Compendium of State and Regional NPDES Nutrient Permitting Approaches

Office of Wastewater Management
Water Permits Division
July 2022
EPA-833-B-22-003

Revisions to the Compendium

EPA first published the Compendium of State and Regional NPDES Nutrient Permitting Approaches in January 2021. This compendium is designed to be a "living document" that can be updated as needed; future updates may include topics such as variances, adaptive management, implementation of narrative criteria, and implementation of nutrient TMDLs. Revisions to the compendium since January 2021 are summarized below.

1. July 2022 - EPA updated broken links and made minor editorial revisions.

Table of Contents

Table of Contents

Table of Contents

Introduction to the Compendium

This compendium is a collection of state practices, policies, and procedures (hereafter, "procedures") for reducing excess nutrients. Its purpose is to facilitate state-to-state sharing about different approaches for addressing the adverse effects of excess nutrients in National Pollutant Discharge Elimination System (NPDES) permits. This compendium will showcase different state procedures and open dialog on the different approaches.

The compendium includes information about nutrient-specific procedures employed by authorized NPDES state and regional permitting authorities. It is divided into the following sections:

- Permitting Critical Conditions
  - Critical Receiving Water Upstream Flow
  - Critical Effluent Pollutant Concentration
  - Critical Receiving Water Pollutant Concentration (i.e., background)
- Performance Based Approaches
- Water Quality Trading
- Watershed-Based Permitting
  - Integrated Municipal Permits
  - Multisource Watershed-Based Permits
  - Coordinated Individual Permits

EPA will update the compendium as needed based on comments received and new information. The inclusion of any particular permit example, policy, or procedure should not be read as an Agency endorsement of the approach taken in that permit, nor should it be read as EPA's independent determination that the permit terms meet the regulatory requirements to satisfy the appropriate water quality requirements of the Clean Water Act and the implementing regulations that govern the NPDES program.

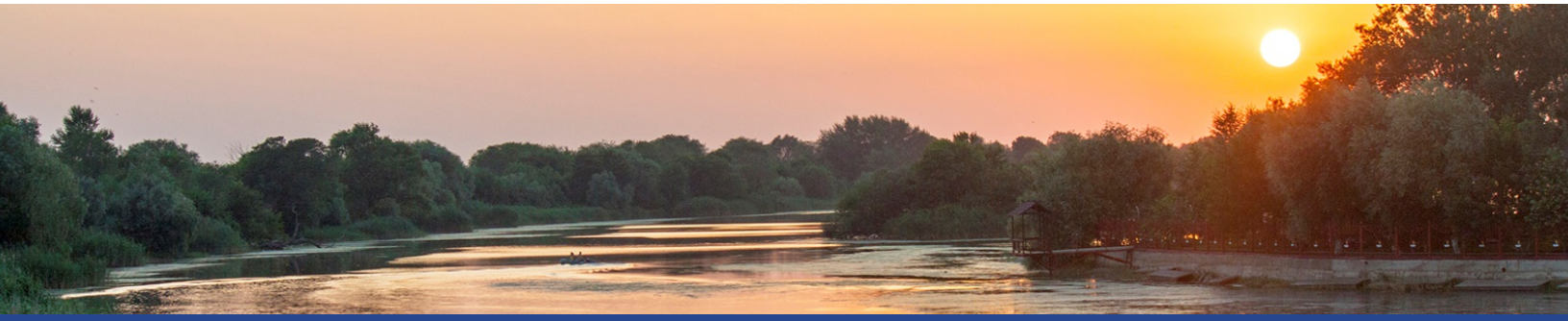
This document does not contain or impose any legally binding requirements on EPA, states, or the regulated community, and does not confer legal rights or impose legal obligations upon any member of the public. EPA made every attempt to ensure the accuracy of the examples included in this document; in the event of a conflict between this compendium and any statute, regulation, or permit, the statute, regulation, or permit controls.

For more information about nutrient permitting under the NPDES program, visit https://www.epa.gov/npdes/nutrient-permitting.

Compendium at a Glance

State	Critical Receiving Water Upstream Flow	Critical Effluent Pollutant Concentration	Critical Receiving Water Pollutant Concentration	Performance Based Approaches	Water Quality Trading	Watershed Based Permitting
	Permitting Critical Conditions			Alternate Approaches		
Alabama				Page 8		
California					Page 30	Page 74
Colorado	Page 1	Page 4	Page 6	Page 8	Page 34	
Connecticut					Page 36	Pages 76 & 92
Delaware				Page 11		
Florida					Page 39	
Georgia				Page 12		
Idaho	Page 2	Page 4	Page 6		Page 41	
Indiana				Page 12		
Iowa				Page 14		
Louisiana					Page 44	
Maryland					Page 48	Page 77
Michigan				Page 15		
Minnesota	Page 2	Page 4	Page 6	Page 16	Page 50	
Missouri				Page 17		
Montana	Page 3				Page 52	
New Jersey				Page 17		
New Mexico						Page 81
New York				Page 18		
North Carolina				Page 20		Page 83
Ohio				Page 21	Page 54	Page 93
Oregon					Page 57	Page 72
Pennsylvania				Page 22	Page 60	
Rhode Island						Page 96
Tennessee				Page 23		
Texas				Page 24		
Vermont						Page 98
Virginia				Page 25	Page 63	Page 89
Washington					Page 65	
Wisconsin	Page 3		Page 7	Page 26	Page 67	Pages 91 & 102

Click here to return to the Table of Contents



PERMITTING CRITICAL CONDITION

Permit writers may use water quality models to assess the impact a discharge(s) has on a receiving water. Where steady-state models are used for water quality-based permitting, an important part of characterizing the effluent and receiving water is identifying the critical conditions needed as inputs to the water quality model. The critical conditions used for nutrient permitting may be different than the critical conditions used for permitting toxic pollutants (EPA's NPDES Permit Writers' Manual). This compendium identifies **state policies or procedures** that reflect what permit writers have considered for the following critical conditions to control excess nutrients: flow, pollutant concentration, and receiving water pollutant concentration.

1. **Critical receiving water upstream flow**
2. **Critical pollutant concentration**
3. **Critical receiving water pollutant concentration**

Critical Receiving Water Upstream Flow

For rivers and streams, an important critical condition is the stream flow upstream of the discharge. This condition, generally specified in the applicable water quality standards, reflects the duration and frequency components of the water quality criterion that is being addressed. For most pollutants and criteria, the critical flow in rivers and streams is some measure of the low flow. Examples of typical critical hydrologically-based low flows in water quality standards include the 7Q10 (lowest 7-day average expected to occur once in 10 years) low flow for chronic aquatic life criteria, the 1Q10 low flow for acute aquatic life criteria, and the harmonic mean flow for human health criteria for toxic organic pollutants (EPA's NPDES Permit Writers' Manual). However, a different measure could be appropriate for nutrients due to the complex dynamics of nutrients and the receiving waters. Unlike toxic pollutants that have a direct and often immediate effect, the impacts of nutrients may be delayed over time as the nutrients are processed within the aquatic system. Longer flow averaging periods may be more representative of critical receiving water flows due to these delayed and accumulated impacts.

COLORADO

The Colorado Department of Public Health and Environment's (CDPHE's) Basic Standards and Methodologies for Surface Water (Regulation #31) define critical flow conditions of the upstream receiving waters for the purposes of developing effluent limitations or other

requirements for discharge permits. For total phosphorus and total nitrogen limitations, Regulation #31 specifies that the critical low flow is the annual median low flow with an average 1-in-5 year recurrence interval, which can be calculated from the second driest year in a 10-year period.

IDAHO

The Idaho Department of Environmental Quality (DEQ) provides guidance for selecting critical conditions for nutrients in Section 3.7.1 of the *Idaho Pollutant Discharge Elimination System: Effluent Limit Development Guidance*. When selecting the critical receiving water upstream flow, the guidance recommends aligning the stream flow averaging duration and the nutrient averaging period. If the receiving waterbody's response to nutrients is best represented on a seasonal or annual basis, the guidance recommends using a corresponding receiving water duration (e.g., a receiving water with a seasonal nutrient load should use the corresponding seasonal flow).

The guidance also acknowledges that the receiving waterbody's size may also affect the selection of the appropriate average flow. For example, low-flow conditions may represent critical receiving water flows for small waterbodies and large rivers and reservoirs. For systems with long retention times, large flows may represent critical receiving water flows if they result in greater nutrient response.

Idaho DEQ's approach is designed to produce effluent limits that will ensure receiving water nutrient concentrations will not exceed the applicable criterion more than once in a 3-year period. For a monthly average, the critical flow condition can be defined as the lowest 30-day (i.e., monthly) average flow occurring once in 3 years (30Q3). For seasonal nutrient averaging periods (e.g., 60 or 90 days during growing periods), the critical flow condition can be defined using seasonal flow conditions that return with a frequency of once in 3 years. If an annual averaging period is appropriate for the receiving water, the guidance recommends using the harmonic mean flow.

Consistent with Idaho's mixing zone policy at IDAPA 58.01.02.060.01.h.i, the guidance specifies that the percentage of stream flow allocated for nutrient mixing may not be expanded to be larger than necessary and may not exceed 25 percent of the design low flow unless justification is provided by the permittee considering siting, technological, and managerial options available to the discharger as required in the water quality standards mixing zone policy.

PERMITTING CRITICAL CONDITIONS

MINNESOTA

For mixing zones and compliance with river eutrophication standards, Minnesota Administrative Rule 7053.0205 Subpart 7.C states, "Discharges of total phosphorus in sewage, industrial waste, or other wastes must be controlled so that the eutrophication water quality standard is maintained for the long-term summer concentration of total phosphorus, when averaged over all flows, except where a specific flow is identified in chapter 7050."[1]

Per Rule 7053.0255, for reservoirs, residence time is determined using a flow equal to the 122Q10 for June through September.

The Minnesota Pollution Control Agency (MPCA) provides guidance for choosing critical conditions in the *Procedures for Implementing River Eutrophication Standards in NPDES Wastewater Permits in Minnesota*. When a Total Maximum Daily Load (TMDL) or a detailed water quality model exists, it is used to determine reasonable potential and WLAs related to phosphorus limits. The procedures also describe using the 80 percent exceeds summer flow of the river, minus the actual flows from contributing wastewater treatment facilities, as the critical receiving water flow (Q_s) for reasonable potential analysis and effluent limit calculations, which are based on a mass-balance approach. MPCA chose the 80 percent exceeds summer flow because it is reliable, reproducible, and simpler to derive than conventional low flow statistics (e.g., 30Q3 or 7Q10). Flow calculations are based on summer (June to September) flow data collected over 30 years.

MONTANA

The Administrative Rules of Montana (ARM 17.30.635(2)) specify that the seasonal 14Q5 shall be used as the critical low flow for developing effluent limits for total nitrogen and total phosphorus. The seasonal 14Q5 is the lowest average 14-consecutive-day low flow, occurring from July through October, with an average recurrence frequency of once in 5 years.

WISCONSIN

Wisconsin's Administrative Code (NR 217.13) specifies the procedures for calculating effluent limits for phosphorus using a mass-balance approach. The procedures require that the receiving water design flow (Q_s), in units of volume per unit time, be determined using one of the following:

[1] "Averaged over all flows" means that no high or low flow conditions are excluded in the calculation of the long-term summer average flow.

- The average minimum 7-day flow that occurs once every 2 years (7-day Q_2).
- The average low 30-day flow that occurs once every 3 years (30-day Q_3).
- Other flow deemed more representative of flow conditions.

The 7-day Q_2 and 30-day Q_3 must be based on information derived by the U.S. Geological Survey, or another information source approved by the Wisconsin Department of Natural Resources (DNR), using data from a representative gauging station with a period of record of at least 10 years.

Critical Effluent Pollutant Concentration

The critical effluent pollutant concentration represents a reasonable estimate of the maximum amount of the pollutant that would be expected to be present in the effluent. For toxics, EPA has recommended considering a concentration that represents something close to the maximum concentration of the pollutant that would be expected over time (e.g., the 99th or 95th percentile of a lognormal distribution of effluent concentrations) (EPA's Technical Support Document for Water Quality-based Toxics Control). For nutrients, a different measure could be appropriate since the impacts of excess nutrients occur primarily as a result of long-term average exposure rather than acute exposure and the duration component of nutrient criteria are often longer (e.g., seasonal or annual criteria) than acute and chronic aquatic life criteria for toxic pollutants.

COLORADO

CDPHE's Nutrients Management Control Regulation (Regulation #85) requires domestic wastewater treatment works to characterize the nutrient load in their discharge using routine water quality monitoring programs. Major dischargers are also required to characterize the upstream receiving water concentrations and the nutrient load below the discharge.

Sampling for total nitrogen (total Kjeldahl nitrogen plus nitrate-nitrite, or the components to calculate total nitrogen) and total phosphorus (or the components to calculate total phosphorus) is required in the receiving waterbody upstream of the discharge and at the closest active gauging station with daily flow downstream of the discharge's mixing zone. Alternatively, facilities may take part in collaborative watershed-based monitoring efforts. Samples must be collected at least six times a year (every 2 months) for minor discharges and monthly for major discharges.

PERMITTING CRITICAL CONDITIONS

IDAHO

Idaho DEQ's *Idaho Pollutant Discharge Elimination System: Effluent Limit Development Guidance* specifies procedures for conducting a reasonable potential analysis and calculating water quality-based effluent limitations following a similar approach to the mass-balance approach described in the U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control*.

To conduct the reasonable potential analysis for nutrients, the guidance specifies that the critical effluent concentration be derived using the 95th percentile of monthly daily maximum effluent based on daily maximum data, instead of the maximum observed effluent concentration, multiplied by a reasonable potential multiplying factor based on a 95th percentile confidence level and 95th percentile probability basis.

When calculating water quality-based effluent limitations for nutrients, the guidance specifies that the long-term average be derived using the 95th percentile confidence level instead of the 99th percentile confidence level, which is used for effluent limits for toxic pollutants based on acute or chronic criteria.

MINNESOTA

MPCA's *Procedures for Implementing River Eutrophication Standards in NPDES Wastewater Permits in Minnesota* use modeling and mass-balance approaches for reasonable potential analyses and water-quality-based effluent limit calculations for discharges to rivers.

For the reasonable potential analysis, the long-term effluent concentration, existing concentration limit, proposed concentration wasteload allocation for the downstream resource, or concentration target of downstream mass wasteload allocation can be used as the effluent concentration (C_e) in the mass-balance equation. The procedures note that no multiplier should be used to transform C_e to 95th or 99th percentile concentration since the river eutrophication standards are long-term summer averages over multiple years. The river eutrophication standards do not specify a frequency of exceedance (e.g., not to exceed once in 10 years).

For developing effluent limits, the procedures require that the wasteload allocation be multiplied by a default multiplier of 2.1 to derive an average monthly limit.

PERMITTING CRITICAL CONDITIONS

Critical Receiving Water Pollutant Concentration

The critical receiving water pollutant concentration represents a reasonable estimate of the maximum amount of the pollutant that would be expected to be present in the receiving water. The permit writer should determine the critical background concentration of the pollutant of concern in the receiving water before the discharge to ensure that any pollutant limitation derived is protective of the designated uses. For toxics, the permit writer might use the maximum measured background pollutant concentration or, perhaps, an average of measured concentrations as the critical condition (EPA's Technical Support Document for Water Quality-based Toxics Control). For nutrients, a different measure could be appropriate since the impacts of excess nutrients occur primarily as a result of long-term average exposure rather than acute exposure and the duration component of nutrient criteria are often longer (e.g., seasonal or annual criteria) than acute and chronic aquatic life criteria for toxic pollutants.

COLORADO

The Colorado Department of Public Health and Environment's Nutrients Management Control Regulation (Regulation #85) requires domestic wastewater treatment works to implement routine water quality monitoring programs to characterize the nutrient load in their discharge, the upstream receiving water concentrations, and the nutrient load below the discharge.

Sampling for total nitrogen (total Kjeldahl nitrogen plus nitrate-nitrite, or the components to calculate total nitrogen) and total phosphorus (or the components to calculate total phosphorus) is required in the receiving waterbody upstream of the discharge and at the closest active gaging station with daily flow downstream of the discharge's mixing zone. Alternatively, facilities may take part in collaborative watershed-based monitoring efforts. Samples must be collected at least six times a year (every 2 months) for minor discharges and monthly for major discharges.

IDAHO

Idaho DEQ's *Idaho Pollutant Discharge Elimination System: Effluent Limit Development Guidance* specifies procedures for conducting a reasonable potential analysis following a similar approach to the mass-balance approach described in U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control*.

To conduct the reasonable potential analysis for nutrients, the guidance specifies that the critical receiving water pollutant concentration be derived using the 90th to 95th percentile of background pollutant concentrations.

PERMITTING CRITICAL CONDITIONS

MINNESOTA

MPCA's *Procedures for Implementing River Eutrophication Standards in NPDES Wastewater Permits in Minnesota* use modeling and mass-balance approaches for reasonable potential analysis for discharges to rivers. For these analyses, the procedures allow the following options for estimating the upstream total phosphorus concentration:

- Use river monitoring data from upstream of point sources during low flow conditions.
- Assume upstream resource meets the applicable river eutrophication standard.
- Estimate the concentration based on modeling or mass-balance calculations.

WISCONSIN

Wisconsin's Administrative Code (NR 217.13) specifies procedures for calculating effluent limits for total phosphorus using a mass-balance approach. The procedures require using the representative upstream concentration of phosphorus, derived using data from the specific stream or from a similar location. This concentration is equal to the median of at least four samples collected from May through October. All samples collected during a 28-day period shall be considered as a single sample and the average of the concentrations used. If available, up to 5 years of data may be used for the calculation. Data older than 5 years may be used if they are representative of current conditions.

Click here to return to the Table of Contents

PERFORMANCE-BASED APPROACHES

Some states have adopted performance standards for nutrients that apply to certain categories or classes of facilities—for example, publicly owned treatment works (POTWs)—or that apply to facilities discharging to a certain waterbody or statewide. These state performance standards are similar to, and supplement the minimum technology-based requirements of, the Clean Water Act. They often are associated with specific waterbodies or types of waterbodies, yet separate from state water quality standards.

ALABAMA

Key Characteristics of the Approach

Geographic scope: *Treasured lakes in Alabama*

Pollutants: *Total phosphorus*

Types of facilities: *New and expanding continuous point sources*

The Alabama Department of Environmental Management's Admin. Code r. 335-6-10-.10(2) requires the establishment of a monthly limit of 1.0 milligrams per liter (mg/L) for total phosphorus for new and expanding major continuous point source discharges to a waterbody classified as a "Treasured Alabama Lake." Treasured Alabama Lakes are high-quality waters within impoundments and natural lakes that constitute exceptional resources: for example, waters of state parks and wildlife refuges and waters offering exceptional whole-body water-contact recreation, water supply, or rare and extraordinary ecological significance.

The rules require existing water quality for Treasured Alabama Lakes to be maintained and protected pursuant to the state's Antidegradation Policy and Implementation Procedures. New and expanding discharges to Treasured Alabama Lakes are not allowed unless a thorough evaluation of all practicable treatment and disposal alternatives demonstrates there is no feasible alternative.

COLORADO

CDPHE seeks to control nutrients in a number of ways, primarily through its Nutrients Management Control Regulation (Regulation #85), Basic Standards and Methodologies for Surface Water (Regulation #31), and Colorado Nutrient Management Plan and 10-Year Water Quality Roadmap (Clean Water Policy 8).

PERFORMANCE-BASED APPROACHES

CDPHE promulgated Regulation #85 in June 2012 as part of a coordinated strategy to address excess nutrients. Regulation #85 establishes the following numerical effluent limits for domestic wastewater treatment plants (WWTPs) and industrial wastewater dischargers that are likely to have significant levels of nutrients in their discharges.

Type of Facility	Total Phosphorus		Total Inorganic Nitrogen as N[a]	
	Annual Median Limitation[b]	95th Percentile Limitation[c]	Annual Median Limitation[b]	95th Percentile Limitation[c]
Existing domestic WWTPs and non-domestic facilities[d]	1.0 mg/L	2.5 mg/L	15 mg/L	20 mg/L
New domestic WWTPs and non-domestic facilities[d]	0.7 mg/L	1.75 mg/L	7 mg/L	14 mg/L
Existing non-domestic facilities within Standard Industrial Classification (SIC) Major Group 20 (Food and Kindred Products)	10 mg/L	25 mg/L	20 mg/L	27 mg/L
New non-domestic facilities within SIC Major Group 20 (Food and Kindred Products)	5 mg/L	13 mg/L	10 mg/L	20 mg/L

[a] Determined as the sum of nitrate as N, nitrite as N, and ammonia as N.

[b] Rolling annual median: The median of all samples taken in the most recent 12 calendar months.

[c] The 95th percentile of all samples taken in the most recent 12 months.

[d] Limits apply to non-domestic facilities that, without treatment for nutrients, are expected to discharge total inorganic nitrogen or total phosphorus concentrations in excess of the listed concentrations (excluding non-domestic facilities within SIC Major Group 20).

The numeric effluent limits do not apply to:

- existing domestic WWTPs with a design capacity of less than or equal to 1.0 MGD or
- existing domestic WWTPs owned by a disadvantaged community.

Additionally, the effective date of the numeric effluent limits is delayed until December 31, 2027, for:

- existing domestic WWTPs subject to watershed protection control regulations,
- existing domestic WWTPs with a design capacity of less than or equal to 2 MGD, and
- existing domestic WWTPs and non-domestic facilities discharging into low-priority watersheds.

CDPHE established the effluent limits for existing facilities based on "first-level" biological nutrient removal (BNR) that would typically consist of a three-stage process (i.e., single stages of anaerobic, anoxic, and aerobic zones). The effluent limits for new facilities were based on enhanced BNR that would typically consist of a four- or five-stage process (i.e., multiple stages of anaerobic, anoxic, and/or aerobic zones).

Voluntary Incentive Program for Early Nutrient Reduction

As described in Clean Water Policy 8, in 2027, CDPHE will amend Regulation #31 to include revised numeric water quality criteria for nitrogen and phosphorus in rivers and streams. NPDES permits adopted thereafter will include, where necessary, new water quality-based effluent limits based on the revised criteria that are more stringent than the technology-based effluent limits in Regulation #85. CDPHE anticipates that facilities in Colorado will likely need to install more treatment facilities beyond enhanced BNR to comply with such limits.

In anticipation of the new, more stringent water-quality-based effluent limitations, Section 85.5(1.5) of Regulation #85 and the Voluntary Incentive Program for Early Nutrient Reductions (Policy 17-1) establish the requirements for a voluntary incentive program to encourage facilities to voluntarily reduce phosphorus and/or nitrogen concentrations below the technology-based effluent limits applicable before 2027.

Under the voluntary incentive program, permittees that achieve early reductions in nutrient concentrations below the concentrations allowed by the Regulation #85 effluent limits will receive an extended compliance schedule to provide additional time to meet the new water quality-based effluent limits after 2027. This additional time is beyond that which would otherwise be granted to a permittee not participating in the incentive program. The amount of time granted will be based on both the levels of reduction that the facility achieves and the timeframe in which it achieves and maintains those levels. The total duration of the compliance schedule, including both the time allowed by participating in the incentive program and the

time the facility would receive if it had not participated (i.e., the underlying compliance schedule), may not exceed 15 years.

Every permittee participating in the voluntary incentive program is required to submit a nutrient reduction plan and annual nutrient monitoring reports.

CDPHE does not require wastewater treatment facilities to implement a specific treatment technology to participate in the voluntary incentive program, but CDPHE anticipates that nutrient reductions will be achieved through BNR or enhanced BNR (eBNR) optimization, water quality trades, source reduction plans, watershed nutrient reductions, or other capital improvements.

Policy 17-1 authorizes permittees participating in the voluntary incentive program to accrue time under a compliance schedule through water quality trading. CDPHE will use the applicable provisions of the Colorado Pollutant Trading Policy and Section 85.5(3)(d) of Regulation #85 to determine the appropriate amount of time to be provided. For more information on Colorado's water quality trading program, see "Water Quality Trading." Once the voluntary incentive program period has been completed (December 31, 2027), any trading program developed to generate an incentive will no longer be in effect. Thereafter, any permittee desiring to continue the reduction of nutrients at the same locations will have to submit a new request for trading credits.

DELAWARE

As a member of the Delaware River Basin Commission (DRBC), the Delaware Department of Natural Resources and Environmental Control implements the DRBC antidegradation policy for discharges to the Delaware River Basin within the state. See the "Delaware River Basin Commission" section for more information.

PERFORMANCE-BASED APPROACHES

GEORGIA

Georgia DNR issued a memorandum titled "Strategy for Addressing Phosphorus in NPDES Permitting." The strategy specifies effluent limits for total phosphorus for new and expanding municipal and industrial discharges that exhibit reasonable potential to exceed a water quality standard, as follows:

Key Characteristics of the Approach

Geographic scope: *Statewide in Georgia*

Pollutants: *Total phosphorus*

Types of facilities: *New and expanding municipal and industrial facilities*

- Major dischargers will be permitted at 1.0 mg/L total phosphorus or less.
- Minor dischargers will be permitted at 8.34 pounds/day total phosphorus or less.
- All discharges to or close to reservoirs, lakes, impoundments, and/or estuaries will be permitted at 0.5 mg/L total phosphorus or less.

INDIANA

The Indiana Department of Environmental Management's (IDEM's) nonrule policy document[2] "State Total Phosphorus Treatment Standard for 1 MGD or Greater Sanitary Wastewater Dischargers" (WATER-019-NPD), under the authority of 327 IAC 5-10-2(a)(2), states that for total phosphorus, an effluent limit of 1.0 mg/L (expressed as an average monthly limit) is needed for sanitary WWTPs with average design flows greater than or equal to 1 million gallons per day (MGD) to protect downstream water uses. The nonrule policy is considered applicable to all major sanitary WWTPs that were scheduled to submit a permit renewal application after January 1, 2015, or that applied for new NPDES permits after January 1, 2015.

Key Characteristics of the Approach

Geographic scope: *Statewide in Indiana*

Pollutants: *Total phosphorus (calculated as elemental phosphorus)*

Types of facilities: *POTWs and non-POTWs*

[2] IDEM's nonrule policy documents are intended to clarify IDEM's interpretation of environmental statutes or rules for the public. They are not intended to have the effect of law.

PERFORMANCE-BASED APPROACHES

According to *Indiana's State Nutrient Reduction Strategy*, IDEM will continue to implement phosphorus removal as required by 327 IAC 5-10-2, which requires phosphorus removal or control facilities for discharges that:

- have a daily discharge, as a monthly average, that contains 10 pounds or more of total phosphorus (calculated as elemental phosphorus) and are within the Lake Michigan or Lake Erie Basins, discharge directly to a lake or reservoir, or enter a tributary within 40 miles upstream of a lake or reservoir; or
- are determined to need phosphorus reduction to protect downstream water uses or achieve water quality standards.

For applicable POTWs, the treatment facility is required to achieve the following reductions in the discharge (calculated as elemental phosphorus) or produce an effluent containing no more than 1.0 mg/L of elemental phosphorus as a monthly average, whichever is more stringent.

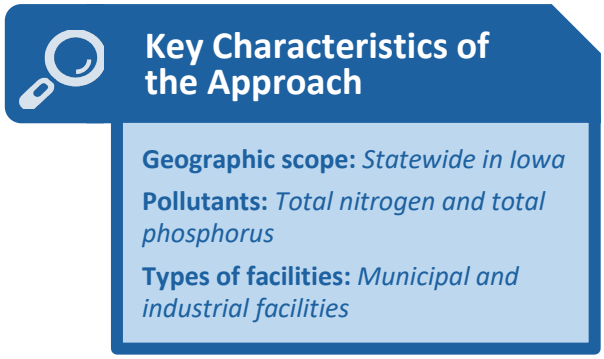
Elemental Phosphorus (P) Level in Raw Sewage	Required % Removed
≥4 mg/L	80%
<4 mg/L and ≥3 mg/L	75%
<3 mg/L and ≥2 mg/L	70%
<2 mg/L and ≥1 mg/L	65%
<1 mg/L	60%

For applicable non-POTWs, the amount of total phosphorus (calculated as elemental phosphorus) in the discharge must be reduced by at least 90 percent unless the permittee can demonstrate that such a reduction is technologically infeasible, and an alternate reduction is warranted.

PERFORMANCE-BASED APPROACHES

IOWA

Iowa DNR developed the *Iowa Nutrient Reduction Strategy* to address nutrients delivered to Iowa waterways and the Gulf of Mexico. Section 3 of the strategy requires the development of technology-based effluent limitations on a case-by-case basis.



Each major municipal, industrial, or minor facility that treats wastewater using biological treatment is required to develop a feasibility study to evaluate the economic and technical feasibility of reducing nutrient discharges. The evaluation is based on the goal of achieving annual average mass limits equivalent to 10 mg/L total nitrogen and 1 mg/L total phosphorus. The specific effluent limitations that apply to each discharger are developed based on the procedures in 40 CFR Part 125 Subpart A ("Criteria and Standards for Imposing Technology-Based Treatment Requirements Under Sections 301(b) and 402 of the Act").

According to the strategy, the limitations will be based on the effect of the pollutant in the water and the feasibility and reasonableness of treating the pollutant. Permit requirements will vary based on the following factors.

- Whether treatment is:
  - Already installed.
  - Not installed, with no capacity increases planned.
  - Not installed, with capacity increases planned.
  - Impracticable.
- Whether the discharger is a new discharger.
- Whether the discharge is from a power plant.

The strategy specifies that permits will not establish limits that are more stringent than 10 mg/L total nitrogen and 1 mg/L total phosphorus where biological treatment is the primary means of achieving the nutrient reduction goals. Facilities that cannot achieve these reductions because of higher nutrient concentrations in the raw wastewater are expected to achieve reductions of 66 percent total nitrogen and 75 percent total phosphorus.

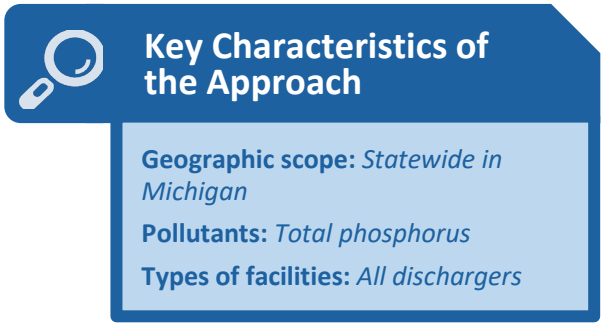
PERFORMANCE-BASED APPROACHES

For a permitted discharger that installs nutrient reduction processes and whose NPDES permit includes technology-based total nitrogen and total phosphorus limits, the strategy states, limits will not be made more restrictive for at least 10 years after the completion of the nutrient reduction process construction unless it is determined that more restrictive limits are necessary to achieve water quality standards. This is consistent with Iowa Code Section 455B.173(3.b) for municipal dischargers. For non-municipal dischargers, the strategy states that this prohibition on establishing more restrictive limits "can be enforced through the permitting process or as part of the adoption of any future nutrient limitation."

The strategy provides for limits to be expressed as annual average mass limits. The limit calculation procedure is based on Appendix A of the U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control*. The annual average is the sum of all measurements for a given pollutant collected during a 12-month period (starting on the effective date of the permit) divided by the number of measurements made.

MICHIGAN

Michigan's Water Quality Standards (R 323.1060) include a standard for plant nutrients. The plant nutrient standard requires phosphorus from point source discharges to achieve 1 mg/L of total phosphorus as a maximum monthly average effluent concentration unless other limits, either higher or lower, are deemed necessary and appropriate by Michigan DEQ. In addition, nutrients shall be limited to the extent necessary to prevent stimulation of growths of aquatic rooted, attached, suspended, and floating plants, fungi, or bacteria that are or may become injurious to the designated uses of the surface waters of the state.



PERFORMANCE-BASED APPROACHES

MINNESOTA

Per Minnesota Rule Chapter 7053.0255, Subpart 3, the discharger must provide total phosphorus removal to 1.0 mg/L for a discharge:

- directly to or affecting[3] a lake, shallow lake, or reservoir;
- to certain designated waters; or
- that is new[4] or expanded.[5]

Key Characteristics of the Approach

Geographic scope: *Lakes, shallow lakes, reservoirs, and certain designated waters in Minnesota*

Pollutants: *Total phosphorus*

Types of facilities: *Dischargers to certain waterbodies and new or expanded facilities*

The total phosphorus limit is applied as a calendar month arithmetic mean, unless the MPCA Commissioner finds that a different averaging period is acceptable.

Dischargers of new or expanded discharges subject to the 1.0 mg/L limit may request an alternative phosphorus limit if they can demonstrate that one of the following conditions is met:

- The discharge is to or upstream of an impaired waterbody and an approved TMDL considered impacts from the discharge.
- The environmental benefits to be achieved by meeting a total phosphorus limit are outweighed or negated by the environmental harm caused by meeting a limit.
- The treatment works, regardless of the type of treatment technology, uses chemical addition to achieve compliance with the 1 mg/L limit and the discharge is to a receiving stream in certain watersheds.

[3] "Affects" means a measurable increase in the adverse effects of phosphorus loading as determined by monitoring or modeling, including, but not limited to, an increase in chlorophyll-a concentrations, a decrease in water transparency, or an increase in the frequency or duration of nuisance algae blooms, from an individual point source discharge.

[4] "New discharge" means a discharge that was not in existence before May 1, 2008, and discharges more than 1,800 pounds of total phosphorus per year.

[5] "Expanded discharge" means a disposal system that after May 1, 2008, discharges more than 1,800 pounds of total phosphorus per year to a surface water on an annual average basis, and increases in wastewater treatment capacity as indicated by an increase in the design average wet weather flow for point source dischargers of sewage or design average daily flow rate for dischargers of industrial or other wastes.

PERFORMANCE-BASED APPROACHES

MISSOURI

Per Missouri 10 CSR 20-7.010, discharges to Lake Taneycomo and its tributaries between Table Rock Dam and Power Site Dam (excluding discharges from the dams) shall not exceed 0.5 mg/L of total phosphorus as a monthly average. This applies to discharges permitted after May 9, 1994, and those with design flows equal to or greater than 22,500 gallons per day (GPD).

Key Characteristics of the Approach

Geographic scope: *Lake Taneycomo and Table Rock Lake watersheds in Missouri*

Pollutants: *Total phosphorus*

Types of facilities: *Facilities with discharges permitted after 1994 and 1999 with flows >22,500 GPD*

Discharges to the Table Rock Lake watershed shall not exceed 0.5 mg/L of total phosphorus as a monthly average, except those discharges with design flows less than 22,500 GPD permitted before November 30, 1999, unless the design flow is increased.

NEW JERSEY

As a member of the Delaware River Basin Commission (DRBC), the New Jersey Department of Environmental Protection (DEP) implements the DRBC antidegradation policy for discharges to the Delaware River Basin within the state. See the "Delaware River Basin Commission" section for more information.

Key Characteristics of the Approach

Geographic scope: *Freshwater lakes, ponds, and reservoirs and their tributaries in New Jersey*

Pollutants: *Total phosphorus*

Types of facilities: *All dischargers*

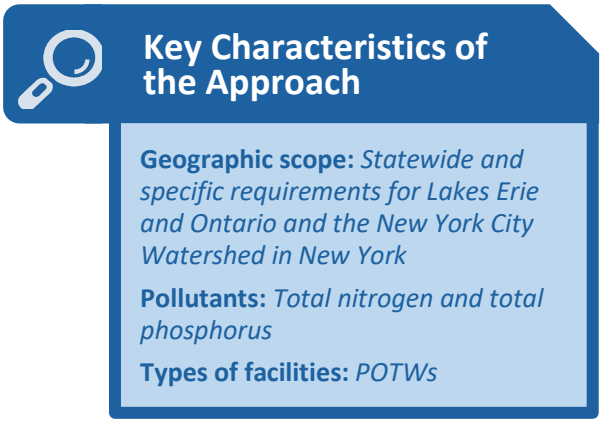
Section 7:14A-12.7 of the New Jersey Code establishes a phosphorus effluent standard that states, "The effluent standard for phosphorus discharged to a freshwater lake, pond or reservoir, or tributaries to these waterbodies is that, at a minimum, no effluent shall contain more than 1.0 mg/L total phosphorus (as P), as a monthly average, unless the discharger(s) to such a waterbody can demonstrate that a less stringent requirement will not result in a violation of the Surface Water Quality Standards (N.J.A.C. 7:9B) or that the control of point sources alone, in the absence of effective nonpoint source controls, will not result in a significant reduction of phosphorus loadings to the waterbody."

PERFORMANCE-BASED APPROACHES

NEW YORK

As a member of the Delaware River Basin Commission (DRBC), the New York State Department of Environmental Conservation (NYSDEC) implements the DRBC antidegradation policy for discharges to the Delaware River Basin within the state. See the "Delaware River Basin Commission" section for more information.

Additionally, NYSDEC implements performance-based approaches for discharges of total nitrogen and total phosphorus elsewhere in the state, as described below.



Total Nitrogen

The NYSDEC Division of Water's *SPDES Permit Development for POTWs* (Technical and Operation Guidance Series [TOGS] 1.3.3), requires all POTWs with a design flow of 1.0 MGD or greater to monitor for influent and effluent ammonia and total Kjeldahl nitrogen.

Total Phosphorus

The Division of Water's *Phosphorus Removal Requirements for Wastewater Discharges to Lakes and Lake Watersheds* (TOGS 1.3.6) establishes phosphorus removal requirements for wastewater discharges to lakes and lake watersheds. The TOGS applies to discharges to ponded waters (waters with "P"s in their index numbers, 6NYCRR Parts 800–941) and their topographic watersheds, with the exception of Lakes Erie and Ontario if there is no intermediate ponded water between the discharge and the Great Lakes. Implementation of TOGS 1.3.6 for existing discharges necessitates the inclusion of total phosphorus monitoring at the time of permit renewal to establish baseline total phosphorus loadings before flow expansion. Permits for discharges with design flows greater than 1.0 MGD to saline waters require influent and effluent monitoring for total phosphorus and orthophosphorus.

For POTWs that discharge within the watershed contributing surface water to the New York City water supply, NYSDEC requires discharges to meet total phosphorus levels set forth in the Rules and Regulations for the Protection From Contamination, Degradation, and Pollution of the New York City Water Supply and Its Sources Chapter 18-36(a)(8), as shown in the following table. New facilities must be constructed to meet these limitations.

Permitted Total Flow (Gallons per Day)	Total Phosphorus Limit (mg/L)
≤50,000	1.0
>50,00 and <500,000	0.5
≥500,000	0.2

For POTWs that discharge to Lakes Erie or Ontario or their drainage basins and are not subject to more stringent requirements under TOGS 1.3.6, NYSDEC implements the 1987 Great Lakes Water Quality Agreement, which requires total phosphorus control as follows:

30 Day Average Flow (MGD)		Guidance
Design	Actual	
≤1.0	≤1.0	No total phosphorus limitations will be imposed.
≤1.0	>1.0	If the permittee cannot reduce flows to 1 MGD or less, the permit should be modified to limit total phosphorus to 1.0 mg/L on an average 30-day basis.
>1.0	≤1.0	It is not necessary to limit total phosphorus in the permit, but the design and construction of the POTW will include provisions for achieving a 30-day average total phosphorus limit of 1.0 mg/L at such time as the discharge exceeds 1.0 MGD on an annual average basis.
>1.0	>1.0	The effluent concentration of total phosphorus will be limited to 1.0 mg/L on an average 30-day basis.

The permit writer may waive total phosphorus controls for POTWs discharging to tributaries of the Great Lakes upon acceptable demonstration that the actual amount of total phosphorus that could reach the Great Lakes is less than 8.34 pounds/day (on an average 30-day basis) due to transport phenomena, immobilization, or other causes.

PERFORMANCE-BASED APPROACHES

NORTH CAROLINA

The North Carolina DEQ, Division of Water Resources, has established performance-based approaches for establishing nutrient limits for discharges to specific waterbodies in the Cape Fear River Basin in the applicable basinwide water quality plan. DEQ has also established a performance-based approach for the Lower Falls Watershed as part of a nutrient strategy adopted in the NC Administrative Code.

Key Characteristics of the Approach

Geographic scope: *Cape Fear River Basin and Lower Falls Watershed in North Carolina*

Pollutants: *Total nitrogen and total phosphorus*

Types of facilities: *All dischargers*

Cape Fear River Basin: Deep River Between High Point Lake and Carbonton Dam

The 2000 *Cape Fear River Basinwide Water Quality Plan* recommends the following limits for new and expanding discharges to the Deep River between High Point Lake and the Carbonton Dam:

- 1 mg/L total phosphorus for facilities with a capacity greater than or equal to 1 MGD.
- 2 mg/L total phosphorus for discharges less than 1 MGD.

Cape Fear River Basin: Deep River from Randleman Reservoir to Carbonton Dam

The 2005 *Cape Fear River Basinwide Water Quality Plan* recommends the following limits for new and expanding discharges to the Deep River from Randleman Reservoir to Carbonton Dam:

- 1 mg/L total phosphorus for facilities with a capacity greater than 1 MGD.
- 2 mg/L total phosphorus for discharges between 0.5 MGD and 1.0 MGD.

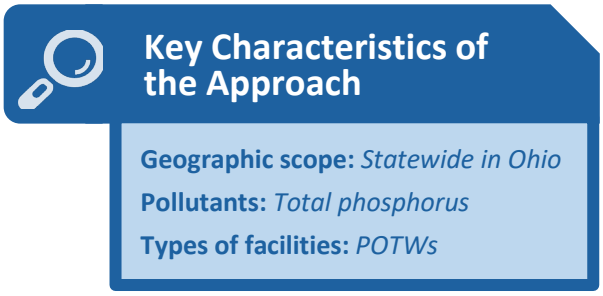
North Carolina DEQ has developed basinwide water quality plans for each of the 17 major river basins in the state on a 5-year cycle. The basinwide plans are part of a watershed-based approach to restoring and protecting water quality. The program is being revised to address both water quality and water resources (supply) concerns. For more information on North Carolina's basin planning process, see DEQ's basin planning website.

Cape Fear River Basin: Cape Fear River from Buckhorn Dam to Lock and Dam #3

The 2005 *Cape Fear River Basinwide Water Quality Plan* recommends the following limits for discharges to the Cape Fear River from Buckhorn Dam to Lock and Dam #3:

- Seasonal (April–October) mass loads based on 6 mg/L total nitrogen and 2 mg/L total phosphorus for new discharges.
- Seasonal (April–October) mass loads based on the greater of the following for expanding discharges:
  - Current mass loading using actual flows and actual nutrient concentrations.
  - Mass loadings based on the permitted expansion flow and concentrations of 6 mg/L total nitrogen and 2 mg/L total phosphorus.

OHIO



The Ohio EPA developed the *Ohio Nutrient Reduction Strategy* to reduce excess nutrients in Ohio's surface waters, which includes a phased approach for establishing limits for nutrient dischargers. The strategy provides guidelines for establishing initial, performance-based effluent limits for total phosphorus for POTWs, to be followed by effluent limits based on TMDL wasteload allocations once they are developed and approved. The phased approach allows point sources to explore water quality trading or other options for achieving compliance. The recommended initial limits vary depending on watershed, impairment status, and facility size.

For POTWs discharging **more than 1 MGD,** the strategy provides the following guidelines:

- If the receiving water is in the Lake Erie Basin and is not impaired, set the initial permit limit at 1.0 mg/L total phosphorous at the design flow.
- If the receiving water is in the Ohio River Basin and is not impaired, no limit should be established, but monitoring should be required.
- If the receiving water is impaired, set the initial permit limit at the lower of 1.0 mg/L total phosphorous at the design flow or the existing permitted load and require optimization of the existing treatment facility to minimize discharge. Where the impairment is addressed by an approved TMDL, Ohio EPA will follow the implementation plan identified in that document.

For POTWs discharging **0.15 to 1.0 MGD,** the strategy provides the following guidelines:

- If the receiving water is not impaired, no limit should be established, but monitoring should be required.
- If the receiving water is impaired and the POTW is the predominant contributor to the impairment, set the initial permit limit at 1.0 mg/L total phosphorous and the design flow.
- If the receiving water is impaired and the POTW is one of multiple contributors to the impairment, set the initial permit limit at 1.0 mg/L total phosphorous and the design flow if the limit will result in a significant improvement in biological assemblages. Monitoring should be included in the permit if no limit is included in the permit.

For POTWs discharging **0.025 to 0.15 MGD,** the strategy provides the following guidelines:

- If the receiving water is not impaired, no limit should be established, but monitoring should be required.
- If the receiving water is impaired and the POTW is the predominant contributor to the impairment, set the initial permit limit at 1.0 mg/L total phosphorus and the design flow.
- If the receiving water is impaired and the POTW is one of multiple contributors to the impairment, no permit limit should be established, but monitoring should be required.

For POTWs discharging **less than 0.025 MGD,** for any waterbody impairment situation, the strategy specifies that no limit should be established, but monitoring should be required.

PENNSYLVANIA

As a member of the Delaware River Basin Commission (DRBC), the Pennsylvania DEP implements the DRBC antidegradation policy for discharges to the Delaware River Basin within the state. See the "Delaware River Basin Commission" section for more information.

Key Characteristics of the Approach

Geographic scope: *Statewide in Pennsylvania*

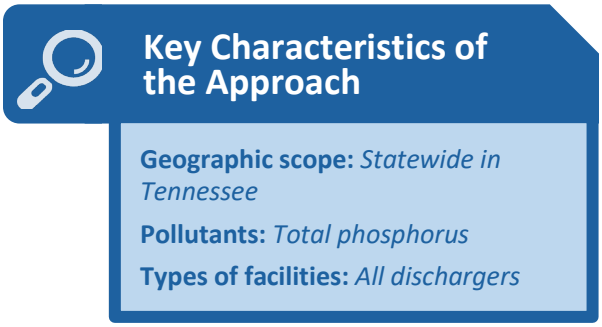
Pollutants: *Total phosphorus*

Types of facilities: *All dischargers*

Title 25, Section 96.5(c), in the Pennsylvania Code specifies requirements for nutrient discharges. Where total phosphorus contributes or threatens to impair existing or designated uses, point source discharges of total phosphorus must be limited to an average monthly concentration of 2 mg/L. More stringent controls may be imposed as a result of an applicable TMDL.

PERFORMANCE-BASED APPROACHES

TENNESSEE



The Tennessee Department of Environment and Conservation (TDEC) developed the Tennessee Nutrient Reduction Framework to accomplish long-term nutrient reductions in state waters. Under the framework, TDEC assigns a nutrient impact level to each U.S. Geological Survey Hydrologic Unit Code 10 (HUC-10) watershed of high, medium, or low based on a combined analysis of an enrichment factor and the percentage of WWTP contribution. The resulting nutrient impact level indicates the appropriate level of nutrient reduction for WWTPs to achieve the Protective Annual Watershed Load, which is the estimated post-reduction annual nutrient load for the watershed after incorporating the expected load reductions from point and nonpoint sources. The Protective Annual Watershed Load represents the load that is expected to meet the narrative nutrient water quality criteria for fish and aquatic life.

In the first stage of implementation, this strategy applied to major municipal as well as permitted industrial WWTPs. Effluent limits for total nitrogen and total phosphorus are assigned to WWTPs according to the impact levels, as follows:

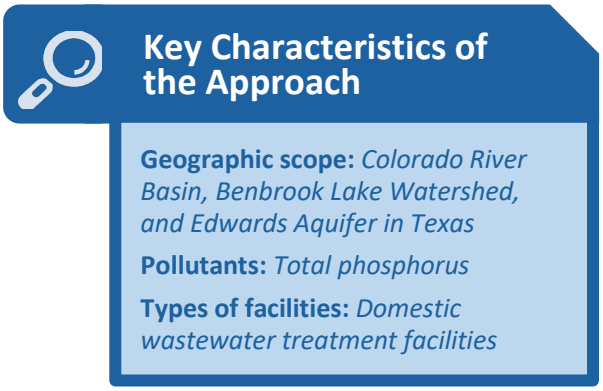
- 5 mg/L total nitrogen and 0.3 mg/L total phosphorus for high impact levels.
- 8 mg/L total nitrogen and 1 mg/L total phosphorus for medium impact levels.
- Capped at current levels for low impact levels.

The effluent limits assigned to watersheds with high impact levels represent expected performance based on additional chemical treatment for phosphorus removal. The effluent limits assigned to watersheds with medium impact levels represent nutrient concentrations corresponding to conventional biological nitrogen and phosphorus removal and tertiary filtration.

PERFORMANCE-BASED APPROACHES

TEXAS

The Texas Commission on Environmental Quality (TCEQ) has developed nutrient screening procedures for wastewater discharge permit applications to determine if permit requirements are needed to prevent violation of numerical nutrient criteria and/or preclude excessive growth of aquatic vegetation. These procedures are found in TCEQ's *Procedures to Implement the Texas Surface Water Quality Standards*.



In addition, Title 30 Texas Administrative Code requires performance-based limits for nutrients for certain watersheds.

Rule §311.43 requires discharges of treated sewage into the tributaries of Segment 1428 of the Colorado River or directly into Onion Creek and its tributaries to achieve a 1 mg/L of total phosphorus level of effluent treatment, based on a 30-day average.

Rule §311.67 requires any domestic wastewater discharger applying for a new or expanding discharge after January 1, 2015 (the date of the rulemaking), other than oxidation pond systems, to meet a daily effluent limit for total phosphorus of 1 mg/L, based on a 30-day average, if the wastewater treatment system:

- has a permitted annual or daily average flow greater than or equal to 0.10 MGD and a discharge point in the Benbrook Lake water quality area; or
- has a permitted annual or daily average flow greater than or equal to 0.25 MGD and a discharge point in the Benbrook Lake watershed, but outside the Benbrook Lake water quality area.

Rule §213.6 requires all new or increased discharges of treated wastewater into or adjacent to a water in the state (other than industrial wastewater discharges) within 0 to 5 miles upstream from the Edwards Aquifer recharge zone to achieve a level of effluent treatment for total phosphorus of 1 mg/L, based on a 30-day average.

PERFORMANCE-BASED APPROACHES

VIRGINIA

9VAC25-40 (the Regulation for Nutrient Enriched Waters) provides for the control of discharges of nutrients from point sources affecting state waters that are designated "nutrient enriched waters" in 9VAC25-260-350 or are within the Chesapeake Bay watershed. A 1.0 mg/L total phosphorus permit limit is imposed on applicable dischargers to nutrient enriched waters that are listed in the water quality standards. New or expanding dischargers in the Chesapeake Bay watershed are subject to effluent limitations of 1.0 mg/L total phosphorus and 8.0 mg/L total nitrogen or 0.3 mg/L total phosphorus and 3.0 mg/L total nitrogen depending on the size and location of the discharge. Existing dischargers in the Chesapeake Bay watershed are not required to install treatment technology to meet the wasteload allocations required by the Chesapeake Bay TMDL. They may choose to trade under the watershed general permit. Any facility that installs nutrient removal technology is subject to an annual average concentration limit based on the technology installed. For more information on Virginia's water quality trading program and watershed-based permit for the Chesapeake Bay watershed, see "Water Quality Trading" and "Watershed-Based Permitting."

Key Characteristics of the Approach

Geographic scope: *Nutrient enriched waters, Chesapeake Bay, Occoquan, Potomac Embayments, and Chickahominy Watersheds in Virginia*

Pollutants: *Ammonia, total Kjeldahl nitrogen, and total phosphorus*

Types of facilities: *All dischargers*

Discharges to specific watersheds are subject to additional nutrient limitations, as described in the sections below.

Occoquan Watershed

The Occoquan Policy sets the following treatment and discharge requirements to protect water quality. They are stringent, particularly since the waters are an important water supply for almost two million residents in the area.

- Unoxidized nitrogen (as total Kjeldahl nitrogen) not to exceed 1.0 mg/L as a monthly average and requirement for operation of nitrogen removal facilities when the ambient nitrate concentration (as N) is 5.0 mg/L or higher in the Occoquan Reservoir in the vicinity of the Fairfax County Water Authority intake point.
- Total phosphorus not to exceed 0.10 mg/L as a monthly average.

PERFORMANCE-BASED APPROACHES

Potomac Embayments

The Potomac Embayment Policy sets stringent effluent limits for carbonaceous biochemical oxygen demand (CBOD) and total suspended solids (TSS), as well the following limits for nutrients:

- Ammonia nitrogen (April 1–October 31) not to exceed 1.0 mg/L as a monthly average.
- Total phosphorus not to exceed 0.18 mg/L as a monthly average.

Chickahominy Watershed

Special effluent limits apply to wastewater treatment facilities in the entire Chickahominy watershed (a tributary of the James River) above Walker's Dam, excluding discharges consisting solely of stormwater. These limits are:

- Ammonia nitrogen not to exceed 2.0 mg/L as a monthly average.
- Total phosphorus not to exceed 0.10 mg/L as a monthly average for all discharges (except Tyson Foods, Inc.).
- Total phosphorus not to exceed 0.30 mg/L as a monthly average and 0.50 mg/L as a daily maximum for Tysons Foods, Inc.

WISCONSIN

Wisconsin's Effluent Standards and Limitations for Phosphorus (Chapter NR 217) require the following point sources that discharge phosphorus to surface waters of the state to meet an effluent limitation of 1 mg/L total phosphorus as a monthly average:

Key Characteristics of the Approach

Geographic scope: *Statewide in Wisconsin*

Pollutants: *Total phosphorus*

Types of facilities: *POTWs, privately owned domestic sewage works, and other facilities discharging >60 pounds/month*

- POTWs and privately owned domestic sewage works subject to Chapter NR 210 that discharge wastewater containing more than 150 pounds of total phosphorus per month, unless an alternative limitation is provided under NR 217.04(2).

- Discharge of wastewater from facilities other than those subject to Chapter NR 210 that contain a cumulative total of more than 60 pounds of total phosphorus per month, unless an alternative limitation is provided under NR 217.04(2). Outfalls consisting of noncontact cooling water without phosphorus-containing additives may not be included in the calculation of the cumulative total of total phosphorus discharged from the facility.

Compliance with the concentration limit shall be determined as a rolling 12-month average, as determined by the total phosphorus from all outfalls subject to the effluent limitation for the most recent 12 months divided by the total flow for all those outfalls for the same period.

DELAWARE RIVER BASIN COMMISSION

The Delaware River Basin Commission (DRBC) regulates water resources in the Delaware River Basin and comprises representatives from the U.S. Army Corps of Engineers and the four states with land draining to the Delaware River: Delaware, New Jersey, New York, and Pennsylvania. The DRBC *Administrative Manual*, at Section 3.10.3, sets forth an antidegradation policy for surface waters of the Delaware River Basin that includes performance-based requirements to address excess nutrients in Special Protection Waters (i.e., Outstanding Basin Waters[6] and Significant Resource Waters[7]).

Key Characteristics of the Approach

Geographic scope: *Delaware River Basin in Delaware, New Jersey, New York, and Pennsylvania*

Pollutants: *5-day carbonaceous BOD, dissolved oxygen, TSS, ammonia, total nitrogen, total phosphorus, and fecal coliform*

Types of facilities: *New and expanding wastewater treatment facilities*

The antidegradation policy requires that there be no measurable change in existing water quality except toward natural conditions in Special Protection Waters. For Outstanding Basin Waters, the policy requires discharges to be treated as required and then dispersed in such a manner that complete mixing of effluent with the receiving stream is instantaneous. For

[6] "Outstanding Basin Waters" are waters contained within the established boundaries of national parks; national wild, scenic, and recreational river systems; and/or national wildlife refuges with exceptionally high scenic, recreational, and ecological values that require special protection.

[7] "Significant Resource Waters" are waters with exceptionally high scenic, recreational, ecological, and/or water supply uses that require special protection.

Significant Resource Waters, the policy allows for localized degradation to provide for initial dilution within a defined mixing zone.

In addition, the antidegradation policy requires new and expanding wastewater treatment facilities discharging directly to Special Protection Waters (i.e., Outstanding Basin Waters and Significant Resource Waters) to meet the effluent quality of the best demonstrable technology (BDT). Equivalent effluent criteria for industrial facilities and seasonal limits, if any, may be developed on a case-by-case basis. BDT may be superseded by any more stringent federal, state, or DRBC criteria. Specifically, BDT is defined by the following effluent quality:

Parameter	30 Day Average Effluent Criteria
5-day carbonaceous BOD	10 mg/L or less
Dissolved oxygen	6 mg/L or greater
TSS	10 mg/L or less
Ammonia-nitrogen	1.5 mg/L or less
Total nitrogen	10.0 mg/L or less
Total phosphorus	2.0 mg/L or less
Fecal coliform	50/100 mL or less

The antidegradation policy specifies that, in addition to meeting BDT, new and expanding facilities may be approved only after the applicant demonstrates that it has fully evaluated all non-discharge/load reduction alternatives (for discharges directly to Special Protection Waters) or all natural wastewater treatment system alternatives (for discharges within the drainage area of Special Protection Waters) and cannot implement these alternatives because of technical and/or financial infeasibility. When evaluating alternatives, applicants must consider alternatives to existing and proposed loadings in excess of actual loadings at the time of Special Protection Water designation.

For point sources originating outside the boundaries of stream reaches classified as Outstanding Basin Waters and Significant Resource Waters, discharges must be treated and dispersed in the receiving water so that no measurable change occurs at boundary or interstate control points. This requirement may be satisfied through demonstration (using a DRBC-approved model or other methodology) that the new or incremental increase in the facility's flow or load will cause no measurable change at the relevant water quality control point for

ammonia, dissolved oxygen, fecal coliform, nitrate or nitrite plus nitrate, total nitrogen or total Kjeldahl nitrogen, total phosphorus, TSS, and BOD.

Click here to return to the Table of Contents

WATER QUALITY TRADING

Water quality trading is an exchange of water quality credits generated through pollutant reductions. Sources with higher pollutant control costs may purchase pollutant credits from sources with lower control costs. For more information, see EPA's water quality trading website: https://www.epa.gov/npdes/water-quality-trading.

CALIFORNIA

California's North Coast Regional Water Quality Control Board (Regional Water Board) approved the Santa Rosa Nutrient Offset Program for the City of Santa Rosa Subregional Water Reclamation Facility in 2008. In July 2018, the Regional Water Board adopted Resolution No. R1-2018-0025 approving the Water Quality Trading Framework, which applies to both the City of Santa Rosa and the Town of Windsor. The Framework is based on local stakeholder recommendations developed through a 3-year collaboration led by the Sonoma and Gold Ridge Resource Conservation Districts and funded by a Conservation Innovation Grant issued by the U.S. Department of Agriculture.

Key Characteristics of the Trading Program

Geographic scope: *Laguna de Santa Rosa watershed, California*

Key driver(s): *Impairment for total phosphorus and low dissolved oxygen*

Trading scenario: *Point source–nonpoint source and point source–point source*

Pollutant(s): *Total phosphorus*

Status: *Active*

Trade ratios: *2:1 uncertainty ratio and 0.5:1 retirement ratio*

Highlights: *Credit project approval process; initial and ongoing project verification; credit certification, registration, and tracking; project-specific monitoring*

Contact information:

Kelsey Cody
kelsey.cody@waterboards.ca.gov
North Coast Regional Water Quality Control Board

The Framework covers the Laguna de Santa Rosa watershed. The Laguna de Santa Rosa is the largest tributary to the Russian River, draining about 254 square miles in Sonoma County, California. Portions of the Laguna de Santa Rosa and its tributaries are listed as impaired for total phosphorus and low dissolved oxygen.

WATER QUALITY TRADING

Although a TMDL has not yet been completed for the Laguna de Santa Rosa, the Regional Water Board concluded that reductions in total phosphorus loading are necessary to protect beneficial uses. In the absence of numeric water quality criteria for nutrients, the Regional Water Board issued "no net loading" effluent limitations for total phosphorus in the NPDES permits for the City of Santa Rosa and Town of Windsor facilities. To comply with the limitations, the permittees must ensure that the mass of phosphorus discharged is equal to or less than the mass controlled through nutrient offset credits generated via the trading program. The permits require the permittees to calculate and report the mass discharged and the mass controlled to determine compliance with the no net loading limitations.

The Framework gives the City of Santa Rosa and the Town of Windsor an approved method for complying with their "no net loading" effluent limitations through trading. The Framework generally supports trading between NPDES permittees and regulated and unregulated nonpoint sources; however, it also allows trading between point source dischargers or for an entity that generates credits for its own use (e.g., the City's municipal parks department generating credits to be used by the City's NPDES permitted wastewater treatment facility), provided all eligibility criteria and Framework requirements are met.

Under the Framework, a project is eligible to generate credits if it is not otherwise required by law, regulation, permit, enforcement action, or other legal agreement.

The Framework establishes a two-part process for credit generation:

1. Pre-qualified practices for credit generation—general, rather than site-specific methods—are approved. The approval process includes Regional Water Board review, public notice and comment, and Executive Officer approval. After approval, the Regional Water Board adds the practice to a publicly accessible list. Only these pre-qualified practices may be proposed for credit generation in a credit project plan.
2. A credit project plan is submitted. A credit project plan contains basic information; project design and credit information; a project maintenance plan; and a project monitoring, verification, and reporting plan. Credit project plans are subject to a review and approval process, which includes staff review and Executive Officer approval or rejection. Once approved, plans and approval notices are available to the public, as are the required verification reports (see below) once they become available.

The Framework assigns a default trade ratio of 2.5:1 for all trades, which accounts for an uncertainty ratio of 2:1 and a retirement ratio of 0.5:1. The Regional Water Board may allow

the retirement ratio[8] and/or uncertainty ratio[9] to be adjusted downward by as much as 0.5 for a trade under certain circumstances. The Framework specifies that the life of all credits shall be 1 year (October 1 to September 30 of the following year). The Framework allows for credit banking (i.e., generation of a water quality credit to offset a future discharge) for 3 to 5 years, depending on the type of credit-generating project.

To ensure accountability, the Framework specifies project implementation and verification requirements. Credit sellers must document pre- and post-project site conditions. The Framework also requires initial verification (by an independent and qualified third party) to confirm whether a project has been implemented in accordance with the approved credit project plan, as well as ongoing project verification to confirm whether a project continues to be maintained in conformance with the credit project plan, that it continues to meet Framework requirements, and that credits have been accurately estimated. The frequency, required elements of project review, and reporting requirements for ongoing verification will vary by project and must be specified in the approved credit project plan.

The Regional Water Board reviews credit verification reports and certifies credits generated by issuing official credit certificates to the credit seller, at which time the credits are officially available for purchase, sale, or use by an NPDES permittee. A designated administrator (i.e., Regional Water Board staff or third party designee) maintains an official and publicly accessible credit registry to track the status and ownership of certified credits.

The Framework seeks to provide NPDES permittees with cost-effective and environmentally beneficial options for complying with their total phosphorus effluent limitations. To date, the City of Santa Rosa has implemented three nutrient offset projects to generate credits under the 2008 Nutrient Offset Program: two on low-lying dairy properties and another on an upland nature preserve. The Town of Windsor intends to use nutrient offset credits generated under the Framework to achieve compliance with the final effluent limitation, which becomes effective in October 2021.

[8] The Framework defines a retirement ratio as a ratio that sets aside a portion of credits generated for net environmental benefit.

[9] The Framework defines an uncertainty ratio as a ratio that accounts for scientific uncertainty, including potential inaccuracies in estimation methods and/or variability in project performance.

WATER QUALITY TRADING

For more information about California's trading program, visit the Regional Water Board's website at https://www.waterboards.ca.gov/northcoast/water_issues/programs/nutrient_offset_program.

WATER QUALITY TRADING

COLORADO

CDPHE's Nutrients Management Control Regulation (Regulation #85), promulgated in June 2012, establishes numerical technology-based effluent limits for domestic WWTPs and industrial wastewater dischargers that are likely to have significant levels of nutrients in their discharges. As a way to give permittees flexibility in reducing total phosphorus and total inorganic nitrogen to meet these limits, Section 85.5(3)(d) authorizes nutrient trading.

Key Characteristics of the Trading Program

Geographic scope: *A stream segment, watershed, defined TMDL area, or other approved area in Colorado*

Key driver(s): *Anticipated adoption of new, more stringent water quality standards*

Trading scenario: *Point source–nonpoint source and point source–point source*

Pollutants: *Total inorganic nitrogen and total phosphorus*

Status: *Active*

Trade ratios: *1:1 ratio for point source–point source, 2:1 ratio for point source–nonpoint source*

Highlights: *Allows trading to achieve state technology-based limits; voluntary incentive program*

Contact information:

Meg Parish
meg.parish@state.co.us
Colorado Department of Public Health and Environment

Regulation #85 allows for point source–point source and point source–nonpoint source trading. It establishes a trading ratio of 1:1 for point source–point source trades and 2:1 for point source–nonpoint source trades. A lower trade ratio may be allowed for point source–nonpoint source trades based on site-specific data.

In anticipation of new, more stringent water-quality-based effluent limitations, Section 85.5(1.5) of Regulation #85 and the Voluntary Incentive Program for Early Nutrient Reductions (Policy 17-1) establish the requirements for a voluntary incentive program to encourage facilities to voluntarily reduce phosphorus and/or nitrogen concentrations below the applicable technology-based effluent limits prior to 2027. Policy 17-1 authorizes permittees participating in the voluntary incentive program to accrue time under a compliance schedule through water quality trading. CDPHE will use the applicable provisions of the Colorado Pollutant Trading Policy and Section 85.5(3)(d) of Regulation #85 to determine the appropriate duration of the compliance schedule. Once the voluntary incentive program period has been completed (December 31, 2027), any trading program developed to generate an incentive will no longer be in effect. Thereafter, any permittee desiring to continue participation in a water quality trading program will have to submit a new request for trading credits for approval. For more

information on Colorado's water quality trading program and voluntary incentive program, see "Performance Based Approaches."

The Colorado Trading Policy provides more guidance on implementing water quality trading. It specifies that water quality trading should generally occur within a single stream segment, a defined watershed, a defined area for which a TMDL is being developed or has been approved, or another approved area. No trade may result in an exceedance of water quality standards in localized reaches (i.e., "hot spots") as a consequence of the difference in location between the sources.

The Colorado Trading Policy also provides guidance on establishing appropriate baselines for point sources, agricultural nonpoint sources, and other nonpoint sources. Baselines are based on the most protective of the following:

- The actual discharge level based on the most protective of the applicable water quality-based effluent limitation for point sources.
- The pollutant-specific loading associated with existing land uses and reasonable and appropriate best management practices (BMPs) for unpermitted nonpoint sources other than agriculture.
- The most protective of the pollutant specific loading from existing agricultural operations for agricultural nonpoint sources.
- Wasteload allocations, load allocations, or pollutant-specific caps established in a TMDL, watershed management plan, remedial action plan, or similar document.

The Colorado Trading Policy requires credit buyers to ensure that monitoring is conducted and controls are operated and maintained for the life of the trade. At a minimum, monitoring and reporting must include water quality monitoring or modeling, facility discharge monitoring and contractual compliance, certification of proper best management practice implementation and maintenance, and overall trade assessment.

For point source–nonpoint source trades, credit buyers are required to submit annual (or more frequent) reports certifying that nonpoint source controls have been properly operated and maintained. If water quality monitoring is not conducted, nonpoint source pollutant loading reductions must be determined based on data and analysis obtained from a model. The Colorado Trading Policy requires any nonpoint source control to be inspected immediately after installation or initial implementation by a third-party inspector to ensure it is properly sited, the materials and plans satisfy established quality specifications, and the installation job meets

performance standards. Periodic onsite assessments may also be required to ensure continuing functionality.

To ensure verification and tracking of credits, the Colorado Trading Policy requires credit trading documents to describe the method used for credit generation (measured or calculated). Credits must be registered with an appropriate entity (e.g., a nonprofit corporation established for such purposes, a volunteer governmental entity, CDPHE) and the registry of credits must be updated regularly. Information contained in the registry must be made available to the public.

CONNECTICUT

The Connecticut Department of Energy and Environmental Protection (DEEP) and NYSDEC completed a TMDL for dissolved oxygen in Long Island Sound in December 2000 to address hypoxic conditions that occur in Long Island Sound every summer. The TMDL established wasteload allocations requiring a 64 percent reduction of total nitrogen loading from point source discharges by 2014.

Key Characteristics of the Trading Program

Geographic scope: *Long Island Sound watershed, Connecticut*

Key driver(s): *TMDL to address hypoxic conditions*

Trading scenario: *Point source–point source*

Pollutants: *Total nitrogen*

Status: *Active*

Trade ratios: *Equivalency factor based on geographic location*

Highlights: *Watershed-based general permit; Nitrogen Credit Exchange Program; state incentives through financial assistance and subsidies*

Contact information:

Iliana Raffa
iliana.raffa@ct.gov
Connecticut Department of Energy and Environmental Protection

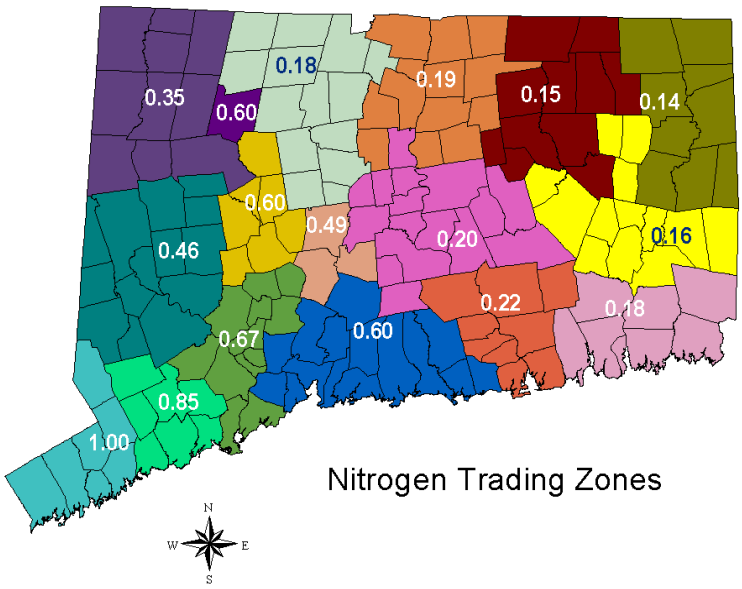
Connecticut created a Nitrogen Credit Exchange Program to provide flexibility in implementing the TMDL. In July 2001, the Connecticut General Assembly passed Public Act 01-180: An Act Concerning Nitrogen Reduction in Long Island Sound, requiring Connecticut DEEP to issue a general NPDES permit with effluent limits for total nitrogen and to establish a Nitrogen Credit Advisory Board (NCAB) to assist and advise Connecticut DEEP with administration of the Nitrogen Credit Exchange Program. When established, the goal of the Nitrogen Credit Exchange Program was to meet the TMDL cost-effectively by encouraging nitrification at POTWs, staggering upgrades over 13 years, and efficiently using funding and resources.

Pursuant to Public Act 01-180, Connecticut DEEP issued the General Permit for Nitrogen Discharges in 2002, which was most recently renewed in October 2018. The 2018 General

WATER QUALITY TRADING

Permit covers discharges of total nitrogen from 79 POTWs. The General Permit is the primary mechanism for implementation of the Nitrogen Credit Exchange Program. It establishes annual mass loading limits for total nitrogen for each POTW. If a POTW cannot comply with the effluent limitation at their facility, it can purchase equivalent total nitrogen credits through the Nitrogen Credit Exchange Program to comply with the effluent limitation. For more information on the General Permit, see "Watershed-Based Permitting."

A POTW generates credits to sell through the exchange if it undertakes a nitrogen removal project and removed more nitrogen than is required by its annual mass loading limit. Equivalent credits are calculated by multiplying the total nitrogen credit (i.e., the difference between the annual limit and the annual load discharged) by an assigned equivalency factor, which operates similarly to a delivery factor. The equivalency factor accounts for geographic location of the POTW and its impact on dissolved oxygen levels in the hypoxic areas of Long Island Sound. In general, the equivalency factors are higher for POTWs closer to the hypoxic areas. Facilities with a relatively high equivalency factor may find it more economical to undertake nitrogen removal projects, whereas it may be more economical for those with lower equivalency factors to purchase credits.



Source: *Connecticut's Nitrogen Trading Program. Connecticut DEEP. 2014. https://portal.ct.gov/-/media/DEEP/water/municipal_wastewater/91714presfutureplansntppdf.pdf?la=en*

Connecticut incentivized participation in the Nitrogen Credit Exchange Program by providing financial assistance to POTWs to undertake nitrogen removal projects through Clean Water Fund grants and loans. Additionally, the state subsidized the program by paying sellers for credits generated in excess of demand. For more information on Connecticut's Clean Water Fund, visit https://portal.ct.gov/DEEP/Municipal-Wastewater/Financial-Assistance-for-Municipal-Wastewater-Projects and https://portal.ct.gov/-/media/DEEP/water/lis_water_quality/nitrogen_control_program/lisrafspdf.pdf.

WATER QUALITY TRADING

The Nitrogen Credit Exchange Program was successful in cost-effectively achieving the TMDL wasteload allocation by 2014, saving an estimated $300–$400 million in upgrade costs. By 2019, 58 POTWs are expected to complete construction of nitrogen removal projects. However, Connecticut DEEP and the NCAB determined that the state subsidization of the Nitrogen Credit Exchange Program was unsustainable long-term, with projections for 2018 estimated at over $5 million. Therefore, the Connecticut General Assembly passed Public Act 15-38 *(An Act Concerning the Sustainability of the Nitrogen Credit Exchange Program)* to move the program toward self-sufficiency by 2016 by no longer providing subsidies. As a result, POTWs generating credits now divide the funds paid by buyers proportionally based on the seller's relative performance, and most sellers receive reduced payments for their credits.

For more information about Connecticut's trading program, visit www.ct.gov/deep/nitrogencontrol.

WATER QUALITY TRADING

FLORIDA

In 2008, the Florida DEP issued a TMDL for nutrients for the Lower St. Johns River and a Basin Management Action Plan (BMAP) to address impairments based on elevated chlorophyll *a* and Trophic State Index levels in the freshwater and marine portions of the river. In 2010, Florida DEP finalized a rule establishing a pilot water quality credit trading program for the Lower St. Johns River Basin. The pilot program was intended to give entities a more effective and cost-efficient option for meeting their required pollutant load reductions. Under the pilot program, at least one of the trading parties was required to have an individual wastewater or stormwater permit, and credits could only be generated when a source reduced its load below its baseline allocation.

In 2010, Florida DEP amended the water quality trading rule to expand the program to allow trading in basins with adopted BMAPs or Reasonable Assurance Plans (RAPs) and to update the rule to reflect "lessons learned" from the pilot program.

Key Characteristics of the Trading Program

Geographic scope: *Within boundaries covered by BMAPs or RAPs in Florida*

Key driver(s): *TMDLs to address nutrient-related impairments*

Trading scenario: *Point source–point source, point source–nonpoint source, nonpoint source–nonpoint source*

Pollutants: *Total nitrogen and total phosphorus*

Status: *Active*

Trade ratios: *Location factor and uncertainty factor*

Highlights: *Pilot program, pre-approval process for credit generation, trade tracking*

Contact information:

Kevin Coyne
kevin.coyne@dep.state.fl.us
Florida Department of Environmental Protection

Florida's current trading rules define the geographic scope for trading as the area within the boundaries of BMAPs or RAPs, including those that address hydrologically connected waters. The rule authorizes trading between both point and nonpoint sources if authorized in the BMAP or RAP.

Credits are expressed as annual loads of total nitrogen or total phosphorus and cannot be rolled over or aggregated from year to year. Credits generated by point sources must be measured and confirmed through effluent monitoring. Credits generated by nonpoint sources can be measured, if feasible. Where direct measurement of nonpoint source credits is not feasible, estimates of the long-term average expected reduction may be used.

WATER QUALITY TRADING

Credits are defined as the amount of nutrient load reduction below baseline requirements. Baseline is defined as the annual nutrient load from a pollutant source after all required pollution control activities are performed. For point sources, baseline is the more stringent of:

- The wasteload allocation in the BMAP or RAP.
- The water-quality-based effluent limitation in the NPDES permit.

For nonpoint sources, baseline is the more stringent of:

- The entity's load allocation in the BMAP or RAP.
- The nutrient load expected after required best management practices (BMPs) are implemented for agriculture sources or nutrient management plan requirements are implemented for concentrated animal feeding operations.

Credits are adjusted using two types of trade ratio: location factors and uncertainty factors. Location factors are used for trades in different waterbody segments to account for the relative impacts of nutrient discharges at the two locations. Uncertainty factors account for the uncertainty associated with estimated credits generated from nonpoint sources. Uncertainty factors default to 2:1 for urban stormwater and 3:1 for agricultural runoff, but can be adjusted on a site-specific basis.

The rule establishes processes for pre-approval and tracking of credit generation. To obtain DEP approval, the credit generator must submit a form describing the activities generating the credits and the expected nutrient load reduction below the generator's baseline. If DEP approves, DEP then notifies the credit generator of the maximum number of credits that could be authorized. The credit buyer must submit a form with information on the terms of trades, number of credits traded, credit calculations, credit unit price, and amount of any state funding used to generate credits. A trade then becomes effective when DEP authorizes the trade in the BMAP, RAP, or individual NPDES permit. DEP tracks all credit generation pre-approvals and all credits traded in a publicly available registry on its website.

To verify that credits are generated, credit sellers must annually certify and document that the BMPs or other actions on which the credits are based are fully implemented and properly operated and maintained. For measured credits, the seller must report the quantity discharged to DEP on a monthly basis. DEP may also conduct site inspections to review records and verify site conditions.

WATER QUALITY TRADING

To date, active trading has only occurred in the Lower St. Johns River watershed. As of the *2015 Progress Report*, point source wastewater treatment facilities in the freshwater and marine reaches and municipal separate storm sewer systems (MS4s) in the freshwater reach of the river had achieved their allocations due, in part, to water quality trading.

IDAHO

Idaho's water quality standards authorize the use of water quality trading when developing TMDLs or equivalent processes. Idaho issued revised *Water Quality Trading Guidance* in October 2016. The 2016 *Guidance* is based on recommendations from the *Draft Regional Recommendations for the Pacific Northwest on Water Quality Trading*, prepared by the Willamette Partnership and The Freshwater Trust in collaboration with state water quality agencies from Idaho, Oregon, and Washington and U.S. EPA Region 10.

The 2016 *Guidance* explains that watershed-level trading programs should be documented in trading frameworks that detail the processes and standards for trading in a geographic area. Once a trading framework is developed, trading plans containing the necessary details to support trading are incorporated into an NPDES permit or other binding agreement.

Key Characteristics of the Trading Program

Geographic scope: *Watersheds or other hydrologically connected geographic areas in Idaho, as specified in approved trading frameworks*

Key driver(s): *Desire to improve water quality and reduce costs of TMDL implementation*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Total nitrogen, total phosphorus, and thermal loading*

Status: *Active*

Trade ratios: *Delivery, attenuation, equivalency, uncertainty, reserve, and retirement ratios*

Highlights: *Implementation through trading frameworks and trading plans*

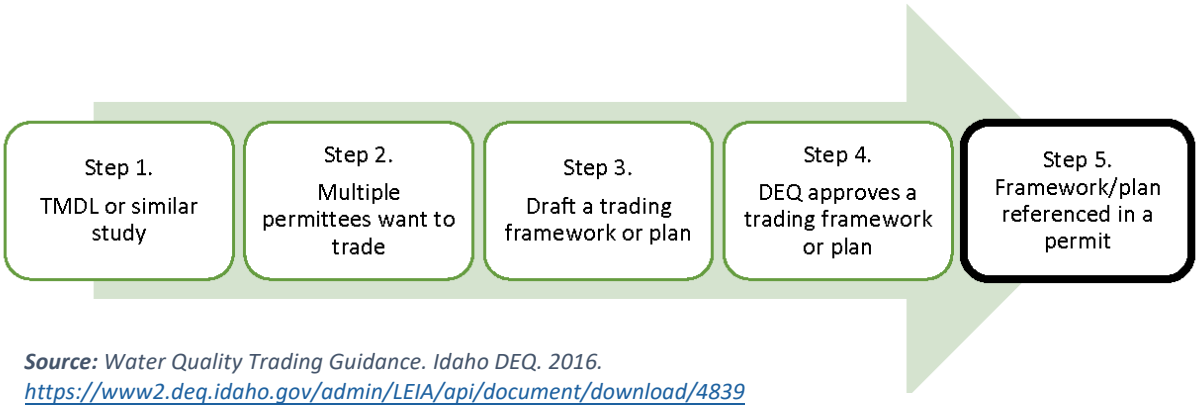
Contact information:

Graham Freeman
graham.freeman@deq.idaho.gov
Idaho Department of Environmental Quality

WATER QUALITY TRADING

The *2016 Guidance* sets forth a five-step process for developing and implementing trading frameworks:

1. Develop a TMDL or similar study. TMDLs are typically a prerequisite for establishing a trading framework; however, the *2016 Guidance* includes criteria for pre-TMDL trading for existing discharges to impaired waterbodies.
2. Confirm that there are multiple buyers within the watershed. The *2016 Guidance* supports both point source–point source trading and point source–nonpoint source trading.
3. Develop a trading framework using information from the TMDL or similar study.
4. Hold a 30-day public comment period; get Idaho DEQ approval.
5. Incorporate trading framework elements into a trading plan in the NPDES permit.



Source: *Water Quality Trading Guidance. Idaho DEQ. 2016.*
https://www2.deq.idaho.gov/admin/LEIA/api/document/download/4839

The *2016 Guidance* recommends elements to be identified in the trading framework, including trading area, baseline, credit quantification and trade ratios, credit life, project design and verification, and credit registration and trade tracking, among others.

The *2016 Guidance* suggests that the seller should usually be upstream from the buyer, but it acknowledges that downstream sellers can sell to upstream buyers in certain scenarios. Including measures or monitoring in the trading frameworks can ensure hot spots do not occur within the trading area. The *2016 Guidance* does not support trading between basins.

The trading framework specifies baseline requirements for trading parties. The baseline for a point source credit seller is the most stringent effluent limitation in their NPDES permit. For

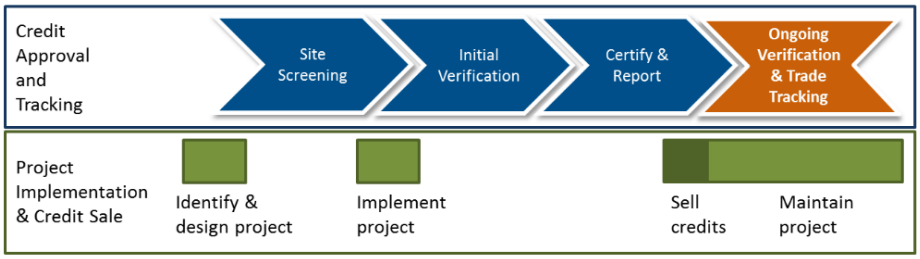
nonpoint sources, baseline can be derived from the source's TMDL load allocation or from other sources of regulatory requirements.

The trading framework must specify how credits will be quantified. For point sources, credits should be quantified through direct measurement of the effluent. For nonpoint sources, direct measurement is preferred, but credits can also be estimated through modeling or BMP efficiency rates. The *2016 Guidance* identifies several types of trade ratios that may be applied in the trading framework and recommends that the overall trade ratio be greater than 1.5:1.

Credits can only be used in the time period during which they were generated (monthly, seasonal, or annual) and must be tied to the critical period (i.e., the time period during which the water quality benefit is needed) for a watershed.

A list of approvable BMP packages must be included in the trading framework. A BMP package identifies the proposed BMP and supporting information, including BMP design, installation, and operation information; procedures for verifying and quantifying credits, and monitoring and maintenance requirements. Idaho DEQ must approve the BMP packages during review of the trading framework. The *2016 Guidance* includes a process for adding new BMPs and quantification methods to an existing framework, including an opportunity for public comment.

Lastly, the trading framework are to describe the process to generate, review, and track credits. Before a project can be used to generate credits, it may be screened for desirability or feasibility at a specific site. Initial project verification may be conducted to confirm the project is eligible, credits were quantified accurately, and necessary nonpoint source BMPs were installed properly or that discharge monitoring reports confirm a point source is achieving the necessary load reductions. Credits must be certified and tracked through a registry maintained by Idaho DEQ or a designated tracking entity. Ongoing verification and credit tracking are required to confirm that projects are maintained and function as designed.



Source: *Water Quality Trading Guidance. Idaho DEQ. 2016.*
https://www2.deq.idaho.gov/admin/LEIA/api/document/download/4839

When approving a trading framework, Idaho DEQ amends the *2016 Guidance* to include the framework as an appendix. Current trading frameworks include the Upper Snake-Rock Trading Framework and the Lower Boise Trading Framework. Water quality trading in the Upper Snake-Rock watershed is implemented through the 2007 General Permit for Aquaculture Facilities in Idaho Subject to Wasteload Allocations Under Selected TMDLs.

For more information about Idaho's trading program, visit https://www2.deq.idaho.gov/admin/LEIA/api/document/download/14946.

LOUISIANA

Louisiana has developed a water quality trading program to incentivize reduction of pollutant discharges to waters of the state. Louisiana's state legislature enacted legislation in June 2017 to provide for the establishment and administration of a trading program, set certain criteria for credit generation and use, and allow for use of a pilot program to aid in program development. In December 2017, Louisiana DEQ issued draft *Louisiana Water Quality Trading Guidance* for public comment.

To develop its program, Louisiana DEQ garnered significant support from over 50 stakeholder groups. Louisiana DEQ held a series of six stakeholder meetings in 2018. They also worked with stakeholders to conduct five pilot projects covering generation of credits from coastal wetland restoration projects, regionalization and home inspection programs for unsewered communities, and agricultural practices and the use of web applications and mapping tools to support water quality trading.

Louisiana DEQ prepared draft rulemaking based on stakeholder input and pilot project

Key Characteristics of the Trading Program

Geographic scope: *Upstream of a point of concern and within the same hydrological basin in Louisiana*

Key driver(s): *Desire to induce reductions of discharges of pollutants to waters of the state*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Total nitrogen, total phosphorus, BOD, sediment, and temperature*

Status: *Active*

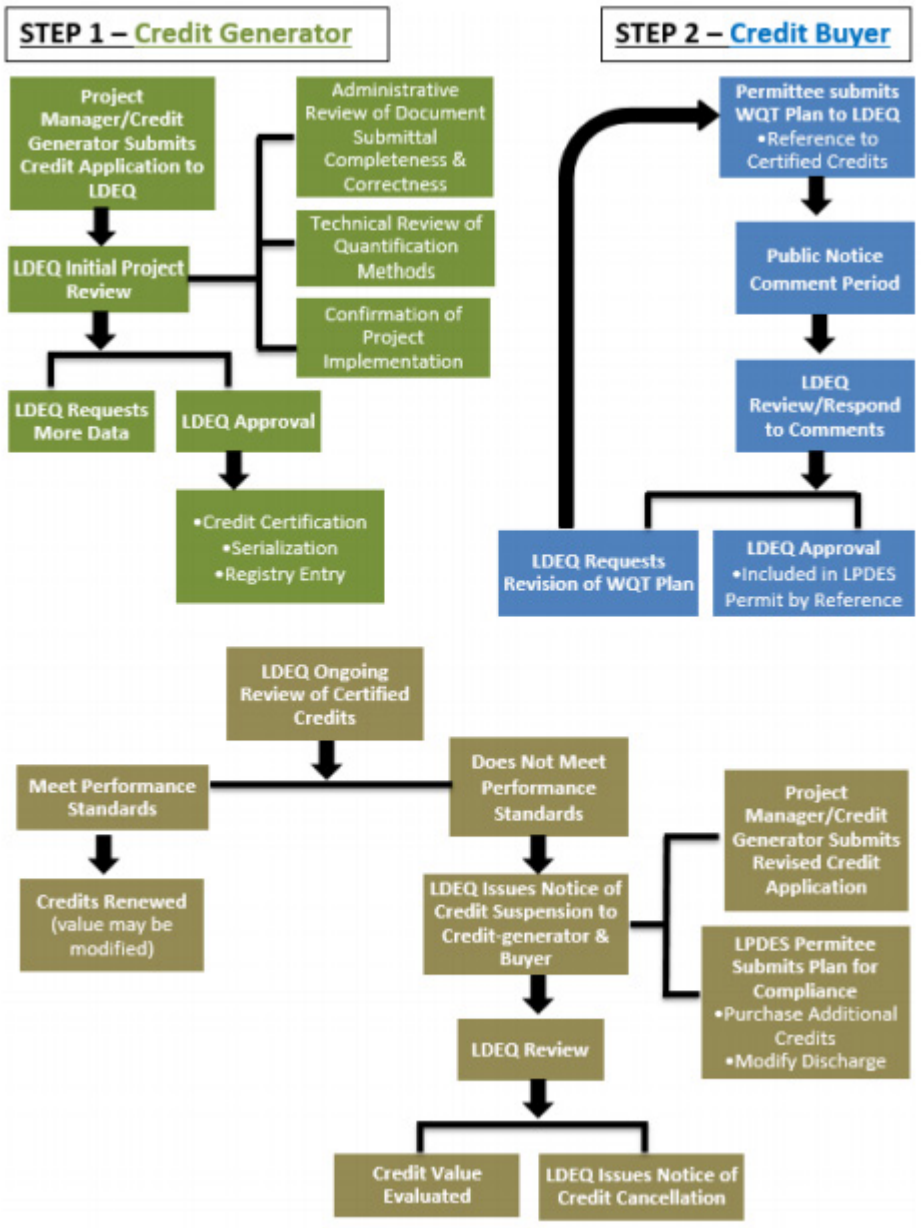
Trade ratios: *Uncertainty, reserve/retirement, and equivalency ratios*

Highlights: *Implementation through approved water quality trading plans or water quality trading frameworks*

Contact information:

Amanda Vincent
amanda.vincent@la.gov
Louisiana Department of Environmental Quality

outcomes. Louisiana DEQ proposed water quality trading rulemaking in January 2019. The rulemaking was finalized, and the guidance was revised, in October 2019.



Source: *Louisiana Water Quality Trading Guidance. Louisiana DEQ. 2019. https://www.deq.louisiana.gov/assets/docs/Water/LouisianaWaterQualityTradingGuidance_DRAFT_10182019.pdf*

WATER QUALITY TRADING

The water quality trading rule (LAC 33, Part IX, Chapter 26) established a basic structure for implementing water quality trading. Specific details of trading will be specified in permittee-specific water quality trading plans or in watershed-level watershed trading frameworks**.** The water quality trading plan will include all the specific details of trading processes and performance standards. Where a watershed trading framework exists, the water quality trading plan will incorporate the terms of the framework. Ultimately, information from these documents will be incorporated into a point source's Louisiana Pollutant Discharge Elimination System (LPDES) permit, the primary mechanism for trading.

The rule identifies the scenarios in which trading may be allowed, including trading in waterbodies with no impairment or in impaired waterbodies with and without TMDLs or TMDL alternatives.

Water quality trading plans must specify the geographic scope, or trading area, and be developed and documented on a case-by-case basis. The trading area shall be defined ecologically where a pollution reduction in one part of the area can be linked to a pollutant being traded that results in a net water quality improvement at a point of compliance. The trading area shall be consistent with any applicable TMDL or TMDL alternative.

The rule establishes eligibility for credit buyers and sellers. Point source buyers that meet their technology-based effluent limitations (i.e., baseline) may purchase credits to achieve water-quality-based effluent limitations. Trades may not cause localized impacts, and water quality trading plans must specify measures and/or monitoring requirements to ensure they do not occur. For sellers, credit-generating projects must use appropriate BMPs, be consistent with other laws and be in good standing, demonstrate consistency with baseline requirements, be able to verifiably quantify pollutant reductions, and account for risk and uncertainty. The baseline for a point source seller is the most stringent effluent limitation in the LPDES permit. The baseline for a nonpoint source seller is determined by current federal, state, tribal, and local requirements; existing abatement requirements from a TMDL or other water quality goal; or a requirement in a water quality trading plan.

The calculation of credits must account for risk and uncertainty through application of trade ratios, which must be included in a water quality trading plan. The rule indicates that trading ratios may be used to account for variables associated with a trading project including, but not limited to uncertainty, reserve/retirement, and equivalency ratios. Uncertainty ratios are applied at the time of credit estimation. Reserve/retirement and equivalency ratios are applied at the time of the trade.

WATER QUALITY TRADING

The rule indicates that each water quality trading plan must include credit life information. Credit life is the period from the date a credit is certified and becomes available for sale to the date that the credit is no longer valid. It may be annual, seasonal, or monthly, or may cover a discrete number of years. Credits cannot be used outside their approved credit life.

The guidance includes standards for project implementation and quality assurance to ensure that projects used to generate credits are achieving water quality benefits. Every project requires a project design and management plan approved by Louisiana DEQ. Projects also must demonstrate that adequate legal and financial safeguards (e.g., leases, deed restrictions, easements, contracts) are in place to provide certainty for point source buyers that credits will be available.

The guidance establishes a standard process to confirm credit-generating project implementation, review project performance, and track credits. Initially, a source wishing to generate credits will submit a credit application to Louisiana DEQ. Louisiana DEQ will then conduct an initial project review consisting of administrative review, technical review, and confirmation of project implementation and maintenance. For each approved project, Louisiana DEQ issues a credit certificate to the seller and tracks credits in a ledger. Projects are subject to ongoing review to ensure credits are generated and nonpoint source projects are maintained and functioning as planned.

For more information about Louisiana's trading program, visit https://deq.louisiana.gov/page/water-quality-trading.

WATER QUALITY TRADING

MARYLAND

Maryland initiated a nutrient trading program in 2008 with issuance of the Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed (referred to as Phase I), the *Guidelines for the Generation of Agricultural Nonpoint Nutrient Credits* (Phase II-A), and the *Guidelines for Agricultural Nonpoint Credit Purchases* (Phase II-B). Phase I established principles and guidelines for trading in Maryland and specified procedures for point source–point source trading between WWTPs. Phases II-A and II-B addressed point source–nonpoint source trading.

Key Characteristics of the Trading Program

Geographic scope: *Potomac River Basin, Patuxent River Basin, and Eastern Shore and Western Shore River Basins in the Chesapeake Bay watershed, Maryland*

Key driver(s): *Chesapeake Bay TMDL*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Total nitrogen, total phosphorus, and sediment*

Status: *Active*

Trade ratios: *Uncertainty, edge of tide, and reserve ratios*

Highlights: *Maryland Nutrient Tracking Tool, central registry, and marketplace*

Contact information:

Gregorio Sandi
mde.wqtrading@maryland.gov
Maryland Department of the Environment

In 2015, Maryland released the Maryland Water Quality Nutrient Trading Policy Statement, seeking to develop a new cross-sector trading program to achieve reductions required by the 2010 Chesapeake Bay TMDL. To that end, the Maryland Department of the Environment (MDE) and Department of Agriculture (MDA) finalized regulations establishing the Maryland Water Quality Trading Program in July 2018. The Trading Program was developed through consultation with the Maryland Water Quality Trading Advisory Committee, comprising over 30 stakeholders.

Maryland's Trading Program requires that credits traded in impaired waterbodies must be generated within the same waterbody or upstream of the credit user's discharge to ensure protection of local water quality. To that end, MDE requires that an NPDES permittee discharging in a given watershed, defined as the Chesapeake Bay TMDL segment, purchase credits from within that same watershed.

WATER QUALITY TRADING

Trading is authorized between agricultural, stormwater (including MS4s), wastewater, and onsite sewage disposal sectors through point source–point source and point source–nonpoint source trading.

The Trading Program establishes sector-specific baseline requirements for nonpoint sources, wastewater point sources, stormwater point sources, nonregulated sources, and onsite sewage disposal systems. Generally, all baselines must be consistent with the Chesapeake Bay TMDL or a local TMDL, if more restrictive.

The Trading Program specifies three types of trade ratio applicable to all trades. An uncertainty ratio is applied to compensate for discrepancies in estimated pollutant reductions and provide a margin of safety. An edge of tide ratio is applied to all credits to normalize loads based on delivery to the mainstem of the Chesapeake Bay. A reserve ratio of at least 5 percent is applied to each credit to create a pool of credits that the state can use to provide a margin of safety to compensate for project failure and/or underperformance and improve overall water quality.

Credits can be generated by implementing BMPs that are approved by the Chesapeake Bay Program. Credit life is one year, and a credit may be used only during the year in which it is generated. Credits may be traded only after they have been certified, verified, and registered. Certification is the process used by MDE and MDA to quantify and register credits. Credits may be certified for more than one year but must be applied annually. MDA certifies all eligible agricultural credit generating practices; MDE certifies credits generated by any Chesapeake Bay Program–approved non-agricultural practice. Upon certification, MDE enters the certified credits into a central registry.

MDA and MDE have established and maintain the following online tools to facilitate trading:

- The Maryland Nutrient Tracking Tool to calculate credits for agricultural credit generators.
- A central registry to document, catalogue, and track credit trades.
- A marketplace to exchange information between credit generators and potential buyers.

As of January 2021, MDE had certified two trades: one between a wastewater source and an industrial source and one between a wastewater source and an MS4. MDE is certifying credits from a number of wastewater, stormwater, and natural BMPs.

For more information about Maryland's trading program, visit https://mde.maryland.gov/programs/Water/WQT/Pages/index.aspx,

WATER QUALITY TRADING

http://www.mdnutrienttrading.com

MINNESOTA

MPCA has implemented water quality trading since 1997. In 2007, MPCA convened a Water Quality Trading Advisory Committee of 14 stakeholders and initiated development of a water quality trading rulemaking. MPCA did not finalize the rulemaking, deeming it unnecessary when the Minnesota legislature enacted a 2014 law expanding MPCA's authority to implement water quality trading.

MPCA implements trading in impaired waterbodies where a TMDL has been developed and where a TMDL is under development. MPCA's initial implementation of pre-TMDL trading was challenged, but was upheld in the Minnesota Supreme Court in 2006. MPCA subsequently approved a Pre-TMDL Phosphorus Trading Permitting Strategy (PTPT Strategy) in 2008, incorporating guidance from the court ruling. Both the MPCA rules and specifics associated with the PTPT Strategy are described below.

Key Characteristics of the Trading Program

Geographic scope: *Upstream of targeted waterbody*

Key driver(s): *Nutrient-related impairments*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Total nitrogen, total phosphorus, sediment, temperature, and carbonaceous BOD*

Status: *Active*

Trade ratios: *Location, delivery, uncertainty, equivalence, and retirement ratios*

Highlights: *Implemented through NPDES permits, PTPT Strategy*

Contact information:

WQtrading.PCA@state.mn.us
Minnesota Pollution Control Agency

MPCA allows for point source–point source and point source–nonpoint source trading. The PTPT Strategy does not address trading with nonpoint sources in pre-TMDL waterbodies, but MPCA may consider allowance of such trades on a case-by-case basis. The PTPT Strategy only applies to individual NPDES permits; if a permittee interested in selling total phosphorus credits is authorized to discharge under a general permit, it must apply for an individual NPDES permit.

MPCA limits the geographic scope of trades to buyers and sellers upstream of the nearest impaired waterbody. Trading is not allowed where a nutrient-impaired waterbody is downstream of the buyer and upstream of the seller. The PTPT Strategy describes options for

determining trading partners, which include partners inside and outside the same major watershed.

MPCA implements trading through NPDES permits. For point sources participating in trading, Minnesota law requires that the point source have a water-quality-based effluent limit or wasteload allocation in place prior to the trade. Mass limits for the buyer and seller are adjusted upward and downward, respectively, in their NPDES permits in proportion to the trade.

The PTPT Strategy specifies the procedures for calculating mass limits in NPDES permits for discharges to pre-TMDL waters. Because a TMDL is not available to account for geography or proximity of the buyers and sellers, the PTPT Strategy requires a pound of total phosphorus discharged by the buyer be offset by a pound of total phosphorus removed from the seller, with a trade ratio applied to ensure a net aggregate reduction.

MPCA may apply various trade ratios depending on the trading scenario, including location, delivery, uncertainty, equivalence, and retirement ratios. Generally, MPCA assigns smaller trade ratios where the pollutant load sources and pollutant fate and transport dynamics are well-understood and higher trade ratios where less information is known about pollutant sources and watershed dynamics. The MPCA-commissioned document *A Scientifically Defensible Process for the Exchange of Pollutant Credits Under Minnesota's Proposed Water Quality Trading Rules* includes guidance for quantifying credits and developing trade ratios accounting for uncertainty for credits generated by nonpoint sources. Under the PTPT Strategy, uncertainty ratios of 1.1:1 and 1.2:1 are applied to expanding and new dischargers, respectively. Additionally, a trade ratio of 1.4:1 is applied for trades that cross a major watershed boundary where the buyer is closer to the impairment.

Under the PTPT Strategy, an entity interested in trading in pre-TMDL waterbodies may initiate the trading process by submitting a completed "Application to Trade Phosphorus" form to MPCA. If approved by MPCA, the trade is incorporated into the NPDES permits for the buyer and seller, subject to public notification identifying the trading partners, impairment of concern, and explanation of baseline and trade calculations. The trades are effective for the life of the NPDES permits unless they are modified to reflect wasteload allocations consistent with an EPA-approved TMDL for the waterbody.

Since 1997, MPCA has implemented three point source–nonpoint source trades and three point source–point source trades through individual NPDES permits. Additionally, MPCA's Minnesota

River Basin General Phosphorus Permit Phase I, a multisource watershed-based permit covering discharges of total phosphorus from 40 WWTPs, allows water quality trading among some wastewater treatment facilities in the basin as an option for compliance. Between 2008 and 2018, 121 seasonal trades occurred under the general permit between 18 credit buyers and five credit sellers.

For more information about Minnesota's trading program, visit https://www.pca.state.mn.us/water/water-quality-trading.

MONTANA

Anticipating adoption of stringent numeric criteria for nutrients, the Montana DEQ developed *Montana's Policy for Nutrient Trading* and the Nutrient Trading Rulemaking in December 2012. The policy provides a framework to use water quality trading as a cost-effective alternative to treatment upgrades or a water quality standards variance. Development of the policy was informed by the Nutrient Trading Subcommittee of the Nutrient Workgroup, an advisory group representing point sources, nonpoint sources, and other interested parties.

Key Characteristics of the Trading Program

Geographic scope: *Within a watershed boundary in Montana*

Key driver(s): *Proposed adoption of numeric criteria for nutrients*

Trading scenario: *Point source–point source, point source–nonpoint source, and nonpoint source–nonpoint source*

Pollutants: *Total nitrogen and total phosphorus*

Status: *Policy*

Trade ratios: *Delivery and uncertainty ratios*

Highlights: *Implementation through MPDES permits, flexible options for generating and calculating credits, "business case" evaluation*

The policy allows point source–point source, point source–nonpoint source, and nonpoint source–nonpoint source trading of total nitrogen and total phosphorus. Trading may be used to comply with a nutrient TMDL, offset a new or increased discharge, comply with water-quality-based effluent limits for nutrients, or provide a cost-effective method for achieving water quality standards and ancillary environmental benefits.

The policy limits the geographic scope of trades to watershed boundaries, with credits generated upstream in the watershed in most scenarios. Montana DEQ may consider allowing downstream credit generation in certain situations, in which case DEQ may include increased trade ratios to ensure protection of water quality.

WATER QUALITY TRADING

Generating pollution reduction credits must be consistent with water quality standards. The policy defines baseline requirements as the TMDL wasteload allocation or water-quality-based effluent limit for point sources. For nonpoint sources, baseline is defined as the loading associated with existing land uses and management practices that comply with applicable state, local, and tribal regulations.

Credits are expressed as pounds of total nitrogen or total phosphorus per applicable period of time that is delivered to surface waters in the watershed. The policy does not allow for credits to be banked for a future period except where an off-season reduction provides water quality benefit within the applicable period of the water quality standards. Montana DEQ may apply a delivery ratio to account for a pollutant's travel over land or in water (or both) and/or an uncertainty ratio to account for variation in the expected reliability and efficiency of the source or type of reduction being applied toward credit.

The policy provides flexible options for generating and calculating credits, including specific BMPs listed in the policy, BMPs and credit calculations implemented in other states, or others proposed on a case-by-case basis.

The policy details the procedures for getting Montana DEQ approval for nutrient trades. The process begins with the submission of a trading application with the Montana Pollutant Discharge Elimination System (MPDES) permit application or permit modification request. The trade application must contain specific details of the trade, credit buyer documentation, and credit seller documentation. The policy identifies trade details that may be required, including the timer period, number, and source of credits to be exchanged; consistency with approved TMDLs; and inspection and verification requirements.

Upon review and approval, Montana DEQ will include the approved trade in a draft MPDES permit. This draft, including the trading provisions, will be subject to public comment. If specific conditions of the trade need to be verified over time, the permit will require submission of an annual update to Montana DEQ to verify compliance.

In 2014, Montana DEQ commissioned a study to evaluate the "business case" for developing a more formal water quality trading program in Montana. The study report, *Water Quality Trading Business Case for Montana*, concluded that the most common opportunities for trading are point source–point source trades and provides recommendations to further prioritize, encourage, and enhance this type of trading.

For more information about Montana's trading program, visit http://deq.mt.gov/Water/Resources/nutrientworkgroup.

OHIO

Ohio EPA established administrative requirements for development and implementation of water quality trading programs in Chapter 3745-5 of the Ohio Administrative Code in 2007. Ohio EPA established the requirements to facilitate watershed-based approaches, improve water quality and minimize the cost of achieving and maintaining water quality standards, provide economic incentives for voluntary pollutant reductions, and achieve additional environmental benefits.

Key Characteristics of the Trading Program

Geographic scope: *A watershed or TMDL area in Ohio*

Key driver(s): *Cost-effective watershed-based improvements to water quality*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Unspecified*

Status: *Active*

Trade ratios: *Uncertainty ratios*

Highlights: *Water quality management plans, public participation requirements, ambient water quality monitoring requirements*

Contact information:

Walter Ariss
walter.ariss@epa.ohio.gov
Ohio Environmental Protection Agency

Trading must be conducted under an Ohio EPA–approved water quality trading management plan. To obtain approval, a person interested in trading must submit a water quality trading management plan application containing a trading area map, identification of trading partners, list of pollutants to be traded, water quality assessment information, justification for trade ratios and baselines, and anticipated BMPs, among other requirements. Once approved, a renewal application providing an economic evaluation and an assessment of overall environmental and economic effectiveness of all water quality trading activities must be submitted every 5 years.

A trading area can be a watershed, a TMDL area, or any other area approved by the Ohio EPA Director. Trading may occur in impaired waterbodies with or without TMDLs. For impaired waterbodies without approved TMDLs, trading must achieve progress toward water quality standards where watershed action plans, nonpoint source implementation strategies, and other locally developed watershed plans provide the data and scientific basis for the trading.

WATER QUALITY TRADING

When an approved TMDL is available, trading must conform to its assumptions and requirements.

The rules specify the following default uncertainty ratios:

- A point source–point source trade ratio of 1:1.
- A point source–nonpoint source trade ratio of 2:1 for impaired waterbodies without TMDLs.
- A point source–nonpoint source trade ratio of 3:1 for impaired waterbodies with TMDLs.

Ohio EPA may specify other trade ratios to account for site-specific considerations.

The water quality baseline for point sources is the lowest of the wasteload allocation established by an approved TMDL, an existing NPDES permit limit or technology-based performance standard where there is no TMDL, or the current discharge level. Loading associated with existing land uses and management practices is used to determine the baseline for nonpoint sources. The baseline for stormwater sources subject to an NPDES permit is the numeric effluent limit established in the NPDES permit or the loading achieved after implementation of BMPs specified by the permit.

Ohio EPA incorporates trades into individual NPDES permits through special conditions that authorize trading, require implementation actions from the approved water quality trading management plan, require notification of insufficient credits for compliance, and require annual reporting. Ohio EPA may also include additional special conditions to ensure trading does not cause adverse local impacts. For point source–point source trading, the permit will include effluent limits adjusted proportional to the credits used or generated. For point source–nonpoint source trading, the permit will include the effluent limit that would apply without trading, effluent monitoring and reporting requirements, the credit applied to the discharge, and special conditions for compliance determination.

The rules provide several opportunities for public participation during program development. Applicants must hold at least one public meeting for submission of the initial water quality trading management plan and major revisions, provide a 30-day public notice before the meeting, and provide a summary of responses to all oral and written comments. The public may also participate during the NPDES permit renewal process.

Ohio EPA may require ambient water quality monitoring to determine whether trading has resulted in harm or improvements to water quality. Ambient water quality monitoring plans

must identify the parameters to be monitored, sampling frequency, sampling locations, and methods and procedures used to monitor each parameter.

To date, two water quality trading programs have been developed in Ohio for the Great Miami River watershed and the Middle Fork of the Sugar Creek watershed. The trading plans for these programs were developed before establishment of Ohio EPA's trading rules. Ohio EPA amended the rules in 2018 to add a compliance date for submittal of a water quality trading management plan by January 2020 for the Great Miami River watershed. A management plan has been submitted for the Middle Fork of the Sugar Creek watershed and is currently under review for consistency with the rules.

For more information about Ohio's trading program, visit https://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/water-quality-trading-program.

WATER QUALITY TRADING

OREGON

As authorized by Oregon Revised Statute 468B.555, the Oregon Environmental Quality Commission issued rules in Oregon Administrative Rules Chapter 340, Division 039, in December 2015 establishing a water quality trading program. The goal of the rules was to provide transparency, enforceability, and clarity to permittees, the public, and Oregon DEQ staff when establishing and implementing water quality trading programs.

To implement the rules, Oregon DEQ issued an Internal Management Directive (IMD) titled *Water Quality Trading* in March 2016. The trading IMD provides guidance to Oregon DEQ staff for approving water quality trading plans, incorporating trading into NPDES permits, and determining compliance and enforcement. The IMD was informed by stakeholder input provided during trading policy forums, the rulemaking process, and IMD development.

Specific details of trading will be specified in trading frameworks and water quality trading plans. Trading frameworks may be established in a TMDL water quality management plan or water pollution control plan, but are not required for Oregon DEQ to approve a water quality trading plan. Where established, trading frameworks must specify pollutants eligible for trading, the trading area, priority areas, and baseline conditions (i.e., regulations, TMDL allocations, and/or implementation schedules).

Key Characteristics of the Trading Program

Geographic scope: *Watersheds or other hydrologically connected geographic areas in Oregon, as specified in approved trading frameworks*

Key driver(s): *TMDLs to address impairments*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Temperature, ammonia, sediment, TSS, and nutrients and other oxygen-demanding substances, including BOD*

Status: *Active*

Trade ratios: *Ratios for attenuation, pollutant equivalency, uncertainty, to incentivize trading projects in priority areas, to address risk, to address time lag, and for credit retirement*

Highlights: *Implementation through trading plans and trading frameworks, guidance for permit writers*

Contact information:

Wade Peerman
peerman.wade@deq.state.or.us
Oregon Department of Environmental Quality

Water quality trading plans are the crux of a trading program. They describe the design, implementation, maintenance, monitoring, verification, and reporting elements of a water quality trade. Where a watershed trading framework exists, the water quality trading plan will

incorporate the terms of the framework. For NPDES permittees, the water quality trading plan may be submitted as part of the application for permit renewal or modification. Ultimately, information from the trading framework and water quality trading plans will be incorporated into an NPDES permit or a Clean Water Act Section 401 water quality certification, which provide the regulatory mechanisms for trading. Oregon DEQ must provide an opportunity for public comment on a plan before it is approved.

A trading area is a watershed or other hydrologically connected geographic area, as defined within a water quality management plan adopted for a TMDL, trading framework, or water quality trading plan. It encompasses the location of the discharge to be offset, or its downstream point of impact, if applicable, and the trading project to be implemented. Trading may occur in high-quality waters and impaired waterbodies with or without an approved TMDL.

The rules define baseline as pollutant load reductions, BMP requirements, or site conditions that must be met under regulatory requirements at the time of trading project initiation. Trading frameworks and water quality trading plans specify applicable regulatory requirements that must be implemented to achieve baseline requirements. If no regulatory requirements exist in the trading area, then existing conditions may be used to represent baseline in the trading plan.

The water quality trading plan must describe at least one trade ratio and document the ratio components and underlying assumptions. Trade ratios may be used to address issues such as attenuation of water quality benefits between the location where credit-generating BMPs occur and the point of use, pollutant equivalency, uncertainty of BMP performance and methods used to measure or estimate a water quality benefit for a particular project, natural and human-caused risks, and time lag between project implementation and realization of water quality benefits. Trade ratios may also be used to incentivize trading projects in priority areas (e.g., areas of ecological significance).

Water quality trading plans must specify how a credit user will verify and document that BMPs conform to applicable quality standards and that credits are generated as planned. NPDES permits that authorize trading must include annual reporting requirements on implementation and performance over the year, including verification of water quality trading plan performance and quantification of credits generated. The trading IMD suggests that verification can be conducted in a manner where every credit-generating activity is confirmed in person and all associated paperwork reviewed by a third party, conducted by a trained and knowledgeable staff employed by the permittee, or through a combination of these approaches.

WATER QUALITY TRADING

The trading IMD includes detailed guidance for permit writers for translating water quality trading plan elements into enforceable permit conditions and for documenting the rationale in the permit fact sheet. The NPDES permit must include the following conditions related to water quality trading:

- Effluent limitations that clearly state the quantity of credits that will be used to meet the water-quality-based effluent limitation and when they are needed (e.g., year-round, seasonally, or for a critical period identified in a TMDL).
- Monitoring and reporting conditions require identification of credits used for compliance in monthly discharge monitoring reports and annual reporting.
- Compliance schedule provisions if the permittee cannot immediately meet the water-quality-based effluent limitation.
- Special conditions based on the approved water quality trading plan elements.

Oregon DEQ anticipates that most trading in Oregon will involve temperature, but hopes to expand the program to include nutrient and sediment trading. Oregon DEQ has authorized trades that involve riparian shade restoration to improve stream temperatures, flow augmentation, and trading of BOD and ammonia between WWTPs.

For more information about Oregon's trading program, visit https://www.oregon.gov/deq/wq/wqpermits/Pages/Trading.aspx.

WATER QUALITY TRADING

PENNSYLVANIA

Pennsylvania DEP initiated a nutrient water quality trading program in 2005 with issuance of a nutrient trading policy. In 2010, Pennsylvania DEP published regulations for water quality trading in the Chesapeake Bay watershed (25 Pa. Code § 96.8). As part of their efforts to implement the Chesapeake Bay TMDL, Pennsylvania DEP published additional guidance for implementing the nutrient trading program in the *Phase 2 Watershed Implementation Plan Nutrient Trading Supplement* (Phase 2 WIP NT Supplement) in 2015. Pennsylvania DEP's primary purpose for the program is to provide a cost-efficient option for NPDES permittees in the Chesapeake Bay watershed to meet their TMDL wasteload allocations. Pennsylvania DEP developed the program with significant stakeholder input.

Key Characteristics of the Trading Program

Geographic scope: *Susquehanna and Potomac Basins in the Chesapeake Bay watershed, Pennsylvania*

Key driver(s): *Chesapeake Bay TMDL*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Total nitrogen and total phosphorus*

Status: *Active*

Trade ratios: *Edge of segment, delivery, reserve, and uncertainty ratios*

Highlights: *Certification, verification, and registration processes; nutrient trading auctions*

Contact information:

RA-EPPANutrientTrad@pa.gov
Pennsylvania Department of Environmental Protection

Four types of trade ratios may be used to calculate credits. Edge of segment ratios are applied to account for the amount of a pollutant expected to reach the surface waters at the boundary of a Chesapeake Bay Model segment through surface runoff and groundwater flows. Delivery ratios are derived from the Chesapeake Bay Model and are applied to all pollution reduction activities to account for attenuation between the location of the activity and the Chesapeake Bay. A 10 percent reserve ratio is applied to all credits generated to set aside for Pennsylvania DEP's credit reserve to address pollutant reduction failures and uncertainty. For credits generated by nonpoint sources, an additional 3:1 ratio is applied to address uncertainty associated with the practice-based credit calculation methodology.

25 Pa. Code § 96.8 defines baseline as the compliance activities and performance standards that must be implemented to meet current environmental laws and regulations.

Baseline for point sources is the most stringent of an applicable technology-based effluent limitation or a TMDL wasteload allocation. The Phase 2 WIP NT Supplement specifies additional

baseline requirements for point source discharges as 6.0 mg/L for total nitrogen and 0.8 mg/L for total phosphorus.

Baseline for nonpoint sources is the set of requirements in regulations applicable to the source at the location where the credits or offsets are generated and the pollutant load associated with that location as of January 1, 2005. 25 Pa. Code § 96.8 also defines additional threshold requirements that must be met by an agricultural operation at the location where the credits are generated. The Phase 2 WIP NT Supplement specifies additional requirements for nonpoint source discharges in the form of an additional 3:1 uncertainty ratio to be applied to the number of credits generated once the defined baseline compliance and threshold is reached, and additional requirements for generation of credits from hauling of poultry manure and manure destruction and conversion technologies. The additional Phase 2 WIP NT Supplement requirements for nonpoint sources were implemented as an interim step until Pennsylvania DEP can develop a performance-based or other approved method-based tool for establishing baseline eligibility for nonpoint sources.

Pennsylvania's trading program involves a three-step process to generate credits: certification, verification, and registration. Once credits are certified, verified, and registered, they may be used for compliance with effluent limitations in NPDES permits.

Certification means Pennsylvania DEP has approved a pollutant reduction activity to generate credits. Pennsylvania DEP has provided a mass certification to all significant sewage point source discharges within the Chesapeake Bay Watershed subject to annual mass load effluent limitations (referred to as cap loads) in their NPDES permits. Potential nonpoint source generators must submit a request for credit certification (including credit calculations and a verification plan) to Pennsylvania DEP. All certification requests are published in the *PA Bulletin* for a 30-day public comment period. If Pennsylvania DEP certifies the activity, a notice of the certification is published in the *PA Bulletin,* beginning a 30-day appeal process.

Verification means that Pennsylvania DEP has confirmed a pollutant reduction activity has generated credits during the compliance year based on the approved verification plan included in the generator's certification application. A credit generator must submit a verification request for each compliance year (i.e., October 1–September 30).

Registration means Pennsylvania DEP has approved the sale of credits upon review of an agreement between a buyer and seller. Registration is Pennsylvania DEP's mechanism to track verified credits before they are used to comply with NPDES permit effluent limitations.

WATER QUALITY TRADING

Registered credits may be applied to meet NPDES permit cap load requirements, resold, or retired for the benefit of the Chesapeake Bay.

Trading partners implement trades through direct communication. Pennsylvania Infrastructure Investment Authority (PENNVEST) nutrient credit auctions were available from compliance years 2010 through 2018. The auctions were originally established to reduce risks for buyers and sellers and to help create a stable nutrient credit trading market, but were discontinued due to lack of use. Historical information related to PENNVEST auction trading can be found on the PENNVEST IHS Markit Auction website.

Pennsylvania DEP's nutrient trading program is very active, with many trades each year. Trading primarily occurs between point sources, though some point source–nonpoint source trades also occur. A summary of nutrient trading transactions for compliance years 2013 through 2019 is provided on Pennsylvania DEP's Nutrient Credit Reports website.

For more information about Pennsylvania's trading program, including credit generation requirements and the trading process, visit www.dep.pa.gov/nutrient_trading.

WATER QUALITY TRADING

VIRGINIA

Virginia initiated its water quality trading program in 2005, when the Virginia General Assembly enacted the Chesapeake Bay Watershed Nutrient Credit Exchange Program. The goals of the program are to meet the wasteload allocations for the Chesapeake Bay cost-effectively and expeditiously, accommodate continued growth and economic development in the watershed, and incentivize achievement of nonpoint source reduction goals. To achieve these goals, the law required the Virginia DEQ to establish a watershed-based general permit and nutrient trading program.

Key Characteristics of the Trading Program

Geographic scope: *Eastern Shore Basin, James River Basin, Potomac River Basin, Rappahannock River Basin, and York River Basin in the Chesapeake Bay watershed, Virginia*

Key driver(s): *Chesapeake Bay TMDL*

Trading scenario: *Point source–point source and point source–nonpoint source*

Pollutants: *Total nitrogen and total phosphorus*

Status: *Active*

Trade ratios: *Delivery, uncertainty, and Eastern Shore ratios*

Highlights: *Watershed-based general permit, Virginia Nutrient Credit Exchange Association*

Contact information:

Allan Brockenbrough
allan.brockenbrough@deq.virginia.gov
VA Dept. of Environmental Quality

Virginia DEQ issued a General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia, covering significant existing dischargers and new and expanding dischargers to the Chesapeake Bay watershed, in 2006. This General Permit has since been reissued in 2012 and 2017. For more information on the watershed-based permit, see "Watershed-Based Permitting."

The General Permit allows for point source–point source trading for total nitrogen and total phosphorus for all permittees. Point source–nonpoint source trading is allowed for new and expanded facilities to offset any new or increased total nitrogen or total phosphorus loads.

Permittees may engage in trading independently or through the Virginia Nutrient Credit Exchange Association. The Association was formed in 2005 and consists of 73 owners of 105 treatment facilities in the Chesapeake Bay watershed. It coordinates and facilitates participation in a nutrient credit exchange program for its members. The Association submits annual compliance plan updates on behalf of its members, develops standard forms of agreement for buying and selling credits, helps permittees identify buyers and sellers, and

coordinates planning to ensure sufficient credits are available for permit compliance. According to Virginia's August 2019 Chesapeake Bay TMDL Phase III Watershed Implementation Plan, Virginia became the only state to meet the original significant point source nutrient load reductions by 2011 by implementing their innovative water quality trading program. Since 2010, point source delivered loads have decreased by 9,934,382 pounds per year of total nitrogen (-50%) and 437,410 pounds per year of total phosphorus (-38%).

The Chesapeake Bay watershed in Virginia consists of five tributary basins. The General Permit specifies that purchased credits must be generated within the same tributary, except owners of permitted facilities in the Eastern Shore Basin may purchase credits from owners of permitted facilities in the Potomac and Rappahannock tributaries, subject to an Eastern Shore trading ratio of 1:1 if generated in the Potomac tributary and 1.3:1 if generated in the Rappahannock tributary.

All credits are adjusted by applicable delivery factors that are determined by the geographic location of the facility to account for attenuation during riverine transport between the facility and tidal waters. Credits generated by nonpoint sources are subject to an uncertainty ratio of 2:1 unless the applicant can demonstrate factors that reduce uncertainty (e.g., direct measurement, land conservation with permanent protection).

Permittees may only acquire credits if the credits are generated and applied to a compliance obligation in the same calendar year. Permittees must annually report the mass loads of total nitrogen and total phosphorus discharged by February 1. Based on this information, Virginia DEQ publishes a report by April 1, annually, summarizing annual mass loads and the number of credits generated or required for each facility for the previous calendar year. Permittees must provide certification that they have acquired the credits necessary to achieve compliance for the previous calendar year by June 1. Virginia DEQ then publishes notice of all credit exchanges and purchases for the previous calendar year by July 1.

Virginia DEQ has published guidance for agricultural nonpoint source credit generators in *Trading Nutrient Reductions from Nonpoint Source Best Management Practices in the Chesapeake Bay Watershed: Guidance for Agricultural Landowners and Your Potential Trading Partners*. The guidance describes most current practices available to generate offsets. It also includes instructions for obtaining certification of nutrient credits. A credit generator must submit a Nutrient Reduction Certificate identifying the BMP enhancements or land conversion and calculation of nutrient reductions achieved, assignment of reductions to the offset broker, assignment of reductions to the VPDES permittee, and project qualification data and

documentation. Virginia DEQ uses the U.S. Army Corps of Engineers' Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) database to track the generation, use, and retirement of nonpoint source credits.

For more information about Virginia's trading program, visit https://www.deq.virginia.gov/Programs/Water/PermittingCompliance/PollutionDischargeElimination/NutrientTrading.aspx.

WASHINGTON

Washington Administrative Code 173-201A-450 provides authorization for water quality offsets in Washington. In April 2011, and then again in March 2018, Washington's Department of Ecology released a *Draft Water Quality Trading/Offset Framework* that outlines the regulatory path for water quality trading. Ecology anticipates finalizing the Draft Framework once an actual trading program has been established in a Washington watershed.

Key Characteristics of the Trading Program

Geographic scope: *Watersheds in Washington*

Key driver(s): *TMDLs*

Trading scenario: *Point source–point source, point source–nonpoint source, nonpoint source–nonpoint source*

Pollutants: *Phosphorus, nitrogen, other oxygen-related pollutants, sediment, and temperature; toxics and fecal coliform may not be traded*

Status: *Policy*

Trade ratios: *Delivery, location, equivalency, retirement, uncertainty, and time lag*

Highlights: *Implementation through trading plans approved by Ecology*

Contact information:

Ben Rau
ben.rau@ecy.wa.gov
Washington Department of Ecology

The current draft framework summarizes the elements of a water quality trading program that must be addressed before approval: defining a common unit of credit (i.e., pounds of pollutant), simultaneous credit generation and use, managing uncertainty (i.e., use of trading ratios, monitoring, modeling, and BMP efficiency estimates), compliance assessment (i.e., record-keeping, certifications, inspections), enforcement, public notice and transparency, and regular reassessment and modification.

Ecology, with input from interested parties, determines what types of trades are eligible. Permittees may submit a proposed trade to Ecology for consideration. If Ecology determines the trading program has merit, it will provide written feedback including items that must be included in the water quality trading program. At a minimum, permittees are required to submit a program plan/study addressing all of Ecology's

initial concerns identified during a scoping consultation, a description of practices to achieve pollutant credits and evidence of the effectiveness of these practices, a determination regarding the credits generated and how uncertainty and trading ratios will be applied, a demonstration through modeling or equivalent actual situations that the pollutant reduction will be achieved, design details (if applicable), implementation milestones, and an effective monitoring plan to demonstrate compliance. Additionally, proponents for water quality trading programs must develop a quality assurance project plan before collecting new data or conducting any work on the plan/study.

Point and nonpoint source pollution controls must be secured using binding legal agreements between all parties for the life of the project, and implementation of the credit must be demonstrated to have occurred in advance of the proposed action. Ecology then develops permits that allow for trading applicable portions of the wasteload-allocation-based effluent limit. Permittees are required to report sampling results, as well as trade-adjusted results, on their monthly discharge monitoring reports. The trade-adjusted results must meet their effluent limits.

To ensure credits are accrued and used in the same time period, the permittee must certify each month that offset activities are in place, that they are properly operated and maintained, and that the necessary pollutant reduction is achieved. Trading programs must use an accounting system to ensure that credits are accrued, used, and tracked to ensure compliance with the NPDES permit. Ecology may conduct periodic inspections and monitoring to validate the reported and certified information.

Credits expire if applicable BMPs are determined to be ineffective or removed, or if the implementation is required by a permit, TMDL, or policy regulation.

No trading is currently occurring due to a lack of interested buyers. In recent years, several groups have expressed an interest in developing trading programs in various watersheds in Washington. Most of these ideas involved having point sources pay for nonpoint improvements, and most of the groups proposing these programs were potential sellers. Washington does not anticipate that a trading program will be developed until there is an interested point source buyer. A *2009 Washington Conservation Markets Study Report,* prepared for the Washington State Conservation Commission, found that farmers, ranchers, and foresters are concerned that after they begin providing and being compensated for conservation, it may become a regulatory requirement or expose them to liability.

WATER QUALITY TRADING

Despite the lack of current trading programs within the state, a 2017 report by the Washington State Conservation Commission found that "interest in the concept of water quality trading remains for both buyers and sellers, depending on specifics of the TMDL."

WISCONSIN

In 1997, Wisconsin passed legislation to create three pilot areas for water quality trading: the Fox River Basin, Rock River Basin, and Red Cedar Basin. Successful trading was first implemented in Wisconsin by the City of Cumberland and agricultural nonpoint sources within the Red Cedar Basin when the City had to comply with a statewide total phosphorus limit for WWTPs of 1 mg/L. The trade agreement required the removal of 4,400 pounds of total phosphorus within the Hay River Watershed each year. The City pays the landowners for each pound of total phosphorus removed by converting conventional tillage to no-till systems.

Key Characteristics of the Trading Program

Geographic scope: *Within a watershed in Wisconsin*

Key driver(s): *New water quality standards*

Trading scenario: *Point source–point source, point source–nonpoint source*

Pollutants: *Total phosphorus, TSS, temperature, total nitrogen, other pollutants (excluding toxic bioaccumulative chemicals)*

Status: *Active*

Trade ratios: *Delivery, location, equivalency, uncertainty, and habitat adjustment ratios*

Highlights: *Implementation through trading plans directly with credit generators or exchanges*

Contact information:

Matt Claucherty
matthew.claucherty@wisconsin.gov
Wisconsin Department of Natural Resources

On December 1, 2010, Wisconsin adopted water quality standards for total phosphorus in surface waters, which resulted in restrictive permit limits for some permittees. Wisconsin DNR identified water quality trading as a compliance option for facilities with restrictive total phosphorus limits. During the same year, Wisconsin DNR assembled a stakeholder group of interested parties to develop a trading framework. In 2011, Wisconsin established the statutory framework for statewide water quality trading (283.84, Wis State Stat.). As of December 2019, 25 wastewater dischargers have identified adequate credit generators to fulfill compliance requirements.

Municipal and industrial permittees may use trading within Wisconsin to demonstrate compliance with water quality-based effluent limits. Trading may occur directly between point sources and nonpoint sources, or indirectly through third-party credit exchanges/brokers.

WATER QUALITY TRADING

In 2013, Wisconsin DNR released two guidance manuals: *Guidance for Implementing Water Quality Trading in WPDES Permits* and *A Water Quality Trading How To Manual*. These documents prescribe the protocols for establishing trading within permits, and for developing successful trading strategies.

The permittee is encouraged to review compliance alternatives and determine if trading is feasible and economical. If trading is identified as the preferred compliance option, the permittee must submit a Notice of Intent to Wisconsin DNR. In evaluating feasibility, the permittee determines the pollutant offset needed, identifies potential trading partners, and evaluates the availability of credits. Upon approval of the notice, the permittee must develop a trading strategy and is encouraged to prioritize economic benefit and ease of partnership. Permittees are encouraged to identify significant pollution-generating sites to generate the most cost-effective credits possible.

Delivery	•Accounts for the distance between the credit generator and the credit user, and the impact that this distance can have on fate and transport of the pollutant.
Downstream	•Accounts for local water quality impacts if the credit user is upstream of the credit generator.
Equivalency	•Accounts for situations where trading partners discharge different forms of the traded pollutant. (Example: Total Nitrogen vs. Nitrate-Nitrogen).
Uncertainty	•Accounts for modeling inaccuracies used to quantify load reductions. For trades with nonpoint source credit generators only (see Appendix A).
Habitat Adjustment	•Used to capture ancillary benefits from select practices that benefit habitat in addition to capturing the pollutant of concern. Only applies to wetland creation, wetland restoration, and stream habitat, improvement and management practices.

Source: *A Water Quality Trading How To Manual. Wisconsin DNR. 2013.*

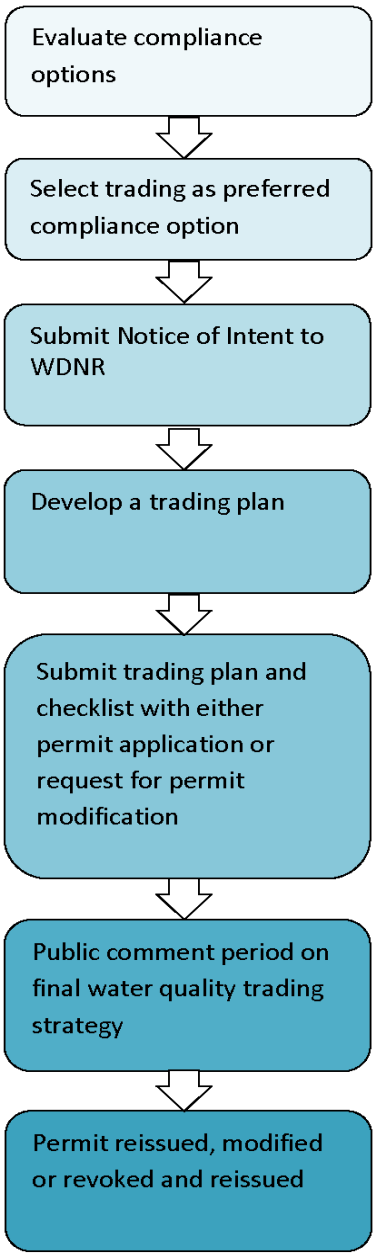
In developing the trading strategy, the permittee must establish trade ratios that consider a delivery factor, a downstream factor (i.e., location factor), an equivalency factor (not necessary for total phosphorus or TSS trades), an uncertainty factor, and an aquatic habitat adjustment

factor (only for aquatic habitat restoration efforts). All trades must result in a net reduction in pollutant discharged to the receiving water.

Once partnerships and a trading strategy have been identified, the permittee must develop and implement trade agreements, quantify credits generated, and maintain permit compliance throughout the permit term. Trade agreements between the credit user and generator specify the location of trading practices, practice description and duration, amount of credit being generated, and other pertinent details of the trade.

To quantify available credits, the permittee must provide the current pollution load, pollution load after trading implementation, and a credit threshold (i.e., performance for trading partner at which credits are generated). The methods for quantifying this information depend on the type of trading partner.

- For point sources, the seller must accept a lower discharge limit than would otherwise be given to them in their WPDES permit. The difference between the revised limit and the previously applicable limit is the amount generated for trading. Effluent monitoring is used to evaluate compliance.
- For nonpoint sources, the current pollutant load (i.e., baseline load) is determined using a variety of methods, such as modeling. In evaluating loading from agricultural land, the baseline should consider the previous full crop rotation and current soil nutrient levels. Once the baseline load is known, modeling can be used to predict future pollutant load once management practices are installed. The reductions made by these agricultural and urban management practices represent the credit that is generated.



Source: *A Water Quality Trading How To Manual. Wisconsin DNR. 2013.*

WATER QUALITY TRADING

A trading plan and checklist must be submitted to Wisconsin DNR, and the requirements of the trade must be built into the WPDES permit, before trading may be used to demonstrate compliance with a water-quality-based effluent limit. The information in the trading plan and checklist will serve as the basis for permitting decisions. Permit development or modification provides an opportunity for public comment on the trading plan.

A management practice registration is required to ensure management practices identified in the trading plan have been properly installed and are effective. This information is used to track implementation progress, verify compliance, and perform audits.

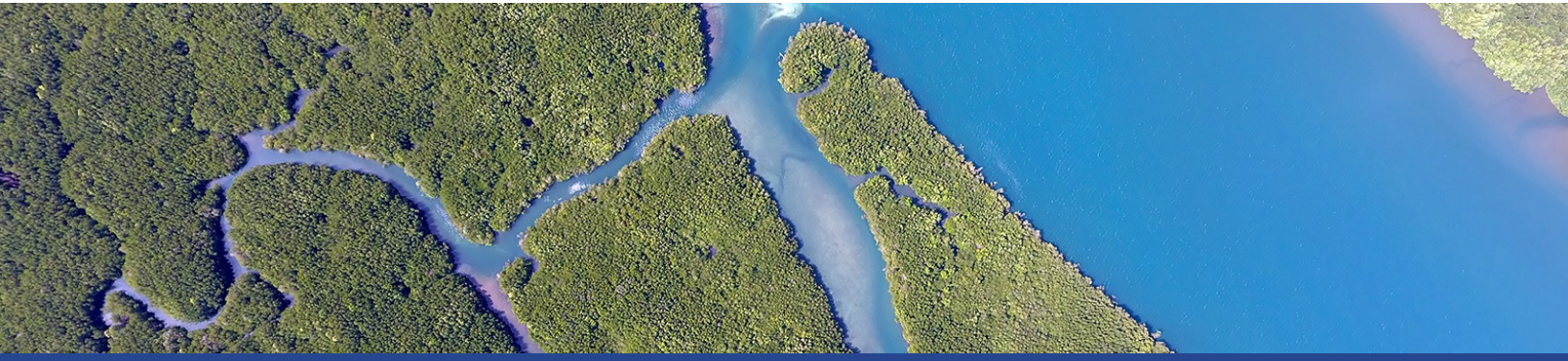
The permittee must submit annual reports that provide the status of management practices and the overall trading project and identify any necessary changes to the trading plan. At a minimum, annual reports shall include a verification that site inspections have occurred, a summary of site inspection findings, any applicable notices of termination or practice registrations, the amount of credit used each month over the calendar year, and any other requirements specified in the WPDES permit.

If a trade agreement or the trading plan needs to be modified or terminated during the permit term, the permittee is required to submit a notice of termination.

According to Wisconsin's Nutrient Reduction Strategy 2017-2019 Implementation Progress Report, over 40 permittees have formally indicated that trading will be used to comply with their phosphorus limits. Of these, 23 permittees have submitted an approvable trading plan. The average phosphorus reduction for each trade is approximately 800 lbs/year, and with the average trade ratio of 2:1, the average point source credit buyer purchases approximately 400 lbs/year of credits to offset its discharge.

For more information about Wisconsin's trading program, visit https://dnr.wi.gov/topic/Wastewater/waterQualityTrading.html.

Click here to return to the Table of Contents



WATERSHED-BASED PERMITTING

Watershed-based permitting is a process that emphasizes addressing all point source stressors within a hydrologically defined drainage basin, rather than individual pollutant sources on a discharge-by-discharge basis. It can encompass activities ranging from synchronizing permits within a basin to developing water-quality-based effluent limits using a multiple discharger modeling analysis. The type of permitting activity will vary depending on the unique characteristics of the watershed and the sources of pollution affecting it. The ultimate goal of this effort is to develop and issue NPDES permits that optimally protect entire watersheds.

Types of watershed-based permits in this compendium:

1. **Integrated municipal permits**
2. **Multisource watershed-based permits**
3. **Coordinated individual permits**

There are a variety of types of watershed-based permits. This compendium categorizes state watershed-based permitting practices into three categories:

- Integrated Municipal Permits.
- Multisource Watershed-Based Permits.
- Coordinated Individual Permits.

There is some overlap between integrated municipal permits and multisource watershed-based permits as these terms are not intended to be mutually exclusive. For more information, see EPA's watershed-based permitting website at https://www.epa.gov/npdes/watershed-based-permitting.

WATERSHED-BASED PERMITTING

Integrated Municipal Permits

Integrated municipal permits may bundle a number of point source permit requirements for a municipality or multiple municipalities (POTWs, combined sewer overflows, biosolids, pretreatment, MS4s, and storm water from municipally owned industrial activities such as public works and utility yards) into a single permit.

OREGON

In 2001, Oregon DEQ issued the Tualatin Subbasin TMDL, which established temperature temperature requirements for the Tualatin River and its tributaries. The TMDL was amended in 2012 to include wasteload allocations for total phosphorus. The NPDES permit issued to Clean Water Services in 2004 was the first example of a municpal, intergrated watershed-based NPDES permit in the nation, with a principal goal of meeting temperature requirements. The current permit, issued in 2016, also includes total phosphorus requirements.

The Clean Water Services permit covers four wastewater treatment facilities with outfalls in the Tualatin River: Durham Advanced Wastewater Treatment Facility, Rock Creek Advanced Wastewater Treatment Facility, Hillsboro Wastewater Treatment Facility, and Forest Grove Wastewater Treatment Facility with Natural Treatment System. Additionally, the permit covers existing and new stormwater discharges from the MS4 within the stormwater service area of Clean Water Services.

Key Characteristics of the Permit

NPDES Permits OR0028118, OR0029777, OR0023345, OR0020168, and ORS108014

Watershed: *Lower Willamette Basin (Tualatin Subbasin)*

Key water quality concerns: *Elevated stream temperatures that affect salmonids and elevated phosphorus due to low dilution factors*

Pollutants:

- *Temperature*
- *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs and stormwater dischargers*

Highlighted approaches:

- *TMDL implementation*
- *Temperature trading*
- *Reservoirs for cooling needs*
- *Easements and setbacks for riparian restoration*
- *Flexibility to move both influent and effluent between three sewage treatment plants*
- *"Bubble" limit for total phosphorus*
- *Integrated stormwater permitting*
- *Wetland-based natural treatment system*
- *Struvite recovery*

WATERSHED-BASED PERMITTING

Features of the Permit

- Influent and effluent may be moved between the Rock Creek, Hillsboro, and Forest Grove facilities.
- Each discharger conducts effluent monitoring for total phosphorus.
- In the dry season, Clean Water Services can treat wastewater at Hillsboro and Forest Grove and direct wastewater through a 95-acre natural treatment system before discharging into the Tualatin River.
- The permit includes the following total phosphorus limits for the three facilities based on the wasteload allocations in the TMDL:

Facility	Monthly Median Phosphorus Limit	Seasonal Median Phosphorus Limit	Applicable Time Period
Durham	0.11 mg/L	Not applicable	May 1–October 15
Rock Creek	0.10 mg/L	Not applicable	May 1–September 30
Forest Grove	Monthly median load (81.6 pounds/day) minus Rock Creek load[a]	Seasonal median load (66.1 pounds/day) minus Rock Creek load[b]	May 1–September 30

[a] Based on the group limit specified in the TMDL. The monthly median limit is calculated as follows: (monthly median load) – [(monthly median Rock Creek discharge concentration of total P mg/L) × (actual monthly median Rock Creek effluent volume in MGD) × (8.34 conversion factor)].

[b] Based on the group limit specified in the TMDL. The seasonal median limit is calculated as follows: (seasonal median load) – [(seasonal median Rock Creek discharge concentration of total P mg/L) × (actual seasonal median Rock Creek effluent volume in MGD) × (8.34 conversion factor)].

For more information about Clean Water Services and the Tualatin River, visit https://www.cleanwaterservices.org/about-us/one-water/.

WATERSHED-BASED PERMITTING

Multisource Watershed-Based Permits

A multisource watershed-based permit uses a single permit for multiple sources in the same watershed, watershed plan, or TMDL. It would allow several point sources in a watershed to apply for and obtain permit coverage under the same permit. This type of permit might be appropriate when a watershed plan or TMDL identifies the need to address a specific pollutant (e.g., nitrogen and/or phosphorus). This approach allows the permitting authority to focus on effluent limitations, monitoring requirements, trading provisions, and other special permit conditions that are developed on a watershed basis in a single permit and clearly links the permitted facilities in a way that simply incorporating watershed-based permit conditions into individual permits does not accomplish.

CALIFORNIA

San Francisco Bay is not presently impaired for nutrients; however, recent data indicate an increase in phytoplankton biomass and a small decline in dissolved oxygen concentrations in many areas, suggesting that the bay may be losing its historical resiliency to high nutrient loadings. Nitrogen is the growth-limiting nutrient of San Francisco Bay, and municipal WWTPs account for about 62 percent of the annual average total inorganic nitrogen (the bioavailable form of nitrogen) load to San Francisco Bay.

To address nutrient discharges to the bay, the San Francisco Bay Regional Water Quality Control Board first established the Waste Discharge Requirements for Nutrients from Municipal Wastewater Discharges to San Francisco Bay in July 2014. The permit was reissued in 2019.

The permit covers 41 municipal POTWs that discharge nutrients to the bay and its tributaries. The Bay Area Association of Clean

Key Characteristics of the Permit

NPDES Permit CA0038873

Watershed: *San Francisco Bay Watershed, California*

Key water quality concerns: *The San Francisco Bay appears to be losing its historical resiliency to high nutrient loads*

Pollutants:

- *Total nitrogen*
- *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *Discharger association (BACWA)*
- *Pre-impairment, pre-TMDL adaptive management*
- *Effluent monitoring*
- *Ambient monitoring and scientific studies of the bay*
- *Studies on plant optimization and treatment upgrade opportunities*
- *Studies on natural systems and water recycling*

WATERSHED-BASED PERMITTING

Water Agencies (BACWA) represents the POTWs and helps serve as a champion and voice for the facilities. Working with BACWA, the Water Quality Control Board developed the permit with nutrient control activities to provide scientific support and certainty for possible future nutrient load reductions that may be necessary.

The 2014 permit represented the first phase of an anticipated multiple-permit-term effort. The 2014 permit required permittees to evaluate potential nutrient reduction options (e.g., treatment plant optimization, sidestream treatment, treatment plant upgrades) and to develop a science plan of necessary studies to support implementation of the San Francisco Bay Nutrient Management Strategy.

The current permit represents the second phase of the effort, the purpose of which is to track and evaluate treatment plant performance, fund nutrient monitoring programs, support load response modeling, and evaluate nutrient removal approaches using natural systems and wastewater recycling. The current permit contains four main requirements:

- Each permittee must conduct effluent monitoring for ammonia, nitrate-nitrite, total inorganic nitrogen, and total phosphorus.
- Permittees must, either individually or through BACWA, submit an annual report that analyzes trends in POTW flow and nutrient loadings.
- Each major POTW must participate in a regional evaluation of potential nutrient discharge reduction by natural systems (e.g., wetlands and horizontal levees) and water recycling.
- The permittees must support receiving water monitoring for nutrients and update and implement the science plan submitted under the 2014 permit.

These requirements can be viewed as a unique combination of watershed-based permitting and adaptive management. Requiring both effluent and ambient monitoring now will produce robust data and relative scientific certainty to support establishment of any necessary future limits for nutrients the POTWs. Each POTW will also know, through its optimization and treatment upgrade studies, how much future nutrient reductions may cost.

For more information about efforts to reduce nutrient discharges to the San Francisco Bay, visit the Water Quality Control Board's website at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/amendments/estuarynne.html and BACWA's website at https://bacwa.org/nutrients/.

WATERSHED-BASED PERMITTING

CONNECTICUT

Connecticut DEEP and NYSDEC completed a TMDL for dissolved oxygen in Long Island Sound in December 2000 to address hypoxic conditions that occur in Long Island Sound every summer. The TMDL established wasteload allocations requiring a 64 percent reduction of nitrogen loading from point source discharges by 2014.

Key Characteristics of the Permit

Watershed: *Long Island Sound, Connecticut*

Key water quality concerns: *Excessive total nitrogen leading to low dissolved oxygen and hypoxic conditions.*

Pollutants: *Total nitrogen*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Point source water quality trading*

To implement the TMDL, Connecticut DEEP issued the General Permit for Nitrogen Discharges on January 2, 2002. The permit was reissued most recently in 2018. The permit addresses only total nitrogen discharges from the 79 POTWs discharging to the Long Island Sound watershed in Connecticut. The facilities are subject to the requirements of their individual NPDES permits for other pollutants.

The permit establishes annual mass effluent loading limits for total nitrogen, expressed in pounds per day, for each applicable POTW. These limits represent the allocated end-of-pipe loading for each facility.

The permit gives permittees two options for achieving compliance:

- Meet their annual discharge limits on site.
- Purchase equivalent total nitrogen credits through the Nitrogen Credit Exchange Program.

A permittee that exceeds its annual discharge limit and does not purchase the necessary amount of equivalent total nitrogen credits is out of compliance and subject to enforcement.

What Is the Nitrogen Credit Exchange Program?

The permit and the Nitrogen Credit Exchange Program work in tandem to provide POTWs with alternatives for achieving permit compliance. The permit requires applicable POTWs to meet their specified annual discharge limits. If the facilities cannot meet those limits, they must purchase equivalent total nitrogen credits. Facilities with treatment that enables them to produce less than their specified annual discharge load generate credits.

The credit exchange program has been successful over the years, and the POTWs now generate more credits than are needed. Projections showed the state would be spending over $5 million by 2018 to continue to subsidize the credit exchange program as it was designed in 2001. The state became concerned that this level of continued subsidization could not be sustained. The governor signed Public Act 15-38 on June 5, 2015 which moved to a more self-sufficient model where the buyer's payments are shared proportionally by the sellers.

For more information on Connecticut's water quality trading program, see "Water Quality Trading."

For more information about Connecticut's nitrogen control plan for Long Island Sound, see the state's website: http://www.ct.gov/deep/cwp/view.asp?a=2719&q=325572&deepNav_GID=1635%20.

MARYLAND

Patuxent River Watershed

EPA established the TMDL for nitrogen, phosphorus, and sediment in Chesapeake Bay in 2010 to address poor water quality, degraded habitats, and low populations of fish and shellfish in the bay. The Chesapeake Bay TMDL applies to five major basins in Maryland, including the Patuxent River Basin.

Key Characteristics of the Permit

NPDES permit MD0069868

Watershed: *Patuxent River Watershed, Maryland*

Key water quality concerns: *Excessive nutrients leading to algae blooms and low dissolved oxygen levels*

Pollutants:

- *Total nitrogen*
- *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Accommodates water quality trading*

In 2008, MDE issued the Patuxent River Watershed Nutrient Permit to the Anne Arundel County Department of Public Works, authorizing discharges of total nitrogen and total phosphorus from its Patuxent Water Reclamation Facility and Maryland City Water Reclamation Facility. Both facilities are subject to individual permits, issued concurrently with the watershed-based permit, for their performance-based nutrient annual loading cap limits (based on actual annual discharged flow and ENR effluent criteria) as well as all other effluent parameters.

WATERSHED-BASED PERMITTING

The permit establishes annual mass loading limits for total nitrogen and total phosphorus based on wasteload allocations in the Chesapeake Bay TMDL. The limits in the watershed-based permit apply in addition to concentration-based limits established in the individual permits to address local concerns.

The individual permits for both facilities require effluent monitoring for total nitrogen and total phosphorus. To avoid duplicate monitoring requirements, the watershed permit does not require effluent monitoring, but instead requires the County to calculate and report the monthly and annual loading rates based on each facility's total monthly flow and monthly average concentration, as measured under their individual permits.

When the watershed permit was reissued in 2013, it accommodated trading with a third facility in the watershed in accordance with MDE's 2008 Nutrient Cap Management and Trading Policy. The traded allocations purchased from the Piney Orchard Utility Company WWTP, also located in the Patuxent River watershed, enable the County to expand their facilities to accommodate growth while ensuring compliance with the TMDL. For more information on Maryland's water quality trading program, see "Water Quality Trading."

Additionally, the permit includes reopener provisions to:

- Incorporate new or revised nutrient trading elements.
- Modify allocations if the County ceases discharge or assumes ownership from another facility in the watershed.
- Revise nutrient limits if a TMDL for the Patuxent River is issued.

To access the permit, visit MDE's Wastewater Permits Search Portal and enter "MD0069868" in the "NPDES Number" field.

WATERSHED-BASED PERMITTING

Patapsco River Mesohaline Watershed

MDE issued the Baltimore Harbor TMDL in 2006 to address water quality impairments associated with excess nutrient loadings in Baltimore Harbor, which includes the Patapsco River Mesohaline watershed. Subsequently, in 2010, EPA established the Chesapeake Bay TMDL to address poor water quality, degraded habitats, and low populations of fish and shellfish in the bay. Both TMDLs include wasteload allocations for the Maryland Port Administration's (MPA's) Cox Creek Dredged Material Containment Facility (DMCF).

Key Characteristics of the Permit

NPDES Permit MDDRG3796

Watershed: *Patapsco River Mesohaline Watershed, Maryland*

Key water quality concerns: *Excessive nutrients leading to algae blooms and low dissolved oxygen levels*

Pollutants:

- *Total nitrogen*
- *Total phosphorus*

Types of point source dischargers covered by permit: *Dredged material containment facilities*

Highlighted approaches:

- *TMDL implementation*
- *Cumulative mass loading limits*

In 2015, MDE issued a watershed-based permit to MPA, authorizing discharges of total nitrogen and total phosphorus from its Cox Creek and Masonville DMCFs to the Patapsco River Mesohaline watershed. Both facilities are subject to individual permits for all other parameters; these were reissued concurrently with the watershed-based permit to reflect the transfer of nutrient requirements (i.e., loading limits, compliance schedules, and other special provisions) from the individual permits to the watershed-based permit.

The permit establishes annual and growing season (May 1–October 31) mass loading limits for total nitrogen and total phosphorus, which apply to the cumulative loading from both facilities. The nutrient limits are based on wasteload allocations for the Cox Creek DMCF established in the Baltimore Harbor TMDL and Chesapeake Bay TMDL.

The Masonville DMCF did not exist when the wasteload allocations were established, so no allocations were assigned for it or any future MPA facilities. The permit provides a means to share the nutrient loads assigned to the Cox Creek DMCF with the Masonville DMCF and any future facilities. This approach gives MPA operational flexibility, allowing it to use other facilities once a facility is filled and to use facilities closest to its dredging operations, while also improving water quality through broader distribution of point source loadings across the watershed.

WATERSHED-BASED PERMITTING

The permit requires MPA to calculate and report the monthly, growing season, and annual loading rates based on loading from each of the facilities, as measured under their individual permits.

Additionally, the permit includes reopener provisions to:

- Implement a TMDL issued or approved for the watershed.
- Authorize additional DMCFs.
- Implement wasteload allocations in the individual permits and terminate the permit.

To access the permit, visit MDE's Wastewater Permits Interactive Search Portal and enter "MDDRG3796" in the "NPDES Number" field.

WATERSHED-BASED PERMITTING

NEW MEXICO

In December 2014, U.S. EPA Region 6 issued the NPDES Storm Water General Permit for MS4s in the Middle Rio Grande Watershed (NMR04A000). The permit authorizes MS4 discharges within the Albuquerque Urbanized Areas (as designated in the 2000 and 2010 Census) and other MS4s in the watershed. These MS4s were previously regulated by an individual permit (Albuquerque MS4) and Phase I (Medium and Large MS4s) and Phase II (Small MS4s) general permits.

U.S. EPA Region 6 developed the general permit as part of a pilot project to evaluate watershed-based permitting for stormwater management. The goals of the pilot project were to better tailor stormwater management plans and permits to meet watershed needs and improve efficiency in implementing certain elements of the stormwater program (e.g., education, outreach, and monitoring). The permit itself was developed:

- To address impairments with a common and minimum set of goals.
- To identify and address upstream pollutant sources through individual and cooperative monitoring, education, and outreach requirements.
- To establish cooperation among permittees, integrate and prioritize implementation, and potentially reduce costs.
- To better understand the complex hydrological and topographical features of the watershed affecting water quality.
- To ensure protection of endangered species in the watershed.

Key Characteristics of the Permit

NPDES Permit NMR04A000

Watershed: *Middle Rio Grande Watershed, New Mexico*

Key water quality concerns: *Impairments due to bacteria, low dissolved oxygen, and nutrients*

Pollutants:

- *Bacteria*
- *Dissolved oxygen*
- *Polychlorinated biphenyls (PCBs)*
- *Total nitrogen*
- *Total phosphorus*
- *Sediment*
- *Temperature*

Types of point source dischargers covered by permit(s): *MS4 dischargers*

Highlighted approaches:

- *BMPs to control nutrients*
- *Dissolved oxygen strategy*
- *Wet and dry weather monitoring*

Contact information:

Nelly Smith
smith.nelly@epa.gov
U.S. EPA Region 6

The general permit includes the following requirements to address impairments for dissolved oxygen and nutrients in the watershed:

- Implementation of a dissolved oxygen strategy to assess and implement source controls to address low dissolved oxygen and prevent impacts to endangered or threatened species.
- Source identification and schedule for implementing targeted BMPs to control nutrients.
- Wet weather monitoring, either individually or coordinated, for dissolved oxygen indicator parameters and nutrients.
- Dry weather screening for BOD and nutrients.

Additionally, the general permit requires stringent stormwater controls to reduce the pollutants in discharges from new or significant redevelopment sites. U.S. EPA Region 6 estimated that implementation of these controls will reduce the discharge of pollutants of concern, including nutrients, from new and significant redevelopment sites by an average of 70 percent.

For more information, see U.S. EPA Region 6's Fact Sheet and Supplemental Information.

WATERSHED-BASED PERMITTING

NORTH CAROLINA

Neuse River Basin

The Neuse River Basin has experienced harmful algal blooms, low dissolved oxygen levels, and increased numbers of fish kills due to excessive levels of nutrients since the 1980s. In 1994, it was identified as an impaired waterbody due to exceedance of the water quality standard for chlorophyll-*a*.

Control of nutrient discharges in the basin is guided by the North Carolina Environmental Management Commission's 1997 Neuse River Basin Nutrient Sensitive Waters Management Strategy and a phased TMDL for total nitrogen approved by U.S. EPA in 1999 (Phase I) and 2002 (Phase II). The Strategy required a 30 percent reduction from of total nitrogen loads (1995 baseline) to the Neuse River Estuary, established a wasteload allocation of 1.64 million pounds of total nitrogen per year for all point source dischargers in the basin, and authorized the issuance of a multisource watershed-based NPDES permit to a group compliance association to provide flexibility for meeting the total nitrogen control requirements.

Key Characteristics of the Permit

NPDES Permit NCC000001

Watershed: *Neuse River Basin, North Carolina*

Key water quality concerns: *Impairment due to excessive nutrient levels*

Pollutants: *Total nitrogen*

Types of point source dischargers covered by permit:

- *POTWs*
- *Industrial dischargers*

Highlighted approaches:

- *TMDL implementation*
- *Discharger association*
- *"Group cap" effluent limits*

Contact information:

Mike Templeton
mike.templeton@ncdenr.gov
North Carolina Department of Environmental Quality, Division of Water Resources

The North Carolina DEQ, Division of Water Resources, issued a multisource watershed-based permit to the Neuse River Compliance Association and its 22 members for discharges of total nitrogen in 2002, which was last reissued in 2018. Effective January 1, 2020, the Association has 23 members with 26 permitted facilities, which include both POTWs and industrial discharges. The member facilities are subject to the requirements of their individual NPDES permits for other pollutants. The watershed-based permit includes:

- An effluent limit for total nitrogen for the Association as a whole (i.e., a group limit).

- Individual limits for total nitrogen for each member.

The group limit and individual limits are applied as annual mass limits. Because members are located throughout the basin and are subject to a variety of transport factors, limits in the group permit are expressed as delivered loads (end of pipe load × transport factor). If the Neuse River Compliance Association exceeds the group limit, it is deemed out of compliance; in addition, the members' individual limits become effective, and members that exceeded their individual limits are also deemed out of compliance. In such cases, the Association and its members are required to make offset payments to the Wetlands Restoration Fund to mitigate the impact of the excess nutrient load to the estuary, and they are subject to enforcement action for their limit violations.

The permit does not require effluent or ambient monitoring requirements since all members are required under their individual NPDES permits to monitor total nitrogen on a regular basis. Instead, the permit requires:

- A mid-year report summarizing the Neuse River Compliance Association and members' loads and notification of any further changes in membership or allocations (waived if the Association's total load for the year is less than 80 percent of its limit).
- A year-end report that includes an accounting of discharges for the previous calendar year, a list of transactions (e.g., regionalization, purchases, sales, trades, leases) affecting total nitrogen allocations, assessment of progress, and planned activities.
- A 5-year report at the time of the renewal application.

For more information on North Carolina's nutrient reduction strategy for the Neuse River Basin, visit the Division's Neuse Nutrient Strategy website. To request a copy of the permit from the Division, contact Mike Templeton at mike.templeton@ncdenr.gov.

WATERSHED-BASED PERMITTING

Tar-Pamlico River Basin

The Tar-Pamlico River estuary was identified as impaired due to excessive levels of nutrients in 1989, which had resulted in harmful algal blooms, low dissolved oxygen levels, and increased numbers of fish kills. Portions of the estuary remain impaired based on chlorophyll-*a* levels in the water column.

Key Characteristics of the Permit

NPDES Permit NCC000002

Watershed: *Tar-Pamlico River Basin, North Carolina*

Key water quality concerns: *Impairment due to excessive nutrient levels*

Pollutants:

- *Total nitrogen*
- *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Discharger association*
- *"Group cap" effluent limits*

Contact information:

Mike Templeton
mike.templeton@ncdenr.gov
North Carolina Department of Environmental Quality, Division of Water Resources

In 1989, the North Carolina Environmental Management Commission adopted the first nutrient reduction strategy through an agreement with the Tar-Pamlico Basin Association, a consortium of 16 POTWs within the Tar-Pamlico River Basin. The strategy has been revised periodically since then, with the most recent update in July 2015. In 1994, the state finalized the Tar-Pamlico River Basinwide Water Quality Management Plan, a TMDL. The TMDL required a 30 percent reduction of total nitrogen loads and no increase in total phosphorus loads (1991 baseline) to the Tar-Pamlico River Basin.

The nutrient reduction strategy, TMDL, and a Memorandum of Agreement[10] were previously the mechanism by which caps on point source nutrient discharges were applied. However, in 2009, due to concerns regarding the enforceability of the strategy, TMDL, and agreement, the Division distributed the group caps and established individual effluent limits in individual NPDES permits for the Tar-Pamlico Basin Association's members.

In 2015, the Division followed up by issuing a multisource watershed-based permit to the Tar-Pamlico Basin Association and its 16 members for discharges of total nitrogen and total phosphorus. The group permit establishes limits for total nitrogen and total phosphorus, and

[10] Parties to the agreement currently include the Association, the North Carolina Department of Agriculture and Consumer Services, the North Carolina Environmental Management Commission, and the North Carolina Divisions of Soil and Water Conservation and Water Resources.

member facilities are subject to the requirements of their individual NPDES permits, which include effluent limitations for other pollutants and monitoring requirements (including nutrients). The watershed-based permit includes:

- Effluent limits for total nitrogen and total phosphorus for the Tar-Pamlico Basin Association as a whole (i.e., a group limit).
- Individual limits for total nitrogen and total phosphorus for each member.

The group limit and individual limits are applied as annual mass limits. If the Tar-Pamlico Basin Association exceeds a group limit, it is deemed out of compliance; in addition, the members' individual limits become effective and members that exceeded their individual limits are also deemed out of compliance. In such cases, the Tar-Pamlico Basin Association and its members are required to purchase offset credits from the North Carolina Agricultural Cost-Share Program to mitigate the impact of the excess nutrient load to the estuary.

The watershed-based permit does not include effluent or ambient monitoring requirements, since all members are required under their individual NPDES permits to monitor total nitrogen and total phosphorus regularly. Instead, the permit requires:

- A year-end report that includes an accounting of discharges for the previous calendar year, a list of transactions (e.g., regionalization, purchases, sales, trades, leases) affecting total nitrogen or total phosphorus allocations, assessment of progress, and planned activities.
- An annual projections report in years the Tar-Pamlico Basin Association exceeds 85 percent of the group limit to identify a timeline for improvements to members' nutrient controls.
- A 5-year report at the time of the renewal application.

For more information on North Carolina's nutrient reduction strategy for the Tar-Pamlico River Basin, visit the Division's Tar-Pamlico Nutrient Strategy website. To request a copy of the permit from the Division, contact Mike Templeton at mike.templeton@ncdenr.gov.

WATERSHED-BASED PERMITTING

Haw River Subwatershed of the Jordan Lake Watershed

B. Everett Jordan Lake was impounded in 1983 and was thereafter consistently rated as eutrophic or hyper-eutrophic. In 1992, the lake was listed as impaired due to excessive levels of nutrients. In 2007, EPA approved a TMDL for each of the three Jordan Lake subwatersheds, including the Haw River. In 2009, the North Carolina Environmental Management Commission finalized the Jordan Water Supply Nutrient Strategy rulemaking. The strategy required a total phosphorus load reduction of 5 percent by 2010 and a total nitrogen load reduction of 8 percent by 2016 (1997–2001 baseline) for the Haw River subwatershed, with wasteload allocations distributed in proportion to maximum permitted flows and applied to dischargers with permitted flows greater than 0.1 MGD.

Key Characteristics of the Permit

NPDES Permit NCC000003

Watershed: *Haw River Subwatershed of the Jordan Lake Watershed, North Carolina*

Key water quality concerns: *Impairment due to excessive nutrient levels*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Discharger association*
- *"Group cap" effluent limits*

Contact information:

Mike Templeton
mike.templeton@ncdenr.gov
North Carolina Department of Environmental Quality, Division of Water Resources

In 2009, the Division modified the permits for the 10 existing facilities in the Haw River subwatershed to incorporate total phosphorus limits based on the TMDL wasteload allocations. The effluent limits went into effect in 2010.

Four of the affected dischargers (the municipalities of Greensboro, Mebane, Reidsville, and Graham) elected to establish the Haw River Nutrient Compliance Association and, in June 2016, applied for a multisource watershed-based permit as allowed under the strategy. In December 2016, the Division issued a multisource watershed-based permit to the Haw River Nutrient Compliance Association and its four members. (The municipality of Burlington joined the Association effective January 1, 2020.) The watershed-based permit includes:

- Effluent limits for total phosphorus for the Haw River Nutrient Compliance Association as a whole (i.e., a group limit).
- Individual limits for total phosphorus for each member.

WATERSHED-BASED PERMITTING

The group limit and individual limits are applied as annual mass limits. If the Haw River Nutrient Compliance Association exceeds a group limit, it is deemed out of compliance; in addition, the members' individual limits become effective and members that exceeded their individual limits are deemed out of compliance. In such cases, the Haw River Nutrient Compliance Association and its members are required to purchase offset credits from the NC Division of Mitigation Services to mitigate the impact of the excess nutrient load to the lake.

The watershed-based permit does not require effluent or ambient monitoring requirements since all members are required under their individual NPDES permits to monitor total phosphorus on a regular basis. Instead, the permit requires:

- A year-end report that includes an accounting of discharges for the previous calendar year, a list of transactions (e.g., regionalization, purchases, sales, trades, leases) affecting total nitrogen or total phosphorus allocations, assessment of progress, and planned activities.
- An annual projections report in years the Haw River Nutrient Compliance Association exceeds 85 percent of the group limit to identify a timeline for improvements to members' nutrient controls.
- A 5-year report at the time of the renewal application.

For more information on North Carolina's nutrient reduction strategy for the Jordan Lake Watershed, visit the Division's Jordan Lake Nutrient Strategy website. To request a copy of the permit from the Division, contact Mike Templeton at mike.templeton@ncdenr.gov.

WATERSHED-BASED PERMITTING

VIRGINIA

In 2005, Virginia established wasteload allocations in the Water Quality Management Planning (WQMP) Regulation (9VAC25-720), which were developed from the Commonwealth of Virginia Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy. Subsequently, EPA established the Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment in 2010 to address poor water quality, degraded habitats, and low populations of fish and shellfish in the bay. The Chesapeake Bay TMDL applies to five river basins in Virginia that drain to the Chesapeake Bay.

Key Characteristics of the Permit

NPDES Permit VAN000000

Watershed: *Chesapeake Bay Watershed, Virginia*

Key water quality concerns: *Excessive nutrients leading to algae blooms and low dissolved oxygen levels*

Pollutants:

- *Total nitrogen*
- *Total phosphorus*

Types of point source dischargers covered by permit:

- *POTWs*
- *Industrial/non-process wastewater dischargers*

Highlighted approaches:

- *TMDL implementation*
- *Aggregated mass loading limits for James River dischargers*
- *Point and nonpoint source water quality trading*
- *Discharger association*

The Virginia State Water Control Board first established the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia (VAN000000) on January 1, 2007. The current permit was most recently reissued in January 2017. The general permit addresses only total nitrogen and total phosphorus discharges from wastewater treatment facilities to implement the WQMP Regulation and Chesapeake Bay TMDL. The facilities are subject to the requirements of their individual NPDES permits for other pollutants.

The permit establishes the following requirements:

- Annual effluent loading limits for total nitrogen and total phosphorus for all significant and new or expanding dischargers in the Chesapeake Bay watershed in Virginia.
- Compliance schedules and compliance plans.
- Monitoring and reporting requirements.
- Conditions by which credits may be exchanged.

WATERSHED-BASED PERMITTING

By affording covered facilities of each watershed multiple ways to achieve water quality goals, the permit offers a more flexible and economically feasible approach than other possible permit options. Covered dischargers can comply with their existing load limits through:

- Treatment technology upgrades.
- Trading among permitted facilities through the Exchange Association.
- Buying nutrient credits directly from compliant facilities within their watersheds.
- Joining multiple facilities to create an aggregate nutrient cap.
- Purchasing nutrient reductions generated by nonpoint source BMPs (to offset new or expanded discharges only).
- Paying into the Water Quality Improvement Fund where no other options are available.

For more information on Virginia's water quality trading program, see "Water Quality Trading."

WATERSHED-BASED PERMITTING

Wisconsin

Wisconsin DNR adopted the Lower Fox River Basin TDML in 2012 to address impairments caused by excessive phosphorus and sediment loading in the Lower Fox River Basin and Lower Green Bay.

The Green Bay and De Pere wastewater treatment facilities (jointly the "Green Bay Metropolitan Sewerage District") both discharge into the mainstem of the Lower Fox River watershed. The facilities were previously covered under unique individual permits. However, on April 15, 2014, Wisconsin DNR issued a multisource watershed-based permit to cover both facilities in light of changes to regulations (e.g., total phosphorus water quality standards and the Lower Fox River Basin TMDL). The permit expires June 30, 2019. In addition to streamlining the permit reissuing process for Wisconsin DNR, the permit can facilitate coordinated optimization and upgrades at the two facilities, as well as allow for exploration and adaptive management options.

Key Characteristics of the Permit

NPDES Permit WI0065251

Watershed: *Lower Fox River Watershed, Wisconsin*

Key water quality concerns: *Excessive total phosphorus and sediment loading leading to nuisance algae growth, oxygen depletion, reduced submerged aquatic vegetation, water clarity problems, and degraded habitat*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit(s): *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Adaptive management*
- *Facility optimization*

In 2014, Wisconsin DNR published *Watershed Permitting Guidance* (Guidance Number 3400-2014-01) to inform Wisconsin DNR staff and others about watershed permitting, with an emphasis on the potential use of this process to facilitate implementation of TMDLs, water quality trading, adaptive management, or other large-scale projects. The *Guidance* includes an example multisource watershed-based permit template.

Coordinated Individual Permits

Coordinated individual permits are the closest to traditional NPDES permitting in that each discharger receives a permit. Water-quality-based effluent limitations and other conditions of coordinated individual permits are developed using a holistic analysis of the watershed conditions rather than being established to ensure attainment of water quality standards on a permit-by-permit basis. To strengthen the coordination among individual permits, the permitting authority could consider synchronizing their expiration and reissuance or effective dates.

CONNECTICUT

In the absence of numeric criteria for phosphorus, Connecticut DEEP developed the *Interim Phosphorus Reduction Strategy for Connecticut Freshwater Non-Tidal Waste-Receiving Rivers and Streams Technical Support Document*, which provides a methodology to develop total phosphorus water quality targets non-tidal freshwater based on the narrative criteria and policy statements. The purpose of this strategy is to meet the pressing need to include total phosphorus limits in NPDES permits and be protective of the environment. These methods were approved by U.S. EPA in a letter dated October 26, 2010, as an interim strategy to establish water-quality-based total phosphorus limits for industrial and municipal water pollution control facilities (WPCFs) until Connecticut DEEP has established numeric nutrient criteria.

Key Characteristics of the Permit

Number of coordinated individual permits: *45*

Watershed: *Varies*

Key water quality concerns: *Excessive total phosphorus loadings leading to cultural eutrophication and its effects on the biological condition of the stream*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit(s):

- *Municipal WPCFs*
- *Industrial WPCFs*

Highlighted approaches:

- *Narrative criteria*
- *Watershed analysis to establish phosphorus reduction goals*
- *Coordinated total phosphorus limits by watershed*

The interim strategy is based on best available information at a statewide level using methods to identify phosphorus enrichment levels in waste receiving rivers and streams that adequately protects aquatic life uses. This strategy results in overall reductions up to 95 percent of the current watershed load once the strategy is fully implemented.

WATERSHED-BASED PERMITTING

Forty-five NPDES facilities were identified as discharging total phosphorus to 20 non-tidal freshwater systems in Connecticut with an enrichment factor at or above 84. These facilities would need to have NPDES permit limits for total phosphorus equivalent to the load reductions established in the strategy at the time of their next permit renewal (see table 8 of the strategy for facilities and permit limits). Forty-three are WPCFs and two are industrial plant dischargers.

Connecticut's approach to permitting for total phosphorus is considered a watershed approach because the phosphorus reduction strategy analyzed each sub-watershed and established targets for permit limits based on an overarching watershed analysis. Therefore, the individual total phosphorus limits are coordinated on a watershed basis, even though they are not synchronized (i.e., issued on the same watershed all at the same time).

OHIO

Upper Little Miami River Watershed

In 1998, Ohio EPA conducted chemical and biological assessments of the Upper Little Miami River and its tributaries that showed impairment of aquatic life uses due to nutrient enrichment, low dissolved oxygen, and habitat alteration. As a result, Ohio EPA issued a TMDL for the Upper Little Miami River in April 2002 with a goal for full attainment of the aquatic life use.

The 11 municipal point source dischargers in the watershed accounted for a significant percentage of the total phosphorus loading during critical low-flow months, so the TMDL established wasteload allocations for those facilities. The TMDL proposed the following iterative, adaptive management approach for implementing the wasteload allocations in NPDES permits:

Key Characteristics of the Permit

Number of coordinated individual permits: *11*

Watershed: *Upper Little Miami River Watershed, Ohio*

Key water quality concerns: *Impairment of aquatic life use due to nutrient enrichment*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Iterative, adaptive management approach*
- *Compliance schedules*

Contact information:

Walter Ariss
walter.ariss@epa.ohio.gov
Ohio Environmental Protection Agency

- An initial 3-year compliance schedule to comply with a seasonal (May–October) 30-day average effluent limit of 1.0 mg/L total phosphorus.
- An additional 7 years to comply with a more stringent seasonal effluent loading limit based on the facility-specific wasteload allocations from the TMDL.

The initial compliance schedule provided time to evaluate treatment plant capabilities, implement measures to maximize the ability of the existing treatment plant, and (if necessary) develop a plan to achieve the limits. Special conditions in the permits allowed flexibility for achieving the additional loading reductions through:

- Nonpoint source reduction projects.
- Projects to increase assimilative capacity in the receiving water.
- Cooperative agreements to implement projects to achieve the cumulative point source loading reductions.
- Upgrading the existing treatment facilities.

Ohio EPA conducted a Biological and Water Quality Study of the Upper Little Miami River in 2011 demonstrating that all mainstem sites downstream of the facilities are no longer impaired, largely due to the POTWS' efforts to reduce phosphorus loadings.

Ohio EPA renewed the NPDES permits for the five major POTWs within the watershed in 2019. These permits continued the existing concentration and loading limits as a measure to ensure continued attainment status.

WATERSHED-BASED PERMITTING

Lower Great Miami River Watershed

The Ohio EPA assessed the Lower Great Miami River watershed in 2010 and found that the river is impaired due to nutrient enrichment. Through further evaluation, Ohio EPA determined that the City of Dayton and Montgomery County Western Regional WWTPs contribute to a significant increase in the total phosphorus concentrations, dissolved oxygen swings, and chlorophyll-a values in the river.

Ohio EPA is implementing an adaptive management approach to address the impairment of the Lower Great Miami River, with coordinated issuance of NPDES permits to the two major municipal point sources in December 2015 as the first step. This approach allows Ohio EPA to evaluate the effectiveness of controls and obtain additional information to inform the next implementation step.

Key Characteristics of the Permit

Number of coordinated individual permits: *2*

Watershed: *Lower Great Miami River Watershed, Ohio*

Key water quality concerns: *Impairment of aquatic life use due to nutrient enrichment*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *Pre-TMDL implementation to address impairment*
- *Iterative, adaptive management approach*
- *Compliance schedules*

Contact Information:

Walter Ariss
walter.ariss@epa.ohio.gov
Ohio Environmental Protection Agency

The permits for the City of Dayton and Montgomery County Western Regional WWTPs include:

- A final seasonal (July–October) aggregate total phosphorus loading limit based on facility flow and a total phosphorus concentration of 1 mg/L.
- A 3-year schedule for complying with the final effluent limit.
- Requirements to develop a proposal for meeting the final limit (e.g., treatment improvements or demonstration that the plant can meet the limit through current operations).

For other major WWTPs in the watershed, Ohio EPA is requiring:

- Continued effluent and receiving water monitoring for total phosphorus.
- Development of studies to evaluate the technical and financial capabilities of their facilities to reduce total phosphorus below 1.0 mg/L.

Before the next permit renewals, Ohio EPA will evaluate whether the river has returned to full attainment following the required load reductions. If not, Ohio EPA may modify the effluent limits based on an approved integrated management plan and/or an approved TMDL. Ohio EPA may allow permittees to use alternate reduction strategies (e.g., water quality trading, habitat restoration offsets, and physical watershed alterations) to achieve future reductions.

For more information on the watershed-based permitting approach for the Lower Great Miami River, see the NPDES permit fact sheets for the City of Dayton and Montgomery County Western Regional WWTPs.

RHODE ISLAND

The Rhode Island Department of Environmental Management (DEM) issued a TMDL for Belleville Ponds and Belleville Upper Pond Inlet in September 2010 and a TMDL for Scott Pond in May 2014 to address phosphorus impairments to the ponds.

The 2014 Scott Pond TMDL identifies the five major point sources contributing total phosphorus to Scott Pond via discharge to the Blackstone River: four in Massachusetts (permits issued by EPA Region 1) and the Woonsocket Wastewater Treatment Facility in Rhode Island. The four Massachusetts permits include total phosphorus limits to address eutrophication in the Blackstone River. The Woonsocket permit, issued by Rhode Island DEM in 2008, included more stringent total phosphorus limits to meet the water quality criterion in the pond. The modeling for the TMDL demonstrated that compliance with the existing limits at the five point sources would be sufficient to achieve the water quality criterion in the pond.

Key Characteristics of the Permit

Number of coordinated individual permits: *5 (Scott Pond), 1 (Belleville Ponds)*

Watershed: *Belleville Ponds watershed and Scott Pond watershed, Rhode Island*

Key water quality concerns: *Excessive algal growth and anoxic conditions due to excessive phosphorus loading*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit(s):

- *Wastewater treatment facilities*
- *Fish hatcheries*
- *MS4 dischargers*

Highlighted approaches:

- *Point source and MS4 requirements*
- *Coordinated MS4 requirements encouraged*

Contact information:

Joseph Haberek
joseph.haberek@dem.ri.gov
Rhode Island Department of Environmental Management

WATERSHED-BASED PERMITTING

The 2010 Belleville Ponds TMDL identifies a point source, the Lafayette Trout Hatchery, contributing total phosphorus to the ponds. Rhode Island DEM issued the draft permit for the facility, which included effluent limitations for total phosphorus based on the wasteload allocation in the TMDL, concurrent with the comment period for the TMDL.

Both TMDLs identify two small MS4s that contribute to loading to the ponds (Town of Lincoln and Rhode Island Department of Transportation [DOT] to Scott Pond; Town North Kingstown and Rhode Island DOT to the Belleville Ponds). The MS4s are covered under the Rhode Island DEM's Phase II MS4 General Permit.

The TMDL requires the MS4 permittees to update their Storm Water Management Program Plans and implement specific BMPs to achieve compliance with TMDL. Because storm sewers and ditches associated with stormwater runoff frequently have multiple interconnections between MS4s, the TMDLs encourage the permittees to cooperate in developing and implementing the six minimum control measures and in constructing BMPs (e.g., through inter-agency agreements).

WATERSHED-BASED PERMITTING

VERMONT

Lake Champlain and Lake Memphremegog Basins

U.S. EPA issued phosphorus TMDLs for Vermont segments of Lake Champlain in June 2016 and the Lake Memphremegog phosphorus TMDL in September 2017 to address impairments of the aquatic life and recreational uses in the lakes. The State of Vermont detailed its strategies to address point source pollution in the lakes in the September 2016 Vermont Lake Champlain Phosphorus TMDL Phase 1 Implementation Plan and the November 2017 Lake Memphremagog Tactical Basin Plan.

For Lake Champlain, the Phase 1 Implementation Plan specifies that the Vermont DEC will reissue NPDES permits for the 59 direct discharge facilities in the basin during the first year of implementation following development of each Phase 2 Tactical Basin Plan. For Lake Memphremegog, the Phase 2 Tactical Basin Plan specifies that DEC will reissue NPDES permits for the four direct discharge facilities based on formal wasteload allocations. Aligning NPDES permit issuance with the tactical basin planning process will ensure that the permits are developed using the most up-to-date monitoring and scientific information available.

Key Characteristics of the Permit

Number of coordinated individual permits: *59 (Lake Champlain) and 4 (Lake Memphremegog)*

Watershed: *Lake Champlain and Lake Memphremegog Basins, Vermont*

Key water quality concerns: *Eutrophication due to excess total phosphorus loading*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit:

- *POTWs*
- *Industrial wastewater dischargers*

Highlighted approaches:

- *TMDL implementation*
- *Permit issuance schedule based on watershed basin planning cycle*
- *Annual average effluent limits for total phosphorus*
- *Offers flexibility through compliance schedules, trading, and integrated watershed planning*

Contact information:

Ethan Swift
ethan.swift@vermont.gov
Vermont Department of Environmental Conservation

The implementation plans for both lakes are designed to minimize the financial impact of reducing total phosphorus loads and provide flexibility in meeting the wasteload allocations by implementing the following in individual NPDES permits:

- Effluent total phosphorus limits expressed as total annual mass loads to provide operational flexibility.

- A 12-month optimization period before limits are effective.
- An 80 percent loading threshold for optimizing phosphorus treatment and/or upgrading phosphorus treatment facilities.
- A phosphorus optimization plan requirement.
- Compliance schedules that allow enough time for planning, budgeting, and engineering and take advantage of cost-efficient opportunities to couple upgrades with other planned construction projects.
- Providing other forms of flexibility to achieve wasteload allocations in a cost-effective manner (e.g., water quality trading and integrated watershed plans and permits).

For more information about Vermont's Lake Champlain and Lake Memphremegog TMDL implementation, visit U.S. EPA's Lake Champlain TMDL website, DEC's Lake Champlain TMDL Implementation website, and DEC's Lake Memphremegog Basin Planning website.

WATERSHED-BASED PERMITTING

Connecticut River Basin, Long Island Sound Watershed

In 2001, U.S. EPA approved the TMDL Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound to address hypoxic conditions that occur in Long Island Sound resulting from excessive total nitrogen. To implement the TMDL, Vermont DEC developed the Vermont Long Island Sound TMDL Monitoring and Permitting Plan in July 2013. The Plan specifies monitoring and permitting requirements for Vermont's 34 municipal dischargers in the Connecticut River Basin, a tributary of Long Island Sound.

At the time of the Plan, limited effluent data were available to develop wasteload allocations for the municipal dischargers. To generate sufficient data, the Plan proposed a four-pronged monitoring plan that includes:

- A DEC-led monitoring program to collect additional influent and effluent data.
- A voluntary request to initiate and continue data collection until each facility's next permit renewal.
- Additional monitoring requirements to be included in each permit renewal.
- Participation in a low-cost retrofit study by the New England Interstate Water Pollution Control Commission for six Vermont facilities.

Key Characteristics of the Permit

Number of coordinated individual permits: *34*

Watershed: *Connecticut River Basin, Long Island Sound Watershed, Vermont*

Key water quality concerns: *Excessive nutrients leading to algae blooms and low dissolved oxygen levels*

Pollutants: *Total nitrogen*

Types of point source dischargers covered by permit: *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Monitoring requirements for total nitrogen*
- *Permit issuance schedule based on watershed basin planning cycle*
- *Facility-specific total nitrogen loading caps and triggers*
- *Optimization study requirements*

Contact information:

Ethan Swift
ethan.swift@vermont.gov
Vermont Department of Environmental Conservation

The Plan establishes a 5-year permitting schedule aligned with DEC's watershed basin planning cycle to allow for development of formal wasteload allocations using the most current data available for the watershed involved. As an added benefit, the schedule reduces the potential for creating a backlog of expired permits.

Per the Plan, DEC includes the following in each NPDES permit:

- Interim annual average total nitrogen loading caps, which serve as enforceable effluent limits, for all dischargers except lagoon and rotating biological contactor facilities.
- Total nitrogen loading triggers for additional monitoring for lagoon and rotating biological contactor facilities.
- Nitrogen optimization requirements for facilities that are not designed for denitrification.

The caps and triggers ensure that all facilities in the watershed do not exceed 1,727 pounds per day on an annual basis, consistent with the TMDL. Once sufficient data are available for all facilities, DEC will develop formal wasteload allocations and may replace the caps and triggers with effluent limits based on the wasteload allocations, as appropriate.

WATERSHED-BASED PERMITTING

WISCONSIN

Wisconsin DNR adopted a TMDL for total phosphorus and TSS in the Rock River Basin, approved by U.S. EPA in September 2011, to address impairments caused by excessive phosphorus and sediment loading. The TMDL anticipated that individual permits issued to municipal and industrial wastewater discharges to surface water would include limits consistent with the approved TMDL wasteload allocations, providing the necessary reasonable assurance that the wasteload allocations in the TMDL will be achieved. Facilities operating under general permits would be screened to determine whether additional requirements may be needed to ensure that the permitted activity is consistent with TMDL goals, including issuing individual permits or other measures.

Key Characteristics of the Permit

Number of coordinated individual permits: *83*

Watershed: *Rock River Basin, Wisconsin*

Key water quality concerns: *Excessive total phosphorus and sediment loading leading to nuisance algae growth, oxygen depletion, reduced submerged aquatic vegetation, water clarity problems, and degraded habitat*

Pollutants: *Total phosphorus*

Types of point source dischargers covered by permit(s):

- *Industrial facilities*
- *POTWs*

Highlighted approaches:

- *TMDL implementation*
- *Synchronized watershed-based permitting*
- *Adaptive management*
- *Water quality trading*

Contact information:

Kevin Kirsch
kevin.kirsch@wisconsin.gov
Wisconsin Department of Natural Resources

Amy Garbe
amy.garbe@wisconson.gov
Wisconsin Department of Natural Resources

WATERSHED-BASED PERMITTING

Wisconsin DNR initiated synchronized individual permit issuance in the Upper and Lower Rock River Basins in 2012. Permits were reissued, modified, or revoked and reissued to put all permittees on a similar timeline to achieve compliance with nutrient limits. The 83 industries and municipalities holding individual permits in the basin were grouped (based on location within the TMDL) into groups of nine to 12 permits that could be reissued concurrently. Wisconsin DNR reissued each expired one with a similar set of conditions related to TMDL-based wasteload allocations for total phosphorus and TSS. Wisconsin DNR encouraged permittees in each group to pool resources, where possible, and explore joint adaptive management or water quality trading possibilities. For more information on Wisconsin's water quality trading program, see "Water Quality Trading."

In 2014, Wisconsin DNR published *Watershed Permitting Guidance* (Guidance Number 3400-2014-01) to inform Wisconsin DNR staff and others about watershed permitting, with an emphasis on the potential use of this process to facilitate implementation of TMDLs, water quality trading, adaptive management, or other large-scale projects.

Click here to return to the Table of Contents