DRAFT/FINAL REPORT | Prepared for North Georgia Water Resources Partnership

Alternative Nutrient Management Strategies

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Technical Memorandum

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Contents

Attachments

List of Abbreviations

Association	Neuse River Compliance Association
Bay	Chesapeake Bay
BMAP	Basin Management Action Plan
BMP	best management practice
CFR	Code of Federal Regulations
City	City of Boise
CY	compliance year
d	day(s)
DEQ	North Carolina Department of Environmental Quality
DO	dissolved oxygen
Exchange	Virginia Nutrient Credit Exchange
FDEP	Florida Department of Environmental Protection
GA EPD	Georgia Environmental Protection Division
ID	identifier
IDEQ	Idaho Department of Environmental Quality
L	liter(s)
lb	pound(s)
LID	low-impact development
LNBA	Lower Neuse Basin Association
MCD	Miami Conservancy District
mg	milligram(s)
mgd	million gallons per day
MS4	municipal separate storm sewer system
N	nitrogen
NNWQT	National Network of Water Quality Trading
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NRCS	National Resources Conservation Service
P	phosphorus
PADEP	Pennsylvania Department of Environmental Protection
Partnership	North Georgia Water Resources Partnership
PENNVEST	Pennsylvania Infrastructure Investment Authority
Program	Pennsylvania Nutrient Trading Program
SCD	Soil Conservation District
SCDHEC	South Carolina Department of Health and Environmental Control
SDRWCB	San Diego Region Water Control Board
TALU	tiered aquatic life use
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
UAA	use attainability analysis
UNRBA	Upper Neuse River Basin Association
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
Water Councils	Coosa-North Georgia and Savannah-Upper Ogeechee Regional Water Planning Councils
WQBEL	water quality-based effluent limit
WWTP	wastewater treatment plant

Executive Summary

Nutrient pollution remains a national challenge to water quality and can be a threat to public health and local economies, sometimes contributing to toxic algal blooms; contamination of drinking water sources; and costly impacts on recreation, tourism, and fisheries (United States Environmental Protection Agency [USEPA] 2016). The Georgia Environmental Protection Division (GA EPD) has developed nutrient criteria for lakes and will develop nutrient criteria for streams and rivers in the next few years, followed by estuaries. Nutrient or nutrient-related total maximum daily loads (TMDLs) have been developed for several lakes in north Georgia. Nutrient issues will only become more widespread and communities are looking for solutions to meet stricter National Pollutant Discharge Elimination System (NPDES) permit limits.

The Coosa-North Georgia and Savannah-Upper Ogeechee Regional Water Planning Councils (Water Councils), working in collaboration with the North Georgia Water Resources Partnership (Partnership), were awarded a GA EPD Seed Grant to help implement their Regional Water Plans. The Regional Water Plans identified the need to study nutrient trading and alternative nutrient management strategies as a way to improve water quality in the region while helping communities meet permit requirements more cost-effectively.

Nutrient trading is one type of water quality trading that is defined by USEPA as an option to comply with water-quality-based effluent limitation in an NPDES permit. Water quality trading can provide greater flexibility on the timing and level of technology a facility might install, reduce overall compliance costs, and encourage voluntary participation of nonpoint sources (NPS) within the watershed. Trading can provide ancillary environmental benefits such as carbon sinks, flood retention, and riparian and habitat improvement.

Alternative nutrient management permit strategies, including nutrient trading, were identified through a national review of state and regional programs. Stakeholder meetings were conducted in the Coosa and Savannah basins to discuss the alternative permit strategies and feedback was solicited from GA EPD and the Partnership. Major recommendations include:

1. GA EPD, in coordination with permittees, establish a watershed permit that further solidifies the legal authority to trade in basins with nutrient or nutrient-related (i.e., Chlorophyll a) TMDLs.
2. Stakeholders, with EPD review and approval, develop a watershed specific or regional nutrient trading guidance document.
3. Permit holders establish a trading organization in watersheds with existing TMDLs to facilitate nutrient trading.
4. Permit holders prepare a trading plan for trades conducted outside of a trading organization in accordance with regional guidance.

This report outlines these activities and provides additional details on recommendations.

SECTION 1

Background

The North Georgia Water Resources Partnership (Partnership) and Water Councils received a GA EPD Regional Water Plan Seed Grant to assist in the development of alternative nutrient permitting strategies for these regions. The goal of the grant is to identify permitting strategies and alternatives that will improve water quality in the watershed while helping communities meet permit requirements more cost-effectively.

There is a growing interest in alternative permitting strategies from groups in the Coosa Basin (exporting poultry litter for total phosphorus [TP] credits), the Chattahoochee Basin (septic tank disconnection to offset individual permit limits), and the Savannah Basin (land conservation and buffers for proactive total nitrogen [TN] reduction). The Water Councils, GA EPD, and basin groups recognize this growing interest and are supporting this study to identify steps needed to implement alternative permitting strategies.

The Partnership took a lead role in developing alternative strategies by evaluating nutrient trading in the *Nutrient Trading in the Coosa Basin: A Feasibility Study* (Brown and Caldwell 2013). The Feasibility Study suggested that nutrient trading is possible in the Coosa Basin from a technical, legal, and financial perspective. In addition, a 2-year field study is now complete that supports the assumptions of the proposed trading practice recommended in the Feasibility Study (i.e., that exporting poultry litter out of the watershed will reduce phosphorus [P] loading in the watershed by as much as 40 percent [Brown and Caldwell 2018]).

The Savannah-Upper Ogeechee Region took a lead role in alternative water quality solutions by implementing a 5R plan, which is an alternative to a TMDL. This robust stakeholder involvement process, which has been accepted by USEPA, GA EPD, and the South Carolina Department of Health and Environmental Control, outlines discharge limits in support of a dissolved oxygen (DO) standard. In addition, the Savannah Clean Water Fund was set up and funded by local utilities to preserve critical areas in the basin with the goal of protecting drinking water quality.

Innovative permitting nutrient management strategies are being researched and adopted in many areas around Georgia and across the country. This report reviews some of those strategies from a national practices review, summarizes categories of alternatives, and discusses the regulatory frameworks that support the alternatives. It also includes examples of programs and projects and recommendations for an alternative permitting strategy. Two stakeholder meetings were held in each of the Water Planning Regions—the Coosa-North Georgia (April 25, 2018) and the Savannah-Upper Ogeechee (May 29, 2018)—to provide background on alternative permitting strategies and offer an opportunity to hear from communities about the alternatives. Details on the stakeholder meeting are provided in Section 3.

1.1 Coosa-North Georgia Water Planning Region

The Coosa-North Georgia Regional Water Planning Region covers 5,500 square miles in north Georgia and includes 18 counties and 52 municipalities (Figure 1). The population was estimated at 759,880 in 2015 with land use mainly forested with sizable urban, agriculture, and other land uses. Key basin industries include manufacturing, agriculture, and higher-learning institutions.

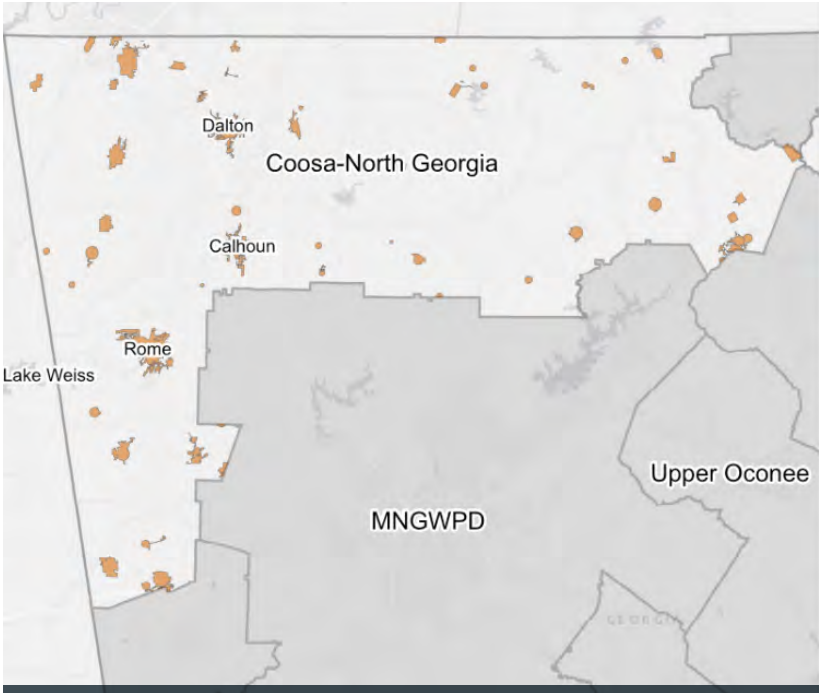


Figure 1. The Coosa-North Georgia Water Planning Region

The recently updated Regional Water Plan outlines a vision to "enhance the potential and quality of life for all communities through sustainable use of water resources in the region and state with partnerships among a broad spectrum of stakeholders" and eight goals were identified to promote this vision (Coosa-North Georgia Regional Water Planning Council 2017b). Key water issues being addressed by the Water Council include "targeted water quality concerns in Lake Weiss, Lake Allatoona, Carters Lake and Lake Lanier" and nutrient management programs and credit trading are listed as management practices and recommendations to the state (Coosa-North Georgia Regional Water Planning Council 2017a).

The Lake Weiss TMDL requires TP reductions for the Coosa River at the Georgia state line with Alabama. GA EPD has responded to this TMDL requirement by establishing TP limits for NPDES point source discharge permits in the Coosa Basin. However, this new requirement does not account for NPS runoff, which, according to the TMDL model developed by USEPA, contributes up to 70 percent of TP loadings to Lake Weiss (USEPA 2008).

1.2 Savannah-Upper Ogeechee Water Planning Region

The Savannah-Upper Ogeechee Water Planning Region encompasses more than 7,100 square miles in east Georgia and includes 20 counties and 67 municipalities (Figure 2). The current population was estimated at 629,700 in 2015 and more than half of the region is covered by forest, with less than 10 percent in urban land use. Key basin industries include government, higher-learning institutions, healthcare services, manufacturing, retail, and construction sectors.

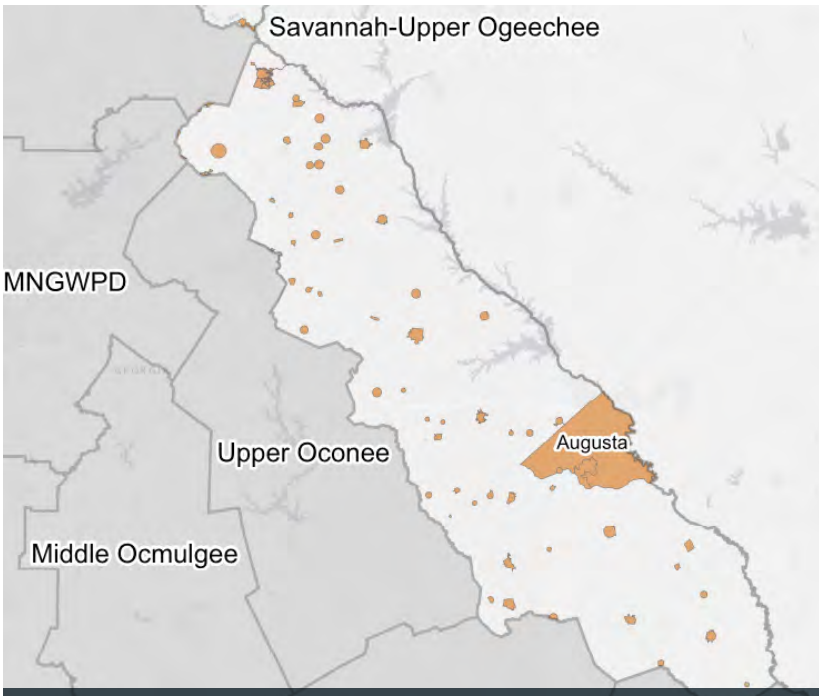


Figure 2. The Savannah-Upper Ogeechee Water Planning Region

The Savannah-Upper Ogeechee Water Plan states a vision that "The Savannah and Ogeechee Rivers … will provide high-quality and -quantity water supplies for balanced growth while protecting the natural and built environments." The Water Council adopted seven goals to promote this vision. Priorities for the Savannah-Upper Ogeechee Region include implementation of the 5R plan (an alternative to a TMDL, described more in Section 2.1.4) to restore water quality in the Savannah River Basin and Harbor. In lieu of developing a TMDL document for DO, a Category 5R process was initiated and a 5R plan was developed with input by stakeholders and regulators. GA EPD is updating affected NPDES permits to be consistent with the 5R plan. The Water Plan Fact Sheet indicates that addressing NPSs of pollution is part of the region's future needs. The Water Quality priorities include the ability of stream segments to accept future wastewater discharges (Savannah-Upper Ogeechee Regional Water Planning Council 2017a).

The Savannah-Upper Ogeechee Regional Water Planning Council anticipates future nutrient water quality standards for the Savannah River Basin. The Savannah-Upper Ogeechee Regional Water Planning Council would like to explore land conservation as a method to reduce nitrogen (N) loading. Identifying permitting strategies proactively will help achieve water quality goals sooner.

SECTION 2

National Background Review of Alternative Nutrient Management Permit Strategies

Nutrients are critical to the health of streams, rivers, and lakes. However, excess amounts of nutrients can produce algae blooms and cause detrimental effects on a local water body's water quality and ecosystem. Nutrient impairment is a concern across the United States and a range of nutrient management strategies have been implemented across the country to improve the water quality of local systems.

The following section discusses various methods that communities have used to address nutrient impairments using both traditional regulatory frameworks and non-traditional alternatives. A discussion of each type of alternative is provided below as well as examples or case studies where implemented.

A broad review of nutrient permit alternatives was conducted to better understand programs and practices that may be applicable to the Coosa-North Georgia and Savannah-Upper Ogeechee Water Planning Regions.

The review focused primarily on strategies implemented throughout the Southeast, with additional highlights from across the country. It is not intended to be a comprehensive list of programs, but rather an overview of the types and variety of programs. Table 1 provides an overview of various alternative permitting strategies while the section below describes details of those strategies.

Alternative Nutrient Management Permit Alternatives

Example Program/Project	Alternative Regulatory Strategy	Alternative TMDL Examples	Trading Examples	Point-to-Point Trading	Point-to-Nonpoint Trading	Nonpoint-to-Nonpoint Trading	Nutrient Offset and Mitigation	Regulatory Authority	Local Ordinance	State General Permit or Rule	Watershed Permit	Individual Permit	Notes
San Diego Water Control Board Post Construction Low-Impact Development (LID) Requirements // California						✓	✓		✓				*The Board requires that individual sites construct LID technologies on site to the extent practicable. Offsite stormwater is an acceptable alternative to implementing onsite retention, but if offsite mitigation is included, the site must include conventional treatment controls for the design storm event.*
San Diego Region Water Control Board Loma Alta Slough Phosphorus Impairment // California		✓									✓		*The SDRWCB had the watershed relisted as 4B based upon the planned implementation of the regional MS4 permit, which modeling indicated that the allowable phosphorus levels would be achieved within a reasonable, specified time frame.*
Lower St. Johns River Nutrient Trading // Florida				✓	✓	✓	✓			✓		✓	*Lower St. Johns River trading developed around Basin Management Action Plan (BMAP). The BMAP nutrient reduction requirements are implemented via permits (WWTP and MS4). Agriculture reductions are required by state regs to meeting TMDL compliance (BMAP Section 6.1.2.1; Florida Code Section 403.067(7)(b).*
Cobb County WWTP Permit // Georgia				✓								✓	*Cobb County has a permit for more than one WWTP, which allows for meeting the phosphorus limit by the nutrient concentration of the combined effluent.*
City of Atlanta Combined WWTP Permit // Georgia				✓								✓	*Atlanta permit for water reclamation facilities within a single watershed, which allow for combined nutrient limits.*
Georgia and South Carolina Savannah Harbor DO 5R Plan // Georgia		✓											*The TMDL includes a discussion of the USEPA philosophy that a TMDL could be met through a variety of project alternatives, so point and nonpoint entities could implement projects that are the most cost-effective. The document does not indicate a specific mechanism for trading between the entities defined in the TMDL. It is expected that the TMDL will be incorporated into individual NPDES permits.*
City of Boise Dixie Drain Nutrient Offset Project // Idaho							✓					✓	*City of Boise constructed a stormwater treatment pond and wetland to remove TP from agriculture drainage area. Project authorized under individual NPDES permit with TP offset.*
Tar-Pamlico Nutrient Strategy // North Carolina					✓	✓					✓		*Authorizes point-to-point trading under watershed permit, trading association setup, purchase from mitigation bank, or other nonpoint sources allowed. This includes new development nutrient reduction goals.*
Neuse River Nutrient Strategy// North Carolina											✓		*Authorizes point-to-point trading under watershed permit, trading association setup, purchase from mitigation bank, or other nonpoint sources allowed. This includes new development nutrient reduction goals.*

Example Program/Project	Alternative Regulatory Strategy	Alternative TMDL Examples	Trading Examples	Point-to-Point Trading	Point-to-Nonpoint Trading	Nonpoint-to-Nonpoint Trading	Nutrient Offset and Mitigation	Regulatory Authority	Local Ordinance	State General Permit or Rule	Watershed Permit	Individual Permit	Notes
Charlotte Post Construction Stormwater Ordinance Mitigation Fee in Lieu Program // North Carolina						✓	✓		✓	✓			*Post-construction stormwater regulations allow for certain developments and in particular redevelopments to pay a mitigation fee to the City for some or all stormwater requirements. The City spends the funds to install water quality measures, in the same watershed when possible.*
Upper Neuse River Basin Association (UNRBA) // North Carolina		✓								✓			*The members of the UNRBA are regulated by a Nutrient Management Strategy developed by DEQ. The group is re-examining the load reductions required by this strategy with a rigorous monitoring and modeling evaluation.*
Neuse River Compliance Association // North Carolina				✓			✓			✓	✓		*Private, voluntary association that operates under a watershed permit. Allows for trade between permittees, the purchase of credit from the Wetlands Restoration Fund, or another transaction approved by the Division.*
Great Miami Water Quality Trading Program // Ohio					✓								*Set up for expected TMDL, southwest Ohio program that works with local extension agents and farmers to provide future credit to NPDES permittees.*
Nutrient Trading Program // Pennsylvania					✓						✓		*As part of the Chesapeake Bay TMDL, authorized point-to-nonpoint trading program includes agriculture BMPs including poultry litter export.*
Reedy River // South Carolina		✓		✓	✓								*SCDHEC is working with local governments and other organizations to develop watershed-level plans to meet TMDL requirements. The available documents do not indicate much about the actual process used to conduct "trades" and it appears they may be tracking and reporting primarily on a watershed scale. It was not clear if there is a regulatory vehicle behind the trades, as it may not truly be a trading program*
Nutrient Credit Exchange Association // Virginia				✓	✓					✓		✓	*The Virginia Nutrient Credit Exchange Association is a voluntary association of 73 owners of 105 treatment facilities cleaning wastewater in the Chesapeake Bay watershed to reduce nitrogen and phosphorus.*
MS4 Permit Chesapeake Bay TMDL // Virginia				✓	✓		✓			✓		✓	*Requirements for reductions to existing TMDL loading for nonpoint sources. Trades must occur within the same watershed and may include trades between MS4 permittees, credit purchases, or trades with point source entities.*
Stormwater Management Program // Virginia						✓	✓		✓				*Regulations for new developments and redevelopments to meet TP requirements.*
Water Quality Trading Program // Wisconsin				✓	✓					✓			*Wisconsin has established a statewide nutrient trading framework to aid in nutrient credit calculations and guidance on appropriate nutrient trading practices.*

2.1 Regulatory Framework Alternatives

The Clean Water Act of 1972 granted the USEPA the authority to regulate the discharge of pollutants into waters of the United States and to establish or approve water quality standards developed by state agencies or tribes. Water quality standards comprise three components:

1. Designated uses of the water body
2. Numeric or narrative criteria to protect those uses
3. Antidegradation requirements

The conventional mechanisms of implementing the Clean Water Act include setting permit limits through the NPDES and/or development of TMDLs that establish required reductions in pollutant loading to achieve water quality standards.

In some cases, these conventional approaches are not the best mechanisms for achieving desired improvements in water quality, especially for nutrients. Different water bodies can respond very differently to nutrient inputs based on factors such as light availability and hydraulic residence time. As a result, it is technically challenging to set meaningful statewide criteria that apply to any water body. Nutrient concentrations alone can be relatively poor predictors of use attainment. In contrast with most toxic parameters, nutrients are ubiquitous and are derived from a wide variety of regulated and non-regulated sources. This makes nutrient reduction very difficult and expensive, and default regulatory approaches are sometimes unattainable. Fortunately, USEPA has established various regulatory alternatives that may be used in these situations, which are discussed below.

2.1.1 Variances

A variance is a temporary modification to either the designated use or criteria component of the water quality standard. The justifications for variances are the same as those listed under 40 CFR 131.10(g) for UAA. While a variance is defined for a specific period, it may be renewed through negotiations with the regulating agency. For example, USEPA issued variances for wastewater treatment plants (WWTPs) in Montana in 2012 that were to be reviewed every 3 years. Montana numeric nutrient criteria for large discharges were 1 mg-P/L and 10 mg-N/L and for small dischargers were 2 mg-P/L and 15 mg-N/L. Facility upgrades to achieve these standards (e.g., reverse osmosis) were deemed to result in widespread economic and social impact. In 2015, USEPA reauthorized the variance with a 20-year term.

2.1.2 Use Attainability Analysis and Use Refinement

A use attainability analysis (UAA) addresses the component of the water quality standard that deals with designated uses. Formal use categories are typically fish, shellfish, and wildlife propagation; primary and secondary recreation; drinking water supply; agricultural; industrial; and navigation. UAAs rarely remove these uses from the water quality standard, but more often refine or subdivide the uses into categories based on the characteristics of the water body.

Six justifications are allowed by USEPA for development of a UAA that either removes or subclassifies an existing designated use (Code of Federal Regulations [CFR] Title 40 Section 131.10(g)):

1. Naturally occurring pollutant concentrations prevent the attainment of the use
2. Natural, ephemeral, intermittent, or low-flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met
3. Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
4. Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use

5. Physical conditions related to the natural features of the water body—such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like—unrelated to water quality, preclude attainment of aquatic life protection uses
6. Controls more stringent than those required by Sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact

Rather than removing use from the standards, UAAs often focus on subclassifying existing uses and assigning corresponding water quality criteria. For example, USEPA developed a UAA for the Chesapeake Bay (Bay) to address the DO impairment. Justification for the UAA included items 1, 3, and 6 listed above (USEPA 2006). Prior to development of the UAA, the DO criterion (minimum allowable) was 5 milligrams per liter (mg/L) at all locations, depths, and times of year for the protection of aquatic life. USEPA recognized, however, that different types of organisms live in different areas of the Bay, and that those organisms have varying DO requirements depending on life stage. As a result of the UAA, the USEPA and states evaluated the habitats and life cycles of the organisms in the Bay and developed DO criteria that varied in space and time. The revised instantaneous minimum DO criteria ranged from 1 mg/L in the bottom waters occupied by worms and clams to 5 mg/L to support migratory fish spawning and nursery use (USEPA 2003).

A closely related concept is tiered aquatic life uses (TALU), by which aquatic life uses are refined to represent different levels of realistic expectations based on variability inherent in natural aquatic ecosystems. While maintaining certain expectations for protection of biological communities, TALU can recognize that water bodies in more developed or agricultural areas have a different biological potential than water bodies in pristine watersheds. States such as Ohio, Minnesota, and Maine have used TALU to refine uses.

2.1.3 Site-Specific Criteria

As the name suggests, site-specific criteria address the criteria component of the water quality standard. Justifications for site-specific criteria include the following:

- Physical and/or chemical characteristics of the site alter the biological availability and/or toxicity of the chemical (e.g., alkalinity, hardness, pH, suspended solids, and salinity influence the concentration[s] of the toxic form[s] of some heavy metals, ammonia, and other chemicals)
- Nutrient-related response variables such as dissolved oxygen, chlorophyll-a, or biological indicators are better indicators of use attainment than nutrient concentrations, and thus should control assessment. This approach is sometimes called bioconfirmation.
- The species at the site are more or less sensitive than those included in the national criteria data set (e.g., the national criteria data set contains data for trout, salmon, penaeid shrimp, and other aquatic species that have been shown to be especially sensitive to some materials, and those species are not found at a site or downstream)

While these justifications tend to focus on toxicity issues for aquatic organisms, site-specific criteria for non-toxic water quality parameters including nutrients have been developed. Site-specific criteria must ensure that the designated uses of the water body are met.

For example, the Florida Department of Environmental Protection (FDEP) allows site-specific numeric nutrient criteria for lakes. The preferred method for setting the site-specific criteria include modeling using the United States Army Corps of Engineers (USACE) BATHTUB model. This approach acknowledges that site-specific factors such as light availability and hydraulic flushing rate affect how N and P impact eutrophication. FDEP also allows the development of site-specific nutrient criteria for streams, based on the demonstration of favorable biological indicators.

2.1.4 Alternatives to Conventional TMDLs

Two strategies may be considered as alternatives to conventional TMDL development. Section 303(d) of the Clean Water Act defines the health of a water body on a scale of 1 to 5. An impaired water body is considered a Category 5 and generally requires development of a TMDL. Once the TMDL is developed and approved, the water is categorized as 4A. If other types of enforceable plans are developed, such as permit limits or nutrient management strategies, then the water is categorized as 4B. If an alternative restoration plan is developed that focuses implementation of projects and near-term solutions, then the water is categorized as 5R. Both 4B and 5R plans can be as technically rigorous as TMDLs. However, these approaches can provide watershed stakeholder with more flexibility and local control over implementation methods. Examples of these alternatives to conventional TMDL development are provided below.

A Category 4B waters designation indicates that an impaired waterway is present; however, existing pollution control mechanisms or adopted strategies negate the need to develop a conventional TMDL. To meet the requirements for this designation, the permittee or stakeholders should be able to document sources of the impairment, water quality standards to attain, pollutant controls that will be implemented, and an estimate of when the water quality standards will be met (USEPA 2007). One example of the Category 4B designation is in Kitsap County, Washington. A bacteria impairment was identified within Puget Sound. Kitsap County identified primary bacteria sources from failing onsite septic tanks and livestock waste. The Kitsap County Health District, funded through property assessments, monitors nonpoint pollution sources and enforces local ordinances regulating septic tanks and animal wastes. The County Health District initiated a project within the watershed to identify and eliminate anthropogenic bacteria sources, and it was estimated that the water quality standards would be met in 2008 (USEPA 2007).

An example of the 5R process is the alternative restoration plan developed for the Savannah Harbor DO impairment. In 2006, USEPA issued a TMDL to address the impairment. Four years later, however, GA EPD revised the DO criteria, which were subsequently adopted by USEPA. In 2012, GA EPD, USEPA Region IV, the South Carolina Department of Health and Environmental Control, and the Savannah River/Harbor Discharge Group began working on an alternative restoration plan to meet the revised criteria. The "Subcategory 5R Documentation for Point Source DO Impaired Water in the Savannah River Basin, Georgia and South Carolina" describes the modeling and resulting pollutant loading that will meet the revised DO criteria for the harbor. The Savannah River/Harbor Discharge Group developed the allocations among the members to meet the pollutant load reductions in an equitable manner, considering the limits of technology. As a result of this process, GA EPD recategorized this water body in its 303(d) list as 5R, and USEPA withdrew the 2006 TMDL.

2.2 Permit Compliance Approaches

Various approaches are available to permit holders to achieve compliance once a pollutant limit is established in an NPDES permit. Permit holders may include municipal or industrial wastewater dischargers with established nutrient limits. Georgia does not currently place nutrient limits in NPDES municipal separate storm sewer system (MS4) or land-disturbing permits.

Approaches for meeting permit requirements include traditional onsite compliance or non-traditional alternatives such as nutrient trading or individual permit offsets. Nutrient trading options can be categorized as point-to-point, point-to-nonpoint, or nonpoint-to-nonpoint trading. Non-traditional permit alternatives may provide a more cost-effective and efficient means to achieving compliance while meeting regulatory and environmental goals. These permit alternatives are outlined below with relevance to Georgia discussed and example programs highlighted.

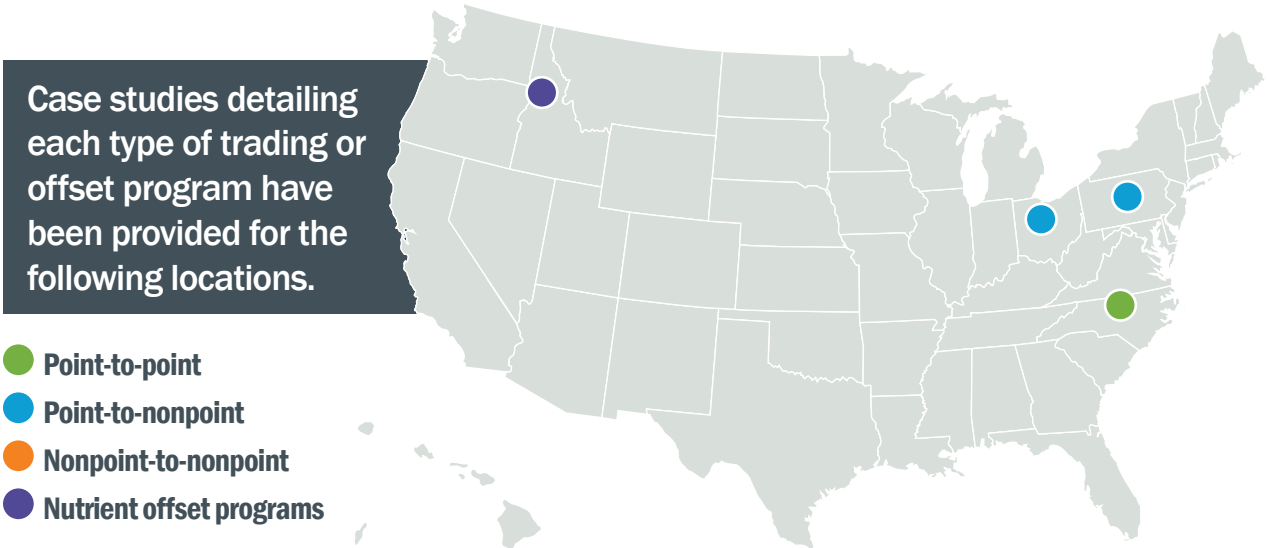
2.2.1 Traditional Onsite Compliance

The traditional approach to achieving permit compliance involves meeting permit limits at an individual wastewater facility. Projects and programs must be implemented to meet the limit within the permit conditions and schedule. To meet traditional onsite compliance requirements, the permittee must have the technical and financial resources needed to reduce nutrients at or below the permit limit. As nutrient limits become stricter, alternatives such as nutrient trading or individual permit offset projects may become more appealing or financially expedient.

2.2.2 Nutrient Trading and Offset Programs

Nutrient trading is the exchange of nutrient reduction credit between one or more entities located within the same watershed. Nutrient trading programs allow for the voluntary trading of credit between interested parties often at a set price per pound of pollutant removed from the watershed.

Three types of trades may be considered in the development of a trading program. Point-to-point trades are those between two or more NPDES permittees. Point-to-nonpoint trades involve an NPDES permittee purchasing credit from a nonpermitted landowner. Nonpoint-to-nonpoint trades generally involve new construction or redevelopment on individual properties where nutrient limits are associated with these activities. Nonpoint-to-nonpoint source trading is not readily applicable to Georgia at this time. Nutrient offset projects or programs are set up and run by the permit holder rather than trading with another entity. Each method and its applicability to nutrient trading are discussed below.



Point-to-Point

Point-to-point trading is the most straightforward form of nutrient trading. It involves the exchange of nutrient reduction credit between NPDES permit holders. These trades are the most common because of their ease in calculating credit and establishing trading programs. Point-to-point source trading may fall into categories such as trading between two individual point source facilities, trading between multiple point source facilities through a credit exchange program, or trading between multiple point source facilities without using a credit exchange program. The credit exchange program can be a voluntary organization set up by trading facilities to help coordinate trades, or a state-administered credit bank. For example, the Virginia Nutrient Credit Exchange Association is an organization of public and private WWTPs that allows the exchange of credit between members (http://www.theexchangeassociation.org/), subject to annual state review and approval. Conversely, nutrient trades for the Long Island Sound are conducted through a board administered by the state of Connecticut.

Permit Compliance

Regulatory authority to execute a trade may exist within an individual NPDES permit (USEPA 2009) or through a watershed permit. See Section 4.1 for more details.

Trading Ratios

Various types of trading ratios may account for trading inequalities, such as different distances in the point of discharge (a delivery ratio) in the watershed and safety ratios if there are uncertainties in effectiveness as found with some types of NPS best management practices (BMPs). Point-to-point source trades may have a delivery ratio depending on the watershed, but do not typically have any type of safety trading ratio as the pollutant removal process is well understood and well documented through regular monitoring.

Monitoring

Effluent monitoring is often required as part of existing NPDES permit conditions. This allows for streamlined accounting of pollutant discharge and the ability to more easily document credit exchange. Regular monitoring

also reduces risk of noncompliance. Point-to-point source trades therefore are a cost-effective option for permit holders.

Relevance to Georgia

Point-to-point source trading may be the first type of trading implemented in Georgia. With recent TMDLs in final or draft phases for Lake Weiss (Coosa Basin), Lake Lanier (Chattahoochee Basin), Lake Allatoona (Coosa Basin), and Carters Lake (Coosa Basin), there is more incentive to implement nutrient trades. Individual NPDES nutrient permit limits are increasingly strict in these watersheds. Point-to-point source trading may provide a tool to meet regulatory requirements in a cost-effective manner or provide schedule relief as capital improvements are implemented over time.

The Coosa-North Georgia and Savannah-Upper Ogeechee water planning regions both contain multiple NPDES permit holders. Point-to-point trade may be a good option within individual river basins to meet individual, or possibly in the future, watershed permits. Existing organizations in the Coosa River and Savannah River basins may be able to support a nutrient trading credit exchange program such as the Partnership and the Savannah Clean Water Fund. Regional authorities and planning groups also may take on additional credit exchange tasks.

Note: Georgia does not currently place nutrient limits in NPDES MS4 programs; although, MS4 permittees are required to comply with applicable TMDLs that may apply to their jurisdiction.

Neuse River Compliance Association //
Point-to-Point Case Study

The Neuse Estuary in North Carolina is listed as impaired because of nutrients. In 1997, the Neuse Nutrient Management Strategy was passed to allocate N loading to the Neuse River through a TMDL. In response, the Neuse River Compliance Association (Association) was formed in 2002 as a point-to-point trading association to limit the TN entering the estuary. The Association has been successful at reducing N delivery to the Neuse Estuary through efficient and effective operations of its co-permittee members, which represent public and private wastewater treatment facilities.

Members with unused N allocation can lease or sell N credits to other members but cannot lease or sell credits outside of the Association. If members cannot meet their permit limit individually or through trading with members, they may also purchase a TN allocation from the state-sponsored Wetlands Restoration Fund or another authorized source.

At a Glance

Name
Neuse River Compliance Association

Type
Point-to-point source trading

Organization
Private trading association

Regulatory Authority
Watershed and individual permits

Regulatory Structure

In 2002, the North Carolina Department of Environmental Quality (DEQ) issued a watershed-based permit to the Association to regulate the discharge of TN into the Neuse River. The Association and its co-permittee members share this NPDES permit for wastewater TN discharges in addition to their individual NPDES permits. The watershed compliance permit regulates the combined discharge of TN from all covered facilities using a group TN allocation, but the requirements under each individual permit remain in effect for other parameters as well as the TN concentration. The sum of all co-permittee members' TN loads must be less than or equal to the estuary TN allocation set by the group permit for that year. The watershed permit is updated yearly to reflect changes in membership.

DEQ does not allow localized hot spots of N, so individual facilities are also required to meet individual water-quality-based effluent limits (WQBELs) for TN, which are incorporated into the member's individual NPDES permit and the group permit. Revised WQBELs for individual facilities are applied in lieu of the Association TN limit.

Transport factors are applied to account for delivery from each facility to the estuary—the farther away the WWTP is from the estuary, the less nitrogen reaches the estuary because of natural degradation of the nutrient.

Who Participates?

The Association is a nonpartisan, nonprofit 501(c)(3) corporation with 23 members based on the 2018 permit. Invitations were extended to all NPDES permit holders in the Neuse Basin with a capacity greater than 0.5 million gallons per day (mgd). Those who join become co-permittee members of the Association with voting rights in the organization. Those permit holders with a permitted flow less than 0.5 mgd were not assigned allocations under the watershed permit but are welcome to join the Association as a "monitoring member" with no voting rights.

Reporting, Documentation, and Verification

Each member is required to monitor its discharge under its individual NPDES permit. The watershed permit requires that the Association compile all monitoring results obtained by each member to submit in semiannual and annual reports. The Association is the primary point of contact for the watershed permit and

is responsible for renewing the permit, preparing and submitting reports, and distributing correspondence from DEQ. While the Association is not required by permit to conduct monitoring, most of the members also participate in the Lower Neuse Basin Association (LNBA). The LNBA conducts a collaborative monitoring program that satisfies the individual monitoring requirements of most of the Association members.

Enforcement and Compliance

If the Association complies with the watershed TN limit, members are exempted from compliance with their individual TN limits. The requirements under each individual permit remain in effect for other parameters. In other words, an individual facility is in compliance with its allocation if one of two conditions is met: (1) the Association meets the watershed permit limit or (2) the individual facility's TN limit is met when the Association does not meet the watershed permit.

If the Association exceeds its watershed limit in a calendar year, permit violations occur for both the Association and any member exceeding its individual permit limit. The Association shall then make offset payments to the Wetland Restoration Fund for the excess TN load. DEQ may take appropriate enforcement action against the Association and the member for exceedances, and offset payments do not relieve the Association or its co-permittee members of their compliance. No co-permittee member shall be liable for any other co-permittee member's noncompliance with the watershed permit.

The Association has created bylaws for its members, which allow for binding mechanisms for members to reduce their TN discharge and comply with their individual TN allocations. The bylaws also create mechanisms to penalize or remove members for failure to reduce TN discharges.

The Association has an internal enforcement policy where members pay a fee for individual exceedances of their limits, which is used to pay for any offsets necessary due to group exceedances or to pay to improve treatment technologies at individual facilities. Up to 80 percent of the penalty is eligible for a refund if there is a timely correction or an unavoidable reason (i.e., large storm) for the allocation exceedance. The member may use this fee for plant improvements. These fees can escalate to provide further incentive for the member to comply.

Summary

The Association has been very successful in its collaborative approach to permit compliance. The Association uses a combination of plant upgrades, water reuse, and system optimization to reduce N loading to the Neuse River. The result is a consistently lower N load than would have been possible if the systems operated under separate permits. The group compliance approach allows the larger municipalities to assist the smaller municipalities that do not have the resources or ability to make capital improvements to their plant quickly. Through point-to-point trading, the Association was able to reduce TN by 70 percent over 20 years during a period of population increase of more than 50 percent.

Point-to-Nonpoint

Point-to-nonpoint source trades are becoming more common as point source reduction requirements exceed technological capabilities or become increasingly expensive. This type of trade involves an NPDES permit holder and a nonpoint participant, such as an agricultural property owner or urban landowner. The NPDES permit holder buys nutrient reduction credit from the NPS landowner. Trades may occur through the purchase of credits directly from a nonpoint landowner or through a third party such as a credit exchange program. By trading credit, the overall cost for meeting the TMDL may be reduced. An NPDES permittee may also construct nutrient reduction projects independently; this is known as a nutrient offset. Nutrient offsets are discussed further in Section 2.2.3.

Permit Compliance

Regulatory authority to execute a trade may exist within an individual NPDES permit (USEPA 2009) or through a watershed permit. See Section 4.1 for more details.

Types of Nonpoint BMPs or Programs

A variety of mechanisms may be used to develop nutrient reduction credit. Depending upon the type of credit and trading program, credits may be purchased annually or permanently. Temporary credits, such as poultry litter export, are dependent upon the amount of credit generated annually. Land conversion or septic tank disconnection programs are examples of possible permanent credit generation. Example NPS projects include:

- Nutrient BMPs on agricultural lands, including poultry litter export out of impaired watershed
- Nutrient BMPs on urban lands
- Riparian buffer restoration or protection
- Septic system disconnection
- Land conversion
- Land conservation

Over the last 10 years, four states within the Chesapeake Bay Program Partnership (Maryland, Pennsylvania, Virginia, and West Virginia) introduced Nutrient Trading programs to provide options for meeting and maintaining permitted nutrient load limits. Through these programs, NPDES permit holders may purchase credits generated on agricultural lands that reduce the nutrients released to impaired water bodies. Many elements of trading programs are similar such as type of pollutants, calculations, and allowable participants.

Virginia has developed a nutrient trading framework that draws from the Chesapeake Bay Program Expert Panels on nutrient reduction techniques. The framework allows point-to-point or point-to-nonpoint trades. Private mitigation banks, such as the Virginia Nutrient Bank, LLC, have been established to develop and sell credits by purchasing agriculture properties and creating forest conservation areas.

Other states such as Ohio (Great Miami River) and Florida (St. Johns River) have set up demonstration trading programs with point-to-nonpoint elements, trading authority, and procedures within specific watersheds. See the Great Miami River case study below.

Trading Ratios

Trading ratios are a method to address the variability in NPS credit generation. Trades with NPSs need to account for the additional uncertainty in nutrient reduction projects or programs. This factor of safety ensures that the calculated nutrient credit is met or exceeded for each NPS project. Trading ratios may account for a variety of uncontrolled factors such as weather conditions, distance from point source, type of practice, etc. Trading ratios are an important part of the trading program but if too stringent may decrease a trade's cost efficiency. The degree of conservatism in setting nutrient credits should be considered when developing trading ratios.

Monitoring

Generally, specific nonpoint project monitoring is not conducted under point-to-nonpoint trading scenarios. Rather, pollutant removal efficiency is calculated using existing information derived from accepted sources such as guidance manuals, field research, or watershed models. Some programs (e.g., Chesapeake Bay TMDL) include required that BMPs are periodically inspected and verified to be in working order. GA EPD must approve final tools and documents used to calculate pollutant removal efficiencies; however, a spread-sheet tool was developed as part of the Nutrient Trading in the Coosa Basin Feasibility Study that included the following sources:

- Land Use Annual Load and Agricultural BMP efficiencies: Chesapeake Assessment and Scenario Tool (Devereaux 2011)
- Agricultural BMP efficiencies: Best Management Practices for Georgia Agriculture: Conservation Practices to Protect Surface Water Quality (Georgia Soil and Water Conservation Commission 2013)
- Urban BMP efficiencies: Georgia Stormwater Management Manual (Atlanta Regional Commission 2016)

Recommendations on documents and tools are provided in Section 5.

Relevance to Georgia

There is interest in point-to-nonpoint trading in the Coosa-North Georgia and Savannah-Upper Ogeechee water planning regions based on stakeholder feedback. Stakeholder feedback also indicates that a trading association or credit change program run by a watershed organization or regional authority would be helpful to facilitate trades. Organizations such as the National Resources Conservation Service (NRCS) might be helpful to coordinate with agricultural landowners as they have established relationships.

Great Miami River Water Quality Trading Program //

Point-to-Nonpoint Case Study

The Great Miami River Water Quality Trading Program in Ohio is a point-to-nonpoint program administered by a regional water management agency, the Miami Conservancy District (MCD).

Draft nutrient criteria and TMDLs led to a proactive approach to implementing a trading program in this large (4,000 square miles) watershed. The watershed is largely agricultural land use, and water quality trading was identified as a tool to promote nutrient reduction projects or BMPs within the watershed thereby reducing the nutrient load more cost-effectively. An economic analysis indicated a potential of more than $300 million in savings realized through trading (MCD 2017). More than 100 meetings were held to help formulate the program, leading to widespread support from diverse stakeholders.

At a Glance

Name

Great Miami River Water Quality Trading Program

Type

Point-to-nonpoint source trading

Organization

Miami Conservancy District

Regulatory Authority

Individual permit and state code

Regulatory Structure

Chapter 3745-5 of the Ohio Administrative Code provides the administrative requirements for the development and implementation of water quality trading programs in Ohio. A pilot water quality trading program was established to provide credit for the upcoming nutrient TMDL.

No credits are awarded to NPDES permit holders to date, but credits generated now can be used when TMDLs and nutrient criteria are finalized. Early credit purchases have a 1:1 trading ratio for waters meeting designated uses and a 1:2 ratio for permittees discharging into impaired waters. Credit purchases will have higher ratios upon final regulatory adoption up to 1:3. This early incentive structure has led to funding by NPDES permit holders and landowner participation before final regulations are in place.

Who Participates?

MCD serves as a clearinghouse for all transactions between NPDES permittees, extension agents, and farmers. MCD also issues requests for bids for nutrient reduction projects, maintains data on credits, manages an insurance pool of additional credits, and supervises water quality data collection.

Soil and water conservation agents in each of 10 counties play a pivotal role, coordinating directly with farmers with whom they already have relationships. Helping farmers prepare bids has led to greater participation, although sometimes payments from other federal programs may be higher for similar agricultural practices. Participation varied greatly by county depending on the interest and availability of individual soil and water conservation agents.

NPDES permit holders buy P and N credits from MCD. Currently, the credits are not applied to permits but will be available in the future.

Farmers submit bids for credit sales and receive credit for improvement beyond a baseline set of practices. Farmers cannot receive other funding for installation of nutrient reduction practices.

Reporting, Documentation, and Verification

A spreadsheet is used to calculate the number of proposed credits, with help from local soil and water conservation agents. The spreadsheet uses the Ohio Department of Natural Resources Spreadsheet Tool for Estimating Pollutant Load, based on universal soil loss equation and a spreadsheet developed by USEPA Region 5. Project contract length varies from 5 to 10 years for most practices, but livestock management infrastructure may be contracted for up to 20 years. Credits are annual load reduction multiplied by the length of contract. Bids are selected based on lowest cost per pound of N and P reduction. Projects must be installed before credits are generated, and projects are inspected annually by extension agents.

Enforcement and Compliance

The soil and water conservation agent annually inspects the project to ensure that it is still functional. A portion of credits are set aside for an insurance pool that can be drawn on if projects fail in the future, thereby minimizing risk to NPDES compliance.

Summary

A study of the program's effectiveness found that involving soil and water conservation district agents was key to agriculture landowner participation.

Pennsylvania Point-to-Nonpoint Trading Program //

Point-to-Nonpoint Case Study

The Pennsylvania Nutrient Trading Program (Program) was created as one strategy to address water quality issues as part of the Chesapeake Bay Watershed restoration.

The primary purpose of the Program is to provide a more cost-efficient way for regulated public and private WWTPs and other parties to purchase nutrient credits to meet their N and P discharge limits for the compliance year (CY). NPDES permittees can purchase credits from "credit generators," which are pollution reduction activities that generate credits, to meet their pollutant load limits and satisfy their NPDES permit.

At a Glance

Name

Pennsylvania Nutrient Trading Program

Type

Point-to-nonpoint source trading

Organization

State-facilitated trading market

Regulatory Authority

Individual permit and state code

Regulatory Structure

The Program is regulated by 25 Pennsylvania Code §96.8 titled "Use of offsets and tradable credits from pollution reduction activities in the Chesapeake Bay Watershed," which authorizes trades for NPDES permits holders. The Program involves three credit generation steps with the Pennsylvania Department of Environmental Protection (PADEP): certification, verification, and registration.

- Certification means approval has been given by PADEP for a pollutant reduction activity to generate credits. The CY runs from October 1 to September 30 of the following year. Individual credit generators submit the credits for approval.
- Verification means PADEP approval of a credit generator's verification plan. This verification plan demonstrates that a pollutant reduction activity generated credits during the CY. Verified credits may then be sold and registered to an NPDES permit.
- Registration means approval has been given by PADEP for a sale of credits upon review of an agreement between a buyer (i.e., the NPDES permittee) and seller (i.e., the credit generator). Registered credits may be applied to meet NPDES permit cap load requirements or resold to an NPDES permittee.

Trades can take place through direct communication between credit buyers and credit generators, or the participating parties may use the Pennsylvania Infrastructure Investment Authority (PENNVEST) nutrient credit auctions to buy or sell credits. PENNVEST is a clearinghouse for auction transactions, and credit buyers and sellers contract with PENNVEST, reducing risk for buyers and sellers. Credits bought and/or sold through PENNVEST auctions must still go through all three steps in the PADEP Nutrient Trading Program. Markit, an online auction clearinghouse company, provides eligibility, enrollment, auctions, and registry services for PENNVEST to facilitate these auctions.

Who Participates?

In general, eligible market participants are NPSs (e.g., agricultural operations, other landowners), nonsignificant point sources (e.g., WWTPs that emit substantially less pollution), significant point sources (e.g., industrial or sewage WWTPs), and third parties (e.g., entities other than government agencies and market participants, such as aggregators, consulting firms, soil and water districts, and environmental organizations). For credit purchasers, existing point sources may purchase credits generated by point or

nonpoint sources to meet annual load limits subject to additional conditions of NPDES permits. For credit and/or offset sales, sellers must meet baseline and applicable threshold requirements (such as meeting their baseline pollutant limit) before selling credits.

PADEP has a website for its Program, where a document lists the detailed credit generation requirements that credit generators must meet to be verified, see https://www.dep.pa.gov/Business/Water/CleanWater/NutrientTrading/Pages/default.aspx#Overview.

Point source facilities are authorized to use offsets and credits for compliance purposes through specific language in their NPDES permit.

Currently, three types of NPS pollutant reduction activities are generating credits in Pennsylvania: (1) agricultural BMPs, (2) manure nutrient destruction and conversion technologies, and (3) the export of poultry manure (litter) and agricultural application outside of the Chesapeake Bay watershed. The NPS activities must be compliant with rules and regulations related to erosion, sediment control, and pollution control at agriculture and animal feeding operations.

Credits are regulated for each CY, which runs from October 1 to September 30 of the following year. The credits may be used only to meet the permit cap load requirements for the same CY in which they are generated.

Reporting, Documentation, and Verification

PADEP tracks all available credits through a document available on its online Program website, as well as through the PENNVEST website and Nutrient Credit Trading Auction.

The PADEP Program website maintains a registry with information on credit certification, verified credits, and credits that are registered as sold. Each certified generator receives a Certified Generator Certification identifier (ID) from PADEP. The PADEP Program website contains a "Nutrient Trading Reports" page that lists all certified credit generators, their contact information, credits available for purchase, and current and historical trading data (including buyers, sellers, and details of individual trades). The document listing each certified generator's contact information helps to facilitate communication between buyers and sellers. The website contains a spreadsheet with all NPS credit generators' IDs and the number of P and N credits available. The website's "Trading Resources" page contains a list of all deadlines for submission as well as forms, instructions, nutrient calculation spreadsheets, and other nutrient trading resources. PADEP has a template spreadsheet for WWTPs to use for buying and/or selling credits, which standardizes the nutrient monitoring and accounting for an annual nutrient budget for the CY.

Verification of the program's success is validated through water quality monitoring.

Enforcement and Compliance

PADEP is responsible for the enforcement of the NPDES permits, and may conduct other verification activities, such as monitoring and conducting inspections and compliance audits. Permit holders hold all liability for compliance with NPDES permits. Financially, credit transactions must have a legally enforceable contract that addresses requirements of the legislation, Pennsylvania Code Section 98.6(e).

The compliance period is 1 year. PADEP may undertake standard noncompliance action. PADEP may avoid noncompliance situations by allowing permit holders to acquire credits after the compliance period ends. A permit holder may be granted credits through a reserve pool if uncontrollable or unforeseeable circumstances, such as extreme weather conditions, cause its pollutant reduction activity to fail. PADEP will grant credits if it receives timely notice of failure, deems that the failure is not due to negligence or willingness by the permit holder, replacement credits are available, and credits comply with the trading program's rules.

This PADEP reserve includes 10 percent set aside from all credits generated. Credits in the reserve that are not used to address reduction failures and uncertainty represent nutrient reductions to the Bay.

Summary

The Pennsylvania Nutrient Trading Program provides a market-based approach to nutrient trading. Credit generators do most of the work to set up and have credits approved. Because of this, mostly large agriculture producers participate in the trading program and require assistance by a consultant or other party to help with setup.

Nonpoint-to-Nonpoint

Background

Nonpoint-to-nonpoint trades are another form of nutrient trading but are not readily applicable to Georgia. In other states nutrient reduction requirements are tied to post-construction stormwater runoff control. Nonpoint-to-nonpoint nutrient trades may occur through several mechanisms: purchase of credit from a stakeholder, payment of in-lieu fees to the local municipality or regulatory agency, or nutrient offset.

Relevance to Georgia

Nonpoint-to-nonpoint trading has limited application in the Coosa-North Georgia and Savannah-Upper Ogeechee Water Planning Regions. There are limited regulatory drivers to participate in this type of trade.

Nutrient Offset Programs

Nutrient offsets are permittee-led nutrient reduction projects or programs. Point-to-nonpoint offsets are authorized through an individual NPDES permit, may be subject to trading ratios, and likely require more monitoring than typical point-to-nonpoint source trades. Offsets may occur when an NPDES permit holder cannot meet the established water quality nutrient reductions on site. Rather than purchasing credits, the permit holder may design and construct a project within the watershed. Generally, the permit holder retains control of the project after construction, including maintenance requirements.

Relevance to Georgia

Nutrient offset programs may be applicable to the Coosa-North Georgia and Savannah-Upper Ogeechee River planning regions. In locations where an NPDES permit holder is unable to meet nutrient reduction requirements, projects may be designed and constructed on land within the watershed to achieve the nutrient reduction goals.

City of Boise, Idaho, Nutrient Offset Project //

Nutrient Offset Programs Case Study

The Boise River is an iconic and essential element of the City of Boise's (City) celebrated livability. However, the Boise River's health is compromised by an excess of P. Regulations required a 98 percent reduction in the amount of P leaving the City's wastewater facilities into the lower Boise River. The City made improvements at its wastewater facilities to remove 93 percent of the P, which protects the upper stretches of the river. However, to treat the remaining 5 percent would require expensive modifications. Instead, the City built the Dixie Drain Phosphorus Removal Facility to treat NPS pollutants, which uses conventional water treatment technologies, but at a much larger scale than is typical. This innovative application of existing techniques is an NPS project used to offset TP requirements in a wastewater NPDES permit.

At a Glance

Name
Dixie Drain Offset Project

Type
Individual permit offset

Organization
City of Boise, Idaho

Regulatory Authority
Individual permit

The new facility was built near the confluence of the Boise River and the Dixie Drain, a 30,000-acre agricultural and groundwater drain that discharges into the Boise River 34 miles downstream of the City's West Boise Water Renewal Facility. The Dixie Drain Phosphorus Removal Facility collects groundwater and surface water from this location and treats it to remove P. The facility diverts water from the slough, settles out solids in a sedimentation basin, uses a coagulation process to form P-containing floc particles, and precipitates the floc from the stream in a settling pond. The facility removes an extra 50 percent of P—a total of 140 pounds per day (lb/d)—resulting in a more cost-effective solution, a significantly greater environmental benefit to the Boise and Snake rivers, and a model for other areas facing similar water quality concerns and TMDL limits.

Since the facility began operation in July 2016, it has been treating up to 130 mgd of water from the Dixie Drain. For the same cost as upgrading the City's existing water renewal facilities, this project removes substantially more P from the Boise River from NPS pollution and is applied as an offset in the City's NPDES permit. Sediment levels in the waterways are also greatly reduced, improving not only river aesthetics but also habitat conditions for fish and aquatic life.

Regulatory Structure

Under traditional water quality regulations, NPS reductions are typically achieved through voluntary programs that provide limited water quality benefits. The Dixie Drain project serves as a new way of thinking about how to solve NPS pollution, which is a major source of pollution for most waterways. This project helped create the opportunity for nutrient trading between municipalities and agriculture that should ultimately provide both environmental and economic benefits for all.

With the support of Idaho senators and representatives, the City worked closely with USEPA and the Idaho Department of Environment Quality (IDEQ) to permit the project, and the facility P offset requirements are written directly into the City's NPDES permit for the West Boise Water Renewal Facility. USEPA required a combined solution of WWTP improvements along with the offset at the Dixie Drain Phosphorus Removal Facility. The NPDES permit lists compliance for two outfalls for both facilities.

Who Participates?

The City operates the West Boise Wastewater Treatment Facility, which is the permittee of the NPDES permit that authorizes the Dixie Drain Phosphorus Removal Facility to allow the City to meet its TMDL limits. The City funded and constructed both facilities to meet its TMDL for P.

Reporting, Documentation, and Verification

The TMDL permit requires discharge monitoring reports monthly, development of a Quality Assurance Plan, electronic submission of effluent and surface water monitoring data, methylmercury fish tissue annual report, local limits study plan, annual pretreatment report, and compliance evaluation reports.

Both the West Boise Treatment Facility and Dixie Drain Phosphorus Removal Facility have effluent limits for TP to prevent localized impacts. The Dixie Drain Phosphorus Removal Facility achieves the TMDL permit by also having a monthly TP removal of 25 lb/d. The Dixie Drain Phosphorus Removal Facility must also monitor influent and effluent and submit monitoring data for flow, pH, TP, P removal, aluminum, temperature, flocculent usage, and cost of treatment.

Enforcement and Compliance

The West Boise Treatment Facility and Dixie Drain Phosphorus Removal Facility face the same enforcement and compliance as other NPDES permittees.

Summary

An individual permit-led offset project is a good option for permittees that have an option for a specific nutrient reduction activity in the watershed. The advantage is greater control over the project. The permittee must be committed to design, construction, maintenance, and permitting of the project. Not all watersheds lend themselves to a significant nutrient load reduction project.

SECTION 3

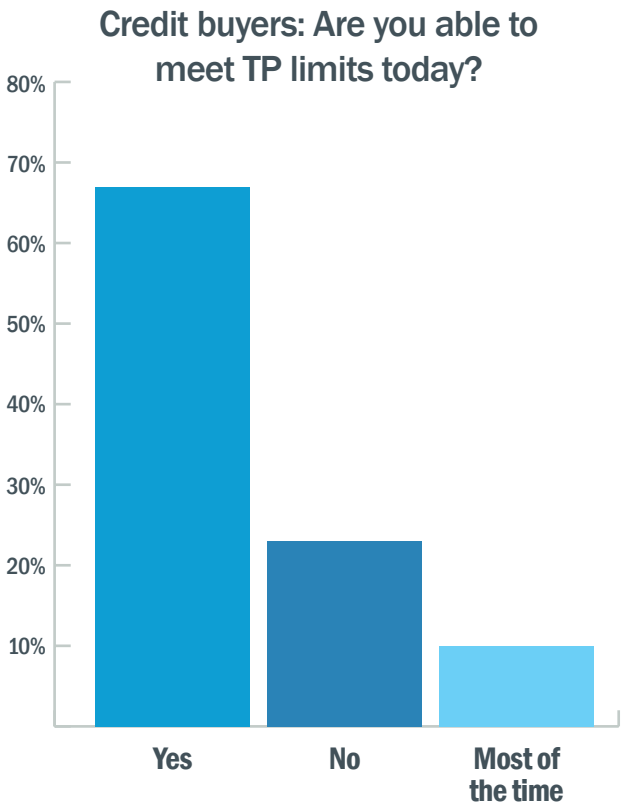
Stakeholder Meetings

Stakeholder meetings were held in the Coosa-North Georgia and Savannah-Upper Ogeechee Water Planning Regions. Results of the alternative nutrient management strategies review were presented and then feedback was solicited through both a real-time survey and by breakout into small groups for discussion. The results are presented below.

3.1 Coosa-North Georgia Water Planning Region

A stakeholder meeting was held on April 25, 2018, as part of the Partnership Annual Spring Seminar. More than 100 people attended the seminar. The results of the alternative nutrient management strategies review and specific nutrient trading examples were presented. The presentation is provided in Attachment B.

A real-time survey was conducted after the presentation to solicit initial feedback and encourage discussion. Details on the survey can be found in Attachment B. Results of the survey indicated that more than 80 percent of participants have heard of nutrient trading, 90 percent expected TP limits to become stricter in the future, and fewer than 70 percent of NPDES permit holders reported that they could meet standards today. Most survey respondents are interested in meeting permit limits through nutrient trading (60 percent) or needed more information (35 percent). A large majority (70 percent) are interested in having a third-party help coordinate trades. Most of the participants represented local governments (70 percent).



Several small stakeholder group discussions were held to further solicit feedback. The following five questions were posed to the group and their responses are provided below.

1. What sounds interesting about what you have heard today?

- Trading will not solve your permit problems completely.
- All in the group are interested in the topic, especially the point-to-point source trading.
- This is a good opportunity to use buffers to prevent pollution.
- This gives multiple options for solutions.
- Total watershed compliance is a good concept.
- It gives poultry farms different options and incentives.
- It is important that bad practices are corrected before getting credit.
- Could demonstrating the need for future credits lead to "banking?"

2. What concerns do you have about what you have heard today?

- Can't cause an excess of contaminants in another basin.
- Costs: how will they be determined, and could wealthy buyers control and/or steer the market?
- Who will regulate this?
- Lack of restrictions of NPSs.
- Inconsistent limits with point-source.
- Unintended contaminants involved in trading.
- Will nonpoint sellers participate? What is their incentive?
- Concerned about point-to-nonpoint source trades, as it seems less sustainable over time.
- Will a trade have a reasonable chance for a WWTP to avoid tertiary treatment?
- How will you make sure that the BMP used by the NPS will stay (i.e., if you buy credits from someone who installs a stream buffer, then removes it later, who is liable and what are the consequences, etc.)?

3. What information would be useful to you to further evaluate trading?

- Possible cost of trade versus capital cost to meet permit.
- How to make it cost-effective.
- Having input from NPSs.
- GA EPD input to help make it more attractive to nonpoint.
- Regulation model.
- In-state examples.
- Recourse if seller reneges on maintenance of property.
- How are seller's credits transferred via land sale?
- Credits tied to the same watershed?
- What type of monitoring is required?

4. What advice do you have for the Partnership and Water Council as they move forward with the project?

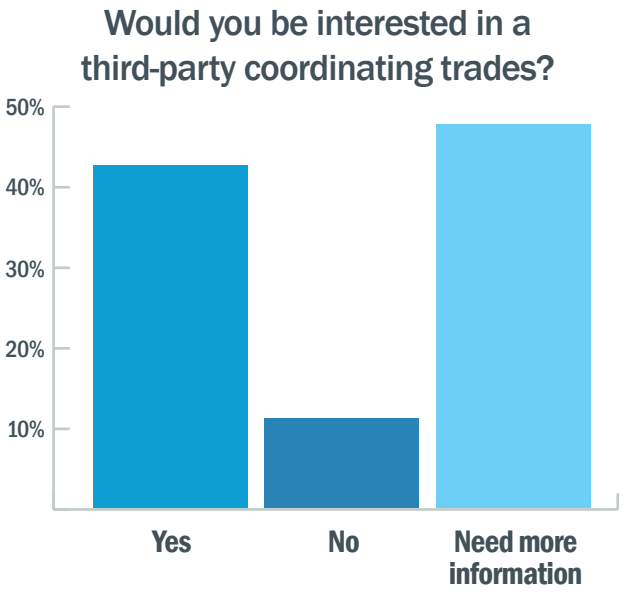
- Investigate other states' successes and problems.
- Proceed with caution.
- An inventory of credits per watershed.
- Seller being responsible party to follow guidelines.
- A third-party broker or person to coordinate.
- Make sure poultry industry understands these concepts, can't be successful without that.
- Keep it as simple as possible; public outreach to educate the poultry farmers and others that will be involved.
- Wet versus dry impacts for nutrient levels.

5. Other questions or comments?

- What reduction comes from areas where livestock are excluded from areas they use to roam?
- How much nutrients are still being released from fields that are not currently receiving chicken litter, but did so for many years prior?

3.2 Savannah-Upper Ogeechee Water Planning Region

A stakeholder meeting was held on May 29, 2018, with more than 20 people in attendance. The results of the alternative nutrient management strategies review and specific nutrient trading examples were presented. The presentation is provided in Attachment C. Attendees at this meeting represented a more varied group of local governments and public and private organizations than the Coosa-North Georgia stakeholder meeting.



A real-time survey was conducted after the presentation to solicit initial feedback and encourage discussion. Details on the survey can be found in Attachment C. Results of the survey indicated that most (90 percent) of participants have heard of nutrient trading, more than 90 percent expected TP limits to become stricter in the future, and fewer than 50 percent of NPDES permit holders reported that they could meet standards today. Most survey respondents are interested in meeting permit limits through nutrient trading (66 percent) or needed more information (34 percent). A large majority (89 percent) are interested in having a third party help coordinate trades or need more information. This group represented a more diverse set of organizations including local governments, private organizations, permit holders, and agencies that support property owners.

Several small stakeholder group discussions were held to further solicit feedback. The following five questions were posed to the group and responses are provided below.

1. **What sounds interesting about what you have heard today?**
   - Interested in combined permits and how that would work between the facilities.
   - Land conservation and buffers impacts: how to determine credits and document compliance with monitoring, etc.
   - Involving a third party, like the Water Council, to assist in the process.
   - Examples of previous states, cities, or watersheds that have implemented similar programs successfully.
   - Glad to hear that people are interested in trading, and that the agriculture community is being engaged in the process.

2. What concerns do you have about what you have heard today?

- What role will GA EPD play in oversight, funding, etc.?
- How will the BMPs be monitored after implementation?
- Permit holders seem to be bearing most of the burden.
- Are we going to have to set higher or artificial limits to incentivize trading?
- Concerned that strict regulatory compliance will cost a lot of money (Virginia).
- Easier to control in an urban watershed than in a 2.8-million-acre watershed, and the challenges associated with that.
- What happens if the landowner sells or removes the BMP?
- How much of a hassle will working with GA EPD be? If it's complicated or difficult, most will not participate.
- How to calculate removal efficiencies or trading ratios? For example, tree buffers will remove different amounts of N or P during the life cycle of the tree.
- Needs to be monetarily advantageous for the permit holder; otherwise, it will just upgrade the plant to meet the removal goals.

3. What information would be useful to you to further evaluate trading?

- What limits will the GA EPD set to start out?
- How many dischargers do we have and what are their limits?
- Would conservation groups trust GA EPD to be the enforcer?
- Data to determine where hot spots are in relation to where the opportunity exists for BMPs.
- Who would verify BMPs, etc.?
- Would it be suggested that the land include easement agreements so that the BMPs stay in place if the land is sold, etc.?
- How does the trading work?
- Is the trading limited to the entire basin, or only a sub-basin?

4. What advice do you have for the Partnership and Water Council as they move forward with the project?

- Suggest we investigate other states' successes and problems, maybe have them come and speak to stakeholders.
- Will GA EPD accept national averages of BMP effectiveness? Or will more studies need to be done to determine specific numbers for each state and watershed?
- Continue seed grant opportunities.
- Involve stakeholders in the entire process, similar to 5R.
- Design a system that is predictable and transparent, but also simple.
- Study programs that have failed or have limited trades.
- Educate landowners, farmers, etc. to get the word out to them to have good participation; also discuss co-benefits, such as reduction of algal blooms, source water protection, etc.
- Do not eliminate the trading tool before we try to work on a program.
- Look at New York City Source Water Protection.

5. Other questions or comments?

- Are there data on buffer nutrient reduction?
- Currently for this area there are no TP limits in permits, only monitoring—TN is the issue.
- When will rivers and streams have nutrient standards? Are estuaries next on the list before rivers and streams?
- Additional ideas for Savannah area; the water quality improvements include only oxbow restoration (projects already in the works for this).

The results and feedback from both stakeholder sessions were included when developing the recommended strategy presented in Section 5.

SECTION 4

Regulatory Authority and Programs for Nutrient Trading

This section describes the permitting structure that may regulate nutrient trading.

4.1.1 Individual NPDES Permit

The municipal or industrial NPDES permit is the regulatory backbone of most individual trading activities and programs. Individual NPDES permits have implicit authority to allow trading through special condition language and federal code. NPDES permits issued by the State of Georgia have language to allow nutrient trading to achieve WQBELs through the use of special conditions to meet compliance with WQBELs. Relevant federal code references NPDES permit regulations 40 CFR Parts 122, 123, and 124 and TMDL regulations (Section 303d (1)). Specifically, 40 CFR 122.44(d)(1)(ii) states "…each NPDES permit shall include conditions meeting the following requirements when applicable …the permitting authority shall use procedures [that] account for existing controls on point and NPSs of pollution…" However, the details of the proposed trade need to be compiled and submitted to the appropriate regulatory agency for approval.

To meet federal code applicable to an NPDES permit, a water quality trade:

- Will not cause or contribute to violation of water quality standards
- Will be consistent with anti-degradation policies
- Will be consistent with local, state, and federal laws

GA EPD indicates that approval of a trade within an individual NPDES permit would require documentation of the trade details, which would be provided in a trading plan that becomes part of the permit. See Section 4.2 below for more details on what would be included in a trading plan.

Individual permit conditions, such as trading, may be subject to public comment, with the possibility of organizations or individuals contesting the trade. Contesting a trade within an individual permit may delay the approval process.

4.1.2 Watershed Permits

Although most NPDES permits cover a single entity, the Clean Water Act also allows permits that address multiple sources within a watershed. Where nutrient limits or a regulatory driver such as a TMDL exist, these watershed-based permits may be employed to facilitate and authorize trading within the watershed. A watershed based permit provides legal authority for permittees to conduct trades and offsets, and provides a clear means to demonstrate compliance with a collective wasteload allocation.

There are several types of watershed-based permits. A single entity watershed permit (more commonly called a "bubble" permit) is a NPDES permit that covers multiple co-owned sources in the same watershed. For example, a utility that operates three WWTPs might a receive a single nutrient wasteload allocation for the sum of the three facilities. The owner would have flexibility in which of the WWTPs was upgraded, as long as the sum of loads from the three facilities remained below the wasteload allocation. An extension of this concept is the integrated municipal permit, by which a locality would receive a single permit that covers multiple Clean Water Act regulated sources (e.g., WWTPs, MS4, sanitary sewer overflows) within its jurisdiction. Integrated planning and permitting can be used to prioritize the most cost-effective projects over a long-term compliance schedule.

One of the most effective means to promote nutrient trading is a general watershed permit, which caps the cumulative load of all the participating sources. Entities covered by this type of permit are in compliance if they meet their individual wasteload allocations or, through trading, contribute to compliance with the aggregate wasteload allocation. A general watershed permit usually covers multiple entities of similar type within the same basin. See the USEPA website for more information on watershed permitting: https://www.epa.gov/npdes/npdes-watershed-based-permitting-background-information.

4.1.3 State Authority

A nutrient trading program must be defensible, efficient, and transparent. The National Network of Water Quality Trading (NNWQT) has studied many trading programs throughout the United States and finds that the regulatory structure depends on the size and scope of trading. If trading is anticipated in multiple watersheds throughout a state, then it may warrant state guidance. If trading is expected in one or two areas, then state-level policy may not be as critical (NNWQT 2015).

The size and scope of the potential trading in Georgia may influence if and how the State itself supports a nutrient trading program. State guidance provides a common set of policy and regulatory tools that can be applied consistently throughout the state. If trading is expected in a limited area, then trades may be approved on an individual permit basis or through a watershed or general permit.

Although implicit in NPDES permit language, 15 states now have a statute, policy, or guidance governing statewide trading (NNWQT 2015). State regulatory options include:

- Use existing agency enabling legislation
- Use existing regulations
- Create a specific water quality trading policy
- Establish a nutrient trading statute
- Develop agency guidance

Some states go a step further and establish programs or departments that support and facilitate nutrient trading, which is described below.

4.2 Trading Programs

A trading program can be run by different types of organizations. Organizations that support trading are critical to implementing trades within a watershed or state.

4.2.1 Trading Organizations

Organizations that support nutrient trading include credit exchanges, trading associations, and regional planning agencies. Trading organizations can assist permit holders in finding trading partners, setting up trades, preparing a trading plan, facilitating meetings, annual reporting, and other tasks. These organizations may take on different forms, including associations that focus strictly on one geographic area or one type of trading.

An organization that helps facilitate trading eliminates the need for NPDES permit holders to find and negotiate directly with other permit holders or individual landowners. Trading organizations in other states have established a board of directors, hired an executive director, created bylaws, and fulfill functions that support nutrient trading. Trading organization activities may include:

- Coordination between trading partners
- Preparation of permit applications
- Annual reporting
- Record keeping of trades and trading partners
- Annual inspections (nonpoint facilities)
- Facilitation of board and stakeholder meetings

Examples include the Association (North Carolina), the Virginia Nutrient Credit Exchange Association (Virginia), or the Miami Conservancy District (Ohio). Attachment E provides examples of watershed groups that are focusing on alternative nutrient management strategies in the southeastern United States.

In addition, working with NRCS, Soil Conservation Districts (SCDs), or other existing extension agencies has been identified as a success factor in other programs in coordinating with landowners.

Feedback from stakeholder groups received during this study indicated the need for a trading organization to support trading programs in Georgia. Existing

organizations may include the Partnership, the Savannah Clean Water Fund, the Metropolitan North Georgia Water Planning District, or other regional planning agencies.

4.2.2 State Programs

Some states provide mitigation programs where individuals permittees can buy credit for nutrient permit requirements and other services.

North Carolina

Nutrient mitigation may be required for any new or existing development where nutrient reduction requirements exist as part of a nutrient management strategy. In North Carolina, there are four nutrient management strategies: Neuse River Basin, Tar-Pamlico River Basin, Falls Lake Watershed, and Jordan Lake Watershed. After all other practical alternatives for avoiding and minimizing the impact have been evaluated, a development may use the following strategies to comply with mitigation requirements:

- Mitigation banks: applicant satisfies the mitigation requirement by purchasing mitigation credits from an approved mitigation bank
- In-lieu fee mitigation: applicant satisfies the mitigation requirement by purchasing mitigation credits through the North Carolina Division of Mitigation Services
- Project-specific mitigation: applicant satisfies the mitigation requirement itself, either at the project site or at an offsite location

North Carolina's Division of Mitigation Services (https://deq.nc.gov/about/divisions/mitigation-services) offers four in-lieu fee mitigation programs for streams, wetlands, riparian buffers, and nutrients. Public and private entities may use these programs to comply with mitigation impacts from development. The North Carolina Department of Transportation is one of the largest buyers of credits. Nutrient credits include nitrogen and to a lesser degree P created with stream buffer enhancement.

Virginia

In 2005 Virginia authorized the establishment of the Chesapeake Bay Watershed Nutrient Credit Exchange Program. This legislation directed the Virginia Department of Environmental Quality to issue a general watershed permit that authorizes and sets conditions for nutrient trading in support of the Chesapeake Bay nutrient regulations. A general permit authorizes nutrient trading among wastewater dischargers (Attachment D) The Virginia Nutrient Credit Exchange (the Exchange) is a voluntary, not-for-profit association of owners of regulated facilities that serves as a facilitator of nutrient trading. An annual report is prepared that summarizes the Exchange activities; the 2017 Annual report can be viewed here:

https://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/2017%20Exchange%20Annual%20Compliance%20Plan%20Update.pdf?ver=2017-10-26-153954-917

A permittee may also purchase credits through payment to a state-run Nutrient Offset Fund, which uses funds to implement projects to address nutrient impairment.

The Virginia Department of Environmental Quality developed a guidance document for NPSs to implement trades, Trading Nutrient Reductions from Nonpoint Source Best Management Practices in the Chesapeake Bay Watershed: Guidance for Agricultural Landowner and Your Potential Trading Partners. https://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/VANPSTradingManual_2-5-08.pdf. One of the highest-ranking BMPs for P removal is land conversion, for example converting pasture to forestland.

Georgia

The Georgia-Alabama Land Trust maintains an in-lieu fee mitigation program for stream and wetland impacts. The Georgia-Alabama Land Trust is a nonprofit entity that coordinates between landowners, regulatory agencies, and other private businesses to provide stream and wetland mitigation credits. The Georgia-Alabama Land Trust is a USACE-approved vehicle for mitigation credits when none are available in a certain watershed. See the website link at http://www.georgiaalabamalandtrust.org/water-resources-protecting-wetlands-in-lieu-fee-mitigation/. No nutrient credits are provided at this time.

GA EPD is developing a framework to authorize nutrient trading under existing NPDES permits. The draft framework focuses on individual permit requirements. The framework is occurring concurrently with this study and stakeholders will meet to review and discuss the framework.

Add EPD draft framework 2-4 pages or as attachment.

SECTION 5

Recommended Strategy

The feasibility and cost of nutrient reduction is one of the major water quality challenges faced by the Water Councils and Partnership. This issue will only grow in the future and has the potential to affect every major sector of stakeholders in Georgia. As discussed in this document, various regulatory alternatives exist that can potentially increase the feasibility and reduce the cost of nutrient reduction. With the aid of the GA EPD Seed Grant, the project partners evaluated these alternatives to determine which would be most effective in the region. The recommended strategy was developed based on information collected during the national practice review (Section 2), stakeholder meetings (Section 3), and additional research of water quality trading programs (Section 4). Input was received from GA EPD, the Partnership, and stakeholder feedback as part of workshops held in April and May 2018.

Based on feedback from the stakeholders (as part of workshops held in April and May 2018), discussions with GA EPD, and review of other State programs, the project partners recommend prioritizing the development of a nutrient trading program as means to increase the feasibility and reduce cost of nutrient reduction. This does not rule out roles for other beneficial alternatives such as site-specific standards or TMDL alternatives. However, a trading program should be prioritized due to its proven potential to promote nutrient reductions in a cooperative, cost-effective manner.

The examples of nutrient trading programs provided in this report provide the basis for many of the recommendations listed below. Regardless of how an individual trade or trading program is set up, consistency in developing a trading program is important to improve the ease of implementation, reduce the cost of implementation, and build trust with the process.

The following are recommendations to establish a nutrient trading program:

GA EPD, in coordination with permittees, establish a watershed permit that further solidifies the legal authority to trade in basins with nutrient or nutrient-related (i.e., Chlorophyll a) TMDLs. The nutrient TMDL for the Coosa Basin reference water quality trading as an implementation strategy. The approved TP TMDL plan for Lake Allatoona and the Chlorophyll a TMDL plan for Lake Lanier both identify nutrient trading as a tool to achieve water quality standards, recognizing that NPS pollution comprises most of the total nutrient load in these watersheds. Example watershed permits and fact sheets are provided in Attachment D.

Stakeholders, with GA EPD review and approval, develop a watershed specific or regional nutrient trading guidance document. The guidance should be a comprehensive document that includes credit development, BMP efficiency, trading ratios, annual reporting, application forms, etc. A draft guidance document outline is provided in Attachment F that was drawn from other state examples. Some details on specific recommendations are included below.

- Establish trading ratios that are reasonable, but not so risk-averse that the cost-benefit of trading is reduced or eliminated. Trading ratios may address factors that include temporal and spatial uncertainty of pollutant reduction achieved. However, practices such as periodic BMP verification lowers the risk of uncertainty associated with NPS trades. Research into the effectiveness of trading programs indicates that barriers from high-trading ratios limit participation because of increased costs to credit buyers, mitigating the cost savings envisioned from trading in the first place (Newburn and Woodward 2012). Credible pollutant reduction estimates must be made to comply with NPDES and TMDL requirements; however, the difficulty and expense in directly monitoring NPS reduction leads to risk reduction strategies in the form of high trading ratios that in effect create a disincentive to trade.
- Create an insurance pool of credits from a set aside with each trade within a watershed, reducing the risk on each project individually while providing more stability for regulators and permit holders. This could be set up and managed by a trading organization.
- Establish a simple process to generate and document credits. Stakeholder feedback indicates that a simple, easy-to-understand process will generate more landowner participation. A guidance document for landowners, training, and examples will help generate interest from landowners. One example is the Great Miami River Watershed Water Quality Credit Trading Program Operations Manual (MCD 2005).
- Establish a simple process to buy credits. Stakeholder feedback indicates that a simple, easy-to-understand process will generate interest in trading to meet permit requirements. A guidance document for credit buyers, training, and permit application examples will help permittees understand the process, advantages, and challenges. One example is A Water Quality Trading How-To Manual (Wisconsin Department of Natural Resources 2013).
- Identify sources for accepted BMP efficiency rates such as the Georgia Stormwater Management Manual (ARC 2016), North Carolina Stormwater Control Measure Credit Document (North Carolina Department of Environmental Quality 2017), or Chesapeake Assessment Scenario Tool. If a specific BMP efficiency is not available, establish the evaluation process to approve BMPs for NPS trades.
- Outline requirements for both individual permittee trading plans and joint trading plans operating under a trading organization and a watershed permit.

Permit holders establish a trading organization in watersheds with existing TMDLs to facilitate nutrient trading. The watershed permit may directly reference the trading organization as the recognized entity to organize and support trades. Feedback received during stakeholder meetings indicated that a trading organization would be helpful to coordinate point-to-point and point-to-nonpoint trading, and to help work with landowners. Individual NPDES permit holders do not have time to seek out one or more landowners and negotiate details of a trade. The trading organization can help facilitate trades, but support from NRCS, extension agents, and private organizations—such as the

poultry federation or the cattleman's association—is also needed to work directly with landowners and possibly help monitor project effectiveness.

One of the advantages of having a general watershed permit, guidance document, and trading organization is that a separate trading plan is not needed for every trade. Rather, for trades conducted through a trading organization, a joint annual trading plan will detail activities within that basin. Credit surpluses and needs are projected at the beginning of the year and point sources that expect to need credits can purchase them. At the end of the year, the projections are reconciled against actual discharges. A joint trading plan would also project credit needs and availability for some future time period (for example 10 to 20 years). This would provide assurance that loads would remain below the collective wasteload allocation for the near future and aid dischargers in planning the timing of upgrades.

The trading organization can also help mitigate risk for members by setting up an insurance pool of credits to use if a trade or project does not function as planned. Every trade would include a small percentage of credits assigned to the insurance pool that is available to all members if needed. Generally, a trading organization would have these key responsibilities and attributes:

- Stakeholder led organization with board of directors and dedicated staff
- Annual notice of credits available and credits needed
- Price credits
- Facilitate point-to-point source trades
- Facilitate point-to-nonpoint source trades
- Annual reconciliation of trades (who/what/where/when)
- Annual reporting of trades to GA EPD
- Set up and hold an insurance pool of credits
- Annual or semiannual stakeholder meeting(s)

Compliance with individual and watershed permits will be documented by the trading organization through the trading plan and annual reporting.

Permit holders prepare a trading plan for trades conducted outside of a trading organization in accordance with regional guidance. The trading plan must be built around a specific framework provided by the GA EPD, consistent with Clean Water Act regulatory framework, and the nutrient trading guidance document discussed above. The trading mechanisms must be science-based and ensure that the program does not produce localized water quality impacts. The trading plan also needs to include tracking and reporting processes and include compliance and enforcement provisions to ensure that the nutrient reductions are met. The trading plan may be a simple document that outlines trading between two stakeholders with a single trading mechanism, or it may be a more complex document that allows for trading among multiple stakeholders and crediting methods. An individual trading plan should include the following elements:

- Nutrient trading application form
- Watershed figure with buyer and seller locations, receiving stream(s)
- Trade description
- Type of pollutant
- Type of trade (point-to-point, point-to-nonpoint, etc.)
- Baseline verification
- BMP description
- Credit calculation
- Calculation method
- Effluent limit
- Compliance limit
- Credits applied
- Trade ratios (description, application)
- Tracking
- Verification
- Copy of trade agreement between credit buyer and seller

Implementation of these recommendations will lead to a transparent, scientifically sound, and cost-effective tool to address nutrient reductions in the Coosa-North Georgia and Savannah-Upper Ogeechee Water Planning Regions and may have applicability in other basins in the state.

SECTION 6

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