NEW YORK STATE | Department of Environmental Conservation

Clean Water Act Section 305(b) Water Quality Report

2020/2022

BUREAU OF WATER ASSESSMENT AND MANAGEMENT

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Part A. Introduction

Water quality reporting under the Clean Water Act (CWA) Section 305(b) and Section 303(d) are highly visible ways of communicating to the public about the health of the nation's waters. Under Section 305(b), states are required to periodically report on the quality of all water resources in the state and whether these waters are fully supporting best uses as sources of water supply, for primary and secondary contact recreation, and for the protection and support of fishing. Section 303(d) requires states to identify waters of the state where water quality standards are not met and where uses are not supported. The Section 303(d) List includes those waters (and associated pollutants) that do not support uses, and which require development of a Total Maximum Daily Load (TMDL). Because the Section 303(d) List of Impaired/TMDL Waters is concerned with only impaired waters – and within the universe of impaired waters, only those impaired waters that can be addressed with a TMDL – the Section 305(b) Report provides a more comprehensive assessment of statewide water quality.

To prepare this report, the New York State Department of Environmental Conservation (DEC), Division of Water (DOW), followed the recommendations made in the United States Environmental Protection Agency's (EPA) 2022 Integrated Report (IR) Guidance Memo and combined the 2020 and 2022 IR reporting periods.

Part B. Background Information

I. Total Waters

New York State has 17 major drainage basins with more than 50,000 miles of freshwater streams, nearly 800,000 acres of freshwater lakes, and over 500 miles of Great Lakes coastline. The saline waters of the state include more than 1,500 square miles, as well as about 120 linear miles of Atlantic Ocean coastline. New York State is the only state in the country that has all five types of waterbodies.

DOW delineates waterbodies into discrete segments, or assessment units, that have specific boundaries and can be monitored and assessed with consistency and comparability. Assessment units that are too small and specific would result in many segments than cannot be assessed with existing program resources. On the contrary, assessment units that are too large would result in segments that are too diverse and difficult to assess accurately.

Assessment unit information and results are reported to EPA's Assessment, TMDL Tracking and Implementation System (ATTAINS), every two years as part of the IR process. All assessment units are assigned to one of the five IR Categories (Figure 1) in accordance with the DEC's Consolidated Assessment and Listing Methodology (CALM).

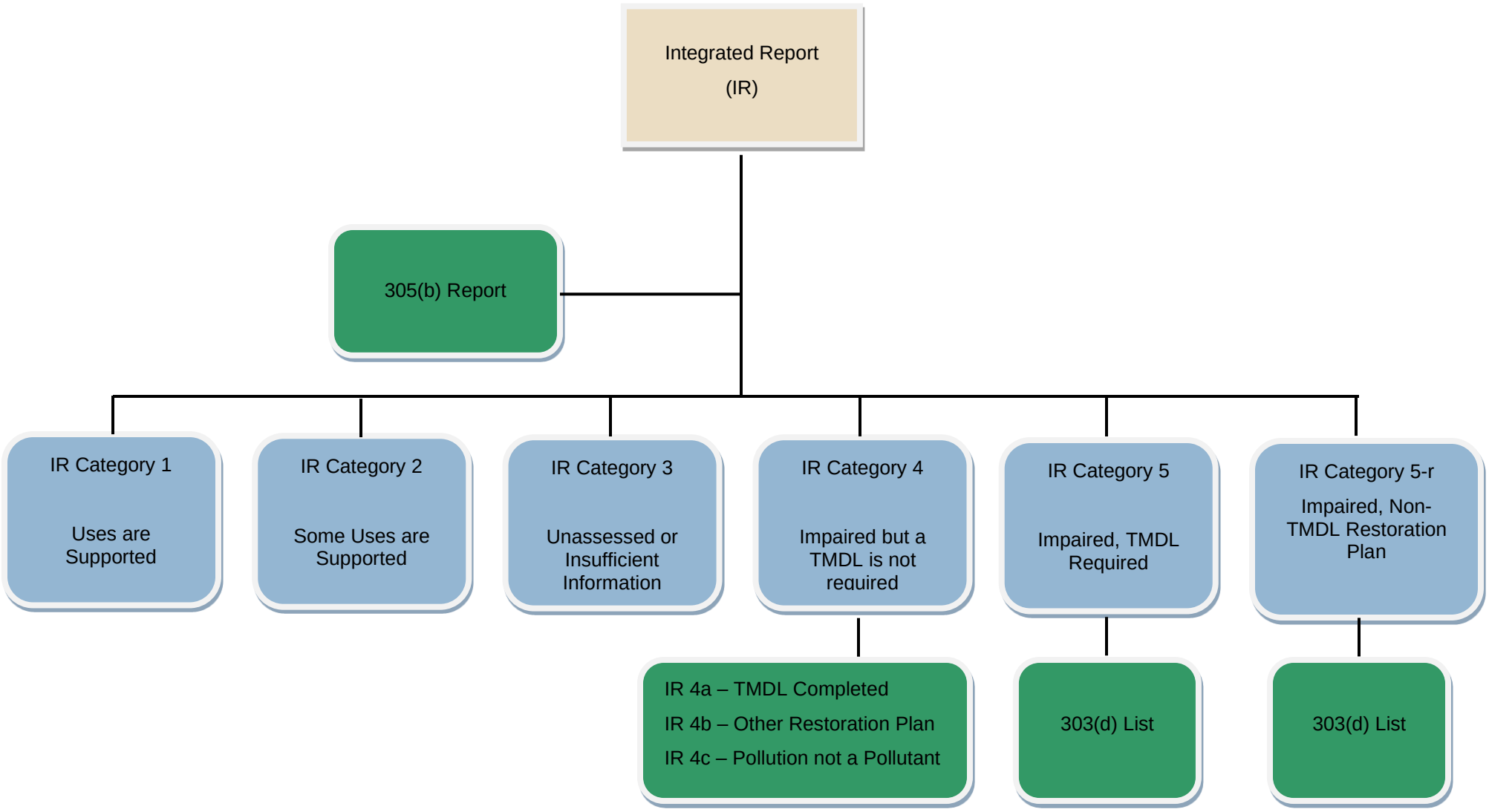

Figure 1. Integrated Reporting Categories

In addition, DOW maintains individual waterbody assessment factsheets for each assessment unit. These factsheets, found on the DECinfo Locator, include best use(s) assessment results, the pollutants evaluated, and information about the water quality data used to conduct the assessment.

II. Water Pollution Control Program

Description of Clean Water Act (CWA) Pollution Control Programs

DOW staff work together to ensure the protection and conservation of New York's waters by monitoring the health of ponded (i.e., lakes, ponds, reservoirs) and flowing waters (i.e., rivers and streams), by awarding and managing grants to municipalities for water quality improvement, by developing, issuing, and regulating permits, by developing clean water plans to regulate pollutant discharges, and by reducing impacts from flooding and coastal erosion.

DOW's water pollution control programs are dependent on one another, as illustrated by the DOW Water Wheel (Figure 2).

Figure 2. The DOW Water Wheel

Assessment

DOW maintains a statewide inventory of water quality assessment, and reports these conditions to the public and EPA, every two years. Water quality assessment means determining the condition of a waterbody segment based on all available water quality data and information in accordance with the CALM. The CALM establishes minimum data quality and quantity requirements for water quality data that is used to conduct assessments. It also establishes a process for determining whether a waterbody can support its applicable best use(s) in accordance with the states' water quality standards adopted in 6 NYCRR Parts 700-706.

Planning and Management

Waterbodies not supporting their best use(s), along with the pollutant that is causing the impairment to the best use(s), are reported to EPA as the Section 303(d) List of Impaired/TMDL Waters. This list of waterbody/pollutant combinations is incorporated into the Clean Water Vision planning process where each impaired waterbody/pollutant combination is prioritized for the development of a clean water plan. Clean water plans are a watershed-based approach to outline a strategy to improve or protect water quality in a waterbody. These plans document pollution sources, pollutant reduction goals, and strategies that communities may use to improve water quality. These plans are developed and used by the state, local governments, and the public to protect waters, guide decisions and to allocate resources. Examples of clean water plans in New York State include TMDLs, Nine Element Plans, Advanced Restoration Plans, and Harmful Algal Bloom (HAB) Action Plans.

Implementation, Permitting, Compliance, and Enforcement

Restoration planning activities identified in clean water plans and other DEC approved plans are funded by federal and state grants through water quality improvement projects and/or planning activities procured through DOW. Funding opportunities are also made available for activities associated with wastewater treatment improvement, nonpoint source abatement and control, aquatic habitat restoration, and stormwater management. The funding addresses the most significant and highest priority water quality issues in New York.

Additionally, water quality improvement and protection activities happen through issuance and enforcement of permits that prescribe the amount of a pollutant allowed from wastewater and stormwater discharges. A strong permit program, coupled with strategic and targeted use of compliance and enforcement, protects water quality, benefits the aquatic environment, and improves public health and the economy. Using the permit process, DOW assists municipalities and businesses in obtaining and complying with the permits required by state and federal law and seeks high levels of facility compliance, promotes voluntary compliance, and achieves state-wide consistency of program implementation.

Part C. Surface Water Monitoring and Assessment

Monitoring of surface waters is conducted to gather information on their chemical, biological, and physical condition. The assessment of surface waters identifies impaired waters in need of restoration and waters that are fully supporting their best use(s) in need of protection. Together, this information guides other DOW programs to restrict and eliminate pollutants and their sources.

I. Monitoring Program

The primary objective of DOW's statewide monitoring program is to support the monitoring and assessment of New York's surface waters. DOW sampling plans are designed to have three components: (1) Fixed/Long-Term Trend Networks, (2) Random Probabilistic/Rotational Sites, and (3) Targeted/Professional Interest Sites. Each of these components are described below:

(1) Fixed/Long-Term Trend Networks

Fixed station monitoring programs monitor long term trends over time and support a historical dataset that can be used to evaluate changes in water quality over time. This network was summarized in 40 years of monitoring in Smith et al. (2018) and will be revisited in 10-year increments going forward.

(2) Random Probabilistic/Rotational

Rotational programs monitor surface and ground water, employing a design in which all major drainage basins in the state are monitored over a five-year period. These include the Rotating Integrated Basin Studies program (RIBS) screening network for rivers and streams and lakes. The probability-based design allows for statistically derived estimates of water quality conditions in a selected area even when all waters within that area are not directly sampled. Probability based monitoring randomly selects a subpopulation of waterbodies to make statistically sound conclusions about water quality conditions statewide. At the Federal level, EPA works with states to survey the condition of lakes, rivers, and streams, and summarize assessment results in the National Lakes Assessment Report and the National Rivers and Streams Assessment Report. The probability-based sampling design is intended to provide a statistically valid representation of water quality conditions from a national or statewide level.

(3) Targeted/Professional Interest

Targeted monitoring programs are designed to answer specific water quality questions, typically related to a regional or watershed specific problem, water quality improvement projects, permit applications, or response to a spill. Examples of these targeted programs include rapid biological assessment surveys,

waterbody specific surveys for clean water planning initiatives, and TMDL projects. TMDL development and support sampling may be conducted by flowing or ponded monitoring staff, watershed program staff, or external partners. This includes DEC directed site and parameter selection designed to fulfill the requirements for a TMDL.

Data collected to support these components of the DOW water quality monitoring program are summarized and used to develop factsheets that are available on the DECinfo Locator. The monitoring design supports data collection in flowing and ponded waters in all seventeen (17) drainage basins every five years (Figure 3). The results of the probabilistic-based monitoring for the 2020/2022 IR cycle, are described below.

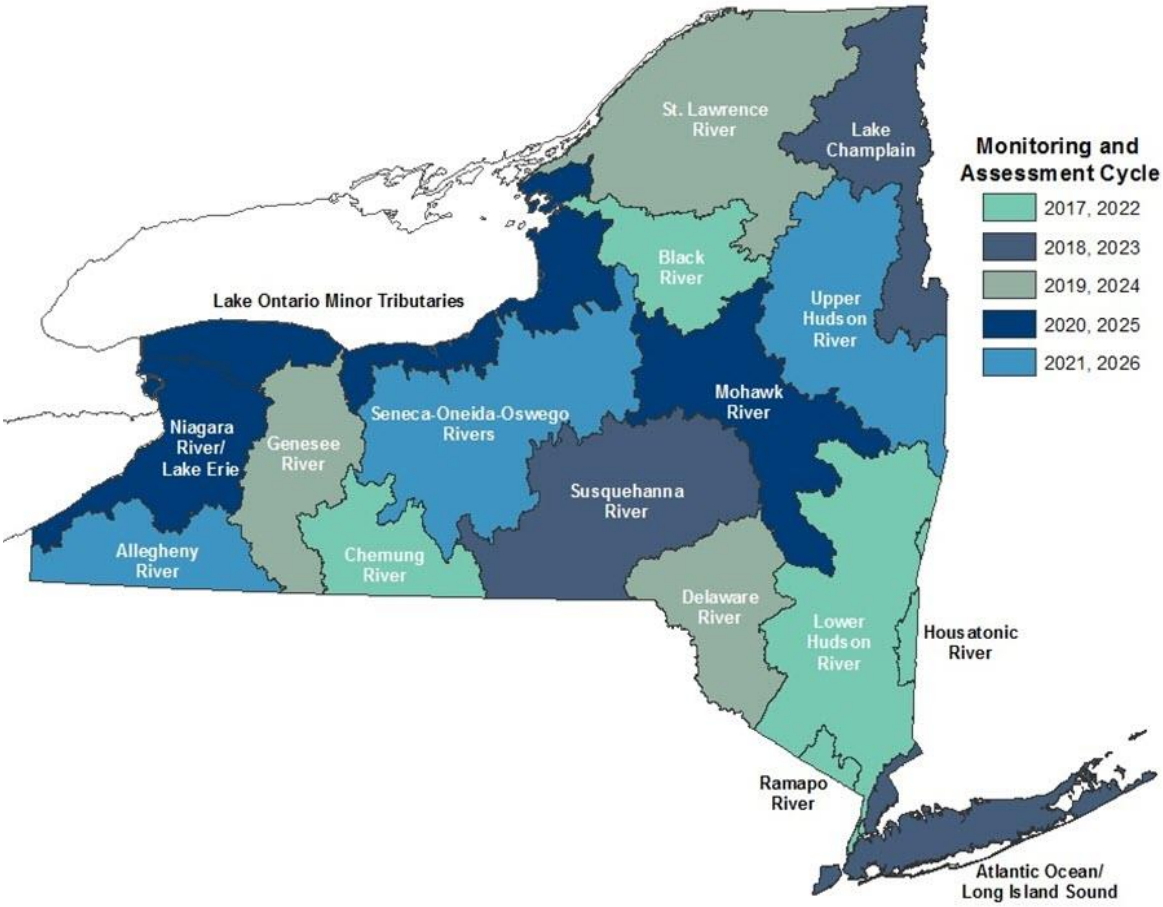

Figure 3. DOW Surface Water Monitoring Schedule

Lakes

In 2021, the Lakes Classification Inventory (LCI) program adopted a probability-based monitoring approach for selecting the RIBS sampling locations. The subpopulation of lakes selected is related to the entire population of New York's lakes using proportional weights such that sample results of this subpopulation can be used to estimate conditions statewide. In this way, probability-based sampling accomplishes one of LCI's primary objectives to assess water quality and satisfy IR requirements. It also accomplishes the secondary objective to detect temporal and spatial trends. Temporal trends are detected after multiple sampling cycles by calculating the % change according to methods developed by the National Lakes Assessment. Spatial trends are detected after a sampling cycle by stratifying the dataset based on geographic categories of interest.

To select the probability-based lakes, the complete National Hydrography Dataset (NHD) lake layer is restricted to non-wetland ponded waters above 6.4 acres. EPA and LCI collaborate to select sampling locations using an R package called "spsurvey." Once a list of sampling locations is generated by the software, a "desktop recon" of each location is made to determine access feasibility, and habitat quality. If a site is inaccessible or habitat is not suitable, the site may be dropped. An over-draw of sampling lakes is generated by the EPA to provide additional sites in case a site is dropped.

The characterization of trophic state has been conducted using total phosphorus and true color according to DEC SOP 203 (Table 1) and Leech et al. (2018). Historically, trophic condition is classified by the quantity of algal biomass and the major nutrients triggering algal growth. Organic material in the water should also be included in the evaluation since phosphorus associated with organic material is unavailable for uptake by organisms but is contained in the total phosphorus results. Furthermore, many lakes in the northern hemisphere are "browning" due to increased runoff of dissolved organic matter. Therefore, in addition to trophic state, the nutrient-color classification proposed by Leech et al. (2018) was utilized to better understand the distribution of lake conditions (Table 2).

Table 1. Trophic Water Quality Indicators

	Oligotrophic	Mesotrophic	Eutrophic
Phosphorus	<10 ug/L	10-20 ug/L	>20 ug/L
Secchi	>5 m	2-5 m	<2 m
Chlorophyl a	<2 ug/L	2-8 ug/L	>8 ug/L

Table 2. Nutrient-Color Classification

	Blue	Green	Brown	Murky
Phosphorus	≤30 ug/L	>30 ug/L	≤30 ug/L	>30 ug/L
True Color	≤20 PCU	≤20 PCU	>20 PCU	>20 PCU

Results

Most of New York's ponded waters are oligotrophic (Figure 4(A)) according to the distribution calculations of statewide conditions utilizing probability-based sampling. Using the same analysis, DOW found that the majority of ponded waters are highly colored (Figure 4(B)). Therefore, it is

not surprising that over half of the states ponded waters fall into the “brown” nutrient-color status (Figure 4(C), meaning they are high in color but low in nutrients.

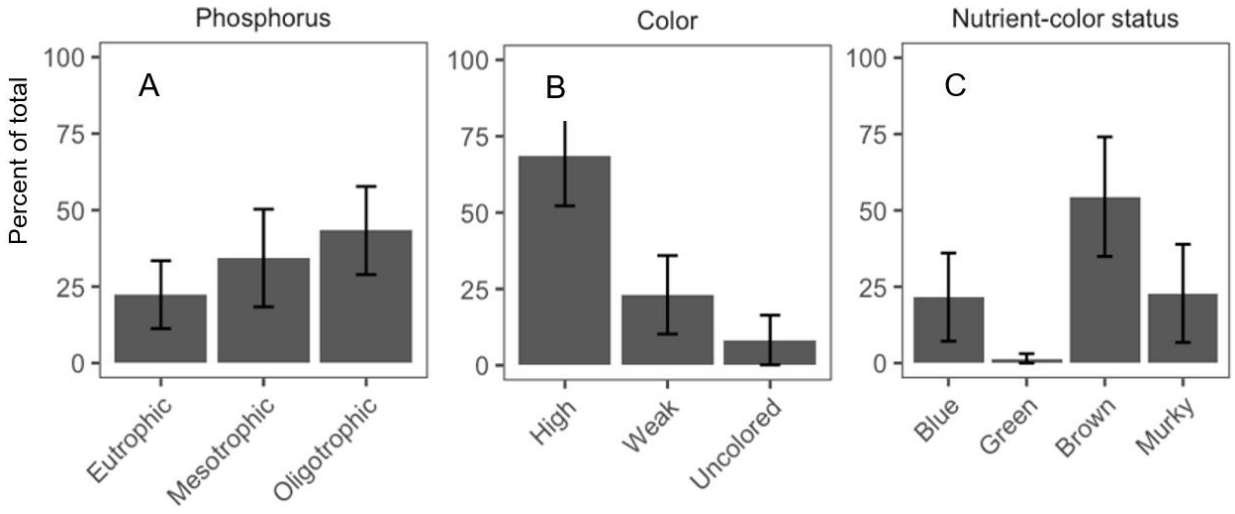

Figure 4. New York statewide extent estimates for trophic-related thresholds
A) Phosphorus thresholds are >20,10-20, and <10 ug/L for eutrophic, mesotrophic and oligotrophic respectively (NYSDEC SOP 203). B) Color thresholds are >20,10-20, and <10 PCU for high, weak, and uncolored respectively (NYSDEC SOP 203). C) Nutrient-color thresholds are a combination of low and high phosphorus concentrations (> or < 30 ug/L) and true color (> or < 20 PCU). Blue lakes have low concentrations of both phosphorus and color, phosphorus is high in green waters, color is high in brown waters, and both are high in murky waters (Leech et al 2018).

Compared with ponded waters nationally, New York has a greater percentage with “good” nutrient conditions (Figure 5). DOW’s probability-based sampling methodology is the same employed by the National Lakes Assessment. Therefore, condition estimates in New York can be compared with national and regional results. The percentage of lakes with “good” phosphorus (<16 ug/L) and nitrogen (<428 ug/L) concentrations is higher in New York State compared to nationwide and is comparable to the northeastern US. The National Lakes Assessment does not monitor for true color or dissolved organic matter, these results cannot be contextualized within the nutrient-color classification. Even so, these results indicate that trophic conditions in New York ponded waters are uniquely “good” compared to ponded waters across the nation.

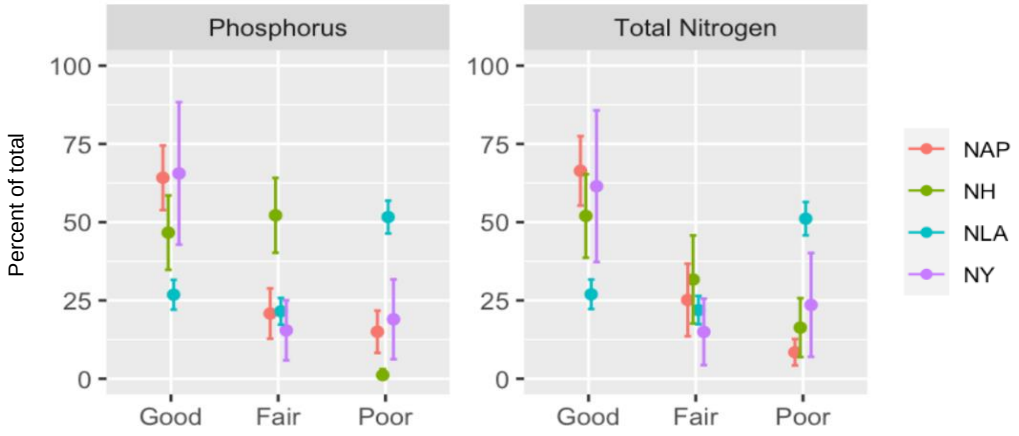

Figure 5. New York State (NY) nutrient conditions compared to national lake assessment (NLA), Northern Appalachians (NAP), and New Hampshire (NH) NLA results

Rivers and Streams

From 2017-2021, probability-based sampling was conducted by the RIBS streams monitoring program. Probability-based sampling follows the Generalized Random Tessellation Stratified (GRTS) survey design introduced by Stevens and Olsen (2004). RIBS implements GRTS with random stratified sampling by major drainage basin (n = 17) and stream size (Strahler Order). This survey design provides spatially balanced sampling, enabling the RIBS program to make representative water quality evaluations at the major drainage basin or state-wide scale. For this analysis, Biological Assessment Profile (BAP) scores were used for basic condition estimates across the state.

BAP summarizes biological community data into a score ranging from 0-10, where zero is the most disturbed community and ten is the least disturbed community. Scores of five or greater are considered to represent non- (7.5-10) or slightly (5.0-7.5) impacted water quality, while scores less than five represent moderately impacted (2.5-5.0) or severely impacted (0-2.5) water quality. This analysis focused on aquatic insects and other invertebrates visible with the naked eye, collectively referred to as benthic macroinvertebrates. Benthic macroinvertebrate communities are a useful indicator of water quality because these organisms must survive and propagate in water quality conditions prior to monitoring. For more information on DEC's benthic macroinvertebrate collection methods and BAP calculations, please see DEC's Biomonitoring SOP and Bioassessment Fact Sheet.

Results

Table 3 depicts the estimated average BAP score across major drainage basins and statewide between 2017 and 2021. These average estimates include the margin of error encompassing the 95% confidence interval around the estimated average BAP score. The estimated average BAP condition for New York State was 6.4 ± 0.4, indicating the average wadeable stream or river in New York State has a biological condition indicative of natural or slightly impacted water quality.

Focusing on the individual major drainage basins, provides the ability to observe spatial patterns at a higher resolution (Figure 6). Atlantic Ocean/Long Island Sound (Basin 17), Oswego River (Basin 7), and Mohawk River Basins (Basin 12), had the lowest BAP scores, all indicating moderately impacted water quality (Estimated Average BAP = 4.0 ± 1.1, 3.9 ± 1.8, 4.7 ± 1.1, respectively). Lake Champlain (Basin 10), Upper Hudson (Basin 11), and Delaware River (Basin 14) basins had the highest overall estimates for BAP scores, all indicating natural or slightly impacted water quality (Estimated Average BAP = 8.0 ± 0.4, 7.8 ± 0.6, 7.8 ± 0.3, respectively). Estimates from the Ramapo River (Basin 15) and Housatonic River (Basin 16) were excluded from the analysis because not enough samples were collected for reliable interpretation.

Table 3. Estimated Average Biological Assessment Profile (BAP) scores by major drainage basins of New York State and state-wide for 2017-2021

Basin Number	Major Drainage Basin	Sample Size	Estimated Average BAP Score
1	Lake Erie-Niagara River	8	6.8 ± 0.5
2	Allegheny River	6	6.8 ± 0.4
3	Lake Ontario	8	5.9 ± 0.4
4	Genesee River	12	6.5 ± 0.9
5	Chemung River	8	7.2 ± 0.5
6	Susquehanna River	18	7.3 ± 0.5
7	Oswego River	8	3.9 ± 1.8
8	Black River	12	7.0 ± 1.1
9	St. Lawrence River	13	7.1 ± 0.7
10	Lake Champlain	12	8.0 ± 0.4
11	Upper Hudson River	5	7.8 ± 0.6
12	Mohawk River	13	4.7 ± 1.1
13	Lower Hudson River	13	6.0 ± 1.0
14	Delaware River	12	7.8 ± 0.3
15	Ramapo River	1	NA
16	Housatonic River	0	NA
17	Atlantic Ocean/Long Island Sound	6	4.0 ± 1.1
	Statewide	**155**	**6.4 ± 0.4**

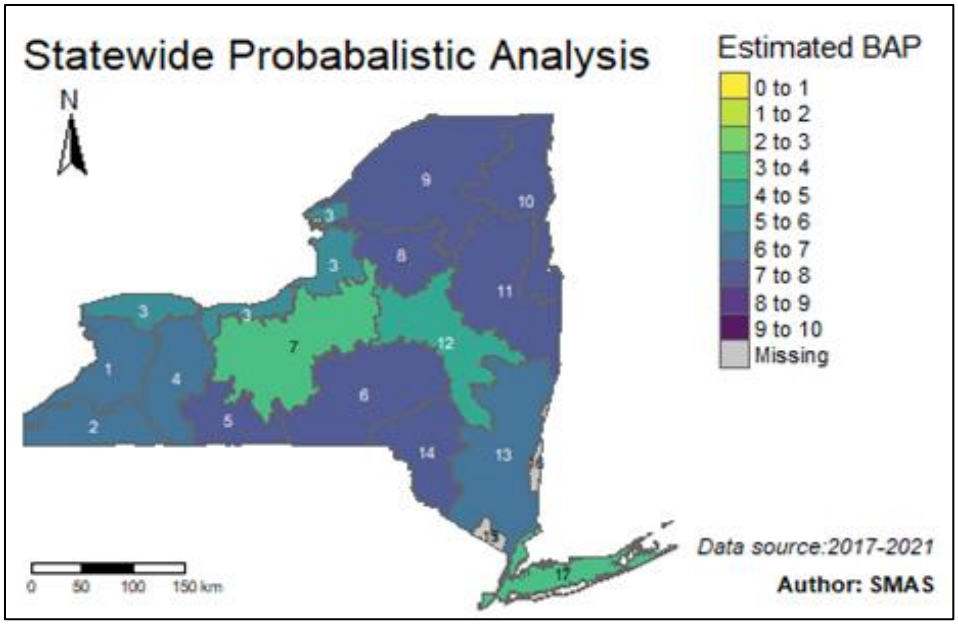

Figure 6. Average Biological Assessment Profile (BAP) by Drainage Basin

Color corresponds to BAP categories indicated in the plot legend. Numeric labels indicate major drainage basin ID.

Groundwater

New York State's groundwater monitoring program is a collaborative effort between the DEC and the United State Geological Survey (USGS) to conduct yearly comprehensive sampling and analysis of groundwater that has included field and physical parameters, bacteria, nutrients, inorganics, organics (including pesticides and VOCs), and radiochemicals. Sampling is conducted by USGS using both public and private wells. Sampling results are available through the National Water Information System and data reports are available for each major basin through USGS's Groundwater Quality Monitoring in NY webpage.

II. Description of Nonpoint Source Management Program

New York State's Nonpoint Source (NPS) Management Program was established in 1990. Since then, DOW has worked closely with willing landowners to reduce sources of NPS pollution to NYS waters. DOW and other involved agencies work with stakeholders to implement NPS control activities. NPS control activities include grant program reviews; development of best management practices (BMPs) standards and guidance for riparian buffers, agriculture, hydrologic habitat modification, lawn fertilization, and on-site septic systems; watershed planning; and waterbody restoration tracking.

DOW reports annually on its' progress and accomplishments implementing its NPS program. From the 2020/2021 NPS Management Program Annual Report (April 1, 2020 to March 31, 2021), DEC and its partners initiated and completed a variety of NPS

projects and reduced the amount of NPS pollutants entering New York lakes, streams, and rivers through implementation of state programs. Projects initiated during the reporting period resulted in a reduction of 11,541 pounds of nitrogen, 1,683 pounds of phosphorus, and 549 tons of sediment per year. Within the reporting period, $29.3 million of state funding was dedicated to projects that implement BMPs to reduce NPS pollution.

III. Cost Benefit Assessment

CWA regulations require states to report on an "estimate of the environmental, economic and social costs and benefits needed to achieve the objectives of the CWA and an estimate of the date of such achievement" (40 CFR 130.8(b)(3)). To derive the cost-to-benefit ratio obtained from clean water, an extensive quantitative economic analysis of water quality programs and social benefit is required, such as an analysis of all investments made to protect and restore water quality coupled with an analysis of use pre- and post-investments. At this time, such a ratio for cost-benefit cannot be determined; however, DEC considers program effectiveness and cost control within all clean water act programs, and can quantify dollar amount invested each year to protect and restore water quality.

DOW administers the Water Quality Improvement Project (WQIP) grant program and the Non-Agricultural Nonpoint Source Planning and Municipal Separate Storm Sewer System (MS4) Mapping Grant (NPG) program on an annual basis. WQIP supports projects that will directly improve water quality or aquatic habitat, promote flood risk reduction, restoration, and enhanced flood and climate resiliency, or protect a drinking water source. NPG funds the initial planning of non-agricultural nonpoint source water quality improvement projects, such as undersized culvert replacements and green infrastructure technologies, and State permit-required storm sewer mapping in urban areas. To date, DOW has awarded a total of over $1.5 billion to over 1,800 implementation projects through the WQIP program and over $6 million in planning projects to over 130 projects through the NPG program. DOW also administers the Clean Water Act Section 604(b) Water Quality Planning Grants program, which provides funding to support water quality management planning activities, such as determining the nature, extent and causes of point and nonpoint source water pollution problems, and developing plans to resolve these problems. DOW awarded nine regional planning boards and two interstate commissions 604(b) grants in 2023 to conduct these planning activities.

DOW's programs work continuously to protect and restore water resources by monitoring water quality to determine if protection or restoration measures are required; providing funding to municipalities to implement water quality improvement projects; assigning professional scientists and engineers to develop clean water plans; implementing a dam safety and flood control program that protects communities from floods, coastal erosion, dam failures, and potentially hazardous weather; and developing, issuing, and enforcing permits to regulate the discharge of pollutants.

IV. Assessment Methodology

The 2021 CALM was used to develop the 2020/2022 IR and provides a description of the data and information used to conduct water quality assessments, a description of how assessments the assessments were conducted, and a rationale for any decision to not use any existing and readily available data.

V. Assessment Results

New York's 303(d) List includes a list of water quality-limited (impaired) waters still requiring TMDL(s) (waters assigned to Category 5), pollutants causing the impairment, and priority ranking for TMDL development (including waters targeted for TMDL development within the next 2 years).

Part D. Public Participation

DOW works with members of the public, Indian Nations, several federal and state agencies, and local stakeholders to foster a shared vision and commitment to deliver stronger and more effective programs for water protection. Every odd year starting in May, DOW solicits the public for water quality data and information that can be used to update the IR. This data solicitation is noticed weekly in the Environmental Notice Bulletin (ENB) and DOW's newsletter, *Making Waves*. Once a Draft CWA Section 303(d) List of Impaired/TMDL Waters is compiled, DOW issues a public comment period that is announced in the ENB and *Making Waves*. The Final CWA Section 303(d) List of Impaired/TMDL Waters is shared via these same outlets, along with any related response to public comment. For more information on how to get involved or to say informed, visit Public Involvement and News - NYS Dept. of Environmental Conservation.

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