based effluent limits" (TBELs) and "water quality-based effluent limits" (WQBELs) in point source NPDES permits must be consistent with the assumptions and requirements in any WLA identified for that source in the TMDL.[38] Trading is a compliance option for meeting WQBELs that a permit writer may include in a NPDES permit for a point source.

To support trading: When appropriate, the WLA section of a TMDL can list trading as an option for achieving the required pollutant load reductions. While a TMDL cannot authorize trading between sources, a TMDL can express an intent by state regulators to support trading and can encourage or endorse specific trading programs

---

[31] *Id.* at p. 67.

[32] Trading areas may be larger than the TMDL area in some cases (e.g., where there is a local watershed TMDL and a basin TMDL).

[33] CWA § 301(b)(1)(C) *and* 40 C.F.R. § 122.4(d).

[34] Oregon Department of Environmental Quality, *Rogue River Basin TMDL*, Chapter 2, p. vi (2008) (hereafter "Rogue TMDL"), *available at* http://www.deq.state.or.us/wq/tmdls/rogue.htm. The definition also says that the point of maximum impact can vary seasonally and that water bodies can contain more than one.

[35] Oregon Department of Environmental Quality, *Tualatin Subbasin Total Maximum Daily Load and Water Quality Management Plan*, Chapter 2, p. 57 (2012) (hereafter "Tualatin TMDL"), *available at* http://www.deq.state.or.us/wq/tmdls/willamette.htm#t.

[36] *Id.* at Appendix 2-A, p. 187.

[37] 40 C.F.R. § 130.2(h).

[38] 40 C.F.R. § 122.44(d)(1)(vii).

as part of the TMDL's strategy to achieve water quality standards. For example, the Chesapeake Bay TMDL Executive Summary points to provisions of the TMDL that allow for modifications of allocations within a basin to support offsets and trading.[39] Several TMDLs make trading a centerpiece of both the TMDL development and implementation. For example, the Lower Minnesota River TMDL introduces trading as one of two options to achieve pollutant reductions.[40] Additionally, the Tualatin TMDL for temperature lists pollutant trading as an option for "meeting the allocated heat loads."[41] Legitimizing trading in the WLA section of a TMDL provides guidance to permit writers who later on attempt to create appropriate permit requirements based on the TMDL.

Ideally, WLAs are articulated in the same units that will be used to articulate nonpoint source LAs and water quality credits (e.g., if WLAs are articulated in mass of pollution per unit time, they can be easier to link to the outputs of most credit quantification tools). WLAs are also relevant for point sources and other stakeholders when analyzing possible exceedances, updating treatment strategies, and ultimately determining point source demand for water quality credits. Signaling the intent to trade in the WLA section of a TMDL provides information to permit writers who look to the TMDL to inform appropriate permit requirements.

3.5. Nonpoint Source Load Allocations (LAs)

A load allocation states the portion of the overall loading capacity granted to existing and future nonpoint sources and to natural background. LAs may be divided amongst sectors or groups of sources,[42] but this is not required. Because this broad allocation is allowed, individual entities rarely receive a specific LA. U.S. EPA recognizes that this process involves estimation, so the standard is "best estimates of the loading" determined by the availability of data and analysis techniques.[43]

The role of LAs in TMDLs is a source of ongoing debate. Do LAs establish requirements that nonpoint sources must meet right away? Are they to be used by TMDL implementation agencies to derive nonpoint source requirements? Are they just used to strengthen the analysis for setting point source WLAs?[44] Somewhere in between? These questions create uncertainty for trading programs. The Clean Water Act is concerned about nonpoint source pollution, but unlike for point sources,[45] provides limited authority to U.S. EPA to address nonpoint sources.[46] U.S. EPA's ability to approve or disapprove of a TMDL is one way to think about the role of

---

[39] Chesapeake TMDL, *supra* note 14, at pp. ES-12 & 8-32 ("Provisions of the TMDL allow, under certain circumstances, for modifications of allocations within a basin to support offsets and trading opportunities.").

[40] Lower Minnesota TMDL, *supra* note 61, at p. 2.

[41] Oregon Department of Environmental Quality, *Tualatin Subbasin Total Maximum Daily Load (TMDL)*, p. 47 (2001), *available at* http://www.deq.state.or.us/wq/tmdls/docs/willamettebasin/tualatin/tmdlwqmp.pdf (the other options listed are passive effluent temperature reductions, changes in facility discharge operation, and purchasing instream flows).

[42] Examples of sectors include agriculture, types of agriculture, stormwater, forest, atmospheric deposition, onsite septic, and urban.

[43] 40 C.F.R. § 130.2(g).

[44] As one Court has stated, TMDLs are "informational tools that allow the states to proceed from the identification of waters requiring additional planning to the required plans." *Pronsolino v. Nastri*, 291 F.3d 1123, 1129 (9th Cir. 2002). *See also*, Jan G. Laitos & Heidi Ruckriegle, *The Clean Water Act and the Challenge of Agricultural Pollution*, 37 Vermont Law Review 1033, 1053-1057 (2013) (summarizing the Pronsolino decision and discussing related cases).

[45] *See* CWA §§ 301(b)(1) & 402 for point source pollution controls and the related CWA permitting programs. The CWA defines "point source" as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, … concentrated animal feeding operation, … from which pollutants are or may be discharged." The definition specifically excludes "agricultural stormwater discharges and return flows from irrigated agriculture." CWA § 502(14).

[46] *See* CWA § 319(h). Along with the CWA Section 319 nonpoint source management program, states must create water quality management plans to fulfill the requirements of CWA §§ 205(j), 208, & 303(e). 40 C.F.R. § 130.6. These plans should include nonpoint source management.

nonpoint sources, but states have the primary authority and responsibility over nonpoint source pollution control.[47] U.S. EPA does not approve or disapprove of TMDL implementation plans.[48] As such, it is largely up to states to decide whether LAs translate into affirmative obligations for individual landowners to reduce nonpoint source runoff. If TMDLs define LAs for a sector broadly (e.g., agriculture or forestry), it can be difficult, even when states use their nonpoint source control authority, to determine what obligations apply to individual landowners. Often, it is the TMDL implementation plans and associated state requirements that turn TMDL LAs into obligations for landowners (see Section 3.11 for a discussion of linking implementation plans to trading).

To support trading: The LA section of the TMDL needs to help inform nonpoint source trading baselines. Trading baseline is the threshold loading level a nonpoint source is required to meet before selling credits. The 2003 U.S. EPA Trading Policy states that "pollutant reductions [should be] greater than those required by a regulatory requirement or established under a TMDL… Where a TMDL has been approved or established by U.S. EPA, the applicable point source waste load allocation or nonpoint source load allocation would establish the baseline for generating credits."[49] The 2007 U.S. EPA Trading Toolkit says a nonpoint source seller's baseline in a watershed with a TMDL "would be derived from the nonpoint source's [load allocation]."[50] Achieving LAs is an important part of water quality trading because the validity of point source WLAs rests on the reasonable assurances that LAs will be met. If a point source is meeting its water quality-based effluent limits through trading in a watershed with a TMDL, there needs to be reasonable assurance that LAs will still be met so that water quality standards are achieved.

To better inform nonpoint source baseline requirements derived from TMDL LAs, TMDLs can provide clear direction on assumed load reductions for individual nonpoint sources. This may not always be possible, but can take on several forms, such as:

- Assumed BMPs that nonpoint source categories should install so as to achieve LAs;[51]
- Clear loading values (e.g., the Neuse River TMDL in North Carolina assumes a 30% reduction from 1995 levels for NPS,[52] and the Long Island Sound TMDL assumes a 10% reduction from NPS[53]);
- Clarity that the LA is an expected amount of pollution from nonpoint sources and not targeted reduction of excess loading;
- Expressing the LA as the same pollutant type and in the same units as the WLAs; and

---

[47] *See Sierra Club v. Meiburg*, 296 F.3d 1021, 1025-1027 (11th Cir. 2002) (summarizing the CWA sections dividing up state and EPA authority over TMDLs and nonpoint sources).

[48] 2002 TMDL Guidelines, *supra* note 15, at p. 5. *See also Amigos Bravos v. Green*, 306 F. Supp. 2d 48, 57 (D.D.C. 2004) (supporting EPA's interpretation of the CWA that EPA is not required to approve TMDL implementation plans).

[49] 2003 EPA Trading Policy, *supra* note 1, at p. 1610.

[50] *See* U.S. Environmental Protection Agency, Office of Wastewater Management, *Water Quality Trading Toolkit for Permit Writers*, p. 29 (2007; updated 2009) (hereafter "EPA Trading Toolkit"), *available at* http://water.epa.gov/type/watersheds/trading/WQTToolkit.cfm.

[51] For example, the Sugar Creek TMDL assumes it is feasible for NPS to achieve a 30% reduction in sediment load once the recommendations from the TMDL report (e.g., increase conservation tillage, establish riparian buffers, fence livestock, etc.) are funded and implemented. This was used as a basis for LAs. Sugar Creek TMDL, *supra* note 21, at p. 62.

[52] North Carolina Department of Environment and Natural Resources, *Phase II of the Total Maximum Daily Load for Total Nitrogen to the Neuse River Estuary, North Carolina*, p. 27-35 (2001) (hereafter "Neuse TMDL"), *available at* http://portal.ncdenr.org/c/document_library/get_file?uuid=48bc46d8-c344-4f07-a656-7a211157c985&groupId=38364.

[53] Long Island Sound TMDL, *supra* note 20, at p. 26.

- Specifically authorizing the phased implementation of load reduction requirements over a reasonable period of time based on current conditions, the TMDL analysis, and other relevant factors (e.g., the Florida statute on trading specifically authorizes the phased implementation of TMDL pollution management strategies;[54] the Long Island Sound TMDL articulated four phases of WLA and LA implementation that included actions to be taken, numeric milestones for load reductions, and expected years for completion[55]).

TMDL implementation plans can also help clarify baseline (see Section 3.11). In many ways, articulating expectations for individual nonpoint sources, setting milestones for achieving LAs, etc. fit better within an implementation plan. It may be difficult in some states to require LA expectations as a baseline requirement unless TMDLs or their implementation plans are connected to state nonpoint source administrative enforcement mechanisms.

Trading does not always occur in areas covered by a TMDL. In this instance, baseline requirements must still be met, but the TMDL will not inform that baseline. A lot of the issues described above still need to be addressed so that trading can contribute directly to progress toward water quality standards. A trading program in a pre-TMDL watershed might consider establishing a trading baseline level based on current land uses compliant with applicable federal, state, and local requirements to more easily transition into a post-TMDL environment.

3.6. Margin of Safety

The margin of safety element exists to account for "any lack of knowledge concerning the relationship between effluent limitations and water quality."[56] A margin of safety can be implicitly incorporated into the TMDL through conservative assumptions or can be explicitly stated as a set load.[57] If the TMDL creates an implicit margin of safety, it must explain the specific uncertainties addressed, the assumptions made, and the method of incorporation into TMDL allocations.[58] Importantly, the TMDL's margin of safety should only address the uncertainties in determining appropriate LAs and WLAs. Thus, the other risks and uncertainties facing a trading program must be addressed by the trading program.

To support trading: Managing risk is essential for a trading program to establish and maintain its effectiveness in improving water quality. However, dealing with too many types of risks can make a trading program overly complex and reduce its economic viability. A TMDL that clearly defines its conservative modeling assumptions, reserved loading capacities, and other margin of safety measures can help trading program managers understand what forms of uncertainty are left to address. The different forms of uncertainty include:

- Scientific and biophysical (e.g., measurement error);
- Extreme events (e.g., flood and drought);

---

[54] Florida Statute 403.067(7)(a)1 (2014) states, "[i]n developing and implementing the total maximum daily load for a water body, the department, or the department in conjunction with a water management district, may develop a basin management action plan... Such plan must integrate the appropriate management strategies available to the state through existing water quality protection programs to achieve the total maximum daily loads and may provide for phased implementation of these management strategies to promote timely, cost-effective actions as provided for in s. 403.151."

[55] Long Island Sound TMDL, *supra* note 20, at pp. 40-48.

[56] CWA § 303(d)(1)(C).

[57] 2002 TMDL Guidelines, *supra* note 15, at p. 4.

[58] *See id.*

- Buyer risk (e.g., credit sellers not producing promised credits);
- Regulatory risk (e.g., changing baseline requirements or effluent limits); and
- Market risk (e.g., changing credit prices).[59]

Of these forms of uncertainty, a margin of safety often deals just with some portion of the scientific and biophysical risks. For example, the Great Miami (upper) TMDL used a five percent margin of safety to account for uncertainties and errors in model assumptions and calibration.[60] The Lower Minnesota River TMDL assumed a certain set of farm BMPs would reduce 20 lbs/day of phosphorous loading, but also assumed only half that reduction would be achieved, leaving a 10 lbs/day margin of safety.[61]

The specific types of uncertainty addressed in a TMDL and trading program must be kept distinct. A TMDL should be clear on the knowledge and estimation gaps addressed by its margin of safety. A TMDL could also assist a trading program by identifying which other types of uncertainty exist in the watershed and encouraging a trading program to address them.

Some states use a "reserve capacity" in TMDLs—a distinct but closely related element to a margin of safety. A reserve capacity sets aside load for new or expanded discharges from point sources in impaired waterways,[62] since these discharges cannot cause or contribute to a violation of water quality standards. Before issuing a permit for a new or expanded discharge into an impaired waterway, the permitting authority must determine if available pollutant load allocations exist and that existing dischargers are subject to compliance schedules to achieve compliance with water quality standards.[63] The *Pinto Creek* case in the United States Court of Appeals for the Ninth Circuit has said that, within its jurisdiction, "plans or compliance schedules" for existing discharges are necessary in these situations to explicitly show how water quality standards will be achieved.[64] Trading may be an appropriate and effective way to offset new or expanded discharges, thus allowing new economic growth while maintaining water quality standards. For example, the Lower Minnesota River TMDL explicitly says, "[n]ew or expanding facilities will use reserve capacity or participate in pollutant trading."[65]

3.7. Seasonal Variation

The CWA requires that a TMDL account for seasonal variations in loading.[66] The TMDL should describe any seasonal variations and their integration into LAs and WLAs.

To support trading: The seasonality of pollution dynamics will affect the compliance periods for point source permittees. Seasonal mismatches might limit the ability of some nonpoint BMPs to provide credits to point sources. This section could clearly define seasonality and how the timing of nonpoint and point source pollution

---

[59] *See* Sara Walker & Mindy Selman, World Resources Institute, *Addressing Risk and Uncertainty in Water Quality Trading Markets* (2014), *available at* http://www.wri.org/sites/default/files/wri_issuebrief_uncertainty_3-9_final.pdf.

[60] Great Miami (upper) TMDL, *supra* note 25, at p. 67.

[61] Minnesota Pollution Control Agency, *Lower Minnesota River Dissolved Oxygen Total Maximum Daily Load Report*, p. 41 (2004) (hereafter "Lower Minnesota TMDL"), *available at*: http://www.pca.state.mn.us/index.php/view-document.html?gid=7994.

[62] *See, e.g.*, Lower Minnesota TMDL, *supra* note 61, at pp. 27 & 38-40.

[63] 40 C.F.R. § 122.4(i).

[64] *Friends of Pinto Creek v. U.S. EPA*, 504 F.3d 1007, 1011-1015 (9th Cir. 2007).

[65] Lower Minnesota TMDL, *supra* note 61, at p. 48.

[66] CWA § 303(d)(1)(C).

interacts. The Great Miami River (upper) TMDL articulated that most loading occurs in wet weather conditions (November to June), but the most severe eutrophic conditions occurred during low flow conditions (summer). Wet weather loads make their way to the channel substrate and are available again in summer. As a result, the TMDL targets were expressed in pounds of phosphorous per year.[67]

3.8. Reasonable Assurances

When reviewing a TMDL covering both point and nonpoint sources,[68] the U.S. EPA looks for "reasonable assurances" that the LAs—and thus the TMDL—will be achieved.[69] When a TMDL is approved, a point source's permit limit needs to be consistent with the assumptions and requirements of the WLA from the TMDL. The basis for that WLA can sometimes rest on the likelihood of the nonpoint LAs being achieved. For U.S. EPA to approve WLAs linked to LAs, the TMDL should contain reasonable assurances that LAs will be met so that U.S. EPA can be confident water quality standards will be met.[70] Essentially, U.S. EPA may find LAs too uncertain or optimistic and, thus, unachievable if the TMDL does not contain reasonable assurances.

If no reasonable assurances that nonpoint source reductions will be achieved exist, the entire load reduction may be assigned to point sources.[71] Factors considered in evaluating reasonable assurances include the technical feasibility of BMPs; the availability of funding; and the existence, requirements, and feasibility of any water quality or implementation plans, like a watershed implementation plan.[72]

To support trading: The reasonable assurances section of a TMDL should be clear on which actions, nonpoint source control requirements, and voluntary programs are essential to meeting LAs, and thus important reasonable assurances to support WLAs. What constitutes reasonable assurances can vary from TMDL to TMDL. Consistent with the baseline discussion in Section 3.5, TMDLs can identify which specific BMPs or other actions constitute reasonable assurances to achieve the TMDL's LAs, and which BMPs or other implementation actions would provide additional reductions that might generate water quality credits. TMDLs can assist trading programs by providing a timeline for the phased implementation of reasonable assurance actions. The Great Miami River (upper) TMDL and the Long Island Sound TMDL both mention trading within the reasonable assurances section of the TMDL.[73, 74]

---

[67] Great Miami (upper) TMDL, *supra* note 25, at p. 59.

[68] In a TMDL covering waters impaired only by point sources, the NPDES program and individual permit requirements provide reasonable assurance that water quality standards will be met.

[69] *See* 1991 TMDL Guidance, *supra* note 13, at Ch. 2, p. 15. The term "reasonable assurance" is actually not contained in either the CWA or EPA water quality regulations – only in guidance. For an example of U.S. EPA's application of the reasonable assurance concept, *see* Chesapeake TMDL, *supra* note 14, at § 7.

[70] *See* 40 C.F.R. § 122.44(d)(1)(vii)(B). The EPA uses CWA §§ 301(b)(1)(C) & 303(d)(1)(C) to establish its authority to require reasonable assurances. *See also* U.S. Environmental Protection Agency, Office of Water, *New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)*, p. 5 (1997) (hereafter "1997 TMDL Guidance"), *available at* http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2003_10_21_tmdl_ratepace1997guid.pdf.

[71] 1991 TMDL Guidance, *supra* note 13, at Ch. 2, p. 15.

[72] *See id.* at Ch. 2, pp. 24-25. *See also* Chesapeake TMDL, *supra* note 14, at § 7.1. In the Chesapeake Bay, EPA based its finding of reasonable assurance primarily on the required watershed implementation plans (WIPs) in that region, but also considered the existence of an Executive Order directing federal agency cooperation and the existence of specific funding sources for Chesapeake Bay water quality.

[73] Great Miami (upper) TMDL, *supra* note 25, at p. 101.

[74] Long Island Sound TMDL, *supra* note 20, at pp. 28 & 31-32.

3.9. Public Participation and Submittal Letter

A TMDL may be disapproved for lack of adequate public participation.[75] A U.S. EPA regulation states that "[c]alculations to establish TMDLs shall be subject to public review as defined in the State CPP."[76] While a state may not need to publish the entire contents of the proposed TMDL for public review, the published information should include specific load allocations and the essential calculations performed to establish them. U.S. EPA guidance recommends that a TMDL describe the state's public participation process and summarize significant comments and responses.[77]

A TMDL package should include a submittal letter stating whether the submission is for technical review or final review. If for final review, this letter establishes the state's intent to submit the TMDL for final review and triggers U.S. EPA's duty to review under the CWA.[78]

To support trading: As a TMDL process moves forward, trading can be an explicit part of the discussion and the public participation process. Early discussions about trading can identify concerns and help sort how the TMDL can address these concerns versus how a permit or trading program will address them. Discussing and developing a trading program or plan during the public TMDL process could result in greater acceptance by stakeholders, smoother operation, and greater participation.

3.10. Monitoring Plan to Track TMDL Effectiveness

EPA guidance advises states to develop a monitoring plan, especially when a TMDL involves both point and nonpoint sources.[79] A monitoring plan can be one element of providing reasonable assurances that nonpoint sources are meeting their LAs. While NPDES permits require monitoring of point sources, nonpoint sources are not subject to monitoring unless a state uses its own authority to implement a monitoring plan.

To support trading: Monitoring plans can be included in a TMDL and count toward reasonable assurances that LAs will be met. Monitoring also provides the data needed to update, revise, and communicate progress toward meeting TMDL goals and water quality standards. Trading programs attached to individual NPDES permits will likely not generate the watershed-level data needed to track progress toward water quality goals alone. A TMDL can articulate a clear monitoring framework that nests data at the project, reach, and watershed scale to link BMP projects up to watershed-scale trends. A TMDL might also include a formal QAPP for data quality assurance and control, which could facilitate easier acceptance of monitoring data related to trading by U.S. EPA and state agencies.

3.11. Implementation Plans

U.S. EPA will neither approve nor disapprove a TMDL implementation plan.[80] However, U.S. EPA does expect states to provide for the "implementation of control actions."[81] U.S. EPA encourages the use of state laws, local laws, and CWA Section 319 management programs to implement TMDLs.[82] In areas without a regulatory

---

[75] 2002 TMDL Guidelines, *supra* note 15, at p. 5.

[76] 40 C.F.R. § 130.7(c)(1)(ii). CPP means "continuing planning process." *See* CWA § 303(e) *and* 40 C.F.R. § 130.5.

[77] 2002 TMDL Guidelines, *supra* note 15, at p. 5.

[78] *Id.* at p. 6.

[79] *Id.* at p. 5.

[80] *Id. See also Amigos Bravos*, *supra* note 48.

[81] 1991 TMDL Guidance, *supra* note 13, at Ch. 2, p. 16.

[82] *Id.*

implementation program, U.S. EPA guidance says that "a State needs to document the coordination which may be necessary among State and local agencies, landowners, operators, and managers and then evaluate BMP implementation, maintenance, and overall effectiveness to ensure that load allocations are achieved."[83] States may find it useful to authorize and create implementation plans, especially for TMDLs containing LAs that cover multiple nonpoint source categories. Implementation plans can be a place to put the specifics needed to support trading that are not appropriate to put into the TMDL itself. As of 2009, five states had laws requiring implementation plans (AZ, CA, DE, OR, and VA), four states complete plans based on agency guidance (ID, HI, MN, and TX), and Kansas includes a brief implementation section in each TMDL. Several states use their nonpoint source enforcement capability to implement TMDLs (AK, HI, FL, SC, TX, VT, WA, and WI), and altogether 43 states are doing some form of TMDL implementation planning.[84]

U.S. EPA provides only general guidance on what needs to be in an implementation plan. This guidance recommends including: (1) regulatory, non-regulatory, and incentive-based programs to assure reductions by nonpoint sources; (2) a public participation process; and (3) a consideration of the usefulness of other regulatory programs such as local source water protection programs, stormwater management programs, Section 319 programs, and a state's continuing planning process requirements.[85] Several states have provided more specific guidance on the contents of implementation plans. For example, Oregon Department of Environmental Quality requires that implementation plans:

> *"(A) Identify the management strategies the DMA [Designated Management Agency] or other responsible person will use to achieve load allocations and reduce pollutant loading;*
>
> *(B) Provide a timeline for implementing management strategies and a schedule for completing measurable milestones;*
>
> *(C) Provide for performance monitoring with a plan for periodic review and revision of the implementation plan;*
>
> *(D) To the extent required by ORS 197.180 and OAR chapter 340, division 18, provide evidence of compliance with applicable statewide land use requirements; and*
>
> *(E) Provide any other analyses or information specified in the WQMP [Water Quality Management Plan]."*[86]

States might choose which information to support trading is best suited for a TMDL compared to a TMDL implementation plan. Many details relevant to trading may be best-suited for implementation plans (e.g., intended BMPs, timelines for achieving load allocation milestones, and plans for monitoring and adaptive management). However, there may be reasons for placing some of this information in the TMDL itself. TMDLs are formally reviewed and approved by U.S. EPA. Also, TMDL implementation plans can sometimes follow TMDL approval by 12-24 months, delaying the information needed to incorporate trading into NPDES permits. If TMDL implementation plans are developed concurrently with the TMDL, the public can comment on and review trading details in both documents to identify any concerns early on. Yet, incorporating trading details into the

---

[83] *Id.*

[84] Virginia Tech & Center for TMDL and Watershed Studies, *State-Specific TMDL Implementation Information* (2008), *available at* http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2009_09_09_tmdl_results_27_st_imp_info_va_tech.pdf (*see also* http://www.tmdl.bse.vt.edu/site/knowledgebase/).

[85] 1997 TMDL Guidance, *supra* note 70, at p. 6.

[86] OAR 340-042-0080(4)(a) (2014).

TMDL may limit the flexibility of state agencies and watershed stakeholders to adjust information as part of adaptive management.

The Lower Minnesota River TMDL includes a trading ratio and some of the basic elements that would need to go into a five-year trading agreement.[87] The Great Miami River (upper) TMDL includes a set of implementation scenarios, but also says, "[I]n addition, NRCS practices 580 and 590 should be encouraged in the Environmental Quality Incentives Program and through the Miami Conservancy District (MCD) nutrient trading program to sequester nutrients and stabilize soil runoff after the growing season."[88] The Chesapeake Bay TMDL includes several paragraphs of considerations for nutrient offsets and water quality trading.[89] A Mid Snake River TMDL in Idaho discusses trading as an implementation strategy and provides basic guidance for trading.[90]

To support trading: Implementation plans can help translate sector-wide load allocations and expectations into clearer plans and timelines for particular landowners participating in trading.

- *Baseline levels*: Implementation plans can set baseline expectations for individual nonpoint source landowners participating in trading and identify how that baseline should be expressed (e.g., minimum BMPs, baseline loading levels, or baseline load reductions). Implementation plans can also identify which BMPs might be pre-approved for generating credits for which land uses (e.g., BMPs for agriculture, ranching, forestry, urban areas, etc.).

- *Timelines for achieving baseline levels:* Point sources are generally required to meet their effluent limits based on a TMDL WLA immediately. If that is not feasible, the permitting authority may in appropriate cases allow those limits to be met "as soon as possible" according to the terms of a compliance schedule.[91] However, there is not a similar federal regulatory requirement for nonpoint source implementations. Some TMDLs assume LAs will be met as soon as possible, while others assume it will take several decades to meet LAs, and still others make no mention of LA achievement timing. An implementation plan can provide measurable milestones for achieving LAs, which can allow a trading program to "phase in"[92] baseline requirements consistent with the TMDL implementation plan. Timelines with specific milestones can add another layer of stakeholder conversation and analysis to building a TMDL implementation plan, but can also make it easier for NPDES permit writers to build compliance schedules and permit requirements for trading.

- *Clarifying how state regulatory requirements apply:* Some state nonpoint source regulations can apply broadly to a landowner, but they may not always be clear on what actions are legally and specifically required. For example, Kentucky requires landowners to have a nutrient management plan with the vision that voluntary action and cost share programs would help implement those plans.[93] But for trading, it may be important to clarify which portions of a nutrient management plan are "expected" to be implemented to meet trading baseline requirements, as opposed to "voluntary" actions that

---

[87] Lower Minnesota TMDL, *supra* note 61, at pp. 45-48.

[88] Great Miami (upper) TMDL, *supra* note 25, at p. 96.

[89] Chesapeake TMDL, *supra* note 14, at §§ 10.1 & 10.2 and Appendix S.

[90] State of Idaho Department of Environmental Quality, *Mid Snake River/Succor Creek Tributaries Sediment Total Maximum Daily Load (HUC ID17050103)*, § 5.5.5 (2013 Addendum), *available at* http://www.deq.idaho.gov/media/1066847-mid_snake_river_succor_creek_tmdl_addendum.pdf.

[91] 40 C.F.R. § 122.47(a)(1).

[92] Chesapeake Baseline Considerations, *supra* note 7.

[93] Kentucky Revised Statute 224.71-120 (2014), *available at* http://www.lrc.ky.gov/statutes/statute.aspx?id=10527.

generate credits and receiving funding from point sources. Implementation plans may be one place for states to help make this clarification.

- *Plans for monitoring and adaptive management:* 'Is trading working?' is a common question many trading programs face. In dynamic watersheds, this question is difficult to answer unless trading sits within a broader monitoring and adaptive management framework for that watershed. In many watersheds, trading is likely to account for just a small portion of pollution reductions compared to other actions (e.g., point source technology upgrades or USDA cost share projects). An implementation plan with a strong monitoring framework can help trading programs design A) what data is collected from credit projects, and B) how that data is formatted to interact with results from other water quality improvements.

- *Tools to track and verify water quality improvements:* Trading needs systems to confirm and track credits, but ideally, all projects improving water quality are tracked to communicate overall progress. A TMDL implementation plan can provide some guidelines for how nonpoint source projects are designed, constructed, and maintained. They can also establish a tracking and accounting system to confirm projects are implemented and generate reports on common progress toward TMDL goals in the watershed—not just from trading, but from the whole of actions being taken in the watershed.

3.12. Administrative Record

The U.S. EPA recommends that states compile a record containing the materials reviewed and created during the TMDL development process.[94] This record may be useful during public or U.S. EPA review of the TMDL.

To support trading: To the extent trading is actively discussed by stakeholders informing the TMDL, the administrative record can help explain the intent of TMDL elements and how they might link to trading activity.

IV. Big Picture Considerations for Trading and TMDLs

For TMDLs to better support trading, they need to be as clear as possible about implementation. Thinking about how to implement TMDLs is not a new challenge, and is one that is bigger than trading. As states consider how to structure TMDLs to better support trading, they are really thinking about how to align resources, prioritize actions, and ultimately achieve water quality goals in a way that makes sense for a watershed and the communities that rely on the clean water that watershed provides. Florida's legislature has stated, "while point and nonpoint sources of pollution have been managed through numerous programs, better coordination among these efforts and additional management measures may be needed in order to achieve the restoration of impaired water bodies."[95] There are still some bigger water quality management questions influencing both TMDLs and trading that need discussion within states. Some of those considerations are outlined here.

Thinking about Watershed Implementation Plans Before TMDLs

While TMDLs are vital to achieving water quality standards, ideally they will be integrated into an overarching watershed management plan. To maximize the effectiveness of TMDLs, such a plan could set clear watershed-level goals, state priority actions, list measurable milestones, identify roles for stakeholders, create accountability mechanisms, and create a strategic plan to maximize all potential sources of funding. For example, a Florida statute encourages the creation of a "basin management action plan" that integrates all water quality management programs, establishes an implementation schedule for the programs, establishes an effectiveness monitoring plan, identifies feasible funding sources, and, where appropriate, incorporates water treatment

[94] 2002 TMDL Guidelines, *supra* note 15, at p. 6.

[95] Florida Statute 403.067(1) (2014).

facilities plans and water quality trading.[96] The Oregon Department of Environmental Quality (DEQ) requires a "water quality management plan" (WQMP) for each TMDL.[97] Although included in a TMDL, a WQMP is very broad, containing 15 elements that form a "framework of management strategies to attain and maintain water quality standards."[98] Sector-specific and source-specific implementation plans are created under the framework of a WQMP.[99] The WQMPs for both the Rogue and Tualatin TMDLs list trading as a legitimate management strategy and express Oregon DEQ's intent to support trading when appropriate.[100]

Tracking and Accounting Progress Toward TMDL Goals

At their core, water quality trading programs are systems to track, confirm, and report on performance. The flexibility trading programs provide comes from clear water quality goals and an understanding of watershed dynamics. The other elements of trading programs are designed to communicate water quality benefits in the same units called for in the TMDL (translated into NPDES permit effluent limits). As a result, coupling TMDL implementation with trading can provide some of the tools necessary to track overall progress toward TMDL goals in general. For example, a trading program might need a registry to track credits, systems for verifying and reporting on credits, and a way to do adaptive management. These are also useful elements of a TMDL, but it may have been difficult to focus on them because of the workload required to issue new TMDLs.

Can States Look to Likely Implementation to Prioritize Where to Issue a TMDL Next?

States are still under pressure to issue TMDLs for their impaired waters. At the same time, several older TMDLs need to be revisited based on a decade of implementation activity, changes on the ground, new science, and litigation. Many states are thinking about how they can prioritize where and how TMDLs are developed or revised. One way is to prioritize TMDL activity in watersheds where implementation is more likely. Trading and the willingness of point sources to work with nonpoint sources more broadly can help achieve TMDL goals more quickly. States, cost share programs, and other stakeholders may identify watersheds where goals can be achieved with meaningful environmental and community benefits.

V. Conclusion

A TMDL written with implementation in mind can be tremendously helpful to trading programs and to the NPDES permit writers who will look to the TMDL as they write permit requirements that include trading. TMDLs can establish the science and quantification methods to turn farm practices into credits, define where trading is or is not appropriate, articulate which actions are additional to baseline expectations, outline milestones for achieving baseline, and create an adaptive management framework within which trading can be successful. With these details from a robust TMDL, regulators and stakeholders can develop trading programs and plans with more speed and legitimacy. Nonpoint source stakeholders, especially landowners and agricultural groups, can create more effective land management plans. Point sources and permit writers can better assess the economic and regulatory viability of trading and create successful trading plans. Each TMDL needs to fit within its watershed context and the unique needs of each state. Water quality trading may be especially effective and appropriate in certain states or individual watersheds. Incorporating the possibility of trading early into TMDL development or update processes can make it easier for trading programs to move forward later on and for trading to become a useful tool in achieving water quality standards.

---

[96] Florida Statute 403.067(7)(a) (2014).

[97] OAR 340-042-0040(4)(l) (2014).

[98] *Id.*

[99] OAR 340-042-0080 (2014).

[100] *See* Rogue TMDL, *supra* note 34, at Chapter 4, p. 4-14 *and* Tualatin TMDL, *supra* note 35, at Chapter 4, p. 117-119.