# Breaking Down Barriers:

## Priority Actions for Advancing Water Quality Trading

A product of a **National Network on Water Quality Trading** Dialogue
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***Website availability***

*All information contained in this document is available at www.willamettepartnership.org/breaking-down-barriers-priority-actions-for-advancing-water-quality-trading.*

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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 programs that meet local needs and conditions. This document does not create any binding requirements or standards of practice. Ultimately, 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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# About the National Network on Water Quality Trading

The National Network on Water Quality Trading ("National Network") is 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 National Network is to establish a national dialogue on how water quality trading can best contribute to achieving clean water goals. That includes providing options and recommendations to improve consistency, innovation, and integrity in water quality trading.

## National Network on Water Quality Trading Steering Committee:

American Farmland Trust
Association of Clean Water Administrators
Electric Power Research Institute
Environmental Incentives
Kieser & Associates, LLC
Maryland Department of Agriculture
National Association of Clean Water Agencies
National Milk Producers Federation
The Freshwater Trust
The Ohio Farm Bureau Federation
Troutman Sanders
Willamette Partnership
World Resources Institute
With USDA as a technical advisor and U.S. EPA as an observer

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# I. Executive Summary

The National Network on Water Quality Trading ("National Network") proposes this *Action Agenda* to get water quality trading off the sidelines and on the ground in more watersheds. Water quality trading is a cost-effective way to provide clean water and deliver multiple other benefits for communities, fish, and wildlife. The *Action Agenda* is designed to address key barriers to increasing demand for water quality credits in existing markets and to launching new water quality trading programs. It supports National Network participants in their individual and collective actions to move forward with water quality trading and other market-based approaches to clean water.

The *Action Agenda* is a multi-stakeholder plan to achieve the following objectives:

1. Simplify water quality trading program design and application.
2. Ensure state regulatory agencies have adequate capacity and resources to engage on water quality trading.
3. Clarify each administration's and the U.S. Environmental Protection Agency's position on water quality trading.
4. Actively address real and perceived risks for buyers.
5. Identify and address risks of litigation.
6. Create guidance on trading for stormwater.
7. Build stakeholder relationships and trust.

Proponents of water quality trading can use this *Action Agenda* to inform budgeting, grant-making, work-planning, and fundraising efforts. It includes priority actions—the products, processes, and initiatives to meet the *Action Agenda* objectives—and encompasses work by state regulatory agencies, the U.S. Environmental Protection Agency ("U.S. EPA"), credit buyers, and nonprofit or foundation partners to, for example, provide clarity around models that quantify credits, create templates that ease program design, offer realistic expectations around the time and expenses involved, and ensure grant-making programs are better designed to support trading program development, among other efforts.

This *Action Agenda* was developed based on a four-part demand assessment to understand the barriers that keep potential credit buyers from pursuing new trading programs or purchasing credits in existing markets. The analysis included over 50 stakeholder interviews on the barriers and opportunities that exist today; review of lessons learned about demand drivers from other environmental markets; examination of the timelines and decision-making processes associated with implementing water quality trading; and, mapping the core predictors of demand for water quality credits and stormwater trading across the United States.

The analysis was conducted to diagnose why, in contrast to other environmental markets, interest in water quality trading and demand for water quality credits has been slow, despite often being a more cost-effective way for wastewater and stormwater sectors to meet their regulatory requirements and deliver co-benefits to the community and the environment, as compared to traditional engineered treatment technology.

# II. Introduction

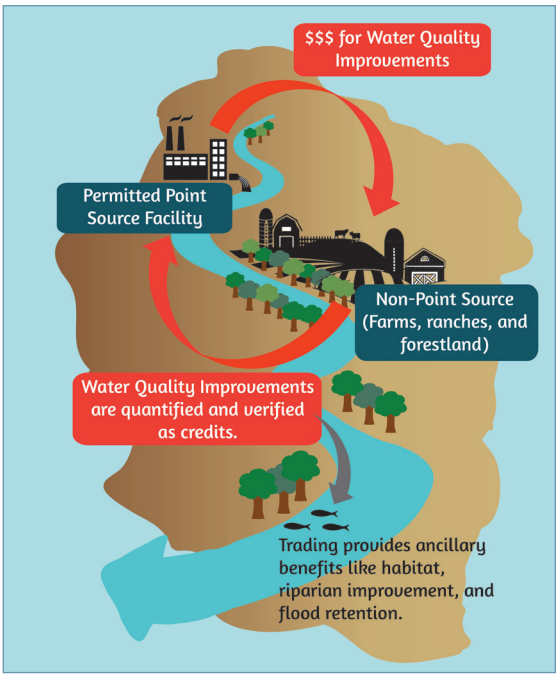
In the United States, market-based programs are used to address climate change (carbon markets), protect endangered and candidate species (conservation banking), and retain aquatic resources (wetland and stream compensatory mitigation). These programs have, for the most part, gained widespread acceptance by the public and industry (Bennett & Gallant, 2018)

Water quality trading is a market-based approach for complying with wastewater and stormwater requirements under the Clean Water Act ("CWA"), often at a lower cost and with a broader suite of environmental benefits when compared with traditional treatment technology or best management practices (Box 1). Since the release of the U.S. EPA policy on water quality trading in 2003 (Water Quality

**Box 1: Terms Used in This Report**

In **environmental markets**, environmental benefits, such as pollution reduction or wildlife habitat improvements, are sold from one party to another. The buyer typically participates because it is more expensive or less feasible for them to produce that benefit themselves.

In **water quality trading (WQT)**, a buyer purchases credits to comply with their water-quality-based permit limits. Credits represent a quantified, verified reduction in pollutant load. Credits might be generated at other permitted facilities or by reducing nonpoint pollutant loading, such as through installation of conservation best management practices (BMP) on upstream agricultural land. Trades used to meet the limits within a National Pollutant Discharge Elimination System (NPDES) permit are subject to the U.S. EPA 2003 trading policy. Credits may also be purchased by non-governmental organizations (NGO) or through corporate social responsibility programs.




*Water quality trading provides one source the choice of installing onsite technology or practices, or working with other sources offsite to generate equal or greater pollutant reductions. / Willamette Partnership*

**Water quality trading programs** can be defined in individual permits or through policy at the watershed or state-level. The trading program creates a market by providing the rules for transactions between buyers and sellers of credits.

**Stormwater trading** is an alternative compliance approach used by jurisdictions subject to Municipal Separate Storm Sewer System (MS4) permits, which are one type of NPDES permit. A stormwater crediting program may be established to provide compliance flexibility for development sites subject to post-construction regulations, or to cost-effectively achieve regional water quality objectives. These programs are not subject to U.S. EPA trading policy unless the MS4 permittee is a credit buyer. Credits might be generated through the installation of urban green infrastructure or through agricultural conservation practices. Stormwater credit buyers include municipal governments, real estate developers, and departments of transportation.

Trading Policy, 2003), there has been a high level of attention focused on how to make water quality trading programs faster and easier to implement, resulting in a robust literature of guidance documents and case studies by the National Network (Box 2), the academic community, and other stakeholders. However, despite these resources and the benefits, water quality trading markets are not incorporated as readily into compliance strategies as markets for climate, species, and wetlands/streams.

Over the last ten years, many academic and industry studies have explored the barriers to successful water quality markets, typically at the permit- or state-scale, and most often through investigating active programs and their participants. These studies point to a lack of numeric discharge limits (U.S. Government Accountability Office, 2017; Industrial Economics, 2008), high transaction costs (Motallebi et al., 2017), a regulatory environment with significant costs for non-compliance, which has led permittees to implement risk-averse compliance strategies (Stephenson & Shabman, 2017), and a lack of empirical analysis of existing programs (Fisher-Vanden & Olmstead, 2013) as some of the main barriers to successful implementation of water quality trading programs. We have considered these findings in crafting *Action Agenda*.

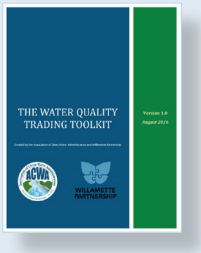
The methodology applied here hones in on the drivers of demand and the perspectives of buyers with a national scope. Further, in addition to interviewing current or past participants in trading programs, we also spoke with organizations who had considered trading and decided against it, and with those for whom trading is not currently feasible but remain hopeful it will be an option in the future.

**Box 2: National Network on Water Quality Trading Products**

*Building a Water Quality Trading Program: Options and Considerations* (2015)


Building a Water Quality Trading Program walks through 11 key elements many trading programs consider in their design, with examples, options, and clear pros and cons for program design to help stakeholders build a program that meets local needs.

*The Water Quality Trading Toolkit* (Association of Clean Water Administrators & Willamette Partnership, 2016)




The Toolkit consists of five water quality trading policy templates meant to make it faster and easier to develop transparent and accountable water quality trading programs that drive meaningful investment toward achieving clean water goals. The templates go along with *Building a Water Quality Trading Program: Options and Considerations*, to provide a blueprint for those states and organizations seeking to create a water quality trading program.

*Economic Approaches to Green Stormwater Infrastructure* (2017)


This report is designed to help stormwater program managers leverage market forces for implementation and investment in green infrastructure.

**All resources listed are available at www.nnwqt.org/products.**

This effort focused particularly on identifying the barriers to developing water quality trading programs for compliance as well as barriers faced by NPDES permit holders (i.e., the market's primary source of demand) to participating in existing markets. The water quality trading demand assessment includes:

- **Section A. Stakeholder Interviews**
  A series of interviews with stakeholders to understand the barriers that keep trading programs from being successfully developed and implemented or that prevent buyers from deciding to purchase credits.
- **Section B. Lessons Learned: Demand Dynamics of Environmental Markets in the United States**
  A review of lessons learned about demand drivers in markets for carbon offsets, wetland and stream mitigation, and endangered and candidate species mitigation to understand how those lessons may apply to water quality trading.
- **Section C. Water Quality Trading Decision-Making Roles and Processes**
  A set of conceptual models to illustrate the processes and key actors in accepting or rejecting the use of water quality trading to confirm our understanding of the decision-making structures through which trading is considered and approved or rejected.
- **Section D. Geography of Demand**
  A spatial analysis identifying watersheds where watershed characteristics, regulatory conditions, and economic factors known to drive demand for water quality trading coincide, to evaluate the overall scale of demand for water quality trading nation-wide and the specific areas where strong potential demand exists.

The culmination of this demand assessment is a comprehensive *Action Agenda*—the products, processes, and initiatives that can address key barriers to increasing demand in existing markets and to launching new water quality trading programs. The *Action Agenda* supports the full suite of National Network participants in their individual and collective actions to move forward with water quality trading and other market-based approaches to clean water where they make economic, social, and ecological sense.

Section III below outlines the *Action Agenda*, followed by Section IV, which details the methods and results of the demand assessment.

# III. Action Agenda: Breaking Down the Top Barriers Affecting Demand for Water Quality Trading

Based on the demand assessment, which included research, interviews, and feedback from the National Network Steering Committee (see Section IV), we have identified the top barriers to increasing demand for water quality trading. The *Action Agenda* is designed to overcome those barriers by targeting the following objectives:

1. Simplify water quality trading program design and application.
2. Ensure state regulatory agencies have adequate capacity and resources to engage on water quality trading.
3. Clarify each administration's and the U.S. EPA's position on water quality trading;
4. Actively address real and perceived risks for buyers.
5. Identify and address risks of litigation.
6. Create guidance on trading for stormwater.
7. Build stakeholder relationships and trust.

Priority actions were selected for each objective based on the following criteria: broad scope of applicability; leverage of a diversity of stakeholder roles and power; and coverage of multiple action areas (e.g. science, policy, communications, and relationship building). The priority actions are organized by stakeholder type.

The *Action Agenda* may appear long on first inspection, but not every item on the list needs to be accomplished before progress can be made. In fact, each of these actions could have powerful impacts on its own, especially for one state or one watershed. The *Action Agenda* is intentionally comprehensive to best leverage the diverse range of interested stakeholders and their respective strengths, but local leaders know best what is needed in their state or watershed and should adapt these actions to fit within their local context. Local knowledge and targeted feasibility analyses can guide users on which *Action Agenda* items are most crucial to their own purposes.

If you or your organization would like support from the National Network on taking any of the actions listed below, please contact the National Network at nnwqt@willamettepartnership.org.

*Riparian wetland restoration practices in Marion, Virginia. / Jeff Vanuga, USDA Natural Resources Conservation Service*

## 1. Simplify water quality trading program design and application.

There is a steep learning curve for just about everyone involved in a trading program, which often includes stakeholders from utilities, municipal governments, agricultural producers, regulators, environmental groups, and practitioners delivering programs on the ground. Some of the seemingly smallest pieces (i.e., credit life) can significantly impact credit demand and trading volume. Some of the biggest pieces (i.e., credit quantification approaches and registration) are thorny technical undertakings, potentially requiring major staffing and financial resources. Such complexity is expensive and time-consuming to navigate, making it hard to communicate or build trust with stakeholders. Reducing the complexity of trading programs and making it easier for multiple parties to understand and trust program design decisions could boost interest in these programs.

*(See table of recommended priority actions on next page.)*

| Stakeholder | Actions |
|---|---|
| **Utilities/ Permittees** | • **Request that consulting engineers consider watershed approaches when evaluating compliance alternatives.** Complicated or highly technical tasks are often conducted by consultants, and trading doesn't need to be any different. Consulting firms may be unfamiliar with trading or may be hesitant to suggest trading or other watershed approaches if they don't have the skills in-house to design and implement the program. But, they will develop those skills if there is demand for them.<br>• **Publish lessons learned from active programs.** Information on existing programs can be hard to find. Publishing lessons learned can help other permittees with their program design and implementation. |
| **State Regulatory Agencies** | • **Dedicate staff to manage the regulatory agency's WQT program.** Dedicated central office staff can provide timely, reliable, expert support to field office staff and permittees during program development. They can modify and streamline the processes in response to feedback and experience.<br>• **Provide permit holders a timeline for how long it will take to implement a trading program.** Clear expectations can compel permit holders to take action when they might otherwise resist getting started with adequate time to understand and get comfortable with trading. A predictable timeline will also be less daunting than the unknown.<br>• **Consider alternative partnership models that present fewer legal and logistical requirements.** There are multiple partnership models that can be used to improve water quality, such as source water protection collaboratives or water funds, and are often seen as simpler to implement and understand. For example, in Pure Water Partners' program in Eugene, Oregon, landowners protect and restore streamside forests and instream habitat with incentive payments from wastewater, drinking water, forestry, and conservation funders (Pure Water Partners, 2018). In the Wisconsin Department of Natural Resources' Adaptive Management Program, permittees partner with landowners and others to reduce nonpoint sources of phosphorus pollution (Wisconsin Department of Natural Resources, 2018). Both programs target water quality outcomes versus tracking individual pollution reduction credits. |
| **NGOs** | • **Develop a cost assessment for designing a trading program.** Templates for state rules, guidance, permits, and annual reports were published in 2016. Being able to predict the costs associated with building out a policy framework using the templates will help states and utilities better plan and budget for that process.<br>• **Build a compendium of simplified program design options.** Provide examples of program design elements that can simplify program planning and implementation (e.g. remote monitoring protocols, pre-approved rates for best management practices, methods to set fixed credit prices, standard landowner agreements). |
| **Funders** | • **Provide grants or loans that match the timelines on which program development and launch take place.** Infrastructure planning grants and Clean Water State Revolving Funds are typically on a timeline based on the design and building of traditional infrastructure projects. That timeline is not well-suited to the process of implementing a trading program. Without a trading framework in place (e.g. state rule and/or guidance), buyers can't evaluate whether it's a good fit for their compliance needs. At the same time, it can feel like a lot of work to design a trading program without knowing that buyers will participate. One way to navigate this chicken and egg conundrum would be to design planning grants in two phases: a smaller grant to fund design of a general trading framework; and, a subsequent, larger grant to build out the operational details and ramp up implementation. |
| **U.S. EPA** | • **Work with the state regulatory agency community (e.g. Association of Clean Water Administrators) to craft language clarifying U.S. EPA's approach to evaluating methods for quantifying credits.** The methods used to quantify credits can be one of the most technically demanding pieces of the program development process. Often, methods must be consistent with water quality models and demand-side regulations. Transferrable methods and certainty about which ones will be accepted would reduce that burden on states and permittees. |

# 2. Ensure state regulatory agencies have adequate capacity and resources to engage on water quality trading.

In many states, a combination of turnover and insufficient resources make it very difficult for the regulatory agency to implement trading programs. Ensuring that states have the funding and capacity they need to dedicate staff to trading program administration could result in a more predictable and efficient process for both regulators and permittees.

| Stakeholder | Actions |
|---|---|
| **Utilities/ Permittees** | • **Ask regulatory agencies for a trading option.** Nearly all the regulatory agencies with trading policies we spoke with indicated that it was their permittees who first approached them about trading. It is difficult for regulatory agencies to allocate staff time to design a trading program if they have not heard interest. Utilities that are interested in trading can ask regulatory agency staff to consider developing trading policy. The request could be accompanied by a link to the National Network's *Options and Considerations* guide and *Water Quality Trading Toolkit* templates (www.nnwqt.org/products).<br>• **Advocate that regulatory agencies prioritize trading and resource key staff.** Utilities could help advocate at the state level for funding long-term staff positions that we know can boost a state regulatory agency's capacity to support trading or advocate that existing staff have the resources to prioritize their work on trading. |
| **NGOs** | • **Create communities of practice for trading.** A mentorship program could facilitate permit writers helping their peers in other states.<br>• **Develop resources for states to train new permit writers.** Turnover among permit writers and loss of institutional knowledge reduces a regulatory agency's capacity to support trading. A permit writers' "boot camp" or similar training would help new permit writers become more comfortable with water quality trading.<br>• **Create case studies about return-on-investment from trading for state regulatory agencies.** Water quality trading helps save public dollars when the buyers are public entities. Articulating the cost-saving benefits of trading and showing a potential to rapidly recoup set-up costs for the state could make a more compelling case for funding program design and administration.<br>• **Update the National Network's *Water Quality Trading Toolkit* templates.** Update the templates with options for funding program administration, including consideration of different state agency fee structures.<br>• **Help state agencies get the funding they need to design a trading program.** Pursue third-party funding partnerships (i.e., grant or foundation monies) to build capacity at a state agency for program design. |
| **U.S. EPA** | • **Provide state regulatory agencies the expert help they need to design and implement a trading program.** Fund a full-time circuit rider position to help state regulatory agencies implement trading programs; or, fund 0.25 FTE of state regulatory agency staff in each U.S. EPA region to serve as a WQT resource. Perform outreach to ensure states are familiar with existing resources. |

# 3. Clarify each Presidential administration's and the U.S. EPA's position on water quality trading.

U.S. EPA released a trading policy in 2003 (Water Quality Trading Policy, 2003) that states have generally understood and supported but is now perceived to be outdated by some. The agency has also issued multiple memos since 2003 reaffirming their support for trading, but each new administration is different. Permittees and state agencies expressed concern to the National Network over whether the current administration will support trading. Clarifying U.S. EPA's position on water quality trading after each administration change would help reassure states and permittees that trading is still a supported compliance alternative.

| Stakeholder | Actions |
|---|---|
| **U.S. EPA** | • **Release a statement of support for trading in the current administration.**<br>• **Clarify the role of U.S. EPA's different memos, guidance, and documents on trading** (i.e., 2003 policy, Permit Writers' Toolkit, Chesapeake Bay memos).<br>• **For above, work with the point source community (e.g. National Association of Clean Water Agencies) to use language that gives sufficient clarity to permittees regarding the administration's policies.** |

Some of those interviewed in this demand assessment, particularly permittees, also suggested that the U.S. EPA integrate trading into Clean Water Act programs either through legislation or rulemaking. They noted that building and implementing a trading program may take several years, and that permittees may choose not to invest that time and money if is there uncertainty as to whether some future administration will find trading acceptable.

*Oregon wastewater treatment plant surrounded by a constructed wetland. / Kristiana Teige Witherill*

## 4. Actively address real and perceived risks for buyers.

Risk aversion is often cited as a key reason that utility demand for nonpoint source credits remains low (Stephenson & Shabman, 2017). Though trading has risks (Selman et al., 2009), they are consistent with the risks to engineered gray infrastructure solutions—pipes, pumps, and filters might underperform or fail, regulatory drivers might change, or contracted services may not meet expectations. This begs the question, why do risks associated with trading present a barrier when the risks associated with gray infrastructure do not? We assume here that utilities understand and are comfortable mitigating for risks associated with traditional engineered treatment solutions, whereas the risks associated with trading are still relatively unknown or misunderstood. These actions focus on demystifying trading such that the risks are well defined and dealing with those risks head-on.

*(See table of recommended priority actions on next page.)*

| Stakeholder | Actions |
|---|---|
| **Law Firms** | • **Contract templates (e.g. for credit producers or landowners).** A contract template can identify and address common risks, such as risks associated with purchasing credits from third parties or installing credit-generating projects on privately owned lands.<br>• **Legal analysis.** A legal analysis of risks associated with trading could give permittees a firmer understanding of likely legal risks and how to mitigate for them. |
| **State Regulatory Agencies** | • **Consider programmatic mechanisms to address commonly cited risks.** State agency staff can consider programmatic or state-level mechanisms that address risks related to working in a dynamic river or land environment (e.g. define a range of acceptable project trajectories that will not influence credit value, support development of insurance products or state credit reserve pools); tracking and accountability for dispersed actions (e.g. required use of registries, approved remote monitoring methods); and, BMPs that are slow to mature (e.g. insurance products and reserve pools, allow credits to be renewed for multiple cycles).<br><br>This recommendation is also relevant for permittees when they design and manage the trading program (i.e., some stormwater credit programs). |
| **NGOs** | • **Explain sources of risk to buyers and clarify risk-associated misperceptions or misunderstanding.** For example, buyers may assume that permanent credits (i.e., one-time purchase) offer less risk compared to regular purchases or term credits. However, one-time purchases may also restrict buyers' ability to change future compliance strategies or pursue lower-cost credit options. Understanding the many risk/rewards inherent to flexible, market-based approaches, could help buyers to develop strategies that best align with their goals and objectives.<br>• **Webinar series designed to introduce the concept of trading to utility boards and executive management.** These individuals are key decision makers that have not been prioritized in past efforts to create interest in trading or demand for credits. They are also unlikely to be interested in detailed, complex materials. Messages need to target this audience's objectives and leadership level.<br>• **A watershed solution circuit rider who can help utilities craft trading plans and incorporate trading into permits.** This approach is used by the National Rural Water Association to provide technical assistance to rural water utilities in operational, financial, and management issues as well as energy audits. |
| **Funders** | • **Incentives for including watershed approaches within facilities plans.** Set aside money specifically for grants or offer lower interest rates to utilities that include WQT or other watershed approaches in their facilities plans (U.S. Department of Agriculture (USDA), for example, through USDA Rural Development funding and the Clean Water State Revolving Fund).<br>• **Fund phase-two projects that build on innovative pilots to grow the number of successful case studies.** Grant funding often prioritizes ideas that are new and innovative. This can lead to good ideas being left stranded in the pilot phase because they are no longer considered "new." Funding that is targeted at scaling up successful pilot programs could help trading programs grow watershed-wide or regionally. |

# 5. Identify and address risks of litigation.

One real risk associated with trading is the threat of legal challenges. There is no case law, at either the federal or state level, regarding the legality of trading or how different program design elements should be interpreted under the Clean Water Act and NPDES permit programs. This creates apprehension in permittees and state regulatory agencies that any program might face the cost and delay of legal action. Documenting where risks of litigation exist and preparing possible responses could help regulators and permittees build stronger, more defensible programs.

| Stakeholder | Actions |
|---|---|
| **NGOs** | • **Hold university law clinics at leading environmental law programs**. Create educational programs about WQT and its uses, risks, and benefits for law schools and legal professionals. Materials can be targeted toward both general counsel for utilities and the environmental law community.<br>• **Expand application of WQT principles beyond the current regulatory compliance context.** Build out the multiple models of agriculture-utility partnerships (where utilities partner with agricultural producers to invest infrastructure dollars in conservation practices to enhance water quality) and document how to navigate which type is right for a given watershed; and, develop templates to get started. These types of partnerships are not centered on permit limits and, therefore, are not subject to the same legal risks as trading.<br>• **Update the National Network's *Options and Considerations* guide to include likely legal risks.** Tying program design decisions to likely legal risks could help states develop stronger and more defensible trading programs. |
| **Law Firms** | • **Become familiar with risks of litigation and communicate possible responses to permittee clients.** Knowing what elements of a trading program are most likely to come under legal scrutiny and possible ways to mitigate those risks can help permittees and regulators feel more comfortable with pursuing trading as an option. Resources exist showing a clear pathway on the legality of trading (see Willamette Partnership & The Freshwater Trust, 2012; Water Environment Federation, 2015). Although the legality of trading is untested in the courts, it may be comforting for permittees to see that there has been robust legal discourse. |

# 6. Create guidance on trading for stormwater.

Municipalities across the country are experimenting with stormwater trading in the absence of national guidance on program design. For example, the Washington D.C. Department of Energy & Environment established the Stormwater Retention Credit Trading Program in 2013 and has been transparent about how the program was developed, what it costs, and how it is working (D.C. Department of Energy & Environment, 2018). The City of Chattanooga (City of Chattanooga, 2016) and City of San Diego have also initiated post-construction program development (Brown & Sanneman, 2017), and the Lake (Tahoe) Clarity Crediting Program supports regional "trades" of load reductions among participating municipalities, though it is more accurately described as an environmental accounting program (Lahontan Regional Water Quality Control Board & Nevada Division of Environmental Protection, 2011; Praul & Branosky, 2017).

As early-adopters of trading in the context of stormwater management, these municipalities committed time and resources to develop their programs in the absence of guidance. The trading community is starting to understand that there is a range of ways to approach trading for stormwater. There is a gap around expectations or even considerations for stormwater trading programs and how they differ from wastewater (e.g. many existing stormwater trading programs focus on volume of retention and not on pollutant loads). Developing guidance for stormwater trading can help interested parties take the first step in assessing feasibility for their local context.

| Stakeholder | Actions |
|---|---|
| **NGOs** | • **Develop guidance or principles to explain how stormwater trading works for a range of trading or trading-like programs**, including regional MS4 permits with multiple municipalities, one municipality with one MS4, and cases like the states of Virginia and Maryland where stormwater reductions come from outside the MS4 jurisdiction. |
| **U.S. EPA** | • **Issue an MS4 trading/alternative compliance policy statement** in support of piloting and working through innovative or alternative methods. |

# 7. Invest more in stakeholder relationships and trust.

Trading programs involve a unique suite of stakeholders coming together on a path that has been long used but lightly treaded. Strong relationships and communication are a huge asset, if not a precondition, for successful trading program development. Trust and good working relationships don't just happen as a byproduct of trying to build a trading program—these things require an investment of time and effort. The required coalition of unlikely allies is often disconnected or has a history of adversarial interactions. This is particularly present in the relationship between certain agriculture groups worried about a slippery slope to regulation and environmental groups concerned about accountability, transparency, and net environmental gain. The actions we propose here can help stakeholders understand each other's concerns and priorities from the outset.

| Stakeholder | Actions |
|---|---|
| **Utilities/ Permittees** | • **Map out the critical relationships required for a successful program in a given watershed.** This will allow utilities to initiate a dialogue with the full suite of important players and tailor messages to best communicate with each group. |
| **NGOs** | • **Develop a water quality trading communications kit.** Engage with marketing groups to match the right messages and messengers to target audiences.<br>• **Help build cross-sector regional leadership teams to support water quality trading programs.** Identify and convene leaders within the U.S. EPA regions for state water and agriculture agencies, agriculture associations, and utility associations to help them learn how to support their constituents in developing water quality trading programs and model the kinds of unlikely partnerships that need to form at the local level for successful trading program implementation.<br>• **Serve as objective intermediaries during trading program design and development.**<br>• **Network with other networks.** Deepen ties to networks like the National Association of Clean Water Agencies, U.S. Water Alliance, River Network, Water Environment Federation, National Association of Conservation Districts, National Soil and Water Conservation Society, and others. NGOs in the National Network or otherwise interested in trading should work with those networks to make connections and lift up success stories. As the profile of trading programs are elevated in different networks, stakeholders can come to see trading's cross-sector relationships as beneficial and, eventually, business-as-usual. |
| **Funders** | • **Provide a small grants program for new agriculture-utility partnerships.** Collaborative partnerships can get off the ground more easily if partners have funding to attend meetings and dedicate staff time to work towards progress.<br>• **Leverage utility investment in water quality trading.** Funders can take advantage of the time and effort going into a trading project by funding complimentary activities that are important for ecological health but may not be aligned with the permittee's compliance needs (e.g. aquatic habitat improvement, irrigation upgrades). When the projects are bigger and better, more stakeholders will feel that their goals are being advanced through the program. This helps build trust. |
| **All** | • **Re-frame how we talk about water quality trading.** Framing water quality trading as a way to optimize the use of resources in a watershed to promote overall environmental and community benefits will engender more support from stakeholders than using language such as, "pollution trading" or "compliance with effluent limits." |

*A stormwater detention basin can help offset impacts of increased runoff as a result of new development. / Clean Water Services*

# IV. Water Quality Trading Demand Assessment

The *Action Agenda* above was developed based on a four-part demand assessment. The demand assessment was designed to identify the barriers preventing permit holders and other potential credit buyers from developing a new water quality trading program or from participating in existing water quality trading markets. This section describes the components of that assessment and the findings that led to the *Action Agenda* objectives and priority actions described in Section III.

The assessment included over 50 stakeholder interviews on the barriers and opportunities that exist today; review of lessons learned from other environmental markets; examination of the timelines and decision-making processes and roles associated with implementing water quality trading; and, mapping the core predictors of demand for trading across the United States.

Through our assessment, we found the main barriers to implementing or participating in a water quality trading program include:

1. Trading program design and application are too complicated.
2. State regulatory agency capacity and resource constraints limit their ability to engage on water quality trading.
3. Stakeholders are uncertain about each administration's and the U.S. EPA's position on water quality trading.
4. Real and perceived risk and liability for buyers.
5. Risk of litigation.
6. There is no guidance on trading for MS4 permittees and only a handful of examples to look toward.
7. Lack of stakeholder relationships and trust.

The following is an overview of each component of the demand assessment.

## A. Stakeholder Interviews

In the summer of 2017 and spring of 2018, the National Network conducted interviews with over 50 professionals experienced with water quality trading to better understand the current landscape of demand for water quality trading in the United States. We asked the participants about their experience with water quality trading, the main barriers and challenges they faced in implementing a trading program, and what resources or actions could help them overcome those barriers (see Appendix A for complete list of questions).

These interviews were modeled after Industrial Economics' "2008 EPA Water Quality Trading Evaluation" (Industrial Economics, 2008), which sought to identify ways that U.S. EPA could better support trading. We modified that methodology to a) focus on identifying barriers and opportunities specific to buyer's interest in trading program development and participation in existing markets; and, b) identify priority actions that can be taken by multiple sectors, including utilities, NGOs, state regulatory agencies, and funders (not just U.S. EPA).

In addition to the National Network Steering Committee members, interviewees included (see Appendix B for a full list of interviewee organizations):

- State regulators working under policy, rules, or guidance on water quality trading.
- State regulators with newly enacted policy, rules, or guidance on water quality trading.
- State regulators working to author new policy, rules, or guidance on water quality trading.
- Utilities and municipalities whose regulatory compliance portfolio currently contains water quality trading.
- Utilities and municipalities who are working towards implementing a water quality trading program.
- Utilities and municipalities who purchased water quality credits in the past but no longer do.

- Utilities and municipalities who are interested in water quality trading but have been unable to implement it so far or will possibly implement it in the future.
- Individuals representing multiple cities and municipalities interested in water quality trading.
- State departments of transportation.
- Engineering consultants.

Throughout the interviews, we heard optimism about the future of water quality trading—both from the perspective of seeing it as a helpful compliance tool and from the perspective of wanting to take actions that can make an impact on overall watershed health. However, most people experienced some level of struggle in implementing it. There was a sense of frustration that it is harder than it should be to pursue trading even when it makes the most sense compared to other water quality improvement strategies.

Data collected during the interviews informed our understanding of the key barriers to water quality trading and shaped the Action Agenda in Section III. The interviews also helped us to corroborate findings from the other components of our demand assessment. We have included quotes from the interviewees throughout the report as examples of on-the-ground experience with water quality trading.

## B. Lessons Learned on Demand: Demand Dynamics of Environmental Markets in the United States

To understand why water quality trading markets have yet to realize their full potential and why demand for credits has been slow to develop, we looked to the lessons learned from other mature environmental markets in the United States. This section details the results of a rapid review of historical performance in markets for carbon offsets, wetland and stream mitigation, and endangered species mitigation (See Box 3 on page 22). The review identified transferrable lessons regarding the key drivers and contextual forces shaping demand for environmental assets and credits.

The rapid review, conducted by Forest Trend's Ecosystem Marketplace, assessed how history, policy context, institutional factors, economic factors, market actors, market designs, and other forces have played a role in stimulating or inhibiting demand. The review explored a range of sources documenting and evaluating historical developments in environmental markets in the United States, including academic literature, journalistic coverage, and "grey" literature, including conference presentations and proceedings, press releases, program reports, weblogs, registries, and government databases. Authors also consulted

*Demand for water quality trading credits has been slow to develop compared to other environmental markets, like carbon offsets. / Veeterzy*

Box 3. Selection of Environmental Markets in the United States

| | |
|---|---|
| Compliance Carbon Markets<br>**Western Climate Initiative**<br>*Regulatory Driver*: California AB 32<br>*Regulatory Body*: California Air Resources Board<br><br>**Regional Greenhouse Gas Initiative**<br>*Regulatory Driver*: State-level statutes and regulation in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont<br>*Regulatory Body*: State authorities in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont | Compliance carbon markets regulate greenhouse gas emitters and obligate them to either reduce their emissions, buy permits, and/or use offsets. (Offset usage is usually capped at a percentage of the overall pollution reduction obligation.) |
| Voluntary Carbon Markets<br>*Regulatory Driver*: None<br>*Standards Bodies*: Verra, Climate Action Reserve, American Carbon Registry, others. | Voluntary carbon markets may be driven by the expectation of future regulation ("pre-compliance") or by purely voluntary motives, such as corporate social responsibility. To create offsets, project developers undertake activities that reduce, avoid, or sequester greenhouse gases, like tree planting or investments in renewable energy projects. |
| Wetland/Stream Compensatory Mitigation<br>*Regulatory Driver*: Clean Water Act Section 404<br>*Regulatory Body*: United States Army Corps of Engineers and U.S. EPA | Compensatory mitigation is an umbrella term for the three main mitigation types (permittee-responsible mitigation, in-lieu-fee payments, and mitigation banking) that may be used to address residual negative impacts from development. In the United States, compensatory mitigation may be required for applicants filing for permits to drain, fill, or dredge a wetland or stream. |
| Conservation Banks or ILF Programs<br>*Regulatory Driver*: Endangered Species Act<br>*Regulatory Body*: U.S. Fish and Wildlife Service (for terrestrial and freshwater species), National Marine Fisheries Service (for marine and anadromous species) | Conservation banks are permanently protected sites where habitat is conserved and managed in perpetuity for the purpose of offsetting impacts that have occurred elsewhere to species protected under the Endangered Species Act. This review did not include habitat exchanges. |

Ecosystem Marketplace's historical, published markets analysis and unpublished internal data to corroborate findings from the literature review. These conclusions were highly consistent with what we heard from our interviewees (Section A). Their quotes are included below to animate each lesson and show its connection to water quality trading.

The contents of this report represents a summary of the conclusions from the review by Forest Trend's Ecosystem Marketplace. A full report is available online (www.forest-trends.org/publications/lessons-learned-on-demand ).

## Implications for Demand in Water Quality Trading Markets

### *Demand Depends on a Confluence of Recurring Factors: Environmental Impact, Bad Alternatives, and Clear Regulatory Signals*

Demand for and within environmental markets is more likely to emerge where serious environmental challenges exist, traditional compliance options are very costly or complex, champions exist in the regulatory agency, and buyers are confident that regulators support the use of credits. For example, demand in California's conservation banking market is greatly aided by the fact that imperiled species co-occur with high rates of development and steep land prices. Expensive property values mean that developers have limited options in shifting development to another site and are motivated to move quickly through the permitting process (Bennett & Gallant, 2018).

For water quality trading, demand for credits is most likely to be found in places where there are numeric water quality criteria, the technology required to meet limits is expensive or available technology is unable to reach limits, and potential credit buyers have support from their regulatory agency to pursue trading. We've also seen that the utilities who pursue water quality trading often have a champion supporting the program within their own organization.

> "We're seeing a lot of concern, particularly from municipalities, about meeting phosphorus-based effluent limits. That's creating a call for trading and other kinds of flexibility."
>
> ***-- A state water assessment section manager***

### *Regulators Are Critical Gatekeepers*

Regulators have the ability to fundamentally shape interest in trading programs by enacting regulatory drivers and designing market rules. For example, the Regional Greenhouse Gas Initiative and the California carbon market has seen vastly different levels of offsetting based on the relative cost to purchase more "allowances," the permits to emit greenhouse gases (Bennett & Gallant, 2018). In the Regional Greenhouse Gas Initiative, offset project development and sales have been slow to develop because companies can purchase allowances at prices below the coast it takes to develop offsets. In contrast, California's Air Resources Board has restricted the supply of allowances compared to overall demand, resulting in higher allowance prices. This, in turn, has made producing and selling offsets cost-effective and driven buyers towards purchasing offsets.

Regulators also have direct and indirect influence over demand given their role in implementing and interpreting market rules. Experience from wetland compensatory mitigation markets is instructive: Despite a joint rulemaking by the U.S. Army Corps of Engineers and U.S. EPA in 2008 that established an explicit preference for third-party mitigation, growth in demand varied widely across the country (Compensatory Mitigation for Losses of Aquatic Resources, 2008). The primary reason is that U.S. Army Corps of Engineers district offices have significant discretion in applying the final rule. Districts vary in the degree to which they follow the 2008 Final Rule preference (which is only considered a "soft" preference by the U.S. Army Corps of Engineers) and their policy on setting bank service areas (each district has its own). This translates to variability in demand for credits (Bennett & Gallant, 2018).

It's especially true that regulators shape demand for water quality trading. State regulatory agencies administer clean water standards, Total Maximum Daily Load (TMDL), and NPDES programs under the Clean Water Act, which determine how stringent permit requirements will be, and when and how trading can be used for permit compliance. A single champion helping steer water quality trading at a state regulatory agency or U.S. EPA regional office can make an enormous difference in whether trading gets off the ground at all in a given state or region. Further, regulators set trading program rules, which drive the cost, risk, and uncertainty that buyers will need to accept before participating.

> "The main barrier we've faced is the willingness of the regulating agency to work with you on the terms of how the program is going to look for you. Depending on which way they're leaning, you might be getting shot down before you even step up to the table, in terms of what your regulatory compliance options are."
>
> ***-- A utility director***

## *Regulatory Risk Is a Concern for Potential Credit Buyers*

Regulatory risk and other threats to buyer confidence can greatly affect participation in an environmental market. Transfer of liability is one program rule that can greatly affect a buyer's perception of regulatory risk. Liability transfer refers to whether the credit provider assumes liability for the buyer's regulatory obligation. In the other markets reviewed for this report, regulatory liability can transfer from a credit buyer to the credit producer. That means the buyer has met their legal responsibility by purchasing the credits and the responsibility to maintain the associated environmental benefits moves to the credit producer for the duration of the credit life.

Liability was a pivotal issue in the past in carbon and wetland/stream markets, and one that market administrators needed to address before significant buyer demand could emerge. For example, in wetland mitigation banking, demand was slow to take off until regulators established the precedent early on that regulatory liability is transferred from the buyer to the in-lieu-fee program or mitigation bank along with the mitigation payment (Shabman & Scodari, 2004). This helped address buyers' perception that banking was risky. Today, wetland and stream compensatory mitigation is the largest and best-established ecosystem market in the United States, transacting an estimated $3.5 billion in credits in 2016 (Bennett et al., 2017).

*Today, wetland and stream compensatory mitigation is the largest and best-established ecosystem market in the United States, transacting an estimated $3.5 billion in credits in 2016. Photo / U.S. Geological ServiceKyle Glenn*

The Clean Water Act has no such mechanism to allow the transfer of regulatory liability away from NPDES permit holders. That means the buyer of a water quality credit could be subject to enforcement action and fines if the credit-generating projects fail. Mechanisms do exist to transfer financial liability for a credit through contracts, but whether that provides sufficient peace of mind for buyers and how compliance risk might be further mitigated is a critical question for further investigation.

> "If things go south with an agreement a permittee has entered into, I don't think we would refer that permittee to the Department of Justice for legal action. Depending on the circumstances, we'd have to work quickly with that permittee to try to develop other trades for them to get them back into compliance. People are probably nervous about that. We haven't come across that yet, so there's a certain amount of trust that has to be built into it."
>
> -- ***A state field operations director for*** **wastewater**

## *Trust in the Market Is Key*

Early on, virtually all markets struggle with buyer perceptions that participation is risky. Demand will suffer if market administrators are not quick to deal with sources of uncertainty or if their actions reinforce the buyers' fears. For example, in the early days of California's carbon market, participants were

uncertain about what would be considered a violation and what it would take for the Air Resources Board to invalidate offsets. Project developers worried that regulators would retroactively invalidate some credits, forcing the credit owners to replace them at their own cost. When a 2014 investigation resulted in Air Resources Board invalidating a large number of offsets, those fears were confirmed and trading of offsets in the California market dropped substantially as a result (Goldstein, 2015).

The initial impression among buyers that a market is unpredictable or mismanaged can take years to undo. However, if buyers see changes to market rules as course-correction rather than a crisis, confidence in the market can be maintained. A predictable and transparent process for reviewing program performance, making changes, and clarifying gray areas can help build trust in the market.

> "The rules would change all the time. Everything was up to interpretation–if you talked to three different people, you would get three different answers. It's hard to have a certain responsibility to uphold a permit and constantly be at the center of this monkey business."
>
> ***-- A former buyer in a water quality market***

> "Some regulators have talked about not renewing fully functional credits after the end of their first credit life. They wouldn't do so for a piece of equipment that was still functioning, so why would they do that for a restoration project that is still functioning? Buyers see this as a big source of risk. They need to see that regulators are not going to treat credits any differently than other treatment systems."
>
> ***-- A trading practitioner***

## *Legal Challenges Impact Demand–and Are Rarely Resolved Quickly*

When challenges to a market's legal status do arise, it creates regulatory uncertainty and is known to interfere with buyer's demand for credits.

Over the years, uncertainty over the precise scope of the U.S. Army Corps of Engineers' regulatory jurisdiction has interfered with demand for wetland mitigation credits. In 2001, the Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers decision found that the U.S. Army Corps of Engineers did not have jurisdiction over hydrologically isolated wetlands on the basis of the so-called "migratory bird rule." The ruling was blamed by project developers for demand falling by as much as 50% in the Chicago area (Hook & Shadle, 2013). The case was an early skirmish in what has proven to be a

long-running dispute about the scope of regulatory jurisdiction under the Clean Water Act that continues to this day. Thus, a measure of legal uncertainty persists at the heart of the primary driver for wetland and stream compensatory mitigation.

While there has been robust discussion supporting the legality of water quality trading under the Clean Water Act (Willamette Partnership & The Freshwater Trust, 2012; Water Environment Federation, 2015), there is no case law on the matter. Environmental laws and regulations routinely face legal challenges from all sides and citizen suit provisions are central to the entirety of the Clean Water Act (33 U.S.C. §505), so while these conflicts are not surprising or unique to trading, they may affect buyer confidence in the market. Water quality trading advocates can best prepare and build confidence in the market by putting in the necessary due diligence to develop defensible programs that can set a positive precedent and stand up to any legal challenges that do come along.

> We are currently going through an appeal of one of our permits that authorizes the use of a trading program to meet load reductions. That takes up our time and leaves us less time to do actual program administration.

***-- A state environmental program manager***

## *The Transaction Process Matters*

Potential buyers of compliance credits in an environmental market consider simplicity and predictability, not just cost. The front-end experience of purchasing a credit is important and market designers may increase demand if they can simplify the transaction or make the process or costs extremely transparent and predictable.

> Field-confirming the benefit of a BMP is pretty sophisticated science. Those of us who are regulated entities are not research institutions. We need to be able to apply formulas that are easy to understand, that use appropriate assumptions based on field data, but don't necessarily require a ton of field data to make those assumptions.

***-- A city deputy director of environmental services***

Oregon's Carbon Dioxide Standard provides a good example of where a program's positive user experience produces a steady demand for offsets. Oregon's Carbon Dioxide Standard gives new power plants three options to address their carbon dioxide emissions. They can reduce their carbon dioxide emissions on-site, develop emissions reduction projects offsite (i.e., create their own offsets), or fund emissions reduction projects carried out by a state-recognized nonprofit. To date, all new plants have chosen the third, and simplest, option (Bennett & Gallant, 2018).

Of course, state regulatory agencies need to prioritize trading program designs that are legally defensible and support clean water outcomes. But as market designers, they might be able to boost participation by understanding the specific

priorities of their potential buyers, whether it is cost, certainty, accountability, speed, minimizing burdens on their employees, or something else.

## *Predictability of Supply and Demand Strengthens Markets*

Many buyers in environmental markets come from the public sector, where it may be possible to predict credit demand well into the future. In North Carolina, the Department of Transportation plans out highway construction projects seven years in advance; this lets them predict wetland impacts. They collaborate with other state and federal agencies that routinely need offsets for impacts to wetlands, streams, or water quality. The Division of Mitigation Services (formerly called the Ecosystem Enhancement Program) ensures a pipeline of approved credits by accepting in-lieu fees from buyers and then using those funds to contract with private companies to deliver the necessary mitigation projects. The model has been successful in ensuring steady demand because it plays to the strengths of the private and public sectors: The private sector carries implementation risk and most of the financing risk while the public sector provides transparency around long-range planning (Bennett & Gallant, 2018).

Trading proponents might consider how to design a program that provides good demand certainty for suppliers and cost certainty for buyers, whether through purchase or price guarantees, requests for proposals for credits/full-service delivery, or some other mechanism.

> "If you could have said to me that the program will always exist, there will always be credits to purchase, and that they'll cost X, there would be no more treatment upgrades."
>
> ***-- A city assistant water and sewer superintendent***

## *Timing Is Everything*

There is so much information required for both the permittee and the regulator to make a decision about trading that analyses should begin well before the cycle for a new permit or a TMDL is written. However, this kind of pre-compliance action (i.e., in anticipation of a forthcoming environmental regulation) has a mixed track record across markets. Buyers may not want to invest a lot of time or resources in trading until they are sure it is going to be in their permit, which drives demand for credits. Regulators may not want to invest time or resources in developing a program if permit holders are not going to participate.

> "If a permittee has to wait to see their permit to know if trading is an option, then by the time someone looks at the technology option and says, 'hey, that's too expensive,' there isn't sufficient time to vet out the water quality trading option; and the permit deadline is impending, so water quality trading doesn't happen."
>
> ***-- A trading practitioner***

The Chicago Climate Exchange has seen both the ups and downs of pre-compliance demand for credits. The market was established in 2003 in anticipation of a nationwide cap-and-trade program in the United States. When the Senate failed to take up a cap-and-trade bill in 2010, offset prices dropped precipitously and the market crashed. In 2011 and 2012, voluntary activity began to recover (albeit outside the Chicago Climate Exchange), buoyed by pre-compliance sales prior to the start of the California carbon cap-and-trade program, which launched in 2013 (Bennett & Gallant, 2018).

Some water quality credit buyers may be convinced to purchase pre-compliance credits if there is certainty the credits will be honored after their permit limits are in place, to secure more favorable permit terms (e.g. a lower trading ratio), or possibly to ensure supply is not lost to other projects or development. State agencies, practitioners, and nonprofit partners will be most successful in promoting pre-compliance markets where a regulatory driver is imminent and the state regulatory agency can provide assurances regarding how those credits will apply after a permit is issued.

> We aren't facing numeric criteria. So when trading comes in, the question is, is the juice worth the squeeze? Are you going to put five staff on implementing a program that four facilities are going to use to offset a few hundred pounds of nitrogen or phosphorus?
>
> ***-- A state water quality resource coordinator***

## *Cost Isn't the Only Driver*

Some buyers are simply seeking the lowest cost. For others, local co-benefits and a good story can be extremely compelling and even tip the balance in favor of a trade that is not cost-competitive with other compliance options. Ecosystem Marketplace has found that voluntary carbon offset buyers have grown increasingly sophisticated over the past decade in terms of their motives for offset purchases and the offset characteristics they require. These "boutique" buyers want a great story and often co-benefits for communities, biodiversity, and water. These buyers often come from sectors where brand management is important, such as consumer goods (Bennett & Gallant, 2018).

*Visitors enjoy bird watching at Fernhill Wetlands, a natural wastewater treatment complex and trail network built by Clean Water Services in Forest Grove, Oregon. / Clean Water Services*

Many wastewater utilities across the United States have rebranded in recent years with names that reflect a shifting focus toward resource recovery and protection. Along with these new names, utilities are

investing in projects that support the health of their watersheds and, ultimately, in the relationships they have with their community members. This lesson points again to understanding the specific priorities of the potential buyers and adjusting the market design to suit where possible.

> Many years ago I would have said [trading] was absolutely core to our compliance strategy for our treatment facilities. Now, even larger than that, it's absolutely core to our organization to be able to continue to implement this program, to be able to engage the communities and various stakeholders in this watershed. We will absolutely continue to scale up our trading program.
>
> ***-- A utility water resource program manager***

## C. Water Quality Trading Decision-Making Roles and Processes

In order to better understand what drives interest in trading and demand for credits, this section of the demand assessment identified key decision-makers and the context under which they consider water quality trading.

We built conceptual models to represent how large clean water utilities and state regulatory agencies make decisions about trading ("key decision-makers") and when trading should be considered during utility capital improvement planning, NPDES permitting, and TMDL development ("key decision points"). The models were tested through interviews with utilities, municipalities, state regulators, and other water quality trading professionals.

The models imply an ideal scenario in which information about trading gets into the hands of key decision-makers at a point in time when it can be most influential. A rapid gap analysis was conducted to compare that ideal scenario to what happens now, as reported by National Network participants. The gaps that we identified were used to inform our understanding of major barriers, and the implications are embedded in the *Action Agenda*.

It is important to note that these models don't show how utilities and state regulatory agencies interact with their stakeholders or how they might improve those interactions, although that is a valid area for future exploration. Instead, they are meant to describe the processes occurring at state regulatory agencies and utilities as they exist today so that trading advocates can better work within them.

### Key Decision-Makers

To understand the key decision makers that accept or reject the use of water quality trading as a preferred compliance option, the National Network used publicly available organizational charts, literature review, and peer review to outline the typical organizational structures for a clean water utility and state regulatory agency. We compiled this information into generalized decision-making structures that can be used to create tailored messages for key decision-makers at wastewater and stormwater utilities, municipalities, and state regulatory agencies for water quality trading.

## *Utilities and Municipalities*

While many personnel at a utility or municipality may take part in evaluating trading as an option, our interviews suggest that leadership (e.g. city council, board of directors, general manger or public works director) is critical to the adoption of any new program, including water quality trading (Figure 1). Consulting engineers can also play an important role in introducing trading as an option to utility or municipality leadership for consideration.

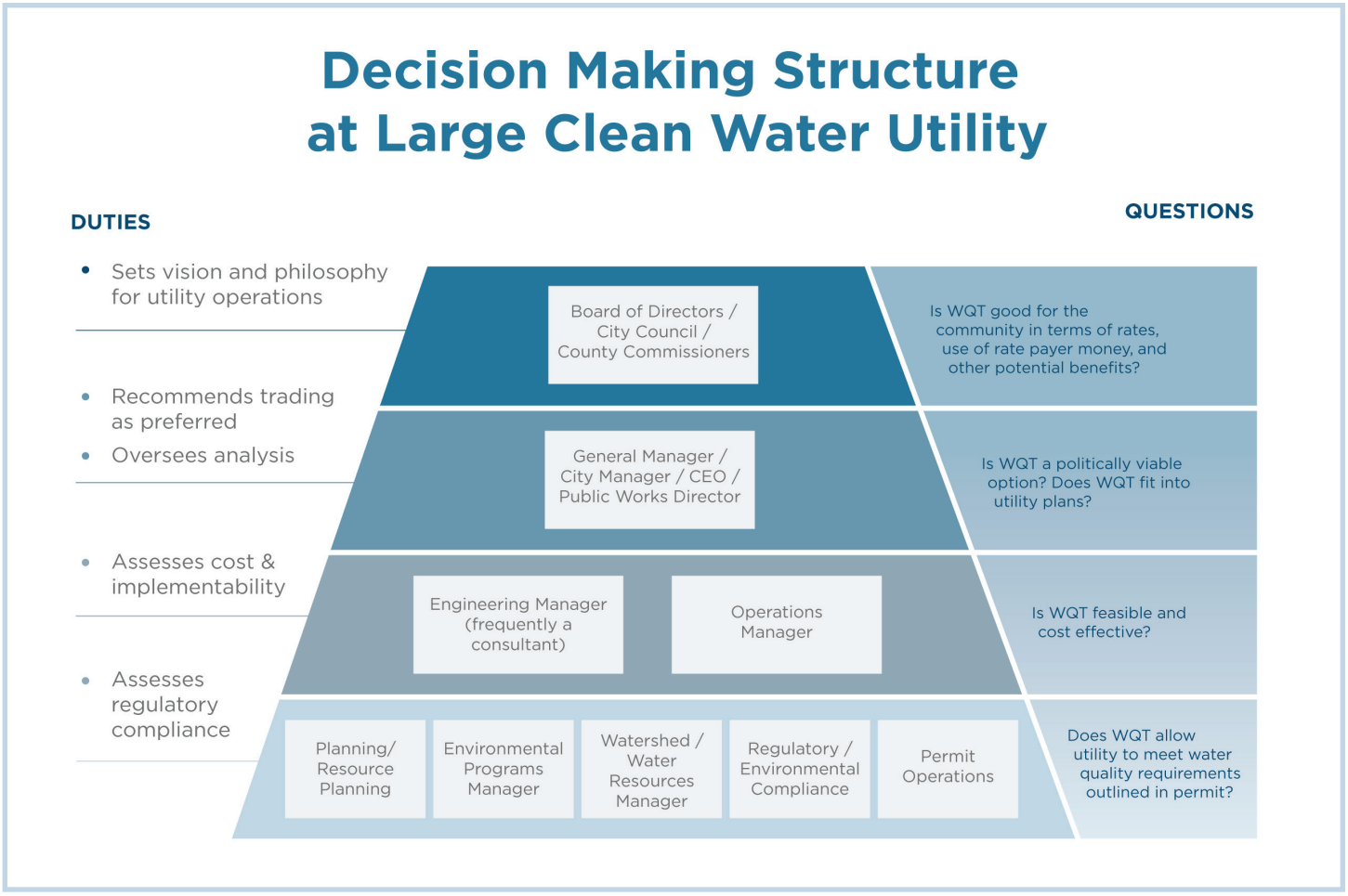



***Figure 1. Conceptual model of utility decision-makers involved in evaluating the use of water quality trading.*** *The model specifies the duties of each role, related to water quality trading, and lists some of the main questions each role will want answered before recommending trading as an option. Each question will need to be answered before the decision can proceed up the model to the next role.*

**BOARD OF DIRECTORS |** The board of directors sets the vision for the organization. Utilities with active trading programs have often had to work hard to convince their board, council, and ratepayers that a utility should function as a resource recovery agency that provides watershed protection and a clean environment, and delivers high value through their investments, including community benefits broader than the infrastructure itself (Nielsen-Pincus & Moseley, 2012). For elected boards, this may be a more

appealing message than the potential for cost savings compared to traditional infrastructure investment. A general manager for a municipal water district told us, "Our board is all publicly elected and is very much environmentally minded and focused. They would strongly consider the connection and goodwill with the community that a trading program would catalyze."

EXECUTIVES | City executives, utility general managers, and public works directors—frequently a single person in smaller communities—can be the driving force behind the successful implementation of a trading program. They are often the person who brings trading as a compliance option to their board. For trading to be an executive's preferred option, they likely need to see that it will cost-effectively fulfill their regulatory obligations and that it will be a politically viable option, given the direction set by their board of directors. For some, a new or different compliance program may feel risky, where others may find it appealing. As one city manager looking to implement the first trading program in his watershed said, "Being first with something and putting a plan together and implementing it is just the way I'm wired. So when I looked at [the city's future waste load allocation] and what the potential options and solutions are, it just made sense that we need to do this."

CONSULTING ENGINEERS | Consulting engineers can also play a critical role in decision-making around water quality trading, even though they may not show up on a utility's organizational chart. Utilities, particularly those serving small- and mid-sized communities, rely on consultants to inform them of their suite of options for achieving regulatory compliance. The environmental program manager at a small utility reported relying heavily on consultants who are "open-minded enough to listen to alternative approaches but maybe not the best at proposing them."

Some firms may simply not be aware that trading is an option, while others who don't have trading expertise may be more likely to recommend alternatives where they can bid on the design build. One consultant we spoke with told us that he had just amended a plan for a city "where another consultant told them trading isn't feasible, but it is." In Wisconsin, the Department of Natural Resources has taken steps to address this by publishing A Water Quality Trading How-To Manual (2013) to help permittees and their consultants understand water quality trading with an emphasis on developing a successful trading strategy.

## *Regulatory Agencies*

As mentioned in the lessons learned from other environmental markets, the regulatory agency's attitude toward trading is critical in creating demand to develop a trading program and supporting participation in existing markets. A utility may prefer to use trading, but the regulatory agency will ultimately decide whether trading can be used to satisfy the utility's permit obligations. Where enforcement of the Clean Water Act has been delegated by the U.S. EPA to the state, the state regulatory agency will play a more involved role in the design and approval of a trading program (see Figure 2 on page 33).

Even in states that have rules, policy, or guidance to enable trading, agency staff can be unfamiliar with the practice. A number of interviewees pointed to high turnover rates of regulatory agency staff as a chief barrier to implementing trading. One person told us there seemed to be a lack of expertise at the regulatory agency with the state's own trading guidance because "turnover is so bad—no one stays there long enough, or they retire because they're in their 50's and 60's. They're losing institutional knowledge."

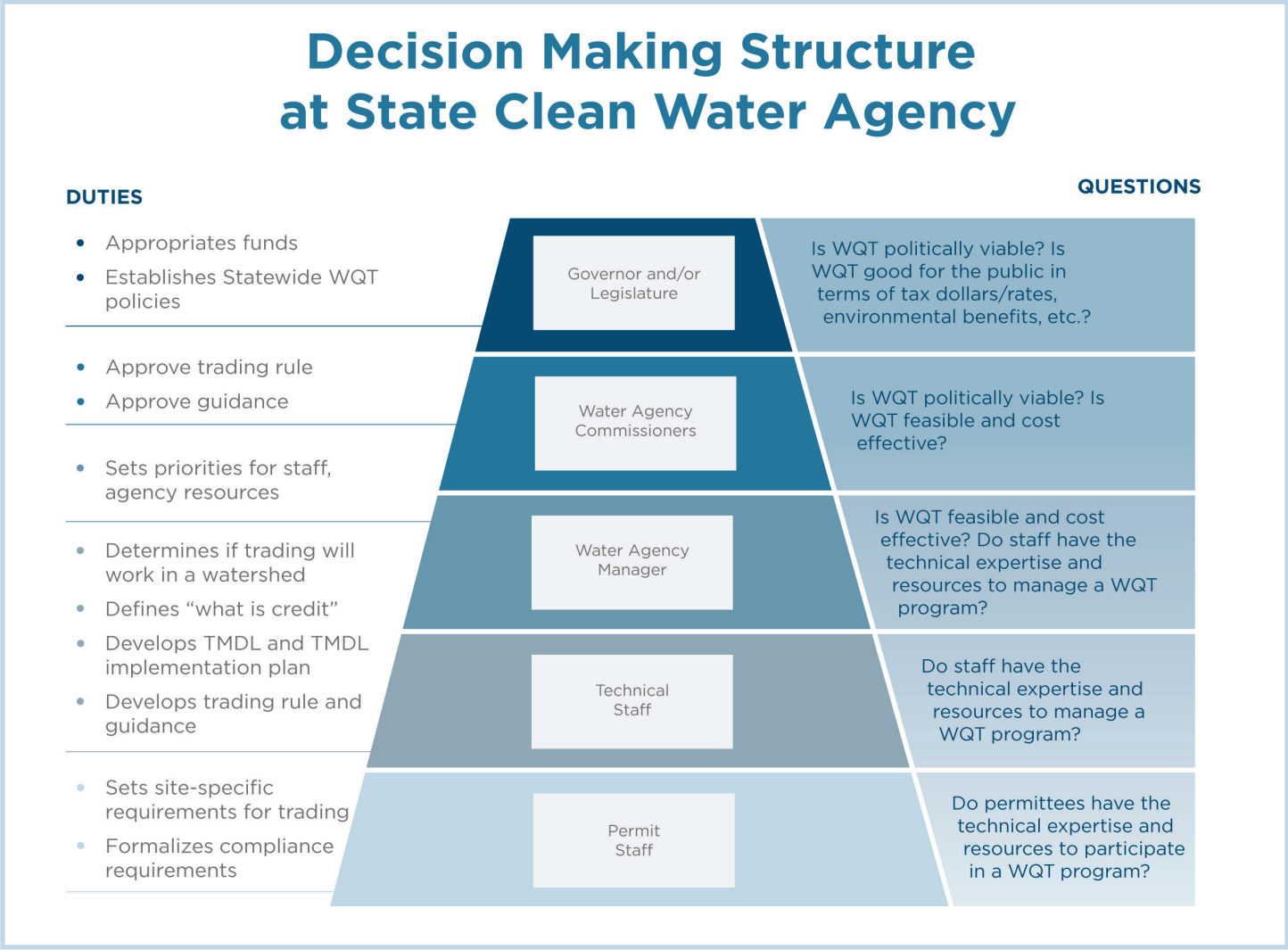



***Figure 2. Conceptual model of state agency decision-makers involved in evaluating the use of water quality trading.*** *This model shows state regulatory agency roles and duties related to trading and questions about trading they might want answered.*

Staff who developed trading guidelines have moved on and new staff, particularly permit writers who are responsible for incorporating trading into discharge permits, are uncomfortable with it or unsure how much risk they can take because they've never written a permit that includes trading. Support from agency leadership can be a key factor influencing how comfortable staff feel engaging on trading. One trading practitioner told us, "A strong declaration of support from the agency director can make the difference for otherwise hesitant staff. When the director of the Department of Environmental Quality made such a statement, we were able to leverage that to help convince DEQ staff how important it was to engage, listen, and find a way."

Since regulators are critical gatekeepers, successful implementation of trading requires ensuring that each role within the regulatory agency has the information and tools they need to fully understand and evaluate water quality trading. Below we highlight some of the key roles and dynamics that can affect a state's implementation of trading.

LEGISLATURE | In some states, legislative bodies have charged the regulatory agency with developing a trading program or even developed trading rules through the legislative process. The legislature also determines funding for the regulatory agency. How much, or if, they fund staff positions like a water quality trading coordinator makes a big difference in the ability of the regulatory agency to consistently engage on trading.

COMMISSIONERS AND MANAGEMENT | Regulatory agency commissioners and managers whose approval is required for trading are usually balancing a number of high-level decisions. They should be informed early, often, and efficiently to identify red flags and build support for trading. Pilot projects can be a good way to convince management that trading programs can deliver water quality benefits and be economically viable.

TECHNICAL STAFF | Often, technical staff are responsible for program development and administration. They will be looking for resources that help them understand the myriad program design options and that provide a robust and justifiable position for the regulatory agency.

PERMIT WRITERS | Permit writers are tasked with fitting trading programs in with a host of other requirements and compliance issues and will likely be looking for templates. In our interviews, we heard there is a lot of turnover in permit writers at state regulatory agencies, so consistently educating new staff about trading is critical.

ACROSS THE BOARD | Staff time and resources are nearly always a constraint. Third parties can help address this by seeking grant funds or supporting regulatory agency budget requests to staff trading program development and administration.

## Key Decision Points

Just as critical as who is making the decision is the question of when those decisions must be made. The National Network reviewed TMDL and NPDES permitting processes for several states, as well as utility capital improvement planning processes, to develop a timeline of when water quality trading needs to be introduced into these processes in order for trading program development to be successful. What's clear is that the conversation has to start early, no matter which decision-making process is underway: utility capital improvement planning, NPDES permitting, or TMDL development.

### *Capital Improvement Planning*

In order for trading to be included in a utility's capital improvement plan, it would ideally be considered, including through cost-benefit analysis, during the utility visioning and facilities planning phase. This will typically be well before the NPDES permit negotiations take place, leaving both the utility and the regulatory agency time to consider trading as an option (see Figure 3 on page 35). It can be difficult to consider (and budget for) trading at this early stage if the utility or the regulatory agency is not familiar with trading or does not have relationships with partners who can assist the utility in vetting the option, such as agricultural producers and trading practitioners. Additionally, there may be significant time

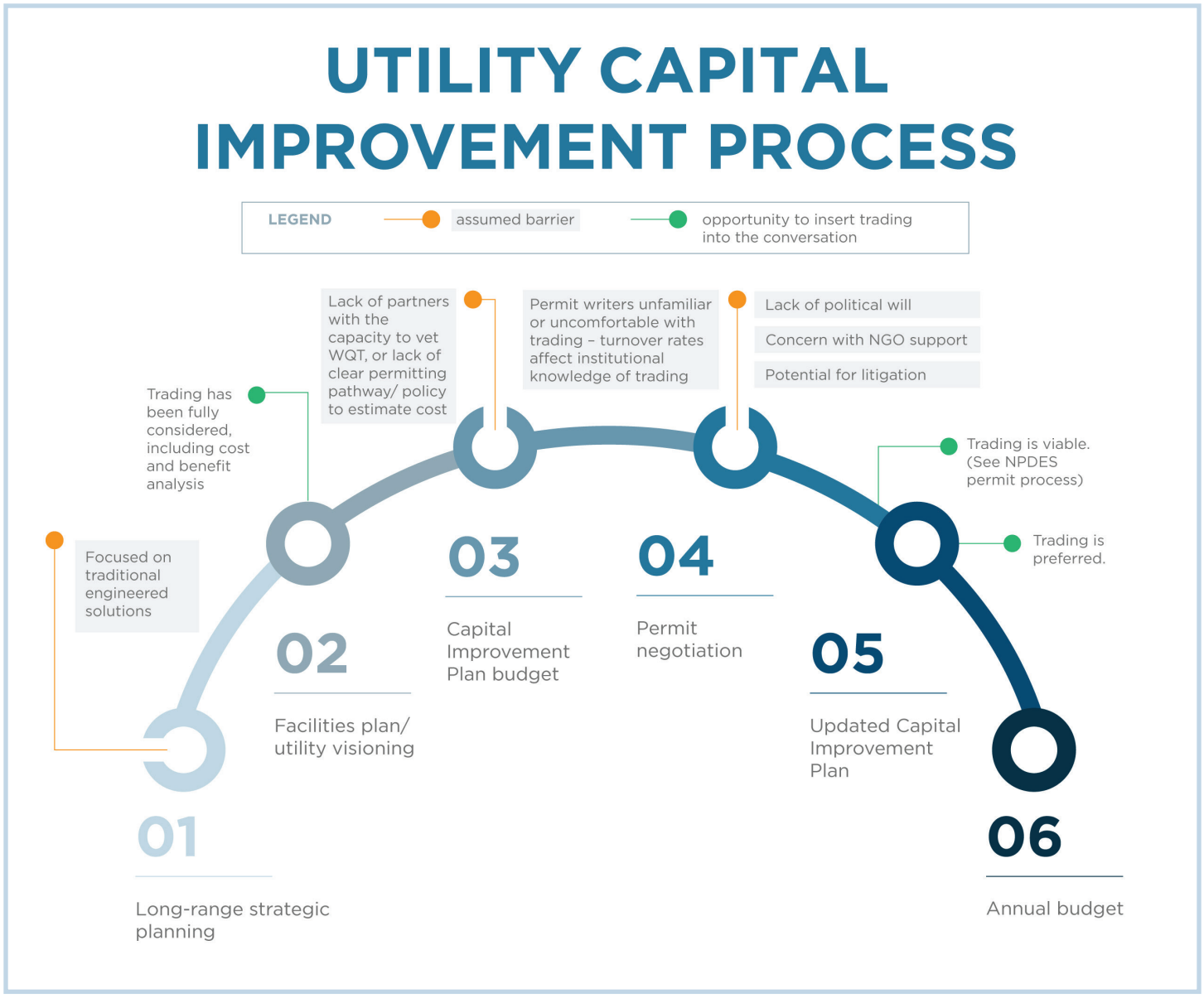



***Figure 3. Conceptual model of a utility's capital improvement process illustrating where challenges to trading might arise and important decision points where trading should be considered.***

and staff capacity involved in coming to agreement on the specifics of a trading program, a process which often also involves stakeholders from the environmental, agricultural, and trading practitioner communities.

## *NPDES Permitting*

As noted above, a utility should have their trading plan worked out well in advance of their NPDES permit application or renewal. The permit process itself may be too late to fully consider a new compliance strategy that includes water quality trading, especially where a utility has to implement a multi-pronged

strategy to address several pollutants and where trading for one of those pollutants is better understood than for other pollutants. For example, if a utility needs to address both temperature and nutrients, and the state has a history of trades for one but not the other, it may be simpler to just deal with them individually given tight permit timelines even though a more holistic solution could ultimately be cheaper and yield better results for the watershed. One utility's general manager was very interested in using trading but ultimately chose to treat all wastewater to potable standards to deal with nutrient limits: "We were under a tight timeline to renew our permit. The [state regulatory agency] was receptive to the idea, but they wanted to learn more. We ran out of time."

In other cases, a shorter timeline may spur action on water quality trading. A city manager told us that a tight window for permit negotiation helped him articulate why trading is his preferred compliance option and win approval from his board of directors.

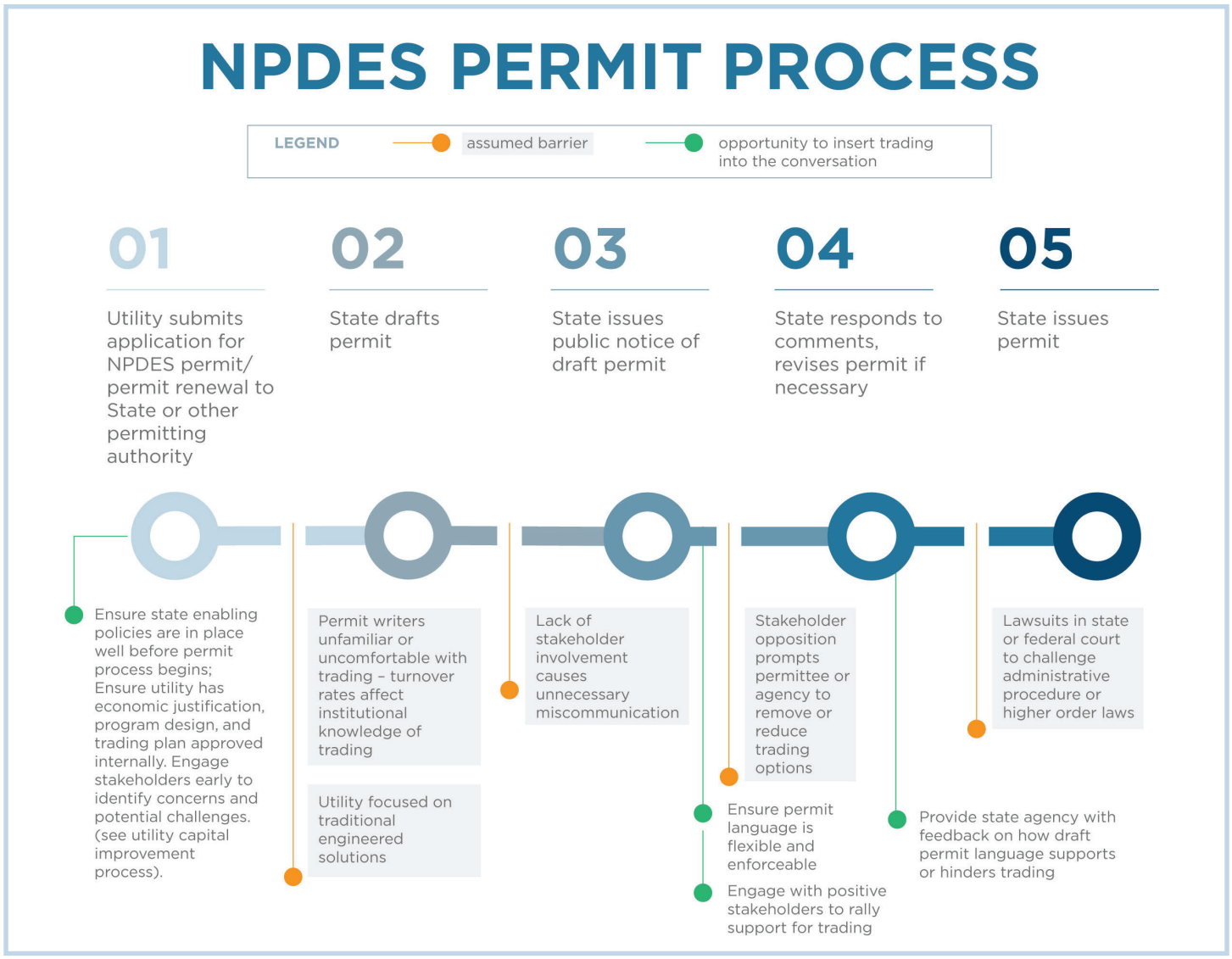



***Figure 4. Conceptual model of NPDES permit process illustrating where challenges to trading might arise and important decision points where trading should be considered.***

Other challenges that can emerge during the NPDES permit process are stakeholder miscommunication and stakeholder opposition leading permit writers to limit options for trading. Involving stakeholders early, demonstrating the process through pilot projects, and creating a transparent process where all parties are speaking a common language is key to the successful implementation of a trading program (see Figure 4 on page 36). State agencies can also consider engaging stakeholders to set some of the rules for their trading programs at the state or watershed level, which can reduce the time and effort needed for a given permit.

## *TMDL Development*

During the TMDL development process, trading should also be considered early, leaving time for the regulatory agency and stakeholders to develop an approach for establishing baseline, credit quantification methods, and priority actions and areas (see Figure 5). That makes it possible for the final TMDL to include language on the intent to trade and incorporate trading actions into the TMDL

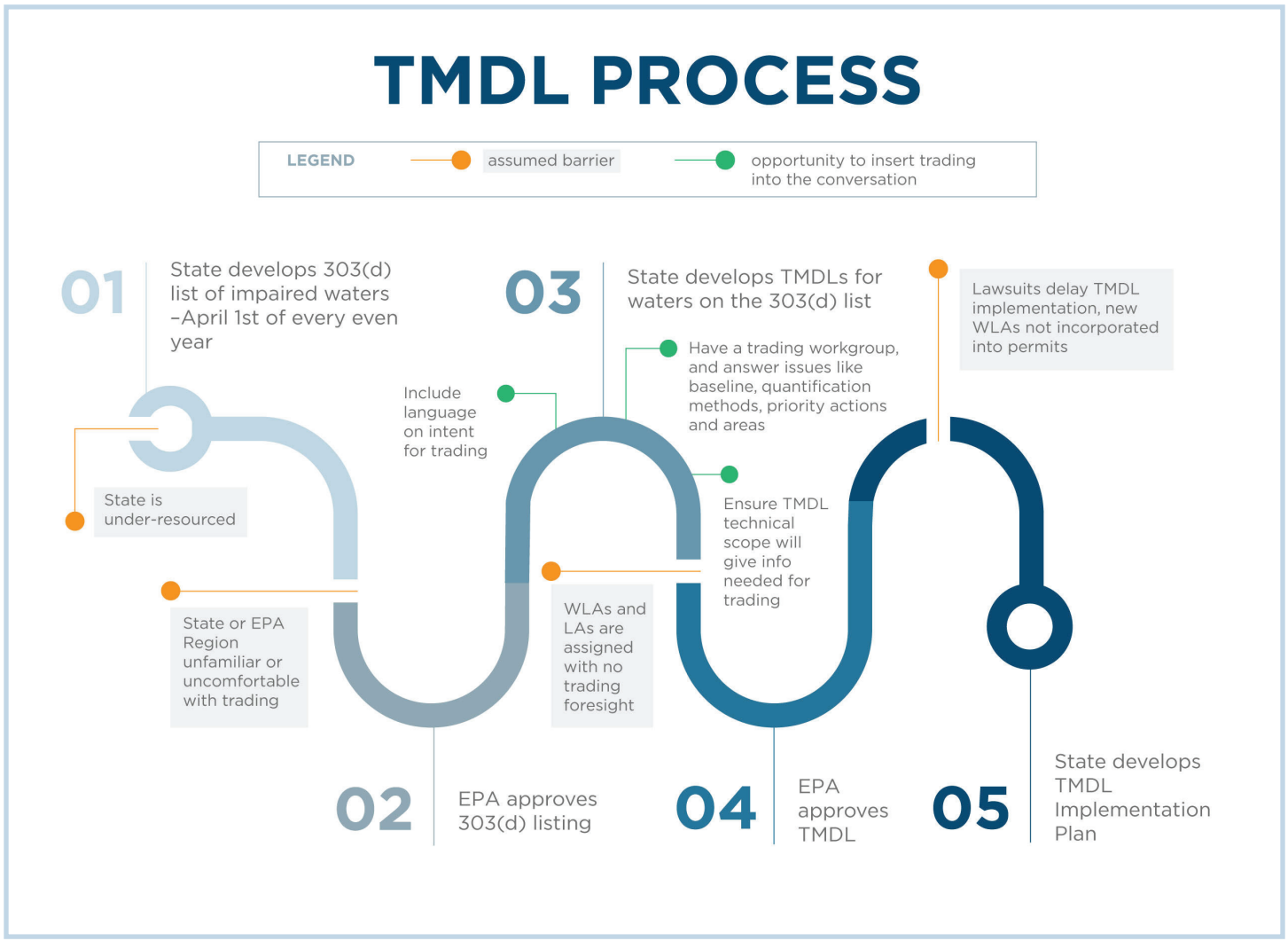



***Figure 5. Conceptual model of TMDL development process illustrating where challenges to trading might arise and important decision points where trading should be considered.***

implementation plan.
Starting the trading conversation early ensures that all parties have time to consider it as an option. But initial inertia can be a challenge. It is hard to prioritize resources to develop a state policy or individual trading program without an imminent need, such as a looming permit renewal. As one state regulator put it, "It's tough to create a program or dedicate resources for a possible future situation without active, pressing concerns." However, by the time the need is clear it can be hard to move quickly enough.

# D. Geography of Demand

In this final section of the demand assessment, we present summary findings from an analysis of the "geography of demand," or the way that demand drivers play out across the United States. This component of the assessment provides a means of testing assumptions about what drives demand for trading, identifies where opportunities to influence demand drivers may exist, and visually communicates the potential scale of trading. The results can also help the National Network and others prioritize places for a more detailed feasibility assessment or target where to apply the priority actions in the *Action Agenda*.

The analysis, conducted by the National Network, in partnership with Forest Trends' Ecosystem Marketplace, U.S. EPA's EnviroAtlas project team, and U.S. Department of Agriculture's Office of Environmental Markets, looks at the watershed characteristics, economic factors, and policy and regulatory drivers across the United States that we expect to be key drivers of demand. Those factors are combined in two models of potential demand: one for water quality credit trading and one for stormwater credit trading.

The results from both models highlight watersheds where trading is already known to be active as well as those where trading could be feasible. We also used the models to explore how the lack of supportive trading policy may be a limiting factor in areas where demand for trading might otherwise be found. The content in this report represents just a summary of the conclusions from that review. A full report providing a detailed explanation of methodology, indicators, data sources, and results of sub-models is available online (www.forest-trends.org/publications/mapping-potential-demand-for-water-quality-trading-in-the-united-states).

## Analytical Approach

Potential demand for water quality credit trading and stormwater credit trading is represented by a score from 1 to 10. The score represents the combined outputs from three sub-models. Sub-models were developed for watershed characteristics, economic indicators, and policy and regulatory indicators of demand (Table 2 on page 39). They were built with input from the National Network's steering committee, Forest Trends, and U.S. EPA, then normalized and combined to create a master score of overall potential demand.

The models and sub-models should be interpreted deliberately. The analysis was conducted at a national level, so additional investigation will be required to evaluate the effect of specific drivers of potential demand at a finer scale. For example, "ground-truthing" national data on the biophysical characteristics of a watershed or understanding whether state-level water quality trading policies are really active in practice

**Table 2. Demand Drivers: Submodel Categories, Indicators, and Use in Water Quality Credit and Stormwater Trading Models**

| Submodel | Indicator | Water Quality Credit Trading | Stormwater Trading |
|---|---|---|---|
| **Watershed Characteristics** | Total annual load volume from NPDES sites (N, P, solids, and organics) | X | X |
| | Total average temperature change from NPDES sites | X | X |
| | Agricultural nonpoint source contribution to pollution: Metric tons of nutrients (N+P) annual loss | X | |
| | Presence of point source facilities with permit limits discharging into impaired waters a pollutant potentially contributing to impairment, and which have a violation of effluent limits or compliance schedules in at least four of the last twelve quarters | X | X |
| | Share (%) of land cover in agriculture | X | |
| | Share (%) of land cover in impervious surface | | X |
| **Economic Drivers of Demand for Trading** | Presence of POTWs reporting insufficient current capacity/level of treatment | X | |
| | Projected population growth | X | X |
| | Projected impervious surface growth | | X |
| | Presence of a city/municipality with >100,000 residents | X | X |
| **Policy/Regulatory drivers of demand for trading** | Kilometers of 303(d) listed impaired waters for N, P, temperature, total suspended solids, and/or dissolved oxygen in the watershed | X | X |
| | Presence of water quality trading program with a trade completed in the last three years | X | X |
| | Active or draft state-level trading regulation, policy, or guidance | X | X |
| | Presence of a regulated MS4 with language supportive of offsets or mitigation | | X |

or just on paper.

Furthermore, the analysis did not capture the qualitative factors that can frequently influence demand, such as presence of a local champion or the ways in which individuals or institutional culture within a regulatory field office shape implementation of policy or regulation. These "soft" factors are often tremendously important to a program's success and should be considered carefully by anyone seeking to develop a trading program.

## Demand Drivers

*Watershed characteristics* included in the model represent both the scale and the sources of water

pollution in a watershed. That is because poor overall water quality often triggers stricter controls through the Clean Water Act (33 U.S.C. §303(d)); and because if water quality is impaired due to a mix of point and nonpoint sources, there may be an opportunity for cost savings and greater environmental benefit by introducing trading. Conversely, if pollution comes primarily from only point sources or only nonpoint sources, there is less opportunity for gains from trading. In the case of stormwater trading, the share of impervious surface cover in the watershed is also included as an important indicator of whether demand might exist for a trading program.

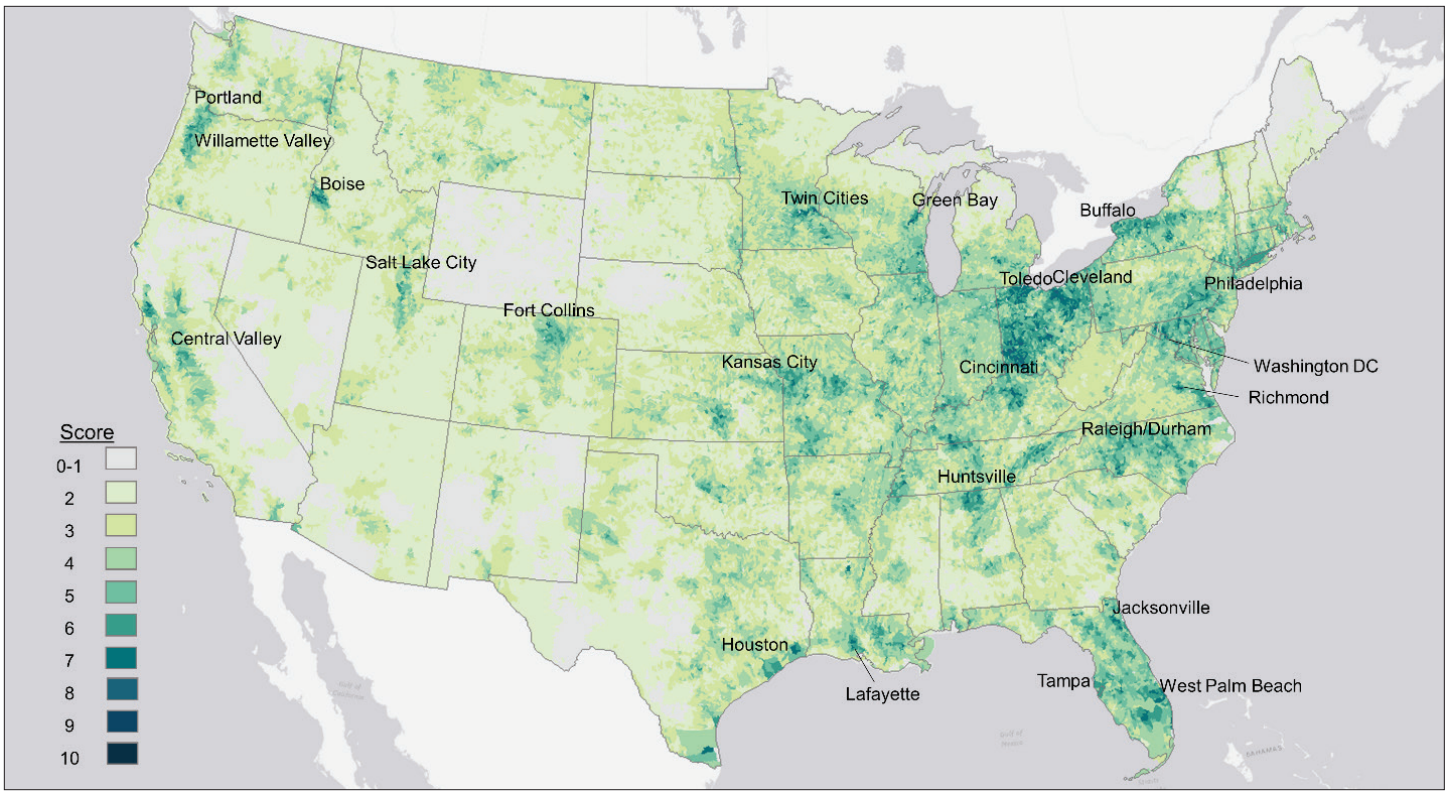
*Economic drivers of demand* are related to new growth that can increase the need to address pollution and may, therefore, increase the need for flexible approaches such as water quality trading. For example, a growing population will put increasing pressure on wastewater treatment facilities, many of which already struggle with insufficient capacity. These facilities may consider water quality credit trading as an alternative, especially if it is more cost-effective or delivers additional benefits to the community. Expected growth in impervious surface coverage can similarly trigger demand for stormwater trading as an alternative or complement to on-site stormwater controls.

*Policy and regulatory drivers* include both the regulations that compel entities discharging pollutants to comply with water quality standards, such as a 303(d) listing under the Clean Water Act (33 U.S.C. §303(d)), and also the policy and guidance that explicitly support water quality trading and/or set out the rules and framework for trading. Both increase the likelihood of interest in trading among potential buyers. We considered whether trading policies or guidance were in place and whether there was a history of trading nearby, which suggests that both effective demand drivers and buyers familiar with trading may already exist in a watershed.

## Potential Demand for Water Quality Credit Trading and Opportunities for Policy

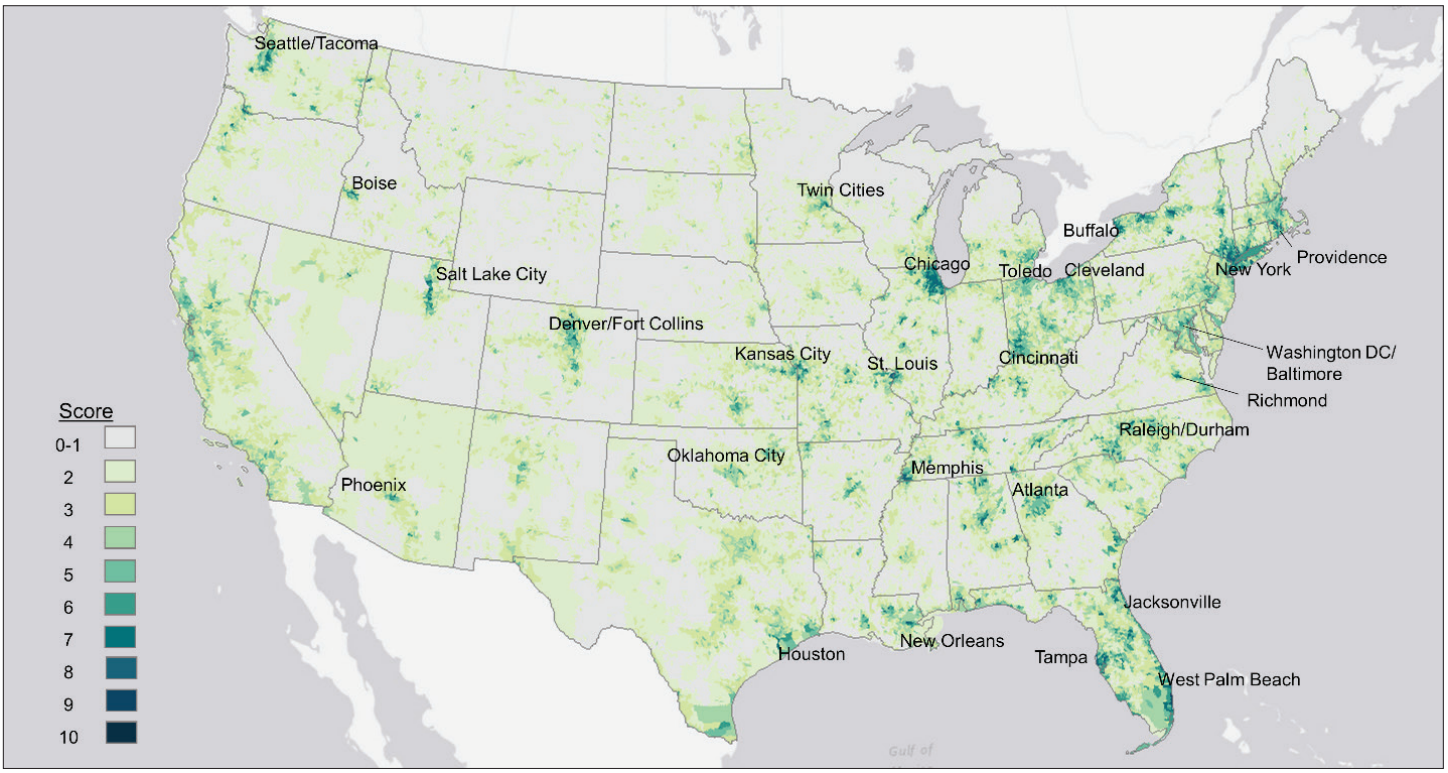
Maps 1 and 2 (on page 41) present results of analyses for water quality credit trading and stormwater credit trading respectively. Each map is based on evaluation of the watershed characteristics, economic, and policy and regulatory drivers discussed above. A high score indicates that more demand drivers are present. These are the places we would prioritize for a more detailed investigation.

Maps 3 (on page 42) shows the opportunities for enabling policy (i.e., state guidance or rules) to enhance opportunities for water quality trading. Some watersheds scored well in watershed characteristics and economic demand but had low scores for policy and regulatory demand. In these watersheds, enabling policy or regulatory conditions may be a limiting factor on demand, and putting new policies, guidance, or



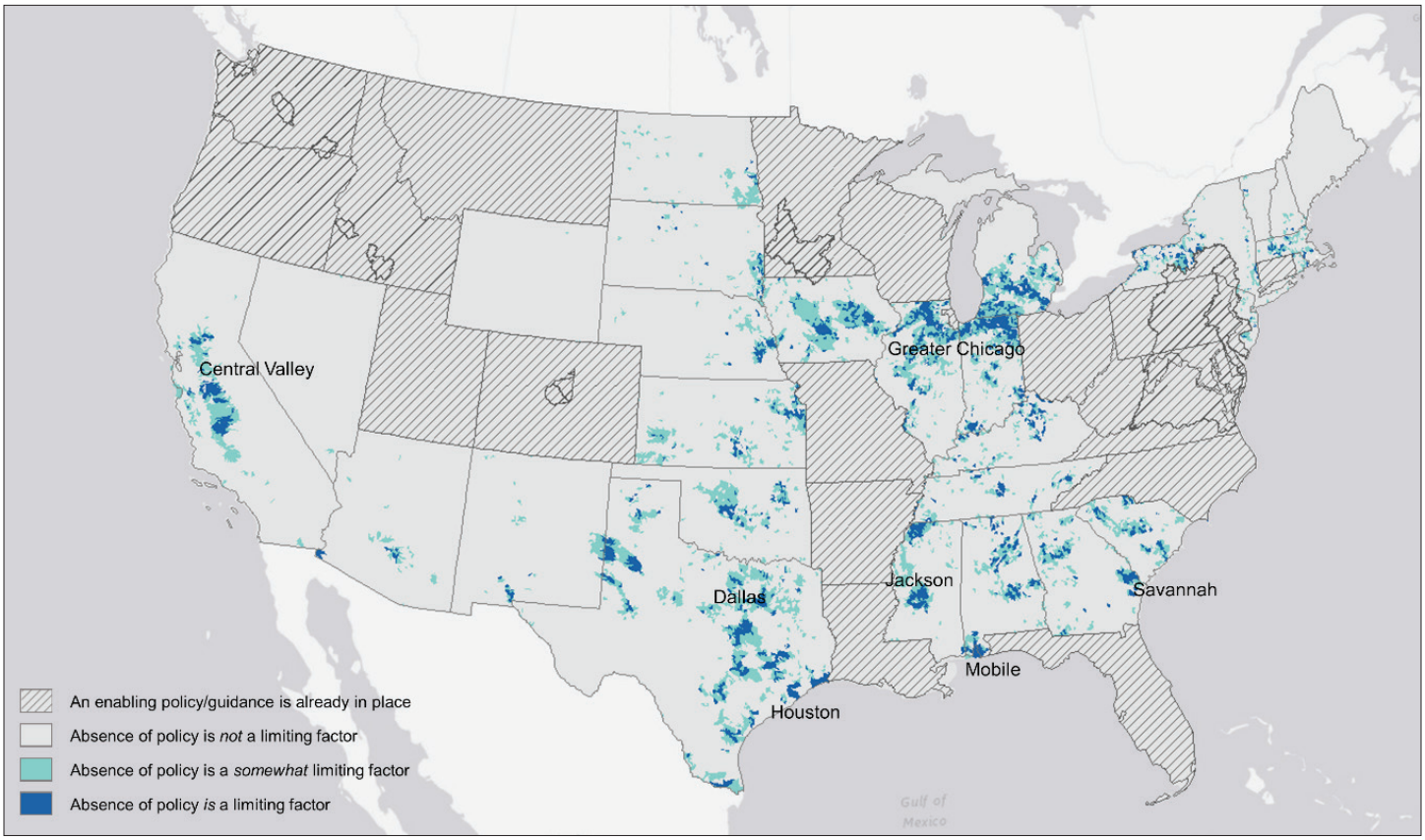

***Map 1. Results of Overall Demand Potential Evaluation: Water Quality Credit Trading***

*Our results include regions where trading is already active or in development, including Chesapeake Bay Basin states, North Carolina, the Willamette Valley, the Ohio River Basin, and Boise. Other areas suggest future potential, such as Sacramento, Akron, Cleveland, Toledo, Buffalo, Lexington, Fort Collins, Kansas City, and a number of major cities in Florida and along the Gulf Coast, including Houston and Lafayette.*




***Map 2. Results of Overall Demand Potential Evaluation: Stormwater Credit Trading***

*Our stormwater model suggests that demand potentially exists in a number of urban areas across the United States. At present, only Washington D.C. has an active trading program. Our enabling conditions indicator was the "presence of a regulated MS4 with language supportive of offsets or mitigation," a taxonomy that includes trading but also a suite of similar mechanisms.*




***Map 3. Regions with Low Policy and Regulatory Demand Scores but High Watershed Characteristics and Economic Demand Scores for Water Quality Credit Trading***
*This map shows the potential for new or strengthened policy or regulation to increase interest in trading or demand for credits including cities in California's Central Valley, Iowa, the Great Lakes states, and multiple metropolitan areas in the Southern United States. A low score on policy drivers can come from a lack of state-level policy, relatively few kilometers of 303(d) listed waters, or few/no trades in the last three years (2015-2017).*

regulation in place in these areas could help unlock new growth in trading.

## Interpreting These Maps

It is clear from these maps that the potential demand for water quality trading may be robust and widespread nationally, and that additional investigation in high-potential watersheds would be valuable. A few key takeaways that emerge from this exercise are the following:

### *We Need More Flexible Compliance Options*

In some ways, these maps also show the sheer scale of water quality challenges in the United States. Those challenges will require a broad set of solutions. We see water quality trading as a particularly valuable strategy in part because it can work alongside other programs (i.e., TMDL implementation). And where trading is not appropriate, there are a range of other partnership models to choose from that also bring together clean water utilities and agricultural producers and deliver multiple benefits for the

community and the environment.

### *Policy Is Important*

Many watersheds have the physical and economic conditions that indicate a potential for demand for trading but are on the sideline because of a lack of enabling state policies. Creating or strengthening policy or regulation in these states could open flexible compliance options to permittees and facilitate new strategies for achieving clean water goals.

### *This Is a Macro View*

These national-scale maps are useful to communicate broad opportunities and spark new conversations. State- or watershed-scale feasibility analyses are imperative to better understand the potential for trading activity in a given area. As noted, national data may not perfectly reflect local conditions, and these models don't include "soft" factors that are critical to successful trading program implementation, such as the presence of an innovation champion at a utility or state regulatory agency.

*Native grasses and forbs are part a buffer along Bear Creek in Iowa. / Roger Hill, USDA Natural Resources Conservation Service*

# V. Conclusion on Demand for Water Quality Trading

Water quality trading can be a useful tool for achieving regulatory compliance. Trading also provides opportunities to leverage economic, community, and environmental benefits in ways that traditional treatment technologies do not. Although water quality trading likely makes sense for communities and the environment in many places in the United States, there are barriers that keep it from becoming a mainstream solution. The suite of priority actions proposed in the National Network's *Action Agenda* provide a path forward for proponents of trading to begin breaking down these barriers and advancing water quality markets in the United States.

The *Action Agenda* is a multi-stakeholder plan to:

1. Simplify trading program design and application.
2. Ensure state regulatory agencies have adequate capacity and resources to engage on water quality trading.
3. Clarify each administration's and U.S. EPA's position on water quality trading.
4. Actively address real and perceived risks for buyers.
5. Identify and address risks of litigation.
6. Create guidance on trading for stormwater.
7. Build stakeholder relationships and trust.

Clean water can be a uniting priority, whether from the perspective of meeting regulatory requirements, building healthy watersheds, or ensuring healthy communities. Water quality trading can support all of those things, and it is our hope that this *Action Agenda* will help get trading off the sidelines and onto the ground in more watersheds to provide clean water, in a cost-effective manner, and with multiple benefits to communities and the environment.

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# Appendix A: Stakeholder Interview Questions

### Municipality or utility with an active trading program

| |
|---|
| 1. Tell us about your facility/utility's experience with trading? |
| 2. How do you view water quality trading? As a tool for regulatory compliance? As a way of promoting voluntary stewardship? Or as something else? |
| 3. What was your primary incentive for getting involved in the water quality trading program? For example, was your participation motivated by a new waste load allocation under a TMDL? Economic considerations? |
| 4. What other factors were important in selecting trading as the preferred compliance option? |
| 5. What barriers, if any, did you have to overcome to get the trading program approved? (technical, cultural, political, logistical) |
| 6. Did you initiate the process of pursuing trading? Alternatively, were you approached by federal/ state regulators or stakeholder groups about participating? |
| 7. Has the program been economically beneficial for you? |
| 8. Are there other benefits you have received from the program? Such as new partnerships or positive exposure? |
| 9. Have there been any negative effects? For example, negative press, litigation, stakeholder pressure? |
| 10. Has the program introduced new/additional reporting requirements for your facility? If so, are these requirements reasonable? Please explain. |
| 11. Were there aspects of the permit writing/negotiation that were problematic or time consuming for you? |
| 12. Do you have any insight as to why other point sources in the watershed choose not to participate in the program (if relevant)? |
| 13. What have been the most significant barriers in implementing the program? |
| 14. What resources or actions would help you overcome those barriers? |
| 15. Do you plan to continue participating in the trading program in future permit cycles or for other pollutants? |
| 16. Is there anything about demand for WQT that we haven't asked that we should know? |

## Municipality or utility without an active trading program

<table>
<tr><td colspan="3">1. Can you tell us about your facility's/utility's interest in WQT?</td></tr>
<tr><td colspan="3">2. How do you view water quality trading? As a tool for regulatory compliance? As a way of promoting voluntary stewardship? Or as something else?</td></tr>
<tr><td colspan="3">3. Has your organization considered the use of water quality trading?</td></tr>
<tr><td colspan="2">If yes</td><td>If no</td></tr>
<tr><td colspan="2">5. What was your primary incentive for considering a water quality trading program? For example, is your participation motivated by a new waste load allocation under a TMDL? Economic considerations?</td><td rowspan="6">4. Why not?</td></tr>
<tr><td colspan="2">6. What other factors were important in considering trading as a compliance option?</td></tr>
<tr><td colspan="2">7. Did you initiate the process of pursuing trading? Alternatively, were you approached by federal/state regulators about participating?</td></tr>
<tr><td colspan="2">8. Have you decided for or against initiating a water quality trading program?</td></tr>
<tr><td>If yes (for) or undecided</td><td>If yes (against)</td></tr>
<tr><td>9a. Skip to question 10.</td><td>9b. Why did you decide against the use of trading? Is there anything that would have changed your decision? Would you consider it in future permit cycles?</td></tr>
<tr><td colspan="3">10. What have been the most significant barriers in implementing the program?</td></tr>
<tr><td colspan="3">11. What resources or actions would help you overcome those barriers?</td></tr>
<tr><td colspan="3">12. Is there anything about demand for WQT that we haven't asked that we should know?</td></tr>
</table>

## State agency with trading rule, policy, or guidance

| |
|---|
| 1. Can you describe your state's experience with WQT? |
| 2. What are your thoughts on trading as an approach for achieving water quality objectives? Do you see widespread opportunities for trading? |
| 3. What are the situations or scenarios that led you to consider water quality trading? Under what circumstances can water quality trading be part of the permitting process? For example, was establishment of a TMDL for the watershed/waterbody instrumental in motivating and allowing a trading approach? Similarly, were there aspects of the point source permit(s) that lent themselves to trading (e.g., a particular/common pollutant of interest)? |
| 4. Who initiated the water quality trading conversation in your state? Did utilities approach you? What has been your experience working with utilities or what feedback have they given on the program? |
| 5. In your view, what factors have influenced the participation or lack of participation in the program? |
| 6. Were there aspects of the permit writing/negotiation that were problematic or time-consuming? |
| 7. Are there specific federal or state programs or agencies that either complement or constrain the implementation of the water quality trading program? |
| 8. What have been the most significant barriers to implementing water quality trading programs in your state? |
| 9. What resources or actions could help overcome those barriers? |
| 10. The next phase of interviews we're conducting will be with permittees that are interested in trading. Would you be willing to introduce us to permittees who are interested in trading so that we can ask them about what challenges they're facing? |
| 11. Is there anything about demand for WQT that we haven't asked that we should know? |

## State agency with interest in trading, without trading rule, policy, or guidance

| |
|---|
| 1. Can you describe your state's experience with water quality trading so far? |
| 2. What are your thoughts on trading as an approach for achieving water quality objectives? Do you see widespread opportunities for trading? |
| 3. What are the situations or scenarios led you to consider water quality trading? Under what circumstances can water quality trading be part of the permitting process? For example, is the establishment of a TMDL for a watershed/waterbody motivating you to consider trading? Similarly, are there aspects of the point source permit(s) that lend themselves to trading (e.g., a particular/ common pollutant of interest)? |
| 4. Who initiated the water quality trading conversation in your state? Did utilities approach you? What has been your experience working with utilities or what feedback have they given on trading? |
| 5. In your view, what factors will influence the participation or lack of participation in trading in your state? |
| 6. Are there specific federal or state programs or agencies that would either complement or constrain the implementation of a water quality trading program? |
| 7. What have been the most significant barriers to implementing a water quality trading program in your state? |
| 8. What resources or actions could help overcome those barriers? |
| 9. Is there anything about demand for WQT that we haven't asked that we should know? |

# Appendix B: List of Interviewee's Organizations

This list reflects early demand assessment scoping interviews with National Network Steering Committee members and technical advisors (summer 2017) and broader stakeholder interviews conducted using the questionnaires in Appendix A (spring 2018).

| |
|---|
| American Farmland Trust* |
| Arkansas Department of Environmental Quality |
| Association of Clean Water Administrators* |
| Borough of Chambersburg, PA |
| Cedar Corporation (WI) |
| City of Caldwell, ID |
| City of Meridian, ID |
| City of Raleigh, NC |
| City of Santa Rosa, CA |
| City of Wilsonville, OR |
| Clean Water Services (OR) |
| Colorado Department of Public Health and Environment |
| District of Columbia Department of Energy and Environment |
| Florida Department of Environmental Protection |
| Great Lakes Commission |
| Idaho Department of Environmental Quality |
| Iowa Department of Natural Resources |
| Kieser & Associates* |
| Las Virgenes Municipal Water District (CA) |
| League of Wisconsin Municipalities |
| Louisiana Department of Environmental Quality |
| Madison Metropolitan Sewerage District |
| Marathon County, WI |
| Maryland Department of Agriculture* |
| Minnesota Pollution Control Agency |
| Missouri Department of Natural Resources |
| Mitchell Williams Selig Gates & Woodyard (AR) |
| National Association of Clean Water Agencies* |
| National Milk Producers Federation* |

| |
|---|
| North Carolina Department of Environmental Quality-Division of Water Resources |
| North Coast Regional Water Quality Control Board (CA) |
| Nyemaster Goode (IA) |
| Ohio Farm Bureau Federation* |
| Oregon Department of Environmental Quality |
| Pennsylvania Department of Environmental Protection |
| Renewable Water Resources - ReWa (SC) |
| South Carolina Department of Health and Environmental Control |
| The Freshwater Trust* |
| Town of Windsor, CA |
| Troutman Sanders* |
| U.S. Business Council for Sustainable Development |
| U.S. Department of Agriculture, Office of Environmental Markets* |
| U.S. Environmental Protection Agency, Office of Water* |
| Village of Marathon City, WI |
| Virginia Department of Environmental Quality |
| Virginia Department of Transportation |
| Wisconsin Department of Natural Resources |
| World Resources Institute* |

**Indicates National Network Steering Committee member or technical advisor.*