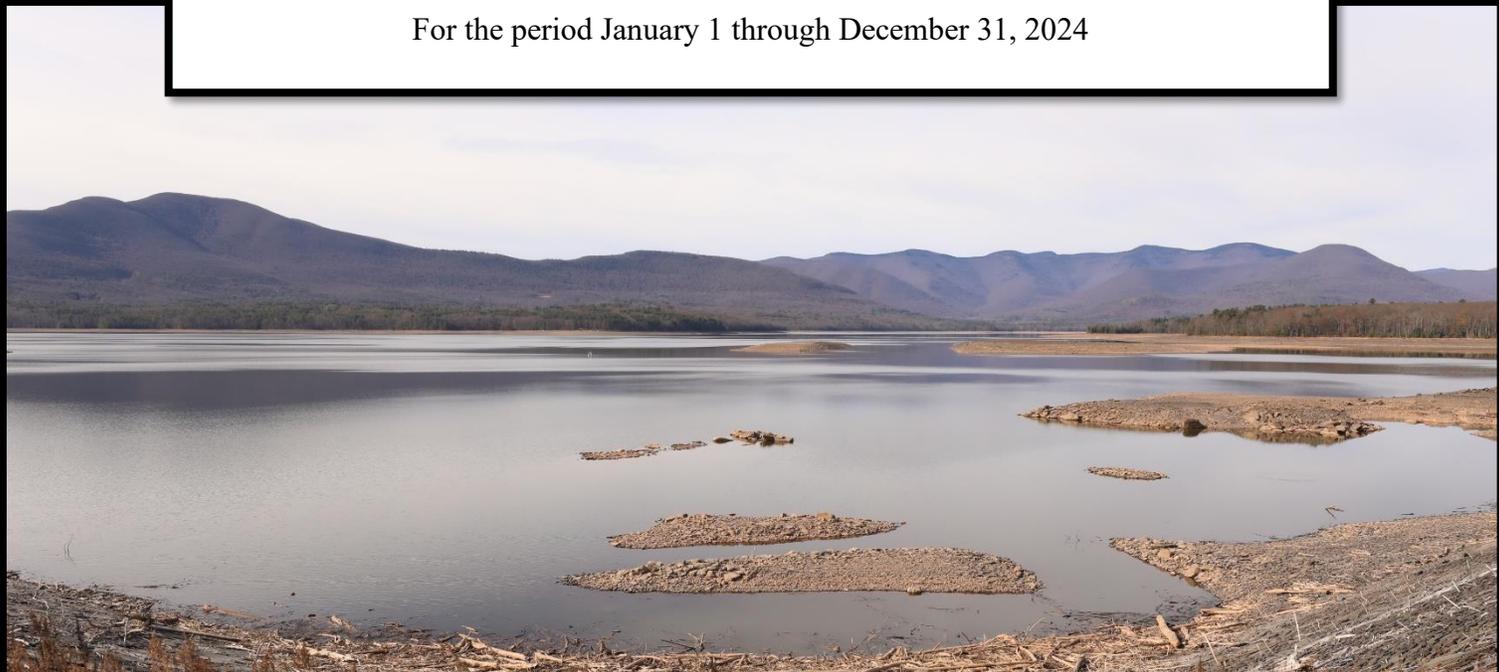




New York City Department of Environmental Protection

Filtration Avoidance Annual Report

For the period January 1 through December 31, 2024



Rohit T. Aggarwala, Commissioner
Paul V. Rush, P.E., Deputy Commissioner
Bureau of Water Supply



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List of Acronyms

APA	Access Permit Areas
BMP	Best Management Practice
BWS	Bureau of Water Supply
CAT/DEL	Catskill/Delaware
CATRR	Catskill Repair and Rehabilitation
CCCD	Catskill Center for Conservation and Development
CCE	Cornell Cooperative Extension
CDUV	Catskill/Delaware Ultraviolet Disinfection Facility
CE	Conservation Easement
CREP	Conservation Reserve Enhancement Program
CRISP	Catskill Regional Invasive Species Partnership
CSAP	Collaborative Streamside Acquisition Program
CSBI	Catskill Streams Buffer Initiative
CT	Contact Time
CUNY	City University of New York
CWC	Catskill Watershed Corporation
CWMP	Community Wastewater Management Program
DBP	Disinfection By-Products
DEIS	Draft Environmental Impact Statement
DEP	New York City Department of Environmental Protection
DMAP	Deer Management Assistance Permit
DOE	New York City Department of Education
DOHMH	New York City Department of Health and Mental Hygiene
DUA	Day Use Area
EFC	New York State Environmental Facilities Corporation
EIS	Environmental Impact Statement
EOH	East of Hudson
EOHWC	East of Hudson Watershed Corporation
FAD	Filtration Avoidance Determination
FITT	Forestry Interdisciplinary Technical Team
FMP	New York City Forest Management Plan
GIS	Geographic Information System
GPS	Global Positioning System
HAA5	Haloacetic Acid Five
HHC	New York City Health and Hospitals Corporation
HPC	Heterotrophic Plate Count

IAR	Inactivation Ratio
I/I	Inflow and infiltration
ISAC	Invasive Species Advisory Committee
ISWG	Invasive Species Working Group
LAP	Land Acquisition Program
LFA	Local Flood Analysis
LFHMIP	Local Flood Hazard Mitigation Implementation Program
LiDAR	Light Detection and Ranging
LUPs	Land Use Permits
MAP	Management Assistance Program
MOA	New York City Memorandum of Agreement
MODIS	Moderate Resolution Imaging Spectroradiometer
MS4	Municipal Separate Storm Sewer Systems
NMP	Nutrient Management Plan
NOV	Notice of Violation
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NYCFFBO	New York City-Funded Flood Buyout Program
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O&M	Operation and Maintenance
OST	Operations Support Tool
PAA	Public Access Area
PFAS	Polymerase Chain Reaction
PRISM	Partnership for Regional Invasive Species Management
RBP	Riparian Buffer Acquisition Program
RCMP	Riparian Corridor Management Plan
RWBT	Rondout West Branch Tunnel
SAP	Streamside Acquisition Program
SCADA	Supervisory Control and Data Acquisition
SEQRA	State Environmental Quality Review Act
SFI	Stream Feature Inventory
SMIP	Stream Management Implementation Program
SMP	Stream Management Program
SPDES	State Pollutant Discharge Elimination System
SSTS	Subsurface Sewage Treatment System
SWC	Surface Water Criteria
SWAT	Soil Water Assessment Tool

SWCD	Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
SWTR	Surface Water Treatment Rule
TASC	Terrestrial Aquatic Sciences Convergence
TCR	Total Coliform Rule
TTHM	Total Trihalomethane
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USGS	United States Geological Survey
WAC	Watershed Agricultural Council
WaLIS	Watershed Lands Information System
WAP	Watershed Agricultural Program
WDRAP	Waterborne Disease Risk Assessment Program
WFMP	Watershed Forest Management Plan
WFP	Whole Farm Plan
WOH	West of Hudson
WQSP	Water Quality Stream Projects
WRRF	Water Resource Recovery Facility
WR&R	New York City Watershed Rules and Regulations
WSP	Water Supply Permit
WWTP	Wastewater Treatment Plant

1. Introduction

In the early 1990s, New York City embarked on an ambitious program designed to protect and enhance the quality of the City's drinking water supply. The City's approach was based on a simple premise: it is better to keep water clean at the source than allow it to get contaminated and clean it up later. Over the past 30 years, New York City's programs have been recognized as an international model for source water protection.

Promulgated in 1989, the federal Surface Water Treatment Rule (SWTR) requires all public surface water systems in the United States to filter their water for the protection of public health. Water suppliers could apply for a waiver from the filtration requirements, but only if they could meet stringent water quality, disinfection and source protection criteria. The New York City Department of Environmental Protection (DEP), which operates and protects the City's water supply, believed that the Catskill/Delaware portion of the City's system qualified for a filtration waiver. Following an initial application, DEP received the first Filtration Avoidance Determination (FAD) in January 1993, and has maintained a filtration waiver continuously since that time. In January 2023, DEP marked the 30th anniversary of the first FAD. DEP has spent or committed more than \$2.9 billion to implement an array of programs that target both existing and potential sources of contamination. The result is that New York City consumers continue to enjoy affordable, high quality water.

Essential to the success of these efforts are the strong relationships developed between DEP and key water supply stakeholders including the watershed communities; locally-based organizations; environmental groups; and federal, state, and local government agencies. DEP's investments are designed to meet the twin goals of water quality protection and preservation of the economic vitality of watershed communities. DEP employs one of the largest workforce in the watershed and scores of additional jobs are created through direct and indirect employment from DEP's contracts. Project funding and tax payments account for nearly \$300 million annually. Projects completed enhance the quality of life for local residents in many ways, for example by providing reliable and inexpensive wastewater treatment or increasing resiliency from floods. In addition, DEP's reservoirs and land holdings are a valuable resource for the local tourism economy.

The cornerstone of DEP's source water protection program is extensive research by DEP scientists into existing and potential sources of water contamination, and the detailed characterization of land use and land cover in the watershed. As climate change accelerates, maintaining resiliency is essential to confronting its growing impacts, including droughts, intensifying wildfires, and storms that bring heavy rainfall followed by drought-like conditions. These challenges put increasing pressure on both infrastructure and communities, making DEP's proactive approach more critical than ever. As part of DEP's source water monitoring program,

tens of thousands of samples are collected annually throughout the watershed. Each year DEP performs hundreds of thousands of laboratory analyses. Based on the information collected through its monitoring and research efforts, DEP has crafted a watershed protection strategy that focuses on implementing initiatives that address current potential pollution sources and prevents the creation of new sources while working to minimize the risk of new contamination, ensuring long-term sustainability and resiliency in the face of a changing climate.

In December 2022, the New York State Department of Health (NYSDOH), in consultation with United States Environmental Protection Agency (USEPA), issued mid-course update to the 10-year FAD issued in 2017. The Revised 2017 FAD calls for continuation of major program elements, with targeted enhancements and adjustments where needed. DEP protection strategies have continued to evolve over the past 30 years, based on program success; changes in watershed conditions; climate change impacts and projections; and improved monitoring and science. The Revised 2017 FAD continues these trends and positions DEP's source water programs for continued success.

This annual report covers the period January 1, 2024, through December 31, 2024, and is compiled to satisfy the requirements of the 2017 FAD. Material in this report is organized to parallel the sections of the FAD. Figure 1.1 and Figure 1.2 depict the impressive level of accomplishment over the past thirty-one years. The programs, each designed to target specific pollution sources, have touched nearly every corner of the City's vast catchment.

While the report focuses primarily on the efforts of New York City, it is important to recognize that DEP works in partnership with many agencies, organizations, and communities throughout the region to achieve its goals. These partnerships are vital to the continued success of the source water protection program and recognize the need to strike a balance between protecting water quality and the fact that the watershed is home to tens of thousands of people. The contributions of many of these groups are acknowledged throughout this report. The other private, governmental, community, academic, and non-profit entities that share a role in this complex effort are too numerous to list. However, DEP gratefully acknowledges their ongoing help and support.

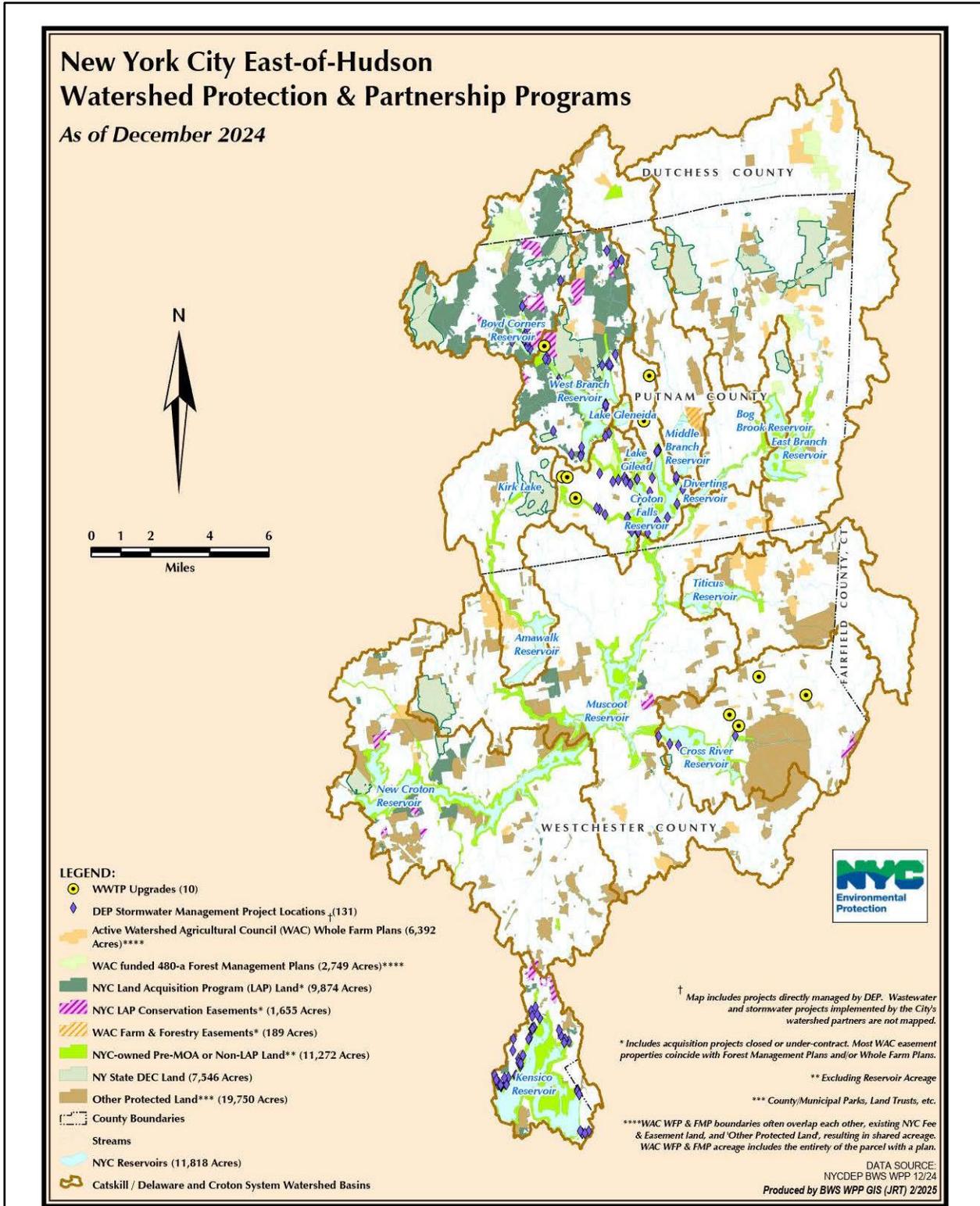


Figure 1.1 New York City East-of-Hudson watershed protection and partnership programs as of December 2024

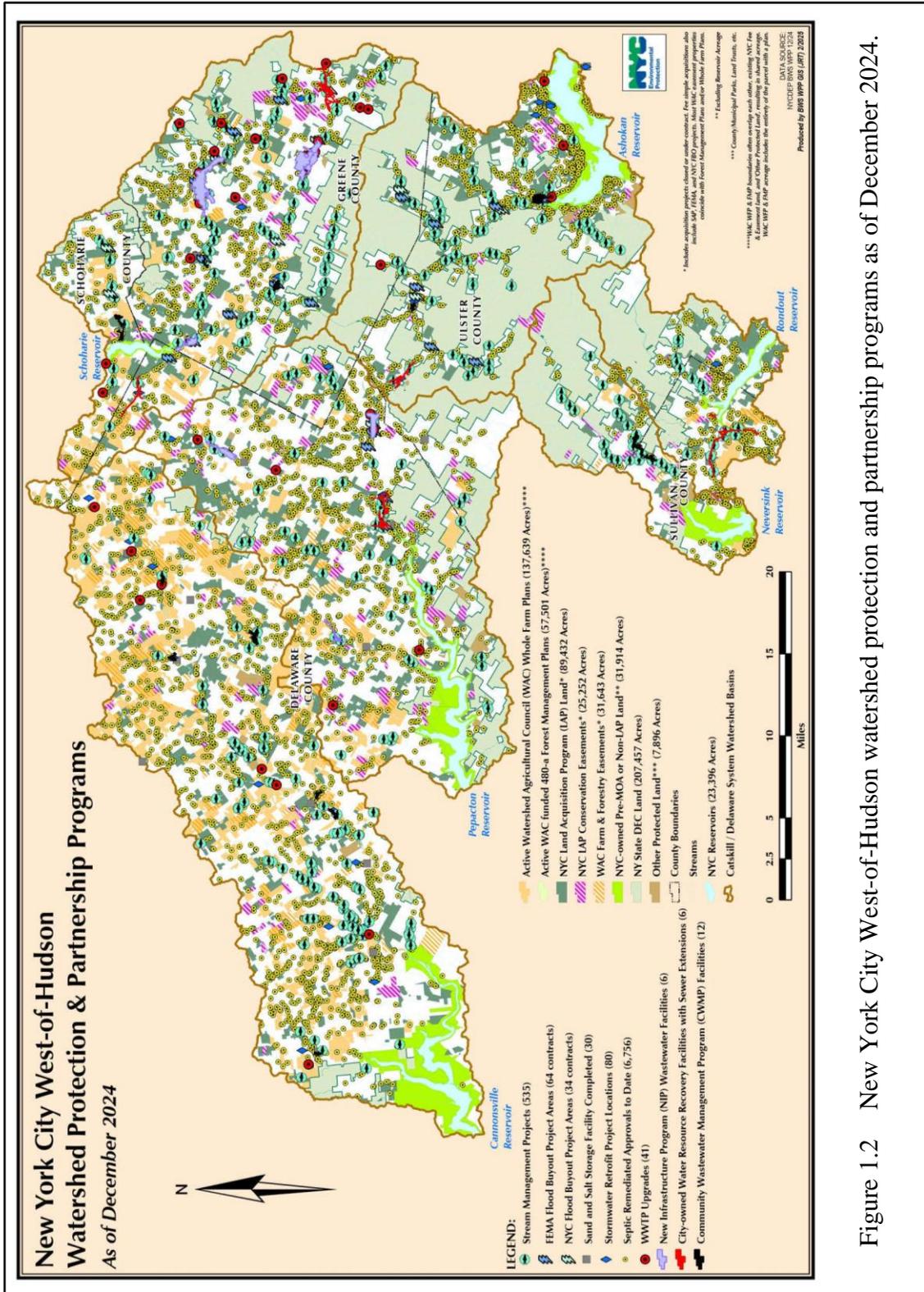


Figure 1.2 New York City West-of-Hudson watershed protection and partnership programs as of December 2024.

2. Federal and State Objective Water Quality Compliance

During 2024, DEP continued its comprehensive water quality monitoring efforts. New York City's sampling program is far more extensive than is required by federal or state law. Each year, the DEP collects tens of thousands of samples in the watershed and in the distribution system. In 2024, DEP collected approximately 46,700 samples and conducted 650,000 analyses. Notably, the City complied with the objective criteria of the Surface Water Treatment Rule (SWTR) (USEPA 1989).

By the tenth of every month, DEP provides the results from its extensive monitoring program to the USEPA and NYSDOH via the monthly Water Quality Report. As an unfiltered drinking water supplier, the City must meet the SWTR specified objective criteria and demonstrate this in the monthly Water Quality Report. The information provided below summarizes compliance monitoring conducted during 2024.

2.1 Surface Water Treatment Rule Monitoring and Reporting

SWTR monitoring includes raw water monitoring for fecal coliform concentrations, turbidity, and disinfection/contact time (CT) values; entry point monitoring for chlorine residuals; distribution system monitoring for chlorine residuals and coliform bacteria levels; and quarterly monitoring in the distribution system for total trihalomethanes and haloacetic acids (HAA5). In 2024, all monitoring samples complied with thresholds defined by the SWTR.

2.1.1 Raw Water Fecal Coliform Concentrations (40 CFR Section 141.71 (a)(1))

In 2024, the Catskill Aqueduct between Kensico Reservoir and the Catskill/Delaware Ultraviolet Light Disinfection Facility (CDUV) were offline. Therefore, no Catskill Aqueduct effluent fecal coliform samples were collected for the year. The Delaware Aqueduct effluent from Kensico Reservoir exhibited fecal coliform concentrations in water prior to disinfection at levels less than or equal to 20 fecal coliforms 100/ml in at least 90% of the samples collected during the year, as calculated by six-month running percentages.

As shown in Figure 2.1, in 2024 the highest six-month running percentage of positive raw water fecal coliform samples at the Delaware Aqueduct effluent from Kensico Reservoir was 0.55%, well below the maximum percentage of positive samples allowed under the SWTR.

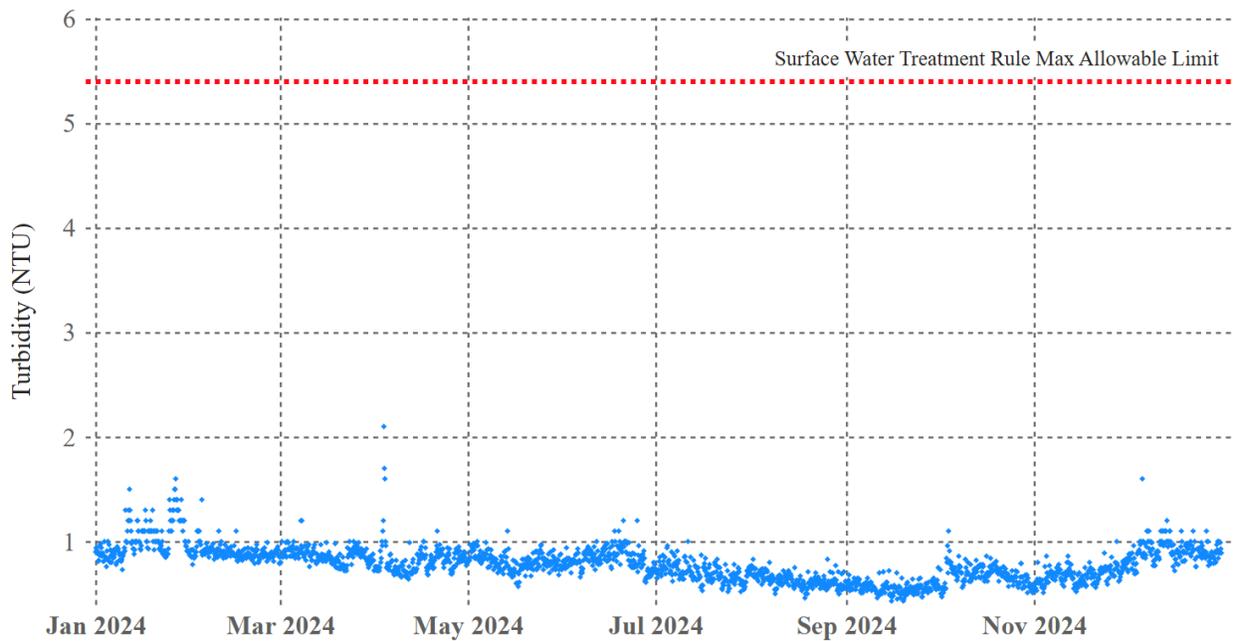


Figure 2.1 Percent fecal coliform samples >20 CFU/100mL over the previous six months, Catskill-Delaware System, 2020-2024.

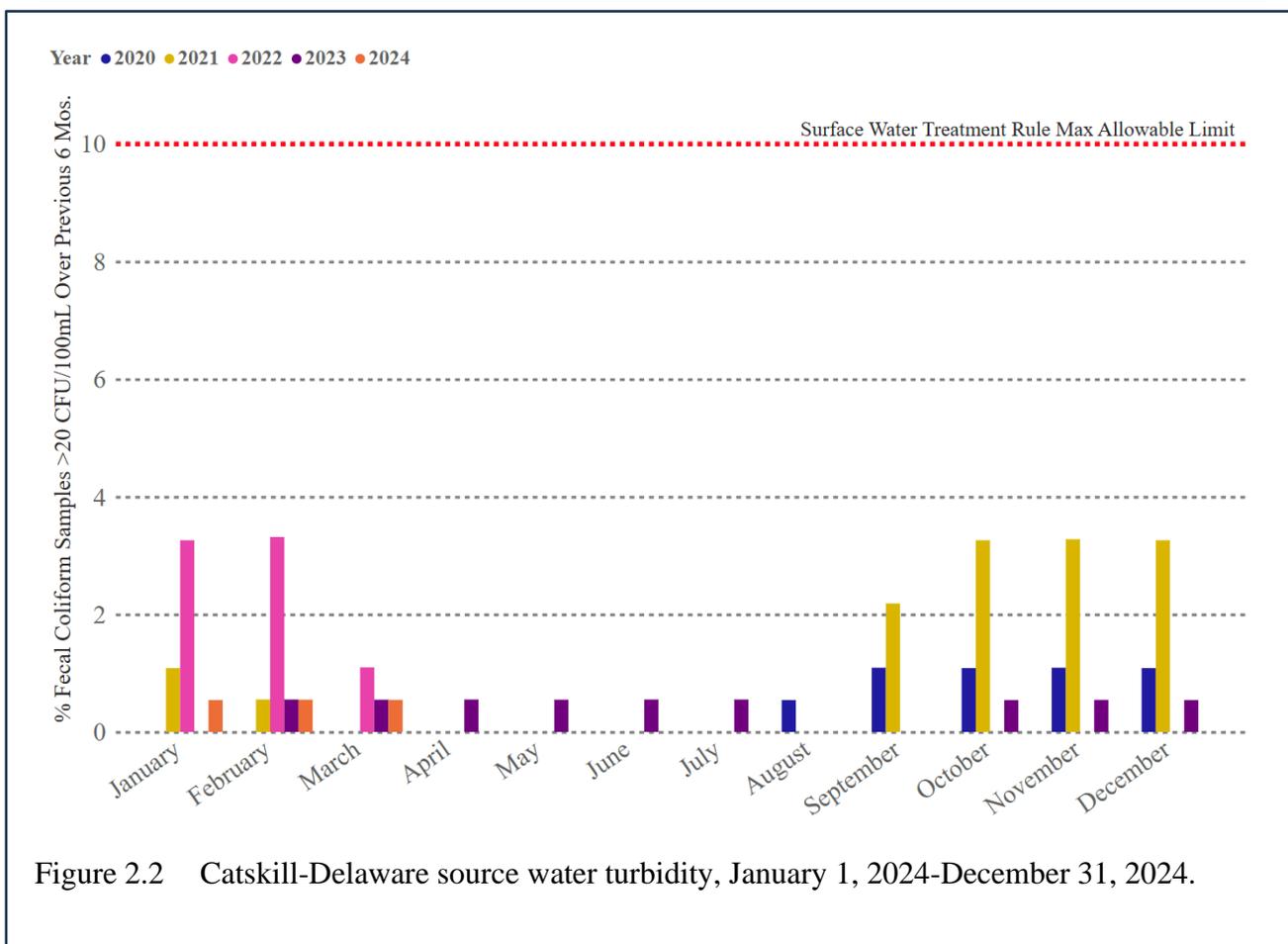
2.1.2 Raw Water Turbidity (40 CFR Section 141.71(a)(2))

The Delaware Aqueduct effluent from Kensico Reservoir exhibited turbidity levels less than or equal to 5 NTU in water prior to disinfection for the entire 2024 calendar year (Figure 2.2). No samples were collected from the Catskill Aqueduct in 2024 because the Catskill Aqueduct south of Kensico Reservoir was offline.

2.1.3 Raw Water Disinfection/CT Values (40 CFR Sections 141.71(b)(1)(i) and 141.72(a)(1))

CT values recorded each day during the year for the Catskill and Delaware systems produced net inactivation ratios (IAR) greater than or equal to 1.0. CT was achieved using both ultraviolet light and chlorine. For *Cryptosporidium*, 2-log inactivation was achieved with UV with a minimum log inactivation of 2.00. For *Giardia*, the required 3-log inactivation was achieved with 2-log using UV plus 1-log using chlorine other than from January 8 to February 8, 2024, and again from May 13 to 15, 2024, when all 3-log was achieved with UV. The minimum log inactivation from UV for *Giardia* was 2.09.

The net IAR using chlorine for 1-log *Giardia* inactivation when it was needed was calculated adding the IAR from two segments. The first segment of the Delaware Aqueduct from Kensico to Shaft 19 at the CDUV was used for both aqueducts because the first segment of the



Catskill Aqueduct was offline from Kensico to Eastview and was added to each aqueduct’s second segment IARs from CDUV to Hillview. The actual lowest net IAR for 1-log Giardia using chlorine in 2024 was 1.2 for the Catskill Aqueduct and 1.1 for the Delaware Aqueduct.

2.1.4 Entry Point Chlorine Residual (40 CFR Sections 141.71(b)(1)(iii) and 141.72(a)(3))

As required, continuous monitoring for free chlorine residual was maintained at the distribution entry points throughout 2024, and at no time did the concentration fall below 0.2 mg/L for more than four hours.

2.1.5 Distribution System Disinfection Residuals (40 CFR Sections 141.71(b)(1)(iv) and 141.72(a)(4))

Of the 15,059 samples measured for residual chlorine within the distribution system during 2024, all were greater than or equal to 0.01 mg/L, except for 13 samples that equaled 0.00 mg/L.

2.1.6 Trihalomethane Monitoring (40 CFR Section 141.71(b)(6)) and HAA5 Monitoring (40 CFR Section 141.171)

The analysis for trihalomethanes in 2024, performed on a quarterly basis, resulted in a maximum total trihalomethane (TTHM) value of 64 µg/L. The analysis for haloacetic acids, also performed on a quarterly basis, resulted in a maximum HAA5 value of 56 µg/L.

The highest TTHM quarterly running annual average during 2024, recorded during the third quarter, was 54 µg/L, a level below the regulated level of 80 µg/L. The highest HAA5 quarterly running annual average, recorded during the first quarter, was 43 µg/L, a level below the regulated level of 60 µg/L.

2.2 Total Coliform Monitoring

2.2.1 Monthly Coliform Monitoring (40 CFR Section 141.71(b)(5))

Within the distribution system, coliform monitoring indicated monthly levels of total coliforms below 1.9% for all 12 months of 2024 (Figure 2.3). The number of compliance samples analyzed in 2024 for total coliforms was 9,244, of which 42 were total coliform positive, and none were E. coli positive. The annual percentage of compliance samples that were total coliform positive was 0.5%. Since 1994, DEP has collected 316,579 coliform compliance samples, and only 17 of them have tested positive for E. coli.

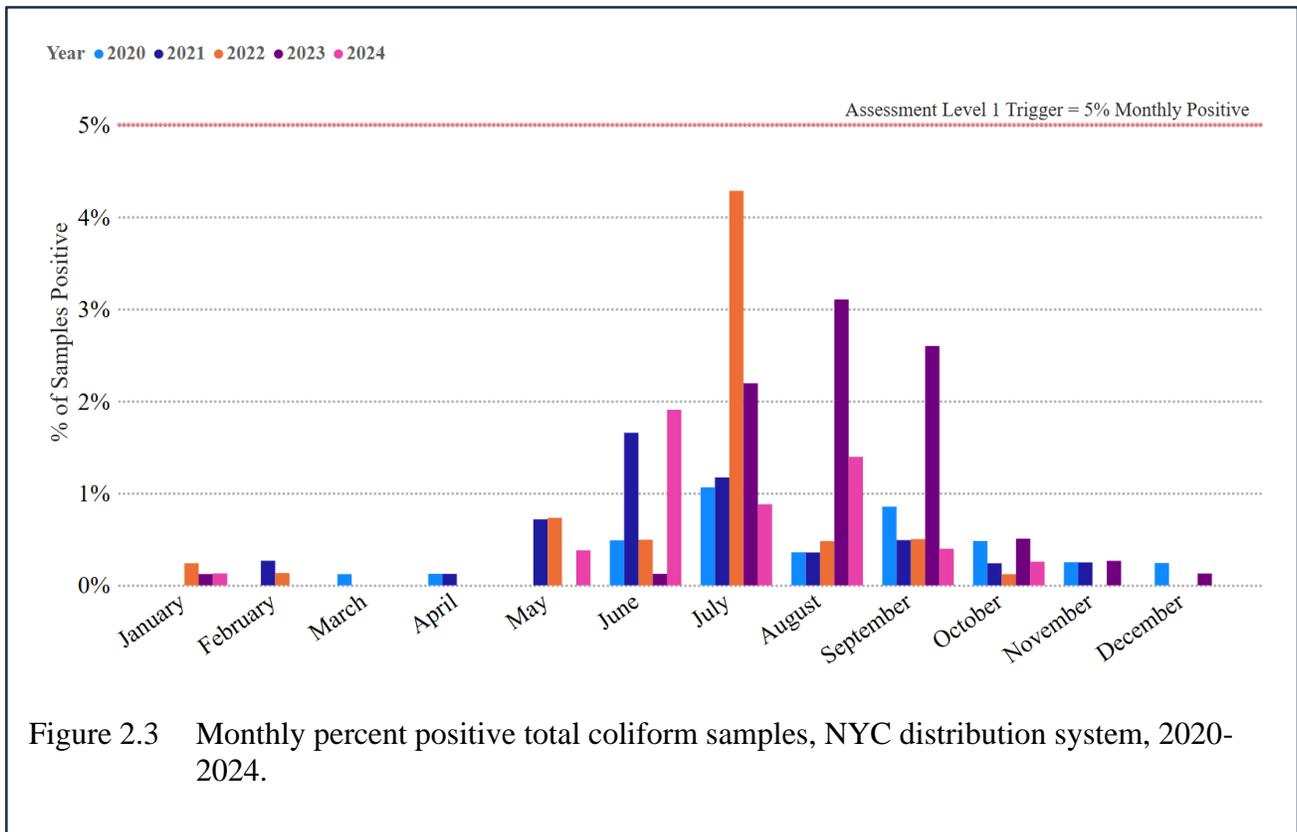


Figure 2.3 Monthly percent positive total coliform samples, NYC distribution system, 2020-2024.

Heterotrophic plate counts (HPC) were all ≤ 500 CFU/mL, equivalent to a measurable free chlorine residual in 2024. Zero percent of the samples had an undetectable free chlorine residual or HPC > 500 CFU/mL. This meets the requirements that a free chlorine residual be maintained at representative points in the distribution system, and that no more than 5% of the free chlorine residual samples be undetectable in any two months.

2.2.2 Chlorine Residual Maintenance in the Distribution System

During 2024, DEP continued to ensure adequate levels of chlorine throughout the distribution system, by maintaining chlorination levels at the distribution system's entry points, conducting spot flushing when necessary, and operating two permanent chlorination booster stations to improve the chlorine residual levels for the Fort Tilden, Roxbury and Breezy Point areas (Rockaway Peninsula) in Queens, and for Staten Island. As a result of these steps, detectable chlorine residuals were maintained throughout the distribution system in 2024.

3. Environmental Infrastructure

3.1 Septic Programs

Since 1997, DEP has committed over \$190 million to rehabilitate, replace, and maintain septic systems in the West of Hudson (WOH) watershed through several programs managed by the Catskill Watershed Corporation (CWC) as described below.

The Septic Rehabilitation and Replacement Program funds the repair and replacement of septic systems serving single- or two-family residences. In 2024, CWC reimbursed 256 residential septic repairs, including 38 second time repairs. To date, the program has funded more than 6,950 residential septic repairs throughout the WOH watershed.

The Septic Maintenance Program is intended to reduce septic system failures through the subsidizing of regular septic tank pump-outs and maintenance. In 2024, CWC subsidized 714 septic tank pump-outs, for a cumulative total of over 5,700 pump-outs since program inception.

The Expanded Septic System Rehabilitation and Replacement Program (formerly the Small Business Septic Program) funds the repair or replacement of failed septic systems serving eligible governmental entities, not-for-profit organizations, and small business owners in the WOH watershed. In 2024, CWC funded the remediation of 24 septic systems under the Expanded Septic Program, for a cumulative total of 105 repairs since program inception.

The Cluster Septic System Program funds the planning, design, and construction of cluster systems in 13 WOH watershed communities; operation and maintenance funding is also available. No communities opted to participate in this program during 2024.

3.2 Community Wastewater Management Program

Administered by CWC, the Community Wastewater Management Program (CWMP) supports the design and construction of community wastewater management solutions. To date, the CWMP has completed 14 projects in Bovina, DeLancey, Bloomville, Hamden, Boiceville, Ashland, Trout Creek, Lexington, South Kortright, Claryville, Shandaken, West Conesville, Halcottsville, and New Kingston.

Highlights for 2024 include the completion of both the Halcottsville and New Kingston projects, which commenced construction in July and November 2022, respectively. For the Halcottsville sewer connection, all 45 sanitary lateral connections were completed in 2024. For the New Kingston community septic system, 30 septic tanks were installed and associated sanitary lateral connections were completed. DEP is pleased to report that the CWMP has now been concluded for the eligible communities identified in the 1997 MOA.

The Revised 2017 FAD also requires DEP to contract with CWC to fund a wastewater solution for the Hamlet of Shokan in the Town of Olive. In August 2020, DEP approved a block grant of \$48.7 million for a WWTP serving the hamlets of both Shokan and Boiceville, and the project has since been in the pre-construction phase. During the second half of 2024, DEP

received and commented on the 95% design submissions for the Shokan WWTP, Boiceville Force Main, Boiceville WWTP conversion, Shokan collection system, and SWPPP. DEP also approved a revised block grant amount of \$70.377 million to address project cost increases, which necessitated an amendment to the CWC funding contract. To fully complete the pre-construction phase, the Town needs to obtain remaining project easements, the NYSDEC SPDES permit, and final design approval from NYSDEC and DEP. CWC anticipates the Town completing this work in the first half of 2025 before putting the project out to bid for construction in mid-2025.

3.3 Stormwater Program

3.3.1 Stormwater Cost-Sharing Programs

DEP pays for incremental costs associated with stormwater measures required solely by the City’s Watershed Rules and Regulations (WR&R) to the extent they exceed the costs of complying with state and federal requirements. Pursuant to the 1997 MOA, CWC administers two separate programs to offset eligible WR&R compliance costs related to the design, construction, and maintenance of stormwater pollution prevention plans and individual residential stormwater plans: the WOH Future Stormwater Controls Program (MOA-128) and the Future Stormwater Controls Paid for by the City Program (MOA-145).

The MOA-128 Program reimburses municipalities and large businesses 100% and small businesses 50% for eligible WR&R costs. DEP has provided over \$36.4 million to CWC for the MOA-128 Program, of which CWC has reimbursed over \$13.1 million to program applicants and transferred approximately \$17.6 million to other eligible programs.

The MOA-145 Program reimburses low-income housing projects and single-family homeowners 100% and small businesses 50% for eligible WR&R costs. Through 2024, CWC has reimbursed approximately \$1.95 million to MOA-145 Program applicants. Table 3.1 summarizes projects approved for funding under both programs in 2024.

Table 3.1 Summary of Stormwater Program Applicants in 2024.

Applicant	Project	CWC Funding
Austin Brown (McMurdy Brook Subdivision)	Subdivision	\$34,932.00
Bearpen Mountain Sports Facility	Sports Complex	\$43,238.52
Birchwood Sponsor LLC	Subdivision	\$221,784.16
Catskill Mountain League Costs	Sports Complex	\$2,633.70
Clark Companies	Parking Area	\$291,488.00

Applicant	Project	CWC Funding
Conestoga Investments LTD	Residential	\$190,707.50
DFF Enterprises LLC	Subdivision	\$45,620.50
Edward Antonio	Residential	\$11,724.00
Emily Reid	Residential	\$26,202.58
Eric Makowski	Residential	\$27,341.00
GDP Partners LLC	Subdivision	\$563,155.00
Kevin Jones	Residential	\$87,472.42
Pacific Revocable Trust	Residential	\$52,603.98
Tannersville Rip Van Winkle Lake Park	Public Park	\$177,121.00
Windham NY Escape LLC	Residential	\$530,079.12
Windham Ventures LLC	Mini-golf Course	\$10,495.00
Worcester Creameries Corp	Parking Area	\$70,126.58

3.3.2 Stormwater Retrofit Program

Jointly administered by DEP and CWC, the Stormwater Retrofit Program provides funding for the design, permitting, construction, and maintenance of best management practices to address existing stormwater retrofit runoff in concentrated areas of impervious surfaces.

Through 2024, the program has completed 19 planning and assessment projects and undertaken 80 stormwater retrofit projects. Among the projects undertaken in 2024, CWC an funded a stormwater retrofit design at the Olive Free Library and a feasibility study at the Pine Hill Community Center; CWC and DEP worked with the Village of Margaretville and Town of Jewett on conceptual designs of stormwater retrofit BMPs; and DEP and CWC conducted an onsite evaluation of Beaver Street in the Village of Stamford to determine whether preliminary design work may help assess the suitability of this location for a stormwater retrofit project.

4. Protection and Remediation Programs

4.1 Waterfowl Management Program

Implementation of the Waterfowl Management Program continued without interruption during 2024. The Waterfowl Management Program Annual Report, submitted on October 31, 2024, summarizes the program's activity from August 1, 2023, through July 31, 2024. The period from August 1 through December 31, 2024, will be summarized in the program's annual report to be submitted on October 31, 2025. Reports are also available on the DEP website ([DEP website](#)).

4.2 Land Acquisition

DEP's Land Acquisition Program (LAP) permanently protects high priority sensitive lands in the Catskill/Delaware watershed through acquisition of conservation easements (CEs) and land in fee simple, both directly by the City and in partnership with the Watershed Agricultural Council (WAC Farm and Forest CE Programs), Catskill Center for Conservation and Development (Streamside Acquisition Program, or SAP), and local municipalities through the New York City-Funded Flood Buyout Program (NYCFFBO).

In 1997, the City owned 3.4% of the land area in the Catskill/Delaware watershed, while an additional 21.3% was owned by New York State and other public entities for a total protected status of 24.7%. As of December 31, 2024, 41.4% of the Catskill/Delaware watershed land area has been permanently protected by the City, state, and others. Appendix A Table 1 describes natural resources and features on City-protected lands and CEs acquired pursuant to the FAD. The acreage shown in Appendix A Table 1 includes reservoir acres and is based on a GIS analysis rather than surveyed acres.

DEP now owns or controls more miles of stream, and roughly the same acreage of buffer land within 300 feet of watercourses and 1,000 feet of reservoirs, than are protected in the entire Catskill/Delaware watershed by all other entities combined including New York State. In total, more than 36% of stream length and stream buffers, 73% of wetlands and deepwater habitats, 44% of forest cover and 65% of floodplains are under some type of permanent protected status. Overall, the proportion of protected water features in the watershed roughly equals or exceeds the proportion of acres protected.

Figure 4.1 depicts protected lands by basin, illustrating that in several high priority reservoir basins the City's land holdings have increased dramatically compared with pre-MOA ownership. Through 2024, the City-owned or controlled a total of 188,817 acres of land in the Catskill/Delaware watershed, or 18.5% of the land area (excluding acreage under reservoirs).

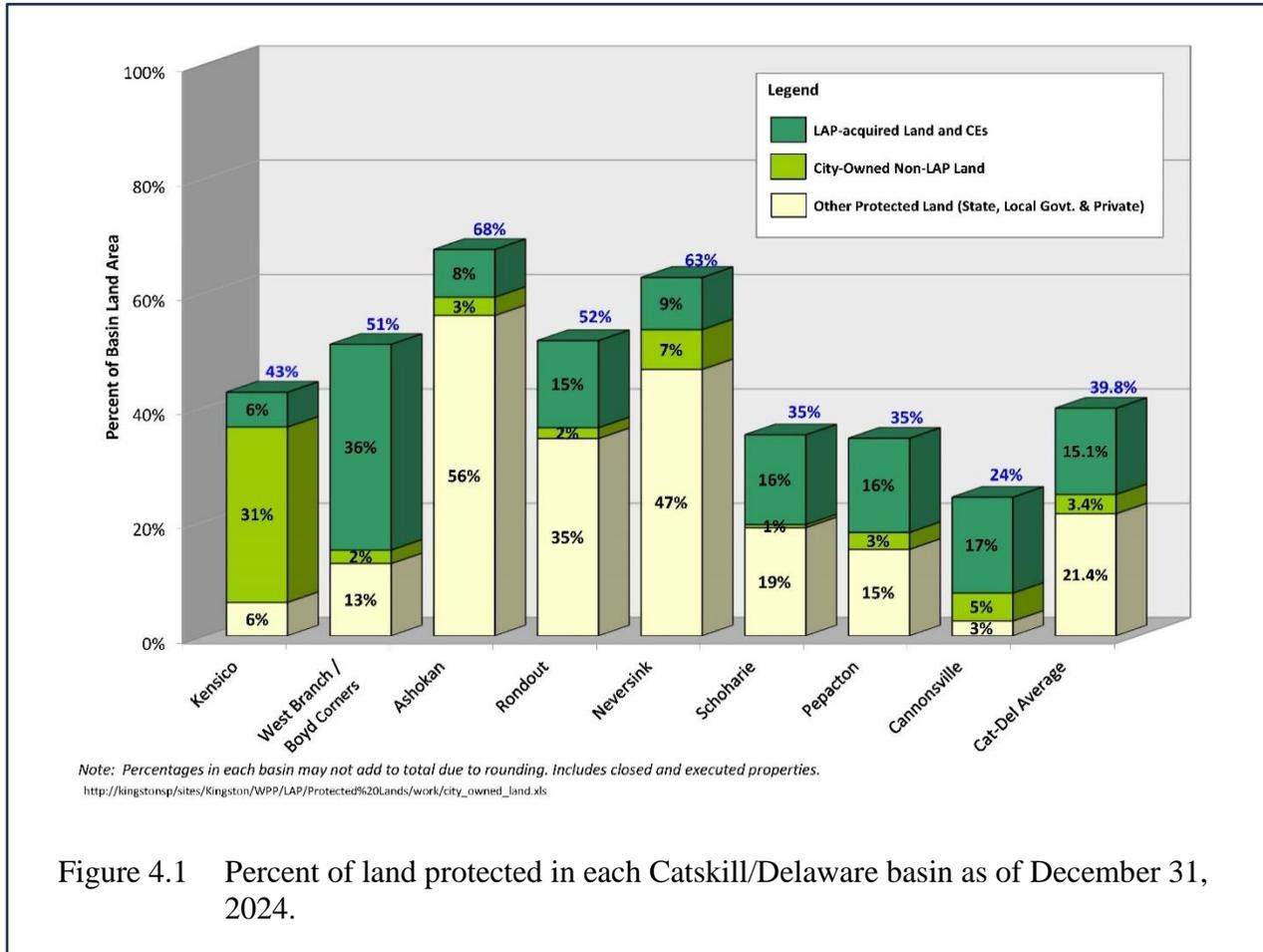


Figure 4.1 Percent of land protected in each Catskill/Delaware basin as of December 31, 2024.

4.2.1 Solicitation Goals

The Revised 2017 FAD requires the LAP to solicit 200,000 acres over the seven-year period 2018-2024. This metric was reduced from 350,000 acres in the original 2017 FAD based in part on community concerns, negotiations with watershed stakeholders, and recommendations from the National Academies of Sciences, Engineering and Medicine.

Through the combined efforts of DEP and LAP partners, the 200,000-acre FAD goal was met in 2024. In 2024, DEP and LAP partners solicited 11,591 acres, with core LAP responsible for 5,050 acres and the remainder representing the partner acreage credit available per the FAD: 572 acres solicited through the SAP, two acres solicited through the NYCFFBO, and 3,674 acres solicited through the WAC Farm and Forest CE Programs. Acreage solicited through the SAP and NYCFFBO are multiplied by five to yield a total FAD solicitation credit of 6,541 acres for WAC, SAP and NYCFFBO.

Since 1997, the LAP has solicited over 480,000 total acres, with most landowner contacts now represented by re-solicitations of previously solicited properties. This figure is a current snapshot of total unique acres solicited at a one-to-one ratio across all programs. For closed

properties, surveyed acres are used for calculations; for all other properties, the most recent solicited acreage is used for calculation. The solicited acreage changes over time due to adjustments in project configuration and/or routine tax parcel updates; it is not as accurate as a final survey.

Overall outcomes of LAP solicitations by basin and county since 1997 are listed in Appendix A Table 2 and Table 3, respectively. Relatively high levels of positive responses (measured by contracts executed or under negotiation) are seen among solicited landowners in EOH basins: 41% in Kensico and 67% in West Branch/Boyd Corners; positive landowner responses in two WOH basins (Ashokan and Schoharie) are also at or above 31%. Similar findings exist at the county level, with solicitations in Dutchess, Greene, Putnam and Westchester counties resulting in positive landowner responses above 33%.

Since 2019, all core LAP solicitations have adhered to NYSDOH-approved modifications that increased Surface Water Criteria (SWC) requirements in relation to other property characteristics and prohibited outgoing solicitations in certain towns upon reaching specified acquisition thresholds. As depicted in Appendix A Table 4, the LAP cannot undertake outgoing solicitations in the towns of Andes, Walton, and Delhi, while Shandaken remains unavailable for solicitation under Special Condition 10(c) of the 2010 Water Supply Permit (WSP).

4.2.2 Purchase Contracts

As depicted in Appendix A Table 5, the core LAP and partner programs executed 12 purchase contracts in 2024 comprising 354 acres at a fair market value of \$1.79 million. The average SWC is 50% for these properties, considerably higher than the cumulative average of 28% across all programs since inception. To date, DEP and LAP partners have signed 1,871 purchase contracts comprising 156,384 acres at a fair market value of \$514.8 million (excluding partner operating costs to administer the SAP and WAC CE programs). DEP has spent an additional \$44.5 million on LAP soft costs such as appraisals, environmental assessments and surveys.

Figure 4.2 depicts acreage signed to contract annually under core LAP and partner programs since 1995. The low numbers of purchase contracts and acres acquired during the past few years are attributable to the effects of the pandemic on the real estate market and refinements of criteria for program eligibility. Project designs now involve more frequent subdivisions to increase the amount of SWC that the City seeks to acquire while leaving more developable land in private ownership.

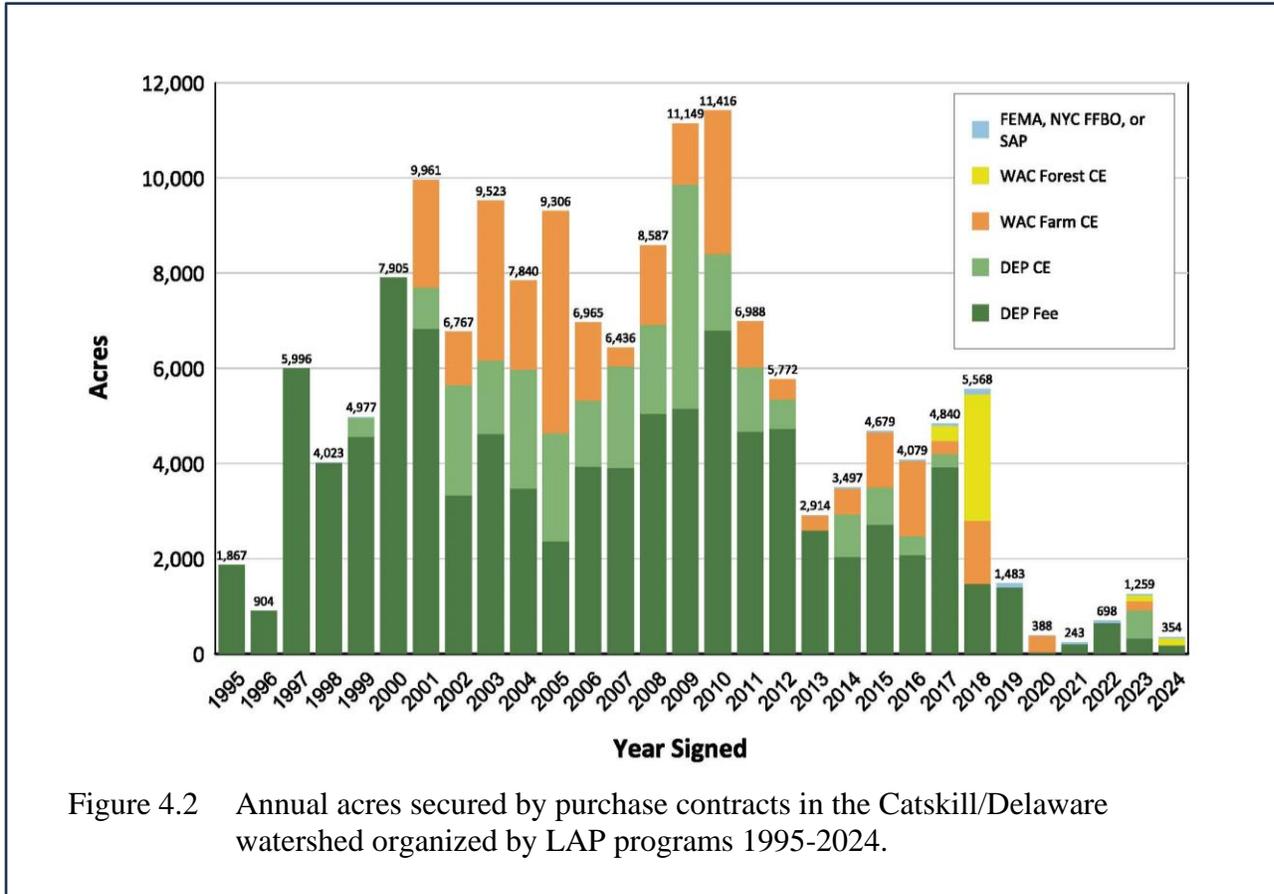


Figure 4.2 Annual acres secured by purchase contracts in the Catskill/Delaware watershed organized by LAP programs 1995-2024.

As depicted in Appendix A Table 6, DEP and LAP partners closed on 20 purchase contracts comprising 915 acres in 2024. The average SWC is 41% for these properties, considerably higher than the average of 28% across all programs since inception. Appendix A Table 6 shows that projects closed in 2024 were valued at \$5.2 million while Appendix A Table 7 provides tax lot details for these acquisitions. Appendix A Table 8 summarizes all acquired lands in the Catskill/Delaware watershed by LAP Priority Area. These totals include 586 acres that are outside the City’s watershed but were acquired as part of 57 separate transactions, where it was difficult or impossible to subdivide tax lots that spanned the watershed boundary.

4.2.3 Transfer of Conservation Easements to New York State

Pursuant to the 1997 MOA, DEP is required to convey CEs to New York State on all watershed lands acquired in fee simple. During 2024, DEP continued to participate in stakeholder meetings to explore potential changes to the model CEs granted to the State to allow for certain new land uses, including public utilities and renewable energy infrastructure, pursuant to the Revised 2017 FAD. Considering these discussions, DEP did not convey any new CEs to the State in 2024. As of December 31, 2024, watershed wide, DEP has submitted and NYSDEC has recorded 83 CEs on 1,093 properties (72,835 acres).

4.2.4 New York City-Funded Flood Buyout Program

The NYCFFBO remained active in 2024, with four new appraisals ordered, one contract executed, and five properties closed. DEP has appraised 50 properties to date through this program, with 31 projects closed (13 owned by the City and 18 owned by municipalities), three now under contract (one to be owned by the City and three to be owned by municipalities), and five offers accepted or under review. Details on NYCFFBO projects closed or under contract are provided in Appendix A Table 9.

4.2.5 Streamside Acquisition Program

DEP administers the pilot SAP through a \$13 million contract with the Catskill Center for Conservation and Development (CCCD). In 2024, CCCD ordered three appraisals totaling 26 acres, executed three purchase contracts on 30 acres, and closed on three projects totaling seven acres. To date, the SAP has ordered 83 appraisals (including updates for time) on 77 properties, which has resulted in 40 signed contracts on 320 acres. As shown in Appendix A Table 5, SAP acquisitions average 76% SWC. To date, the SAP has closed on 36 contracts protecting 281 acres as shown in Appendix A Table 6.

As of the end of 2024, CCCD had expended \$50,000 worth of incentive payments that were developed in collaboration with watershed stakeholders to increase SAP participation. This includes \$24,000 in total for twelve landowners whose properties contain at least 85% or greater SWC and a total of \$24,000 for eight landowners whose properties appraised at or below \$40,000; two of the latter landowners also received an additional \$1,000 incentive payment toward subdivision costs. Since late 2019, when all SAP incentives (financial and non-financial) were put in place, 16 out of 22 SAP transactions (73%) have involved incentive payments.

During 2024 DEP convened stakeholder meetings to explore issues related to the modification and potential expansion of the SAP beyond the Schoharie basin, which requires authorization from the NYSDEC pursuant to the 2010 WSP or a new Water Withdrawal Permit that DEP anticipates taking effect in December 2025. Moving forward, the program has been renamed the Collaborative Streamside Acquisition Program (CSAP) and, once authorized by NYSDEC, is expected to be available throughout the WOH watershed while including a riparian buffer license agreement as a new conservation tool. DEP has extended CCCD's current SAP contract through December 2027 to align with the term of the current FAD which requires the City to continue implementing the SAP in accordance with the 2010 WSP. DEP and CCCD will need to negotiate and execute a new contract to implement the expanded CSAP.

4.2.6 Farm and Forest Easement Programs

DEP funds the Farm and Forest CE Programs through a contract with WAC that has been extended through March 31, 2025 with a three-year successor contract scheduled to begin April 1, 2025. During 2024, WAC solicited the owners of 3,674 acres, appraised eight properties totaling 2,323 acres, signed one Forest CE contract (140 acres), and closed on two Farm CEs (195 acres) and one Forest CE (128 acres).

As summarized in Appendix A Table 6, WAC has closed on a total of 159 Farm CEs protecting 28,424 acres and 10 Forest CEs protecting 3,110 acres within the Catskill/Delaware watershed. It should be noted that two Farm CEs have recently been reduced by a total of roughly 32 acres by local eminent domain proceedings in support of community driven projects relating to wastewater management and utility infrastructure. The average WAC Farm CE includes 29% SWC and the average WAC Forest CE includes 16% SWC

4.2.7 Water Supply Permit

The 2010 WSP authorizes the LAP to acquire up to 106,712 acres of land in the Catskill/Delaware watershed through 2025, beyond the 102,287 acres that had been acquired as of January 1, 2010. Between January 1, 2010, and December 31, 2024, DEP and LAP partners signed contracts on 54,178 acres, leaving a balance of 52,534 acres for potential acquisition. Throughout 2024, DEP engaged with watershed stakeholders and regulators to discuss the future of core LAP and SAP expansion as a precursor to completing the City’s application for a successor 2025 Water Withdrawal Permit. As part of those discussions, DEP agreed to have core LAP cease all solicitation in Priority Areas 3 and 4 and to no longer acquire land in those priority areas except under limited circumstances. In December 2024, DEP submitted additional application materials to NYSDEC for the successor Water Withdrawal Permit that is anticipated to be issued when the 2010 WSP expires in December 2025.

4.2.8 Use of LAP-Acquired Land by Local Communities

The Revised 2017 FAD requires DEP to participate in a workgroup to assess opportunities to use LAP-acquired lands to relocate development outside of floodplains. In 2024, DEP continued to engage in preliminary discussions with one watershed town that submitted a proposal in 2022. Conversations are expected to continue in 2025 after the town has completed some investigative work to determine the feasibility of the proposed site. In addition, two other municipalities have contacted DEP to discuss the relocation of critical community infrastructure from floodplains to LAP-acquired lands. These discussions are still in preliminary stages and DEP anticipates further discussions in 2025.

4.3 Land Management

DEP continues to focus on the management and stewardship of City-owned water supply lands and CEs while supporting and promoting beneficial uses such as watershed recreation.

4.3.1 Fee Simple Lands

As of December 31, 2024, DEP managed 181,227 acres of City-owned fee simple watershed and water supply lands; including 174,536 acres of watershed lands, comprised of pre-MOA lands, reservoirs, and properties acquired through the Land Acquisition Program under the 1997 MOA. The average sized parcel acquired by the LAP under the MOA is 43 acres. The largest contiguous assemblage of City-owned lands acquired by the LAP under the MOA totals 2,921 acres. As the City acquires new, smaller properties under the Flood Buyout Program and Streamside Acquisition Program, these lands are often isolated from other City-owned parcels

and typically involve active neighbors; both factors contribute to property management challenges.

Property Inspections

DEP inspects all City-owned water supply lands pursuant to its monitoring policy. All City-owned lands are posted with appropriate signage, and all properties receive a comprehensive boundary inspection at least once every five years. These inspections include traversing all property boundary lines to ensure proper survey monumentation and maintenance of boundary lines over the long term. DEP records all property inspections and site visits, including encroachments, in its Watershed Lands Information System (WaLIS) database.

Annually, DEP prioritizes ground inspections of properties into two categories based on location, number of adjacent properties, uses conducted on the property, and history of trespass or encroachments. “High Priority” properties generally have active recreational use, a history of encroachments or trespass, multiple, adjacent landowners, or an active DEP permit/project. “Standard Priority” properties are those where minimal or no trespass or encroachments have been observed, or road frontage and/or public use are limited. DEP performs “Focused Inspections” on all High Priority properties, while “Site Visits” are conducted on Standard Priority properties. Focused Inspections are significantly more involved than Site Visits. DEP may change a property’s inspection priority at any time depending on the circumstances, such as the discovery of an encroachment.

Encroachments

DEP strives to cure encroachments when they are discovered on City-owned lands. Once an encroachment is identified and categorized as administrative (minor or major), or as a criminal citation or violation under NYS Environmental Conservation Law, DEP coordinates the appropriate actions to pursue resolution with the Bureau of Police and Security, Bureau of Legal Affairs, or the City Law Department.

In 2024, DEP identified 69 new encroachments on City-owned watershed lands, the majority of which were categorized as minor. In 2024, DEP successfully cured 33 encroachments (13 reported in 2024, 20 from prior years); encroachment resolution remains an ongoing activity.

Land-Use Permits

DEP issues land use permits (LUPs) to qualified entities seeking opportunities for use or occupancy of City-owned lands pursuant to Chapter 17 of Title 15 of the Rules of the City of New York. LUPs have a term of five years and may be renewed with DEP approval. LUPs include conditions that are intended to protect water quality and City-owned property, assets, and infrastructure. During 2024, DEP issued 41 new LUPs and renewed 166 existing LUPs; these include eight amendments to existing LUPs. DEP currently manages 1,202 active LUPs on City-owned water supply lands both inside and outside the watershed boundary.

Agricultural Use

DEP allows for a range of agricultural uses on certain City-owned properties by offering agricultural licenses to watershed farmers, which include terms and conditions to protect water quality. The most common agricultural use on City land is the harvesting of hay, but other common uses include the planting and harvesting of row crops, and the pasturing of livestock. Most farmers using City lands are enrolled in the Watershed Agricultural Program (WAP) and use BMPs adapted for use on City-owned lands. Over the years, in collaboration with WAC, DEP has allowed for the implementation of certain BMPs on City lands, application of nutrients pursuant to a nutrient management plan, planting of cover crops, and the installation of fencing and watering systems to support rotational grazing of livestock.

In 2024 DEP renewed 10 agricultural licenses and issued three new licenses. DEP currently manages 126 agricultural licenses covering 2,909 acres of City-owned watershed lands.

4.3.2 Conservation Easements

DEP holds 177 CEs on private properties totaling over 26,000 acres in the Catskill, Delaware, and Croton watersheds. DEP conducts two annual inspections of all CE properties pursuant to MOA requirements, including one ground inspection and one aerial inspection by helicopter; the latter is highly efficient for larger properties and allows DEP to inspect over 10,000 acres in one day. Violations that could pose serious water quality impacts are clearly visible from the air. If problems are observed through aerial monitoring, ground inspections are scheduled to further document any violations.

During DEP’s 2024 aerial inspections, no new CE violations were identified. DEP resolved one CE violation in 2024 that was associated with a timber harvest. Additionally, DEP approved 10 landowner requests to engage in CE-conditioned activities, including four timber harvests, stream work to support a bridge replacement, and installation of a cell tower.

WAC performed all MOA-required farm and forest CE monitoring inspections in 2024, which included both aerial and ground monitoring inspections for each CE property. WAC reported five easement violations, three of which were resolved.

4.3.3 Watershed Recreation

DEP supports and enhances low-impact recreational uses of 19 reservoirs, two controlled lakes, and thousands of acres of City-owned lands throughout the Catskill, Delaware, and Croton watersheds. DEP continues to expand public access to City-owned recreational lands while supporting local economies through eco-tourism.

In 2024, DEP opened an additional 892 acres of watershed lands for recreational use, increasing the total acreage available to the public to 155,843. This includes 80,977 acres of Public Access Areas (PAAs), 29,436 acres of Access Permit Areas (APAs), 135 acres of Day Use Areas (DUAs), 35,086 acres of reservoirs, and 10,209 acres of pre-MOA reservoir shoreline (included with APAs in Figure 4.3). PAAs allow for hunting, hiking, fishing, and trapping without a DEP access permit, while APAs require a valid DEP access permit for activities such

as fishing and hunting, as well as hiking within select APA areas. DUAs allow for activities such as walking and picnicking without a permit. As part of an effort to expand recreational use of City lands without a permit, a number of APA properties were converted to PAA properties during 2024. While most shoreline areas require an APA permit for fishing, reservoir use and fishing from a boat requires a DEP boat permit. Figure 4.3 provides a breakdown of City-owned lands and reservoir acres opened for recreation since 2003, by recreational use categories.

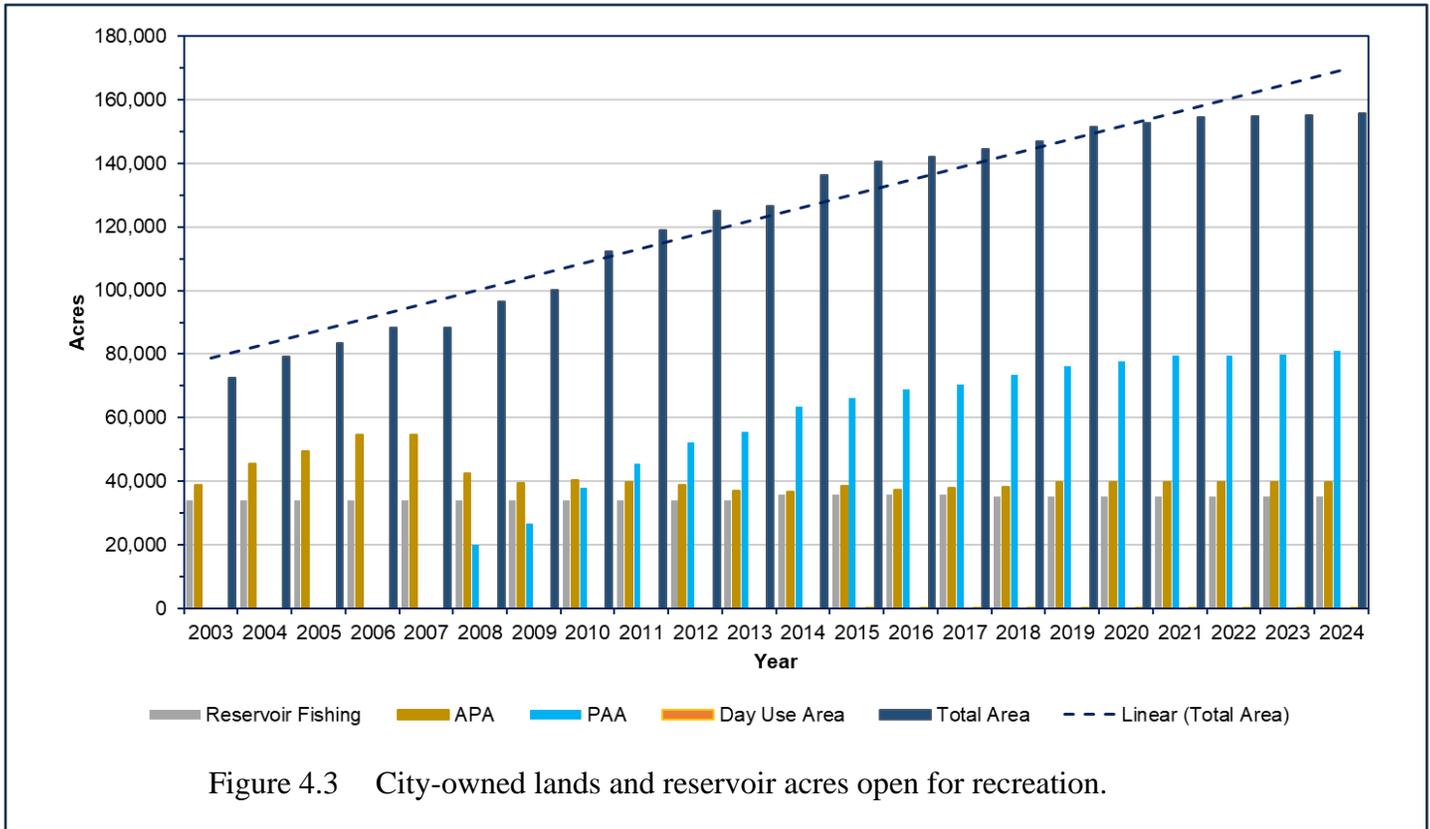


Figure 4.3 City-owned lands and reservoir acres open for recreation.

DEP allows the use of fishing boats on water supply reservoirs for individuals who register their boats and obtain a DEP boat tag. All boats must be steam cleaned before storage, and they must remain on their assigned reservoir and within a specific boat storage area. Boat owners must renew their registration every four years, with DEP limiting the number of allowable boats per reservoir. In 2024, DEP issued 537 new fishing boat tags and renewed 4,317 expiring boat tags. DEP currently permits more than 15,372 fishing boats that are stored at Catskill, Delaware, and Croton reservoirs.

DEP’s recreational boating program on the Cannonsville, Pepacton, Neversink, and Schoharie reservoirs opened for the expanded season on May 1, 2024, and ran through October 31, 2024. In cooperation with CWC, DEP allows certified vendors to rent canoes and kayaks for

recreational use on City-owned reservoirs. In 2024, a total of 1,178 canoes and kayaks were registered with DEP for the season or rented for day use from qualified local businesses.

In 2024, DEP continued to coordinate with Ulster County to manage the Ashokan Rail Trail, where DEP tracks recreational use with trail counters installed at each of the three trailheads. Over 170,000 pedestrians and bikers utilized the trail in 2024. Through a partnership with the Woodstock Land Conservancy and the NY/NJ Trail Conference, volunteer trail stewards monitor the Ashokan Rail Trail during peak times, assist with enforcing trail rules, and educate recreational users about source water protection. In December, DEP issued an LUP to Ulster County to install a portable solar car charging station, which will provide visitors with a free and sustainable way to charge their electric vehicles (EVs). This is the first, publicly accessible electric vehicle charging station installed on City-owned lands directly benefitting recreational users.

In partnership with the Hunter Area Trail Coalition, DEP advanced the engineering phase of an ADA-accessible section of the Hunter Branch Rail Trail. DEP also collaborated with the Catskill Mountain Club, Delaware County, and Friends of the Bramley Fire Tower to relocate the historic Bramley Mountain fire tower to its original location on lands now owned by the City. Construction of the tower was completed in 2024 and the tower will be open to the public in spring 2025. Additionally, DEP supported the ongoing use of 17 hiking trails spanning 67 miles of City-owned watershed lands and engaged partners in planning the addition of several new trails, including the Morris Hill Trail in Delaware County and the Pratt Rock Connector Trail in Greene County.

In 2024, DEP issued six new permits to state-licensed guides, allowing commercial guides to bring clients onto City-owned lands and reservoirs for recreational activities. DEP currently maintains 64 active guide permits.

Since 2022, DEP has allowed for low-impact recreational uses on City-owned lands by organizations, schools, and stakeholder groups via a letter of permission authorized under DEP's Recreational Rules. In 2024, DEP issued 10 letters of permission for recreational uses of City-owned lands, including group educational activities, group hunting programs, and archeological or natural resource investigatory activities. These letters of permission improve DEP's responsiveness to ongoing requests for expanded recreational opportunities.

4.3.4 Deer Management

Healthy forests are a cornerstone of DEP's watershed protection efforts, including strategies to reduce impacts from deer herbivory and promote forest regeneration on City-owned lands. DEP coordinates with NYSDEC, regional sporting groups, and the local hunting community to improve deer harvesting opportunities on City-owned watershed lands. In 2024, DEP again participated in NYSDEC's Deer Management Assistance Program (DMAP) by issuing 526 DMAP permits to local hunters that resulted in 72 harvested deer (14% success rate). Since 2012, DEP has issued 4,466 DMAP permits that resulted in 757 harvested deer over the past 13 years (17% cumulative success rate).

4.4 Watershed Agricultural Program

The Watershed Agricultural Council (WAC) administers the Watershed Agricultural Program (WAP) using DEP contract funds and technical assistance provided by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Delaware County Soil and Water Conservation District and Cornell Cooperative Extension (CCE). The USDA Farm Service Agency provides technical and financial assistance for the federal Conservation Reserve Enhancement Program (CREP). The WAP reduces the risk of agricultural pollution by developing Whole Farm Plans (WFPs) and implementing best management practices (BMPs), along with establishing riparian buffers through CREP.

From 2023 through 2024, WAC, in coordination with DEP, completed a comprehensive reconciliation and verification process of their program data resulting in modifications to some of the program’s cumulative BMP implementation reporting which is reflected in this year’s report.

To date, the WAP has developed 461 WFPs on 377 WOH farms and 84 East of Hudson (EOH) farms. At the end of 2024, WAC reports that 272 WFPs (59%) remained active, including 205 WOH farms and 67 EOH farms. Of the 205 active WOH farms, 16 are classified as “active, ineligible” because they do not meet the WAP’s current eligibility requirements of at least five animal units.

During 2024, the WAP approved no new WFPs on WOH farms; one new WFP was approved on an EOH farm. Two WOH farms went from a status of “active” or “active-ineligible” to “inactive”, two WOH “active” farms became “active-ineligible”, and 15 WOH “inactive” farms were “retired” from the program. The WAP anticipates developing up to one new WFP within 12 months. For the 276 active WFPs reported by WAC at the end of 2023, the WAP conducted 250 annual status reviews (229 WOH, 21 EOH) during 2024, exceeding the 90% FAD metric. The WAP also completed 52 WFP revisions on 41 WOH farms and 11 EOH farms.

In 2024, the WAP implemented 279 BMPs on all participating farms at a total cost of \$4,301,496. These figures include 155 structural BMPs (of which 49 were repair or replacement BMPs on WOH farms totaling \$822,115) and 65 nutrient management plans. To date, the WAP has implemented approximately 8,643 BMPs on all watershed farms at \$74,598,823; these figures include 7,825 BMPs on WOH farms (\$67,010,862) and 818 BMPs on EOH farms (\$7,587,961). In 2025, the WAP anticipates implementing approximately 200 BMPs on WOH farms at an estimated cost of \$6 million and approximately 35 BMPs on EOH farms at an estimated cost of \$1 million.

The Revised 2017 FAD requires the WAP to achieve several BMP design and implementation metrics intended to reduce by 50% an existing backlog of BMPs identified in WOH WFPs prior to January 1, 2017, while limiting the creation of a new backlog of BMPs identified after January 1, 2017. The 50% backlog reduction metric applies to “new” BMPs

identified but not yet implemented in WFP pollutant categories I-VI, as well as previously implemented BMPs regardless of pollutant category, in need of repair or replacement.

To serve as a baseline for the FAD metric, DEP and WAC adopted an official BMP backlog list dated January 1, 2017, that is comprised of 1,754 BMPs estimated to cost \$35.8 million, including 1,410 priority “new” BMPs not yet implemented in WFP pollutant categories I-VI (\$28.1 million) and 344 repair or replacement BMPs (\$7.7 million). At the request of WAC, DEP approved accepting component BMPs toward the goal of 50% backlog reduction metric (196 component “new” BMPs, 28 component repair and replacement BMPs).

Between January 1, 2017, and December 31, 2024, the WAP implemented 622 backlog BMPs at a total cost of \$14,061,744, including 418 “new” BMPs in pollutant categories I-VI (\$8,449,529) and 206 repair or replacement BMPs (\$5,300,615). As required by the Revised 2017 FAD, WAC repaired or replaced all viable BMPs designed and scheduled through the calendar year 2022 by December 31, 2024. During this same period, the WAP completed designs on 888 “new” backlog BMPs including 622 completed designs implemented (622 backlog, 68 component) and 292 completed designs not yet implemented (209 backlog, 138 component). The WAP also completed designs for 208 repair or replacement backlog BMPs (206 implemented and 2 completed designs not yet implemented).

Of the total 101 structural BMPs implemented in 2024, 45 were backlog BMPs (37 “new” and 8 repair or replacement) costing \$2,136,867 (\$1,736,915 for “new” BMPs and \$399,952 for repair or replacement BMPs). During 2024, the WAP anticipates designing approximately 23 “new” backlog BMPs for implementation.

Between January 1, 2017, and December 31, 2024, the WAP deleted 463 BMPs (33%) from the backlog list (417 “new” BMPs and 46 repair or replacement BMPs) due to farms becoming inactive, changes in farm operations or practices, or internal data reporting discrepancies. As of December 31, 2024, the WAP’s official BMP backlog list included 209 total remaining BMPs, comprised of 207 “new” BMPs and two repair or replacement BMPs.

Since January 1, 2017, the WAP has planned or identified an additional 1,102 non-backlog BMPs (including new and repair or replacement BMPs) on active WFPs estimated at \$19,473,671. Out of these 1,102 newly identified BMPs, the WAP has implemented 864 new (non-backlog) BMPs and 132 non-backlog repair or replacement BMPs totaling \$1,740,757. The non-backlog BMP portfolio, more accurately described as a new backlog of BMPs, is being generated primarily through extensive ongoing revisions to existing WFPs. In consultation with WAC, DEP submitted a report to NYSDOH evaluating the WAP metrics, as required by the 2017 Revised FAD, which assessed the adequacy of current WAP metrics and provided recommendations for revised metrics and reporting.

During 2024, the WAP completed 65 new or updated nutrient management plans (NMPs) on 61 active WOH farms and four active EOH farms. In the WOH watershed, 200 participating farms followed NMPs, of which 197 (91%) are current (developed within the last three years).

Additionally, 131 WOH farms participated in the Nutrient Management Credit Program in 2024. Four farms left the NMC program, and one new farm was added (a decrease of three participants). The WAP also implemented its ninth year of the Precision Feed Management (PFM) Program, completing 18 new or revised feed management plans in 2024. The PFM Program now has 57 active participants, including 35 dairy farms (22 in the Cannonsville basin, eight in the Pepacton and five in the Schoharie basin) and 22 beef farms (16 in the Cannonsville basin, four in the Pepacton basin, one in Schoharie basin and one in the Rondout basin).

In 2024, the WAP enrolled two new contracts totaling 11 acres in the Delaware County CREP/Catskill Stream Buffer Initiative (CSBI) pilot program, while two CREP contracts were re-enrolled covering 18 acres of riparian forest buffers. No contracts were terminated or canceled. CREP implements riparian buffers on agricultural lands; CREP/CSBI implements riparian forest buffers on historical agricultural lands that are no longer actively farmed. As of December 31, 2024, there were 130 CREP contracts containing 1,265 acres of riparian forest buffers in the WOH watershed.

The WAP conducted 36 farmer education programs in 2024 attended by 1,191 total participants, of which 649 were watershed farmers. At least 142 individual WAP participants attended at least one farmer education program during 2024, with highlights including the Catskill Regional Agricultural Conference, Spring Crop School, the annual WAC Farm Tour, and Farm Legacy: Preparing for Ownership and Management Transition.

Finally, the WAC Economic Viability Program reaches thousands of people through its Pure Catskills print guide, e-newsletters, marketing website (Pure Catskills), and support of regional events that promote the sale and marketing of locally sourced watershed products. There are currently 335 Pure Catskill members. The Economic Viability Program awarded 21 micro-grants in 2024 totaling \$71,523.

4.5 Watershed Forestry Program

The WAC Forestry Program is a partnership between DEP, WAC, and the United States Forest Service (USFS) that promotes well-managed, working forests as a beneficial land use for watershed protection. The WAC Forestry Program combines core DEP contract funds with USFS grant funding to support the development of forest management plans, the implementation of forest stewardship activities through the Management Assistance Program (MAP), the implementation of BMPs on active timber harvest projects, professional training for loggers and foresters, and educational programs for landowners and school-based audiences.

In 2024, WAC funded the development of 22 forest management plans covering 2,708 acres. Two of these plans resulted in the new enrollment of 142 acres in the NYS Forest Tax Law (480-a tax abatement program), while the remaining 20 plans (2,566 acres) represented re-enrolled properties. A total of 60,250 watershed acres (57,501 WOH, 2,749 EOH) are enrolled in 480-a forest management plans funded by WAC. Landowners who enroll in this tax abatement program agree to restrict development, limit subdivision, and commit to a rolling 10-year

schedule of forest stewardship activities that help prevent conversion of forestland to other less protective uses.

WAC also funded the completion of 115 MAP projects: 12 timber stand improvement projects, 21 wildlife improvement projects, three invasive plant control projects, 17 tree planting projects, and 62 landowner site visits. To date, the program has funded 1,056 MAP projects on 7,477 acres of forestland, with timber stand improvement and wildlife improvement representing 70% of all completed projects. The Revised 2017 FAD requires DEP, in consultation with WAC, to assess and report by December 31, 2025, the effectiveness of the MAP in supporting the implementation of forest management plans. This will include a summary of any modifications made to the MAP or additional improvements needed to promote good forest stewardship.

In 2024, WAC funded the completion of 43 erosion control BMP projects, which included 17 stream-crossing projects on active timber harvest sites. WAC also loaned out 12 portable bridges and distributed 67 free BMP samples. Additionally, WAC completed 30 Croton Trees for Tribs projects planting 470 trees and shrubs along 1,893 linear feet of streams.

WAC continues to maintain the interactive MyWoodlot.com website that educates forest landowners through online modules and helps them develop customized goals and management activities for their properties. The website contains 60 goals, 250 activities, 847 pieces of “how-to” information, and 391 blogs and feature stories. In 2024, 48 landowners created new MyWoodlot.com profiles for a total of 493 profiles to date. WAC reports that 27,640 unique users visited MyWoodlot.com during 2024. In consultation with WAC, DEP submitted a report to NYSDOH, as required by the 2017 Revised FAD, on the status and effectiveness of MyWoodlot.com as a tool for understanding the needs and interests of family forest owners and providing them the knowledge to make positive conservation decisions. This report affirmed the effectiveness of MyWoodlot.com and made recommendations for continued improvements.

In collaboration with the NYS Trained Logger Certification Program and Cornell Cooperative Extension, WAC sponsored 9 professional logger-training workshops in 2024 attended by 137 participants. Approximately 51 loggers working in the Catskill/Lower Hudson region were “Trained Logger Certified” in 2024.

WAC and its partners sponsored numerous forest landowner education programs in 2024, including 15 workshops attended by 459 participants. The Cornell Master Forest Owners Program conducted 100 landowner visits while 84 Master Forest Owners were available to assist forest landowners in the watershed, primarily the Catskill region.

The Watershed Forestry Program implemented the following virtual and in-person school-based education programs in 2024: Green Connections School Partnership Program, Watershed Forestry Institute for Teachers, and the Watershed Forestry Bus Tour Grants Program. Green Connections engaged 272 students during the 2023-2024 school year, while 29 teachers attended the Watershed Forestry Institute. WAC sponsored 30 in-person bus tours were attended by 2,167 participants, primarily New York City students.

Additionally, the four watershed model forests hosted 50 educational programs and outreach events for 2,828 participants including youth, forest landowners, loggers, and water consumers. The Frost Valley Model Forest attracted 500 visitors. The Siuslaw Model Forest hosted 500 youth and adults through their programs, Lennox Model Forest attracted no recorded visitors, while the Clearpool Model Forest reached 1,828 visitors from East of Hudson and New York City.

4.6 Stream Management Program

The Stream Management Program (SMP) contracts with basin partners to restore and protect stream system stability and ecological integrity by promoting the long-term stewardship of streams, riparian buffers and floodplains. SMP projects are identified through a prioritization process based on stream assessment and they are generally categorized as follows: Water Quality Stream Projects (WQSPs), Flood Hazard Mitigation/Local Flood Analysis (LFA), Stream Management Implementation Program (SMIP), and the Catskill Streams Buffer Initiative (CSBI) which is described in Section 4.7.

In 2024, the SMP completed three additional miles of stream feature inventories (SFIs), bringing the total SFI length completed under the Revised 2017 FAD to more than 156.5 miles. The SMP also completed three additional stream projects (Figure 4.4), which taken together with eight CSBI projects, results in 535 total completed projects treating 59 miles of stream since program inception. Throughout 2024, DEP completed negotiations with four of the five SMP basin partners for successor contracts that will continue the SMP through the term of the Revised 2017 FAD; the fifth contract is nearly finalized.

4.6.1 Water Quality Stream Projects

The 2017 FAD requires the completion of 24 WQSPs, at least eight of which shall be in the Ashokan watershed and three shall be in the Stony Clove basin to support the Upper Esopus Creek Watershed Turbidity/Suspended Sediment Monitoring Study. In November 2024, DEP nominated two new WQSPs for NYSDOH approval under the FAD: the West Kill at Howard Road Project in Lexington (Schoharie basin) and the Broadstreet Hollow at MU15 Stream Restoration Project in Shandaken (Ashokan basin). Local SMP partners constructed one previously approved WQSP, the Batavia Kill at Red Falls Project 3, and repaired damage from flooding immediately after construction at the West Kill Above Wolff Road Project.

Through 2024, a total of 22 WQSPs have been approved by NYSDOH under the Revised 2017 FAD, of which 14 projects have been completed, one project was withdrawn, and seven projects are pending completion (including the two projects nominated in 2024). The SMP has completed six of the required eight WQSPs in the Ashokan watershed and all three WQSPs in the Stony Clove basin. Table 4.1 summarizes the status of WQSPs at the close of 2024.

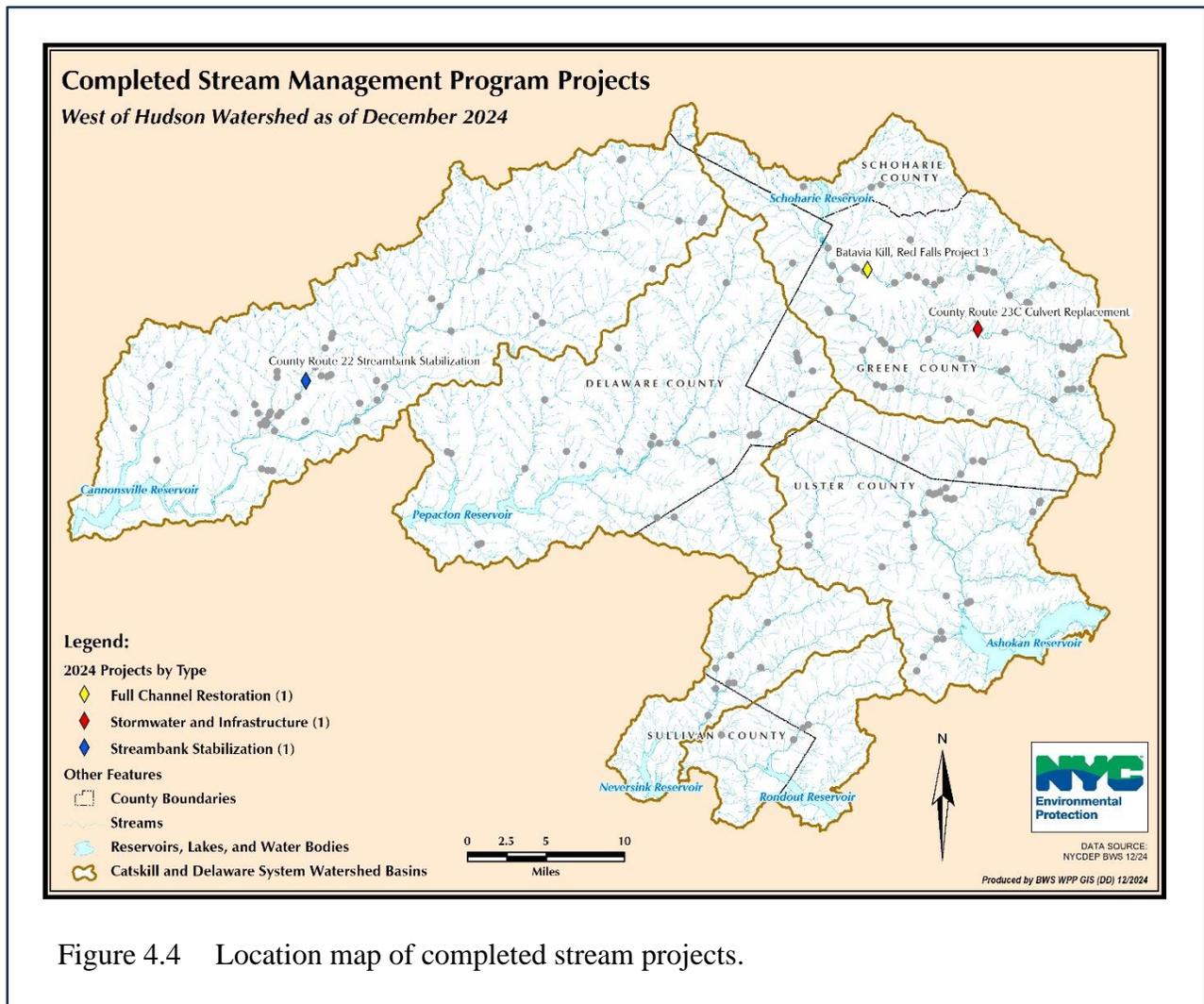


Figure 4.4 Location map of completed stream projects.

Batavia Kill at Red Falls Project 3

The Batavia Kill at Red Falls contains the largest and most complex stream segments to be addressed by the SMP to date. The stream reach of interest is approximately 6,000 feet in length and includes multiple large hillslope failures where mass wasting and excessive erosion into glacial lacustrine clay and till deposits historically cause significant water quality impacts. The SMP completed Project 1 in two phases during 2020-2021 at a cost of \$2.1 million. In 2022, the SMP completed Project 2 at a cost of \$1.1 million, including 830 linear feet of stream and floodplain restoration and hillslope stabilization. Project 3, completed in 2024, restored stability and floodplain connection to 1,650 linear feet of stream extending upstream of Project 2 at a cost of \$2.5 million. Project 3 required two dewatering bypasses to handle the Batavia Kill flow, the establishment of streambed grade controls using boulder riffles and rock cross vanes, streambank stabilization via live stone revetment, and floodplain grading and revegetation. Figure 4.5 illustrates the Batavia Kill at Red Falls Project 3 after construction.

Protection and Remediation Programs

Table 4.1 Status of WQSPs toward fulfillment of the Revised 2017 FAD requirement.

Project Name	Status	Length (feet)*	Basin
Batavia Kill at Kast anis	Completed	3,800	Schoharie
Bush Kill at Watson Hollow	Completed	250	Ashokan
Batavia Kill at Red Falls Project 1	Completed	1,606	Schoharie
Batavia Kill at Red Falls Project 2	Completed	830	Schoharie
West Branch Neversink River at Clothes Pool	Completed	760	Neversink
Hillslope Stabilization at Bull Run	Withdrawn	300	Pepacton
East Kill at Colgate Lake Road	Completed	700	Schoharie
Warner Creek Site 1	Completed	540	Ashokan
Warner Creek Site 2	Completed	560	Ashokan
Stony Clove Above Jansen Road	Completed	1,600	Ashokan
West Kill Above Wolff Road	Completed	750	Schoharie
East Branch Neversink River at Ladleton	Completed	1,360	Neversink
West Branch Delaware River at Riverhaven Farm	Approved	2,350	Cannonsville
West Branch Delaware River at Birdsong Farm	Approved	2,000	Cannonsville
Panther Kill Restoration	Completed	450	Ashokan
Batavia Kill at Red Falls Project 3	Completed	1,650	Schoharie
East Branch Neversink River at Riley Brook	Approved	2,200	Neversink
Elk Bushkill Restoration	Completed	1,300	Ashokan
Batavia Kill at Red Falls Project 4	Approved	2,000	Schoharie
Hollow Tree Brook Stream Restoration	Approved	1,080	Ashokan
West Kill at Howard Road	Approved	1,100	Schoharie
Broadstreet Hollow at MU 15	Approved	1,300	Ashokan

*Lengths for approved projects are estimated; lengths for completed projects are final.



Figure 4.5 Batavia Kill at Red Falls Project 3 after restoration.

4.6.2 Flood Hazard Mitigation Program

The SMP supports the development of LFAs and the implementation of LFA-recommended projects in eligible West of Hudson watershed population centers. City funding is also available to implement LFA-recommended projects and other eligible projects through CWC’s Local Flood Hazard Mitigation Implementation Program (LFHMIP) and the New York City-Funded Flood Buyout Program. Several local flood hazard mitigation projects have also utilized state or federal funding, which is encouraged by the FAD.

Local Flood Analyses

In 2024, DEP worked with the SMP basin partners to update the LFA Program Rules pursuant to one of the recommendations in DEP’s 2023 FAD evaluation report of the Local Flood Hazard Mitigation Program: the need to update existing LFAs to account for new data and shifting local priorities, and the need to develop new LFAs for flood-prone locations that were not originally identified when the Local Flood Hazard Mitigation Program was developed and launched a decade ago. The updated LFA Program Rules expand LFA eligibility beyond population centers to other locations that pose a significant flood inundation risk and where opportunities may exist for reducing flood elevations based on newly developed criteria.

In 2024, the SMP commenced new LFAs in the Hamlet of Trout Creek (Town of Tompkins, Delaware County) and the newly eligible Hamlet of Shokan (Town of Olive, Ulster County). The Town of Olive also began the process of revising its 2017 LFA for the Hamlet of

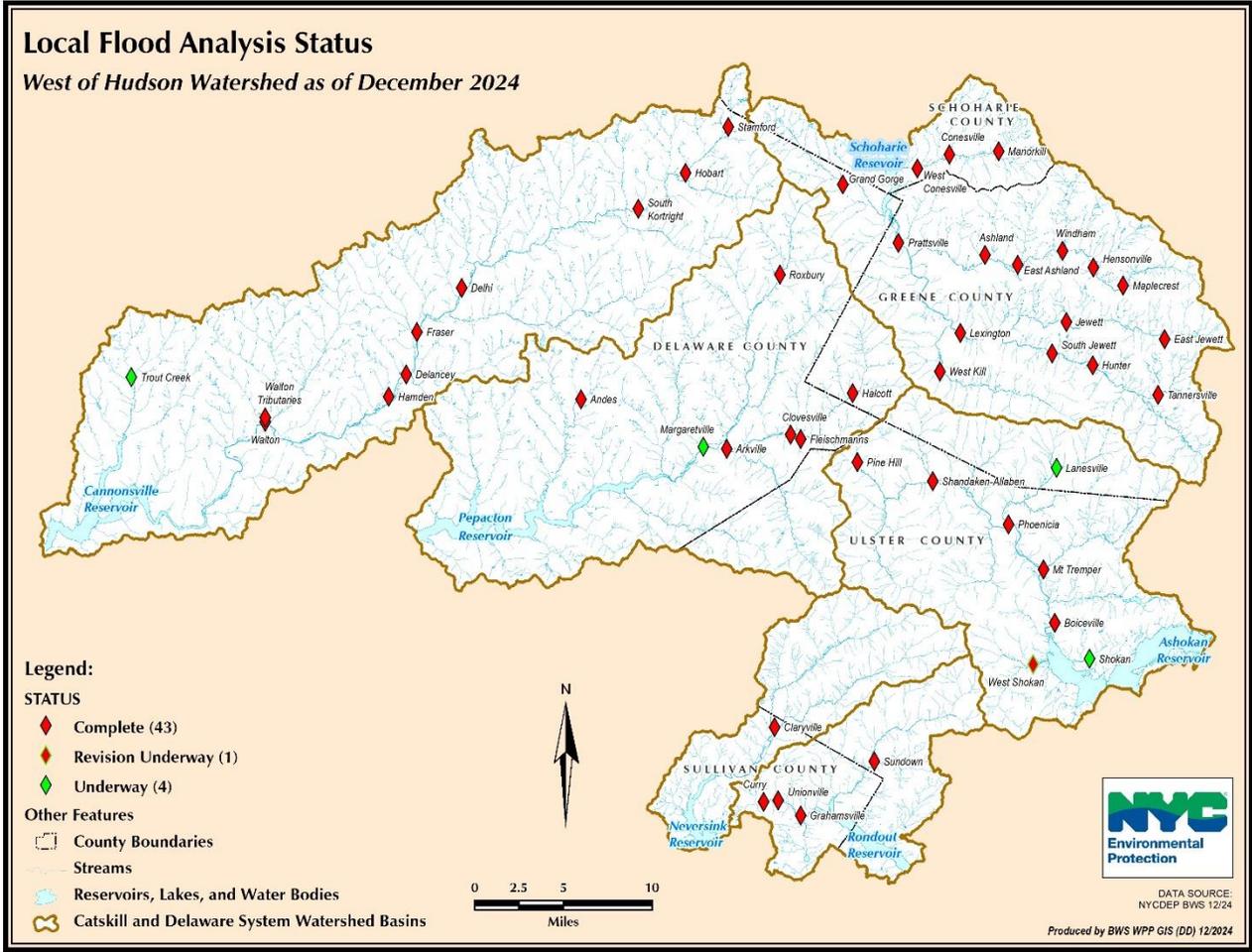


Figure 4.6 Location map and status of Local Flood Analyses.

West Shokan. Two additional LFAs covering the Village of Margaretville and the Hamlet of Lanesville, both initiated in 2023, were substantially advanced in 2024 and will be completed in 2025. To date, DEP has committed just over \$2.2 million to LFA development, with 24 LFAs completed for 43 population centers. Figure 4.6 depicts the locations and status of LFAs.

LFA-Recommended Projects

The Revised 2017 FAD requires the City to commit \$15 million through the SMP to support the implementation of 50 LFA-recommended projects. DEP already committed an initial \$7.1 million in five currently active SMP partner contracts, of which more than \$5.5 million has been committed to projects and more than \$3.5 million has been expended. During 2024, DEP committed an additional \$7.9 million to the five SMP partner successor contracts, thereby fulfilling the \$15 million funding requirement in the Revised 2017 FAD once these successor contracts register in 2025.

In 2024, SMP partners awarded four grants totaling just over \$1.9 million to support the implementation of LFA-recommended projects. These grants will fund the design of the Bonnie View and Station Road replacement culverts in Pine Hill, the construction of the Route 23C replacement culvert in Jewett, the construction of the Pangman Road streambank and floodplain restoration project in Conesville, and additional modeling for the design of the Bridge Street Bridge and floodplain restoration project in Phoenicia. Pursuant to the Revised 2017 FAD to date, the SMP has awarded 40 grants supporting various phases of 25 distinct LFA projects.

CWC Local Flood Hazard Mitigation Implementation Program

In 2024, CWC funded three property protection feasibility studies for potential elevation or floodproofing of flood-prone structures, as well as a feasibility study to relocate a county highway garage in Ashland; this brings the total number of feasibility studies approved to date to 72. Of these, CWC received eight completed studies in 2024 bringing the total number of completed studies to 70. CWC also funded the design of two property protection projects including a residence in Phoenicia and the relocation of a municipal highway garage in the Town of Halcott, bringing the total property protection design approvals to 21.

In addition, CWC funded the construction of an under-sized replacement culvert in the Town of Halcott, and the elevation of two residences in the towns of Prattsville and Ashland. Following Tropical Storm Debbie in August, CWC activated the Emergency Stream Debris Removal Program and funded two post-flood stream debris projects in the Town of Prattsville. Additional post-flood stream debris removal applications from the towns of Andes and Roxbury are pending while eligibility for federal funding is determined.

CWC approved three fuel tank anchoring projects in 2024. To date, CWC has approved 62 applications and funded the anchoring of 64 propane tanks (21,800 gallons) and 26 fuel oil tanks (7,200 gallons).

After receiving CWC funding in 2022 to complete a relocation feasibility study, the Village of Hunter continues to make progress on relocating its flood-prone firehouse by matching City funds through CWC with a \$1.97 million design and construction grant awarded through NYSDEC’s Climate Smart Community Grant Program. The Village was awarded additional CWC funding in 2023 to purchase a suitable parcel for relocation, which was closed in 2024. Both the design of the new facility and the buyout of the existing facility are underway.

New York City-Funded Flood Buyout Program

DEP contracts with CWC to fund the removal of structures on floodplain properties acquired through the NYCFFBO. In 2024, one demolition was completed in the Town of Shandaken. At least eight demolitions are planned for throughout 2025, including five NYCFFBO properties that were closed in 2024.

4.6.3 Stream Management Implementation Program

In 2024, SMP partners continued to meet with their local advisory councils and working groups to implement recommendations made in stream management plans through the Stream Management Implementation Program that supports locally driven projects.

Table 4.2 summarizes the number of SMIP grants awarded in 2024 and total since program inception in 2009. In 2024, SMP partners committed nearly \$610,000 to 10 new SMIP projects while completing 12 previously approved SMIP projects. To date, 340 SMIP grants have been awarded, of which 287 grants are complete, 26 are in process, and 27 have been withdrawn.

Table 4.2 Number of SMIP awards by category for 2024 and totals to date.

SMIP Category	2024	Total ¹
Education and Outreach	4	92
Recreation and Habitat Improvements	1	29
Stormwater and Infrastructure / Critical Area Seeding	1	78
Landowner Assistance / Streambank Restoration	0	50
Planning and Research	4	62
Flood Hazard Mitigation ²	0	29
Total	10	340

1 Includes 27 project grants that were awarded but later withdrawn.

2 Since 2018, flood hazard mitigation projects are tracked separately as LFA-recommended projects to be consistent with the Revised 2017 FAD.

4.6.4 Water Quality Monitoring Studies

The SMP conducts scientific investigations to support stream management strategies and project implementation. A priority task is to continue contracting and collaborating with United States Geological Society (USGS) to advance the 10-year FAD research study to investigate turbidity production dynamics and reduction efforts in the upper Esopus Creek watershed. In 2024, DEP submitted the final biennial FAD research report and the USGS initiated new geologic and geomorphologic investigations to increase the linkage of the monitored turbidity production in the study area with the physical process and geologic sediment sources that supply the monitored stream turbidity.

Other ongoing work included (1) continued streamflow, turbidity and/or suspended sediment sampling at 32 USGS monitoring stations, some of which are funded through SMIP grants; (2) continued remote-sensed surveys of 11 Bank Erosion Monitoring Study sites; (3) repeat SFI mapping of turbidity sediment sources in Ox Clove Creek and Warner Creek tributaries to Stony Clove Creek; (4) preparations for repeat SFI mapping of turbidity sediment sources in Woodland Creek in 2025; and (5) providing technical support to an ongoing research

effort by University of Vermont and USGS researchers applying machine learning algorithms to predict stream turbidity in the Esopus Creek watershed. A peer-reviewed paper was submitted to the Journal of American Water Resources Association in fall 2024. Additional peer-reviewed research documentation included a poster presentation at the December 2024 annual meeting of the American Geophysical Union in Washington, D.C.

4.6.5 Watershed Emergency Stream Response and Recovery Plan

The Revised 2017 FAD requires the SMP to coordinate in-stream and riparian emergency recovery activities that may become necessary following flooding events with the Statewide Programmatic General Permit for emergency response post-storm recovery activities as jointly issued by NYSDEC and the US Army Corps of Engineers. The Statewide Programmatic General Permit (NYSPGP-1) was issued with an effective date of December 21, 2023.

In August 2024, NYSDEC and the United States Army Corps of Engineers activated NYSPGP-1 in response to severe weather events impacting several New York State communities in the West of Hudson watershed. NYSPGP-1 is currently active for use in Delaware County for post-storm recovery activities occurring within state and/or federally regulated waters, and wetlands. The permit will remain active for two years following the activation.

4.7 Riparian Buffer Protection Program

DEP protects and manages riparian buffers as an essential component of its overall watershed protection program. DEP's Land Acquisition Program acquires buffers that become publicly owned, while privately owned buffers are managed and protected through the CSBI, CREP, and other watershed programs.

4.7.1 Activities on City-owned or Controlled Land

DEP's LAP includes 300-foot buffers on either side of a watercourse as a principal eligibility requirement under the natural features criteria set forth in the MOA. Within the Catskill/Delaware watershed, 36.6% (91,607 acres) of all stream buffers are protected by fee simple public ownership or conservation easements held by the City, state, WAC, local municipalities, or land trusts. This includes lands protected by SAP. DEP now owns or controls more stream length (727 miles) and roughly the same amount of land within stream buffers (46,296 acres) as are protected in the Catskill/Delaware watershed by all other entities combined.

DEP carefully considers the presence or absence of riparian buffers when reviewing requests for projects on City-owned lands. For example, when issuing agricultural use licenses, DEP requires a minimum 35-foot buffer between farming activities and the stream. Proposals maintaining a larger buffer receive extra points in their rating. DEP reviews all land use permits and proposed projects for potential impacts to riparian buffers, imposing permit conditions as needed to avoid or mitigate these impacts. DEP secures stream crossing permits as required by NYSDEC and takes extra measures during forestry operations to select BMPs, such as temporary bridges or arch culverts, to minimize impacts on streams and buffers.

4.7.2 Catskill Stream Buffer Initiative

The CSBI is a component of DEP’s Stream Management Program that strives to enhance the extent and functionality of WOH riparian buffers through vegetation mapping, riparian corridor planning, buffer restoration, maintenance and monitoring, invasive plant removal, and extensive education and outreach. DEP works with CSBI coordinators in four county soil and water conservation districts who develop riparian corridor management plans (RCMPs) for participating landowners and guide project design. Since 2009, county CSBI coordinators have completed 202 RCMPs, including four new RCMPs in 2024.

Since 2009, the SMP has contracted with nurseries, including the Greenbelt Native Plant Center and One Nature, LLC, to grow over 77,646 gallon-sized trees and shrubs from locally collected seed. In 2024, the Greenbelt contract closed with final pickup and delivery of 4,000 plugs to the Greene County Soil and Water Conservation District (SWCD) Plant Material Center. Moving forward, Greene County SWCD will directly purchase and grow out seedlings for distribution to other SMP partners implementing CSBI projects.

Table 4.3 lists the eight new CSBI planting projects and two existing project extensions completed in 2024; two of the eight new plantings were completed through the CREP/CSBI pilot program. SMP basin partners completed CSBI buffer restoration on 15.2 acres of streamside property spanning 3,825 feet of stream length. These projects installed 4,276 native Catskill trees and shrubs and 650 willow stakes.

Table 4.3 Summary of new CSBI projects completed in 2024.

Basin	Name of Project	Stream Length (feet)	Area (acres)
Schoharie	Gouda RBP	300	0.21
Schoharie	DEP Snow RBP	565	0.95
Schoharie	Dymond RBP	55	.04
Ashokan	Spencer RBP	300	0.19
Rondout	Scheirer RBP	325	0.25
Neversink	Kremer RBP	75	0.05
Pepacton	Urcioli CREP/CSBI	580	4.46
Cannonsville	Kane CREP/CSBI	1,185	7.56
Cannonsville	2 extensions (prior projects)	440	1.5
Total		3,825	15.2

Since 2009, the CSBI has completed 300 total projects spanning more than 207.4 riparian acres and nearly 27 miles of stream length. These projects installed nearly 110,161 gallon-sized trees and shrubs, in addition to plugs, tubelings, and cuttings from willow and dogwood species (all native Catskill species). Figure 4.7 depicts the locations of completed CSBI projects. The Revised 2017 FAD requires the CSBI to revegetate a minimum of 10 streambank miles during 2018-2027. Through 2024, the CSBI has revegetated 10.6 miles.

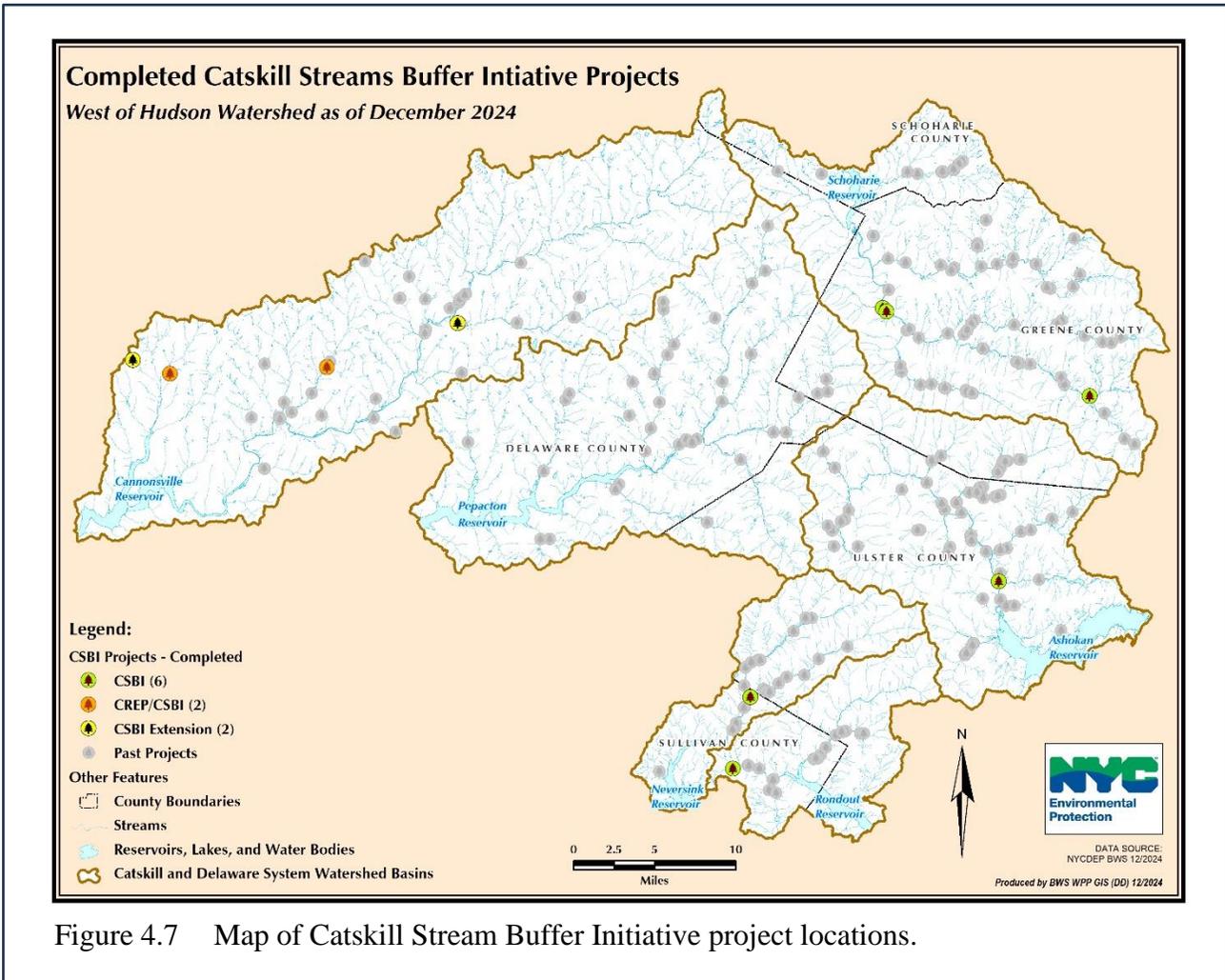


Figure 4.7 Map of Catskill Stream Buffer Initiative project locations.

To understand the factors affecting project success and design follow-up maintenance interventions, CSBI coordinators monitor projects for five years following installation to document browse pressure, plant survival and growth rates, and to assess the effectiveness of installation techniques. In 2024, 50 sites were monitored, and 19 sites were maintained.

Scheirer Riparian Buffer Restoration Project

In 2024, the Scheirer Riparian Buffer Restoration Project was completed along Chestnut Creek in the Town of Neversink. This project enhances 325 feet of streamside buffer and benefits water quality by providing a dense root network for improved soil stability and groundwater filtration. A total of 85 trees and 50 shrubs were planted along the riparian buffer, spanning a cumulative 0.25 acres. The project features 13 different species of Catskill native trees and shrubs, increasing the native biodiversity of the stream buffer, and creating habitat and food sources for pollinators and native wildlife. Sullivan County SWCD installed a perimeter fence along the project area to prevent deer browse and promote long term plant growth. This project will continue to be maintained and monitored in the coming years by Sullivan County



Figure 4.8 Photo of Scheirer Riparian Buffer Restoration Project.

SWCD. Figure 4.8 illustrates the recently installed planting of the Scheirer Riparian Buffer Restoration Project.

Delaware County CREP/CSBI Pilot Program

A CREP/CSBI pilot program is underway in Delaware County to assess the potential for implementing riparian buffer planting projects that combine the federal incentive payments from CREP with enhanced planting resources from CSBI. To date, nine projects have been completed, planting three miles of stream and revegetating nearly 55 acres of riparian buffer.

In 2024, two CREP/CSBI projects were completed: the Kane planting in the East Brook basin (priority #1 for CREP/CSBI) and the Uricouli planting in the Trout Creek basin (priority #6 for CREP/CSBI). The Kane CREP/CSBI planting resulted in a total of 7.5 planted acres, including 3.8 acres under CREP and 3.7 acres under CSBI (see Figure 4.9 **Error! Reference source not found.** and Figure 4.10 for a before-and-after comparison). Overall, 1,185 feet were planted. When the Kane CREP/CSBI planting is coupled with the adjacent 2019 Siegel CREP/CSBI planting, both projects account for 8.9 acres and over a half mile of stream within the East Brook basin. The Uricouli CREP/CSBI planting resulted in a total of 4.5 planted acres, including 1.8 acres under CREP and 2.7 acres under CSBI. Overall, 580 feet were planted for a total of 1,160 feet of bank length. Both plantings were identified as possible CREP/CSBI project sites via a survey sent in 2018-2019 and subsequent targeted mailing in 2023.



Figure 4.9 Before photo of Kane CREP/CSBI planting.



Figure 4.10 After photo of Kane CREP/CSBI planting.

4.8 Ecosystem Protection Program

4.8.1 Wetlands Protection Program

DEP protects wetlands through regulatory means, land acquisition, and multiple stewardship programs. Wetland mapping and monitoring programs provide baseline information to support these protection efforts.

Regulatory Review

DEP receives notification of applications filed in the watershed under Article 24 of the New York State Environmental Conservation Law, Section 404 of the Clean Water Act, and Connecticut state wetland regulations (Conn. Gen. Stat. Sec. 22a-42f). A subset of New York towns within the EOH watershed voluntarily forward wetland permit applications to DEP for review. DEP reviews these submittals and provides comment when alternatives that would avoid, minimize, or mitigate wetland and water quality impacts are identified. DEP's comments often lead to project plan modifications resulting in less overall impact and/or improved wetland mitigation than originally proposed.

In 2024, DEP received 12 wetland permit applications for activities in FAD basins, including eight New York State Article 24 wetland permit applications and four town permit applications. The majority (nine) of the applications reviewed were in EOH FAD basins (Figure 4.11). WOH, DEP reviewed one permit in the Pepacton basin and two in the Schoharie basin. Permanent wetland encroachments were minimal and limited to two applications totaling 0.01 acres associated with the construction of a single-family residence and the repair of a failing septic system. Nine applications included adjacent area disturbance totaling 3.54 acres. Two applications were for aquatic nuisance management and included no permanent disturbance to wetlands or their adjacent areas.

DEP reviewed an additional 22 wetland permit applications in the Croton System, including 10 NYS Article 24 and 12 town wetland permit applications (Figure 4.11). Only three applications included permanent wetland disturbance totaling 0.35 acres associated with improved road access to a utility and an equestrian center, and for a patio and mitigation plantings. Ten applications included adjacent area disturbances totaling 3.96 acres. The remainder of the applications did not involve permanent wetland or adjacent area impacts.

In 2024, DEP also reviewed and provided comments on the Proposed Rulemaking for Potential Revisions to Freshwater Wetlands Regulations (6 NYCRR Part 664). DEP provided recommendations to improve the jurisdictional determination process, and to adjust some proposed wetland classifications and definitions to improve regulatory certainty and habitat protection. In the absence of revised State wetland maps, DEP used its LiDAR derived wetland coverage to estimate potential increases in state regulation in the watershed.

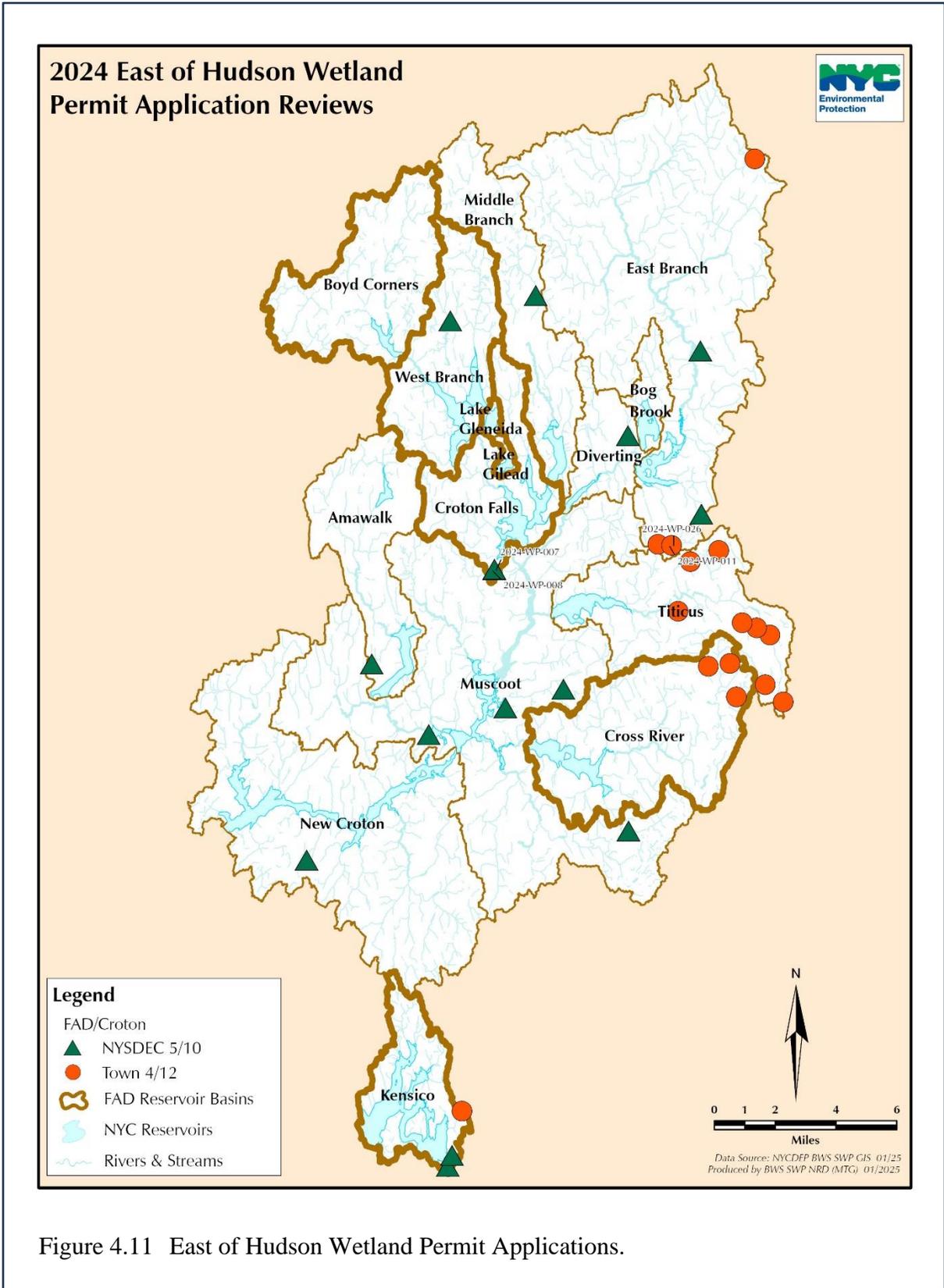


Figure 4.11 East of Hudson Wetland Permit Applications.

Land Acquisition

According to the National Wetlands Inventory (NWI) and NYSDEC freshwater wetland maps, there are approximately 15,190 acres of wetlands in the Catskill/Delaware (CAT/DEL) watershed. Since 1997, DEP has protected 3,075 acres or 20.2% of these wetlands through its Land Acquisition Program. Table 4.4 summarizes the acreage of wetlands protected through acquisition for both the CAT/DEL and Croton watersheds.

Table 4.4 Wetlands acquired or protected by LAP in the Catskill/Delaware and Croton systems as of December 31, 2024.

Description	Acres	% of Total Watershed Acreage	% of Total Land Acquired	% of Total Wetlands or Deepwater Habitats
For Catskill/Delaware (Ashokan, Schoharie, Rondout, Neversink, Pepacton, Cannonsville, West Branch, Boyd Corners, Kensico basins):				
Total Acreage of Entire Watershed	1,048,660			
Total Acreage of Wetlands (both NWI and DEC-regulated) in Entire Watershed (excluding Deepwater Habitats**)	15,190	1.45%		
Total Acreage of Deepwater Habitats in Entire Watershed	28,335		2.70%	
Total Acreage of Wetlands and Deepwater Habitats in Entire Watershed	43,526		4.15%	
Total Lands Under Contract or Closed by NYCDEP as of 12/31/23†*:	153,375		14.63%	
<i>Within those total lands under contract or closed:</i>				
Total Acreage of Wetlands (both NWI and DEC-regulated, excluding Deepwater Habitats**)	3,074		2.01%	20.24%
Total Acreage of Deepwater Habitats**	201		0.13%	0.71%
Total Acreage of Wetlands and Deepwater Habitats**	3,276		2.14%	7.53%
For Croton:				
Total Acreage of Entire Watershed	212,700			
Total Acreage of Wetlands (both NWI and DEC-regulated) in Entire Watershed (excluding Deepwater Habitats**)	20,025	9.41%		
Total Acreage of Deepwater Habitats in Entire Watershed	10,808		5.08%	
Total Acreage of Wetlands and Deepwater Habitats in Entire Watershed	30,834		14.50%	
Total lands under contract or closed by NYCDEP as of 12/31/23†*:	1,985		0.93%	
<i>Within those total lands under contract or closed:</i>				
Total Acreage of Wetlands (both NWI and DEC-regulated, excluding Deepwater Habitats**)	97.1		4.89%	0.48%
Total Acreage of Deepwater Habitats**	1.6		0.08%	0.02%
Total Acreage of Wetlands and Deepwater Habitats**	98.7		4.97%	0.32%

* Source: SWP GIS, December 31, 2024. Note: Acres are calculated directly from areas of GIS polygons and therefore may not match exactly other acreage totals submitted by DEP. Watershed statistics calculated from LiDAR-derived 1m basin boundaries updated in 2014.

** Categories considered "Deepwater Habitats" include reservoirs or large lakes (L1), unconsolidated bottom (L2UB), riverbeds (RUB & RRB) or streambeds (RSB). Categories considered wetlands include Palustrine Systems and exclude the Deepwater Habitats classes as well as all upland (U), and unconsolidated shore (L2US).

† Includes fee, conservation easements, and farm easements. Excludes non-LAP and pre-MOA land.

Statistics produced by J. Tuscanes, BWS WPP GIS, 1/15/2025

Wetland Monitoring

DEP gains information on the characteristics and functions of watershed wetlands through its wetland monitoring program. DEP has collected vegetation, soils, and long-term hydrologic data from numerous wetlands and seasonal pools throughout the CAT/DEL watershed for more than a decade (Figure 4.12). These data provide benchmarks to guide wetland protection and management efforts and identify ecological trends from factors such as surrounding land use, climate change, or invasive species.

In 2024, DEP added five seasonal pool wetlands to the monitoring program, bringing total pools in the program to 51. Water quality data (pH, dissolved oxygen, temperature, and specific conductivity) were collected from seasonal pool sites throughout the growing season.

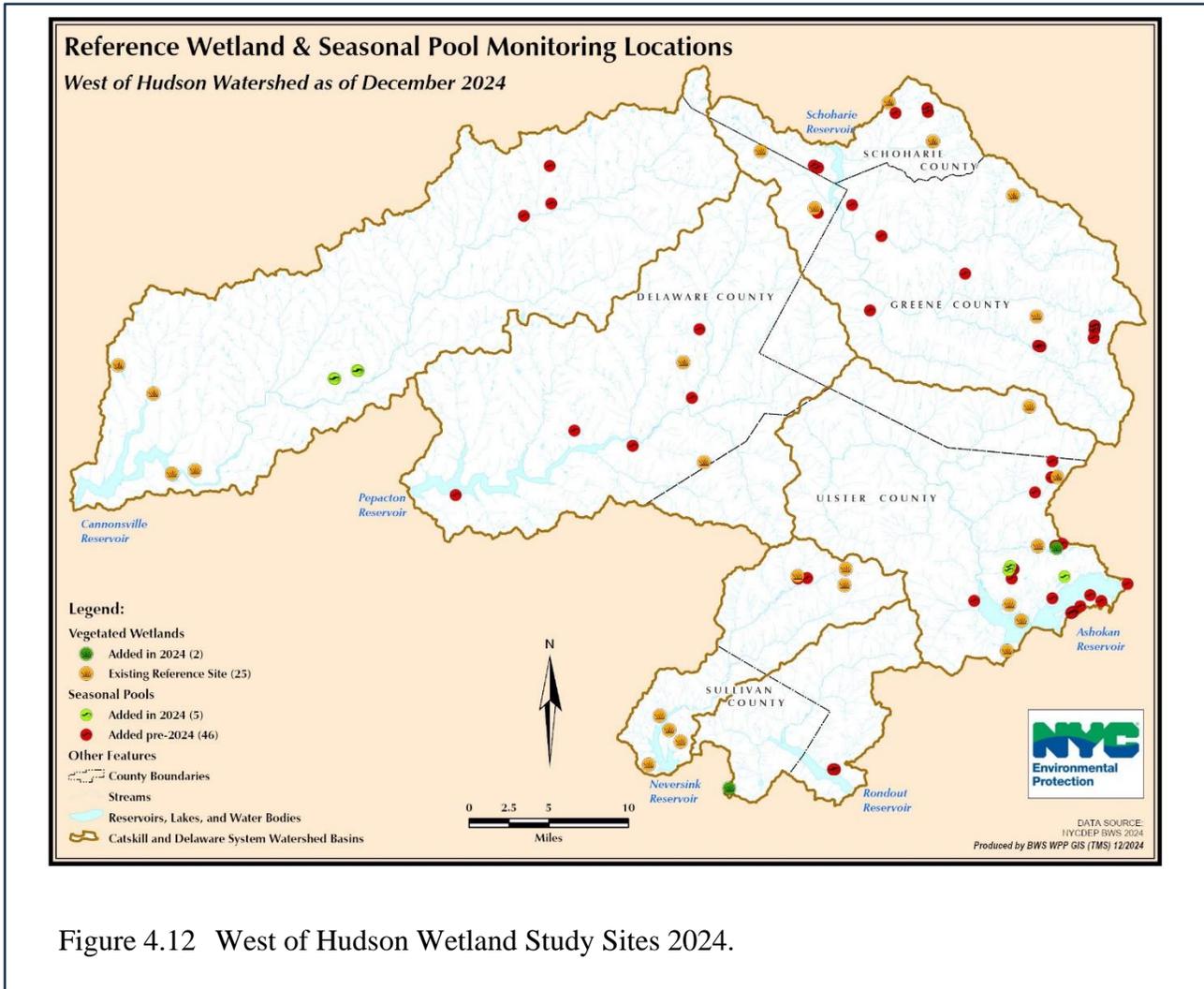


Figure 4.12 West of Hudson Wetland Study Sites 2024.

Spring adult breeding amphibian and invertebrate surveys, and amphibian egg mass counts were also conducted.

DEP added two vegetated reference wetland monitoring sites in the Rondout and Ashokan reservoir basins, bringing the total monitored sites to 27 across the WOH watershed. Soil temperature, water table elevation, and plant cover data were collected at reference wetlands throughout spring, summer, and autumn 2024.

In 2024, DEP continued its partnership with New York Natural Heritage Program (NYNHP) to help develop statewide wetland assessment methodology ([Development of Wetland Assessment Protocols in New York - New York Natural Heritage Program](#)). To date, DEP has evaluated 14 wetlands using this methodology.

Wetland Mapping

Work was completed on the contract to expand the 2015 light detection and ranging (LiDAR) wetland mapping pilot study to the entire watershed in 2022. In 2024, DEP completed an accuracy assessment for the WOH portion of the watershed. Wetlands staff evaluated 1,000 randomly selected points to determine whether they were correctly represented as wetland or upland in the LiDAR-derived coverage. The LiDAR-derived coverage correctly mapped 62% of the points that fell within wetland areas, whereas the NWI included only 33%. Conversely, the LiDAR coverage incorrectly included only 2.6% of upland areas as wetlands, compared to 1.3% for the NWI. A similar assessment will be completed for EOH in 2025. These assessments will inform additional editing needs for the LiDAR-derived wetland coverage.

DEP Forest Management Program

DEP conducts an interdisciplinary review of its proposed forest management projects to ensure long-term responsible stewardship of natural and cultural resources on City lands. As part of this review, DEP wetland scientists delineate on-site wetlands that are treated as exclusion zones in which no disturbance is permitted under normal circumstances. Moreover, the 100-foot-wide area surrounding wetlands is considered a special management zone, within which tree removal and equipment operation are limited. In 2024, DEP delineated 11 wetlands comprising 6.01 acres at two proposed forest management projects on City lands. These delineations also provide DEP with field-scale data on the characteristics of wetlands on City lands and inform remote wetland mapping efforts.

Education and Outreach

In 2024, DEP wetlands staff continued to participate in education and outreach events including an environmental education event at the Hunter Mountaintop Arboretum. DEP staff also led a group of watershed partners and community scientists on a tour of a bog on City lands in the Rondout Basin.

4.8.2 Forest Management

DEP implements its Watershed Forest Management Plan (WFMP) to maintain a healthy, resilient forest on NYC watershed lands that will continue to protect water quality. Much of this

work is achieved through commercial timber harvests that are publicly bid and overseen by project foresters. Considerable planning goes into the selection, development, and review of these Forest Management Projects (FMPs) which includes drawing on in-house expertise through DEP’s Forestry Interdisciplinary Technical Team (FITT).

The Forestry Program bid out four new FMPs in 2024 and registered the two East-of-Hudson Forest Stewardship contracts. A full range of site conditions were experienced in 2025, with the spring and early summer being rather wet leading to saturated soils, but late summer and early fall saw remarkably little rain in the watershed leading to a drought warning and the most active wildfire season for many years. These extreme conditions lead to projects such as Scutt Mountain North and Southslope FMPs being shut down for extended periods in the early summer because of the potential for excessive rutting on skid trails, and other projects such as Shavertown Heights and Quarried Coves FMPs shutting down during the height of the drought due to concerns about possible wildfire ignitions. These delays on active harvests also resulted in two FMPs that had been planned to go to bid in 2024 being pushed out to 2025. Table 4.5 lists the projects that were put out to bid in 2024 and ones that are being worked on for bidding in 2025.

Table 4.5 Forest Management Projects awarded in 2024 and planned for award in 2025.

Award Year	Project Name	FMP #	Basin	Acres
2024	Highland	5221	Ashokan	182
2024	Little Bear	5222	Schoharie	64
2024	Bungalow Brook	5205	Neversink	61
2024	Carpenters Eddy East	5116	Cannonsville	103
2024	EOH Stewardship Contracts	5082	New Croton	123
			Total	533
2025	Old Sholam	5211	Rondout	131
2025	Rocky Knob	5054	Pepacton	70
2025	Tonche Gap	5207	Ashokan	122
2025	Sugarloaf Ravine	5263	Rondout	57
2025	Myers Road	5210	Neversink	142
2025	Carpenter’s Eddy West	5202	Cannonsville	227
			Total	749

In addition to planning and bidding out new FMPs, WOH Forestry Program staff spent significant time overseeing 12 FMPs that were active during all or a portion of 2024. These projects involved over 2,030 acres of forest land straddling all three West of Hudson forestry regions (Ashokan/Schoharie, Neversink/Rondout, Cannonsville/Pepacton). The active projects ranged from an 88-acre ash salvage and thinning in the Town of Neversink on properties that were acquired in 2008 and 2020, to a 157-acre commercial firewood, thinning, and group

selection cut on Ashokan Reservoir pre-MOA lands in the Town of Hurley, and a 108-acre ash salvage and patch cut in the Town of Kortright discussed below.

During phases of active management on City FMPs, DEP foresters are in regular contact with contractors and make frequent site visits to ensure compliance with BMPs incorporated in the Harvest Plan. Problematic site conditions, whether excessively wet or dry, can dramatically increase the amount of time the project forester needs to spend overseeing a harvest. While there were a couple of large complex harvests that fell into this category in 2024, there was also one project where the seasonal timing of work and the operator combined perfectly.

The Wright Brook FMP is a medium sized (108 acres) harvest in the upper reaches of the Cannonsville Basin. The project plan was based on an assessment of inventory data that identified a significant component of ash in a part of the watershed that was not yet infested with Emerald Ash Borer. The areas of concern have an overstory that is primarily white ash and these stands will undergo a large reduction in basal area through Emerald Ash Borer-related mortality if no intervention occurs and those trees that remain will not be able to achieve crown closure. The understory in these areas contains many species, such as American beech, striped maple, ironwood, and hay-scented fern, that impede regeneration of a diverse forest. Hence, the project area was deemed at high risk of transitioning to an undesirable forest state of low species and structural diversity and a proliferation of Beech Bark Disease if no intervention took place. One of the main goals of this project is to therefore improve future forest composition and structure by creating an opportunity for desirable regeneration.

In the summer of 2024, forestry staff treated interfering beech growth in preparation for the harvest. On August 1st the harvester mobilized equipment to the site, completed access and log landing improvements, and began tree cutting (Figure 4.13 and Figure 4.14). Due to an experienced logging crew with specialized equipment, close communication with the project forester, and an unusually dry spell, the work was completed before the end of September. The project generated over 160,000 board feet of white ash and put almost 100 cords of firewood in the local residential heating market.

Forest Inventory and Planning

In 2024, DEP continued to make progress on its revision of the 2011 Watershed Forest Management Plan, a FAD deliverable due in 2027. The 2011 Watershed Forest Management Plan characterizes City-owned forest lands at watershed and reservoir basin scales based on inventory data collected by the US Forest Service and augmented through a contract that inventoried lands acquired between 2011 and 2017. The Watershed Forest Management Plan revision will provide plans for individual reservoir basins (with some basins aggregated EOH),



Figure 4.13 Wright Brook FMP access road improvements.

rather than for the watershed as a whole, as was provided in the original 2011 WFMP. To support this basin-focused effort, staff devoted considerable time to merging the USFS and later inventories into a single database. The merged inventory data can be sorted to allow the four forestry regions to assess forest management concerns and priorities for each basin.

4.8.3 Invasive Species

In 2024, DEP continued to implement the Invasive Species Management Strategy, originally submitted as a FAD deliverable in 2016 and updated in 2022. The strategy outlines actions to prevent new introductions of invasive species; to detect new infestations early and respond to them rapidly; to control and manage existing populations to support specific projects; to mitigate the impacts of species that cannot be otherwise managed; and to restore sites to prevent further impacts. This work is predominantly accomplished through intra-agency collaboration and external partnerships.

Intra-Agency Collaboration

The Invasive Species Working Group (ISWG) was formed within DEP in 2008 to develop and implement a science-based, comprehensive plan to identify, prioritize, and address invasive species threats to the water supply. The ISWG met twice in 2024 to discuss ongoing projects and collaborate on invasive species management challenges, including an updated



Figure 4.14 Wright Brook FMP patch cut in ash stand.

decontamination protocol to include motor flushing to prevent the spread of aquatic organisms in boat motor cooling compartments.

Partnerships

New York State Invasive Species Advisory Committee

DEP has a seat on the New York State Invasive Species Advisory Committee (ISAC), created through state legislation in 2007 to provide information, advice, and guidance to the New York State Invasive Species Council on invasive species impacts, prevention, regulation, detection, and management. In 2024, the ISAC continued to address the development of a New York State economic assessment of invasive species impacts, updates to the prohibited and

regulated invasive species lists, and new programs that are being developed throughout the state to address climate change. DEP attended four ISAC meetings in 2024.

Catskill Regional Invasive Species Partnership (CRISP)

DEP continued to work regionally with partners on invasive species management in the Catskill region. In 2024, DEP continued work with CRISP to run a volunteer program to manage invasive species along the Ashokan Rail Trail and to conduct restoration planting in areas impacted by the emerald ash borer. DEP participated in CRISP quarterly meetings and served as chair of the steering committee.

Lower Hudson Partnership for Regional Invasive Species Management (PRISM)

DEP continued to participate in the Lower Hudson PRISM and completed a term on the steering committee for the PRISM at the end of 2024. DEP worked closely with partners on the Beech Leaf Disease Coalition and installed a pilot deer fence, an emerging strategy in the region to address the regeneration challenges that result from the rapid loss of beech trees from this disease.

Early Detection and Rapid Response

DEP continued several rapid response efforts to eradicate early detection species in 2024 including completing the fourth year of full-scale treatment of the hydrilla (*Hydrilla verticillata*) infestation in New Croton Reservoir. Contractors with Solitude Lake Management treated 250 acres of nearshore area with herbicides containing fluridone (Sonar H4C, Sonar One, and Sonar Genesis). The treatment achieved excellent results in the downstream portion of the reservoir in 2024. However, the upstream eastern portion continued to see hydrilla growth due to challenges in maintaining target herbicide levels under higher flows in that area.

Late in the 2024 growing season, large portions of hydrilla beds were exposed due low water levels, resulting from drought and increased diversion of Croton water into distribution. Desiccation and freezing from exposure may result in significant hydrilla mortality and reduced tuber production, which will be assessed in 2025.

For the seventh consecutive year, DEP attempted to control water chestnut (*Trapa natans*) in New Croton Reservoir just below the Muscoot Dam. Multiple large rain events in 2023 spread floating mats of plants downstream from Muscoot Reservoir along the shoreline of New Croton Reservoir. Ulster County Community College interns, with support from DEP staff, were unable to remove all plants and an alternative approach is under consideration.

Princess tree (*Paulownia tomentosa*) was reported on DEP lands along the Ashokan Rail Trail by members of the public. Three fruit-bearing trees and several small saplings were identified and treated or removed with assistance from CRISP in 2024 in a continued effort to keep this species from proliferating.

Control and Management

DEP continued to manage priority invasive species on City lands through manual and mechanical removal, herbicide applications, and biological control in 2024. Species were targeted based on the threat they pose to specific project areas and include mile-a-minute weed (*Persicaria perfoliata*), Japanese knotweed (*Reynoutria japonica*), Asiatic bittersweet (*Celastrus orbiculatus*), and common reed (*Phragmites australis*).

In partnership with DEP, the Sullivan County SWCD was awarded a Landscape Scale Restoration grant from the USFS to implement an integrated pest management approach to managing hemlock woolly adelgid (*Adelges tsugae*) in eastern hemlock (*Tsuga canadensis*) forests in the watershed. Work on this project is planned to start in 2025. DEP submitted two new grant applications in 2024; one for USFS Bipartisan Infrastructure Law funding to support hemlock silvicultural treatments in combination with biocontrol predator releases, and the other for Landscape Scale Restoration funding in partnership with WAC to work with local businesses to help develop a forest stewardship services market in the WOH watershed.

Mitigation of Impacts

DEP continued to participate in a Monitoring and Managing Ash project to identify lingering ash trees in 2024. DEP staff and Ulster County Community College interns monitored four ash mortality plots throughout the WOH watershed. A lingering ash tree was detected near the Ashokan Reservoir by DEP staff, and one was reported in the East Fishkill Unit by a member of the public. More information about the Monitoring and Managing Ash project is available at <https://www.monitoringash.org/>.

In 2024, DEP continued to monitor the infestation of Zebra mussels (*Dreissena polymorpha*) in the New Croton Reservoir. DEP deployed artificial substrate samplers and collected plankton samples at locations throughout the New Croton Reservoir to monitor settlement and track larval concentrations (Figure 4.15). Zebra mussel numbers continued to expand in New Croton Reservoir in 2024. Veliger concentrations increased approximately 6.5 times at water quality sampling Site 4 (CNC4) and over 35 times at Site 1 (CNC1) in 2024 versus 2023. Settlement on artificial substrates also increased, with peak density reaching approximately 184,000 individuals m² in 2024, up from 6,300 individuals m² in 2023. DEP is collaborating across directorates to track this infestation, prevent its spread, and prepare for and respond to infrastructure impacts. Infestation risk of CAT/DEL reservoirs by zebra mussels is considered low as their water chemistry, especially calcium and alkalinity, is limiting for larval and adult survival.

The Forest Ecosystem Monitoring Cooperative funded collaboration between DEP and the Harvard Forest to develop a tool that remotely monitors forest canopy cover and condition in the WOH and EOH watersheds was completed in spring 2024. DEP staff can use the tool to view



a map that highlights areas in which the forest canopy is “less green” than normal, indicating declines in forest canopy due to pests, stress, clearing, blowdowns, or human disturbances, identifying potential impact mitigation needs (Figure 4.16).

Restoration

DEP continued to implement its restoration plan for the former lakebed exposed following the 2021 removal of the Chia Lin Dam, located in the Boyd Corners Reservoir basin. A contracted licensed pesticide applicator treated the common reed present on the site for a third time in 2024 to facilitate the establishment of a native plant community, which will be augmented with native plantings in 2025 and 2026.

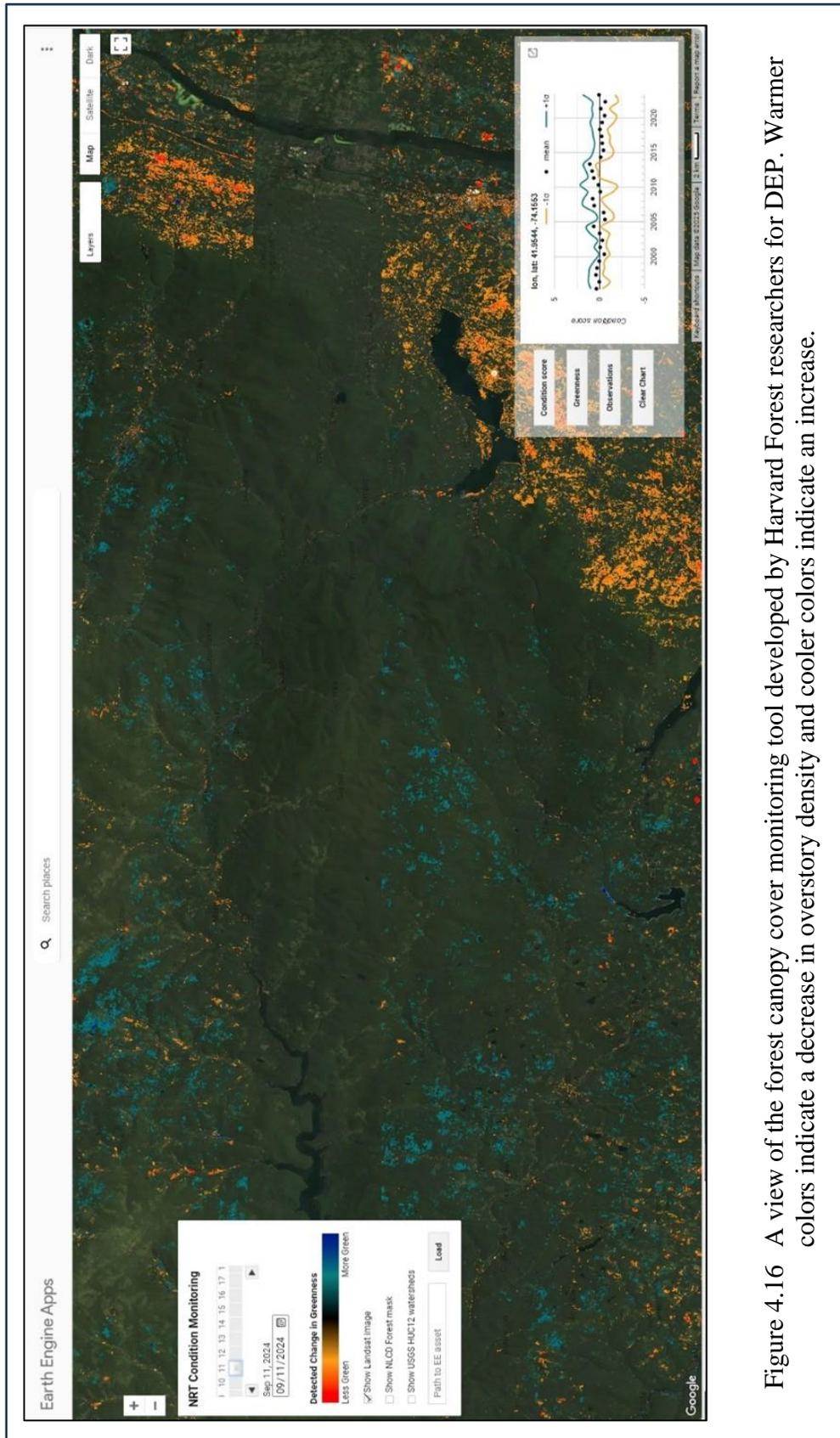


Figure 4.16 A view of the forest canopy cover monitoring tool developed by Harvard Forest researchers for DEP. Warmer colors indicate a decrease in overstory density and cooler colors indicate an increase.

4.9 East of Hudson Non-Point Source Pollution Control Program

The EOH Nonpoint Source Pollution Control Program supplements DEP’s existing regulatory efforts and other initiatives to address nonpoint pollutant sources in the four EOH FAD basins: West Branch, Croton Falls, Cross River, and Boyd Corners.

4.9.1 Wastewater Programs

Septic Programs East of Hudson

DEP supports Westchester and Putnam counties in their efforts to reduce the potential impacts of improperly functioning or maintained septic systems. Westchester County, Putnam County, and their respective municipalities continue to implement the septic requirements of the NYSDEC MS4 General Permit, which obligates municipalities and counties to implement programs for the inspection, maintenance, and rehabilitation of septic systems.

DEP previously partnered with the New York State Environmental Facilities Corporation (EFC) to implement the Septic System Rehabilitation Reimbursement Program in priority areas of the EOH Catskill/Delaware watershed and basins hydrologically connected to the Croton Falls Reservoir (i.e. Bog Brook, Diverting, East Branch, and Middle Branch). Since 2023, DEP manages this program in-house. In 2024, DEP completed the annual direct mailings to eligible residents to promote the program and issued reimbursements for 16 septic repairs; eleven were completed in the West Branch and Boyd Corners basins with the remaining five in the Cross River, Croton Falls, and upstream, hydrologically connected basins.

EOH Community Wastewater Planning Grant Program

Pursuant to the 2017 FAD, DEP developed a grant program, administered by New England Interstate Water Pollution Control Commission, to provide funding to EOH watershed municipalities for preliminary planning of community wastewater solutions for eight areas where septic systems may impact water quality. DEP completed the summary FAD report in 2022.

Video Sanitary Sewer Inspections

DEP implements an inspection program for targeted portions of the sanitary sewer system located within the West Branch and Croton Falls basins. DEP completed the Comprehensive Summary Report of these selected areas and notified the Town of Carmel of the inspection results in 2022.

4.9.2 Stormwater Facility Inspection and Maintenance

The Facility Inspection and Maintenance Program ensures that previously constructed stormwater remediation facilities continue to function as designed through routine inspections. Maintenance is completed under the warranty in each facility’s construction contract during the first year and thereafter under DEP’s maintenance program contract. Inspection and maintenance follow procedures contained in the maintenance contract. During 2024, DEP inspected all facilities, with 58 facilities requiring vegetation removal, 49 requiring sediment and/or debris removal, 14 requiring stone riprap repairs, 11 requiring tree removal, and seven requiring seed and mulch. All stormwater facilities are functioning as designed.

4.9.3 Stormwater Retrofit Grant Program

DEP funds a grant program through the EOH Watershed Corporation (EOHWC) for eligible municipalities to construct the stormwater retrofits needed to satisfy municipal permit obligations under Section IX.A.5.b of the NYSDEC MS4 General Permit. The MS4 Permit mandates that EOH watershed municipalities achieve nonpoint source phosphorous reductions through the construction of stormwater retrofits. DEP contracted with the EOHWC to provide \$22 million to support the design and construction of stormwater retrofits in the EOH FAD basins and those basins upstream of the Croton Falls Reservoir. Through 2024, EOHWC expended or committed approximately \$6 million of the initial payment and associated interest for retrofit projects in the West Branch, Boyd Corners, Cross River, Croton Falls, and upstream hydrologically connected basins. Since inception, EOHWC's retrofit program has removed an estimated 460 kg P/yr. from these basins.

4.10 Kensico Water Quality Control Program

Kensico Reservoir in Westchester County is a terminal reservoir that provides the last impoundment of Catskill/Delaware water prior to entering the City's distribution system. As such, DEP prioritizes water quality protection efforts in the Kensico basin.

4.10.1 Septic Reimbursement Program

DEP previously implemented the Kensico Septic System Rehabilitation Reimbursement Program through a contract with EFC. Since 2023, DEP directly reimburses eligible homeowners for repairs to failing septic systems or to connect those systems to an existing sewage collection system. The program is voluntary, with the goal of encouraging property owners to inspect their septic systems and, if failing, rehabilitate them. During 2024, DEP mailed the annual program reminder letter to all eligible residents and issued two septic reimbursements.

4.10.2 West Lake Sewer

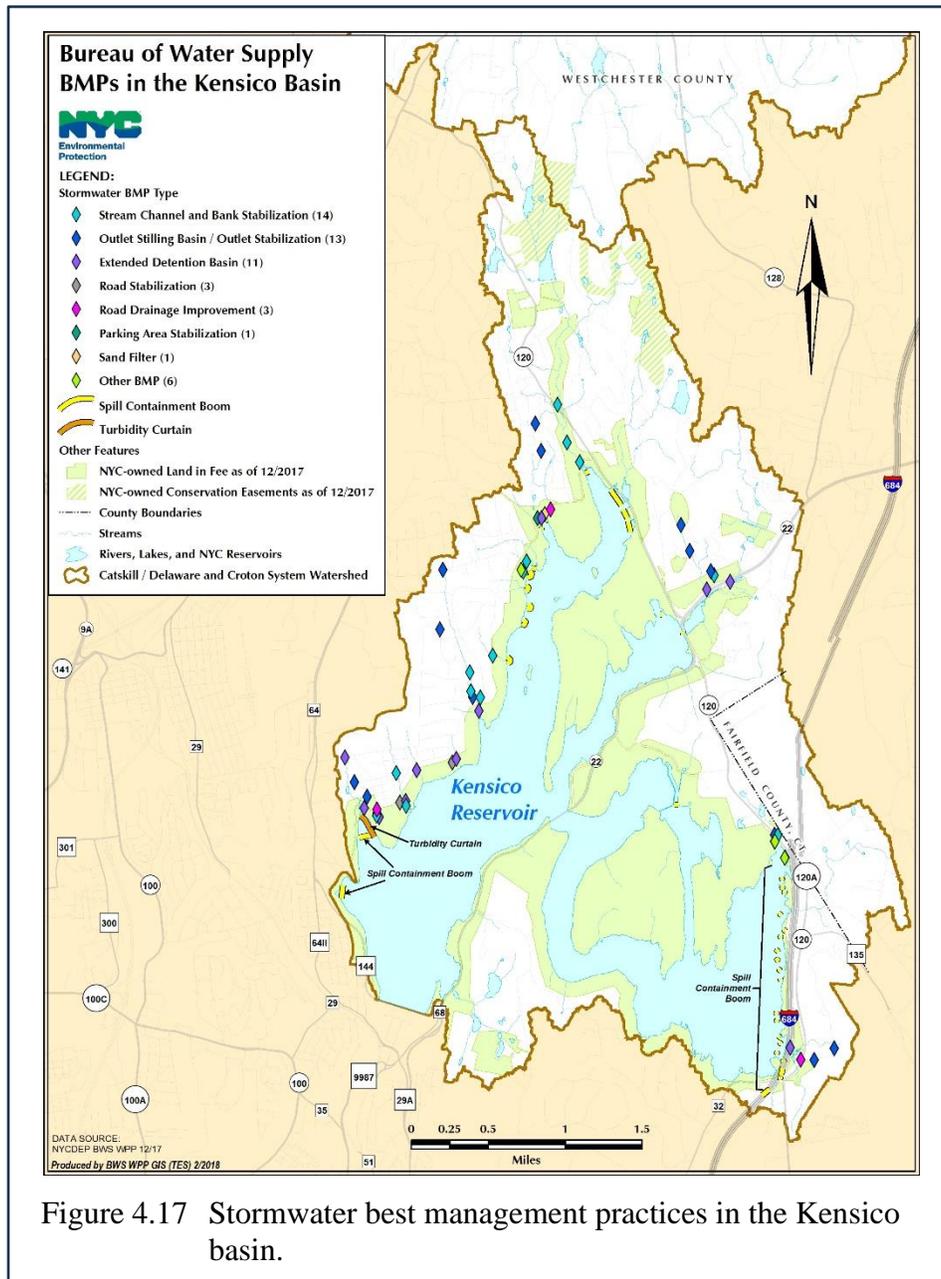
The West Lake sewer trunk line, owned and maintained by Westchester County, conveys untreated wastewater to treatment facilities located elsewhere in the county. DEP previously funded the installation of a sanitary sewer remote monitoring system for the trunk line to provide real-time detection of problems such as leaks, system breaks, overflows, and blockages. To date, there have been no overflows or concerns, and the units appear to be working well. In 2024, DEP conducted an annual visual inspection of the trunk line to assess the condition of exposed infrastructure. DEP also conducted routine partial inspections throughout the year related to ongoing maintenance of Kensico stormwater BMPs near the line. DEP noted no defects or abnormalities.

4.10.3 Video Sanitary Sewer Inspection

DEP implements an inspection program for targeted portions of the sanitary sewer system located within the Kensico basin. DEP's contractor completed the Comprehensive Summary Report of selected areas and notified the Town of Mount Pleasant of the inspection results in 2022.

4.10.4 Stormwater BMPs

DEP has constructed stormwater management and erosion abatement facilities throughout the Kensico basin to reduce pollutant loads to the reservoir. DEP and its contractor inspected and maintained these facilities throughout 2024, according to the O&M guidelines (Figure 4.17). Maintenance consisted of grass mowing, weed whacking, seeding and mulching, vegetation removal, fallen tree removal, swale repair, rip rap repositioning, and sediment and debris removal. All BMPs are performing as designed.



4.10.5 Wildlife Sanitary Surveys

DEP conducts sanitary surveys at the Kensico Reservoir as a proactive measure to identify and remove wildlife excrement before it washes into the water supply and potentially elevate fecal coliform levels. In 2024, DEP’s contractor conducted 52 wildlife sanitary surveys at Kensico Reservoir (Table 4.6). Of the 2,666 fecal samples collected, 73% were attributed to passerine birds, 14% were to Canada geese, 6% to white-tailed deer, 6% to rabbits, and the remaining to bobcat, raccoons, coyote, and unknown mammals. All samples were removed from the property following collections.

Table 4.6 Kensico Reservoir 2024 wildlife sanitary surveys.

Month/ Year of Surveys	Surveys per Month	White-tail Deer	Raccoon	Rabbit	Coyote	Bobcat	Canada Goose	Passerine (birds)	Other/ Unknown Mammal	Total (all species)
Jan-24	3	1	0	7	0	0	0	1	0	9
Feb-24	5	55	1	7	6	0	0	0	0	69
Mar-24	5	17	0	14	1	0	2	3	6	43
Apr-24	4	3	0	3	2	0	56	21	0	85
May-24	5	2	0	0	0	1	295	67	6	371
Jun-24	4	2	0	0	0	0	13	96	1	112
Jul-24	4	5	0	1	3	0	0	385	0	394
Aug-24	5	0	0	0	0	0	0	464	0	464
Sep-24	4	21	0	5	5	0	0	207	3	241
Oct-24	5	0	0	0	2	0	0	689	1	692
Nov-24	4	36	0	66	1	0	0	9	4	116
Dec-24	4	5	0	63	1	0	0	0	1	70
Totals	52	147	1	166	21	1	366	1,942	22	2,666
Percent by species		6%	0%	6%	1%	0%	14%	73%	1%	100%

4.10.6 Spill Containment Facilities

DEP maintains spill containment facilities in and around Kensico Reservoir to improve spill response and recovery. In 2024, DEP conducted routine maintenance at the spill boom sites to ensure they are available in the event of a spill. In June, a minor vehicular leak of diesel fuel occurred at DEP’s Delaware Shaft 18 facility. Speedy-Dry absorbent material was applied to the impacted asphalt surface. No spills impacted the reservoir in 2024.

4.10.7 Shoreline Stabilization

Shaft 18

Since the Catskill/Delaware Ultraviolet Disinfection Facility began operating, all Kensico water flows through the Delaware Effluent Chamber at Shaft 18 on the reservoir's southeast shore. DEP completed shoreline stabilization near the effluent chamber in 2022 to maintain turbidity levels in compliance with state and federal water quality standards.

Upper Effluent Chamber

As part of the Kensico-Eastview Connection project and reconstruction of the Upper Effluent Chamber, DEP will stabilize the shoreline, replace the existing Malcolm Brook turbidity curtain, and remove sediment near the intake channel. In 2024, DEP's engineering consultant continued design of the shoreline stabilization project and design is roughly 90% complete. Construction is anticipated to commence in 2026.

4.10.8 Other Activities

Turbidity Curtain

In 2024, DEP continued to monitor and inspect the extended primary curtain and the backup turbidity curtain that are designed to direct flows from Malcolm Brook and Young Brook farther out to the main body of Kensico Reservoir. Based on the most recent inspection, no repair work was required. The curtains appear to be functioning as intended.

Westchester County Airport

DEP continues to review activities proposed at or in relation to the Westchester County Airport due to its proximity to Kensico Reservoir.

In November 2023, Westchester County initiated SEQR environmental review for the Westchester County Airport snow equipment storage building. Although the project does not require DEP approval of a stormwater pollution prevention plan (SWPPP), DEP did request an opportunity to review the SWPPP report and plans to ensure no adverse impacts to Kensico Reservoir. In December 2024, DEP received a Draft Supplemental Environmental Assessment prepared for the activity pursuant to the requirements of the National Environmental Policy Act, and in accordance with Federal Aviation Administration Order 5050.4B.

Westchester County's website notes that the Airport Master Plan will be updated in the coming months and will not lead to expansion of the airport's existing footprint, an increase in the current passenger limit, or elimination of the voluntary curfew on overnight flights.

The Rye Lake Filtration Plant is proposed by Westchester Joint Water Works on airport property in the Town of Harrison. DEP issued an approval of the SWPPP in May 2023 and a separate tree clearing amendment to the SWPPP in December 2024. In October 2024, Westchester Joint Water Works obtained a NYSDEC Industrial SPDES Permit for stormwater and potable discharges and a NYSDEC Article 24 Wetlands Permit.

Westchester County installed a new 12-inch water main in the vicinity of the airport on New King Street in 2024 to address per- and polyfluoroalkyl substances (PFAS) contaminated water supply wells at various commercial facilities in the area.

Park Place at Westchester is a private 980-space parking garage proposed in the Town of North Castle. DEP formally approved the SWPPP in December 2024.

In accordance with a 2019 NYSDEC consent order, Westchester County prepared a site characterization work plan to assess PFAS and other groundwater contaminants at and near the airport, which was accepted into the NYSDEC Brownfield Cleanup Program. NYSDEC released a draft remedial investigation work plan in October 2022. DEP reviewed and commented on this plan in 2022; the plan remains under review by NYSDEC.

Since identifying an uncapped landfill at the airport in 2015, Westchester County has performed sampling and laboratory analysis of groundwater, surface water, landfill soils, and accumulated iron flocculent. Results of soil samples collected from eight test pits indicate exceedances for certain metals and mercury. The landfill/soil mound is expected to be addressed through Westchester County's participation in the NYSDEC Brownfield Cleanup Program. The landfill is still under investigation and has been incorporated into the remedial investigation work plan mentioned above.

On December 13, 2024, a small aircraft crashed in the median of Interstate 684 near the Rye Lake portion of Kensico Reservoir in the Town of Harrison. An unknown amount of high-octane gasoline leaked onto the grass area of the median but did not advance to a nearby storm drain about 50 feet north of the crash site. A section of absorbent boom was placed around the storm drain inlet as a precaution but there was no impact to Kensico Reservoir.

4.11 Catskill Turbidity Control

Due to the nature of the underlying geology, the Catskill watershed is prone to elevated levels of turbidity in streams and reservoirs. High turbidity levels are associated with high flow events, which can destabilize stream banks, mobilize streambeds, and suspend the glacial clays beneath the streambed armor. The design of the Catskill System considers local geology and provides for settling within Schoharie Reservoir, Ashokan West Basin, Ashokan East Basin, and the upper reaches of Kensico Reservoir. Under normal circumstances, the extended detention time in these reservoirs is sufficient to allow the turbidity-causing clay solids to settle out and the system easily meets the SWTR turbidity standards (5 NTU) at the Kensico effluent. Occasionally after extreme rain/runoff events in the Catskill watershed, DEP has used aluminum sulfate (alum) as chemical treatment to control high turbidity levels.

Since 2002, DEP has undertaken several studies and implemented significant changes to its operations to better control turbidity in the Catskill System. DEP has implemented many of these measures pursuant to the 2002 and 2007 FADs and the Shandaken Tunnel and Catalum SPDES permits. A comprehensive analysis, the Catskill Turbidity Control Study, was conducted by DEP with the Gannett-Fleming-Hazen and Sawyer Joint Venture in three phases between

2002 and 2009. DEP implemented several alternatives based on the results of this study: a system-wide Operations Support Tool (OST) that allows DEP to optimize reservoir releases and diversions to balance water supply, water quality, and environmental objectives; an interconnection of the Catskill Aqueduct at the Delaware Aqueduct Shaft 4 to improve overall system dependability; and structural improvements to the Catskill Aqueduct stop-shutter facilities. The Catskill-Delaware Interconnection and the Catskill Aqueduct stop-shutter facilities projects achieved functional completion in 2016.

4.11.1 Catalum Consent Order and Environmental Review

Rain events in October and December 2010 caused elevated turbidity levels in the Ashokan Reservoir. In addition to alum at Kensico, DEP also utilized the Ashokan Release Channel as part of a strategy previously approved by NYSDOH and USEPA to ensure all drinking water standards were met. Using the channel raised concerns from communities along the Esopus Creek downstream of the reservoir.

In February 2011, NYSDEC commenced an administrative enforcement action against the City for alleged violations of the Catskill Aqueduct Intake Chamber Catalum SPDES Permit (NY0264652) regarding operation of the Ashokan Release Channel and alum addition. NYSDEC and DEP negotiated a consent order to resolve the alleged violations, which took effect in October 2013. The consent order included penalties, environmental benefit projects, a schedule of compliance, and an Interim Release Protocol for the channel’s operation.

Consistent with the consent order, DEP requested a modification to the Catalum SPDES Permit in 2012 to incorporate turbidity control measures in water diverted from Ashokan Reservoir and to postpone dredging of alum floc at Kensico Reservoir until completion of certain infrastructure projects. The proposed modification is subject to environmental review under the State Environmental Quality Review Act (SEQRA), for which NYSDEC is lead agency. Below is a timeline for the Catalum environmental impact statement (EIS) development:

- NYSDEC released a draft scope for the Catalum EIS for public comment from April 9, 2014, to August 29, 2014. More than 550 commenters submitted more than 900 comments.
- The final scope was issued on March 22, 2017, and it took into consideration feedback from the public review process and includes responses to the comments received.
- A draft DEIS was submitted to NYSDEC on May 30, 2019.
- NYSDEC released the DEIS for public comment on December 16, 2020.
- DEIS public hearings were held on February 4, 2021 and March 3, 2021.
- The public comment period for the DEIS closed on June 16, 2021. Over 1,300 comments were received.

- On January 10, 2022, NYSDEC issued a [“Scope for the Supplemental Environmental Impact Statement for the Catalum SPDES Permit Modification.”](#) which requires DEP, as the project sponsor, to prepare a Supplemental Draft Environmental Impact Statement that is limited to analyzing the specific adverse environmental impacts that were not addressed or inadequately addressed in the DEIS. (www.dec.ny.gov/docs/permits_ej_operations_pdf/catalumsuppeisscope.pdf)
- On February 9, 2022, NYSDEC issued a [“Combined Notice of Intent to Prepare a Supplemental Draft Environmental Impact Statement \(SDEIS\) and Notice of Acceptance of Scope”](#). The combined notice was published in the Environmental Notice Bulletin and reflected the January 10, 2022 Scope document. ([ENB Region 3 Notices 2/9/2022 - NYS Dept. of Environmental Conservation](#)).
- During 2023 and 2024, DEP and NYSDEC continued reviewing comments submitted in response to the DEIS and discussing the scope of the Supplemental DEIS.
- On October 5, 2022, DEC announced a draft modification to the Interim Release Protocol for review and comment by the Ashokan Release Working Group.
- On July 1, 2024, DEC and DEP issued a Revised Interim Release Protocol for the Ashokan Reservoir.

5. Watershed Monitoring, Modeling, and GIS

5.1 Watershed Monitoring Program

5.1.1 Routine Water Quality Monitoring

To ensure the delivery of high-quality drinking water, DEP conducts extensive water quality monitoring encompassing all areas of the watershed, including sites at aqueducts and water supply intakes (keypoints); streams; reservoirs; City-owned water resource recovery facilities (WRRFs) and private WWTPs. DEP’s watershed monitoring objectives are documented in the Watershed Water Quality Monitoring Plan and its associated addenda, which are designed to meet the broad range of DEP’s regulatory and operational requirements. The overall goal is to maintain an objective-based water quality monitoring network capable of providing scientifically defensible information that can be used to protect and manage the New York City water supply.

The plan’s objectives have been defined by DEP managers and program administrators, with input from regulatory agencies and other external stakeholders. The plan prescribes monitoring to achieve compliance with all federal, state, and local regulations; meet the terms of the Revised 2017 FAD (NYSDOH 2022); support water supply operation and modeling efforts; and ensure delivery of the best water quality to consumers. Many specific objectives fall within each of these major areas.

Compliance

The compliance objectives focus on meeting the regulatory monitoring requirements for the New York City watershed. These include the Surface Water Treatment Rule (SWTR) (USEPA 1989) and its subsequent enhancements, Drinking Water Monitoring, the New York City Watershed Rules and Regulations (DEP 2019), administrative orders, and SPDES permits. The sampling sites, analytes, and frequencies for each objective are defined by the applicable permit, rule, or regulation.

FAD program evaluation

As required by the 2017 FAD, the City submitted its Watershed Protection Program Summary and Assessment in March of 2021. In response, and in a report entitled Implementation of New York City’s Watershed Protection Program and Compliance with the 2017 Filtration Avoidance Determination (July 2021), NYSDOH concluded that the City’s watershed protection program was comprehensive, robust and effectively implemented by the City and its partners. In 2024, NYSDOH revised the 2017 FAD based on the Review of the New York City Watershed Protection Program (NASEM 2020). In general, the activities outlined in the 2017 FAD remain the same, with some revisions to enhance effectiveness or improve efficiency. The following paragraphs describe these changes as incorporated in the New York City Filtration Avoidance Determination, Revisions to the 2017 Surface Water Treatment Rule Determination for New York City’s Catskill/Delaware Water Supply System (Revised 2017 FAD). In addition to annual

reports, the City also conducts a periodic assessment of the program's effectiveness using DEP's water quality monitoring data. Program effects on water quality are reported in the Watershed Protection Program Summary and Assessment reports (e.g., DEP 2021), which are produced every five years.

Modeling support

Modeling data are used to meet the long-term goals for water supply policy and protection and to provide guidance for short-term operational strategies including reservoir balancing, establishing release rates and managing unusual water quality events. These objectives are achieved through implementation of watershed and reservoir model improvements based on ongoing data analyses and research results; ongoing testing of those models; updating of data necessary for the models' development; and development of data analysis tools to support modeling projects.

Stream, reservoir, aqueduct, and meteorological data are all needed to develop, calibrate, and validate models. Data acquired through stream monitoring include both flow and water quality data. Aqueduct monitoring provides flow and reservoir operations data to support reservoir water balance calculations. The water balance and reservoir water quality data are needed to test, apply, and further develop DEP's one- and two-dimensional models. The meteorological data collection provides critical input necessary to meet both watershed and reservoir modeling goals. The modeling program's 2024 activities are summarized in the Watershed Water Quality Annual Report.

Surveillance monitoring

The surveillance objective focuses on aqueduct, stream and reservoir monitoring to guide the short-term operation of the water supply system. Additional monitoring is conducted to support treatment operations, maintain a baseline understanding of potential and emerging contaminants (e.g., trace metals, organic compounds), and evaluate water quality status and long-term trends for reservoirs and streams in the Croton System.

DEP operates an extensive Robotic Water Quality Monitoring Network (RoboMon) as part of its routine surveillance program. The network provides high-frequency data which are used for water supply management during routine operations as well as water quality events (e.g., storms). The network is critical for providing an early warning of water quality conditions, informing DEP management in making effective operational decisions, and supporting operational models. The network includes fixed-depth buoys (including two under-ice buoys), profiling buoys, and several stream installations. The RoboMon network made over 2.5 million measurements in the watershed in 2024.

5.1.2 Additional Water Quality Monitoring

In addition to routine monitoring, atypical events and operations may necessitate additional water quality monitoring. These may include operation of the Croton Water Filtration Plant, activation of the Cross River and/or Croton Falls pump stations or other event-driven

monitoring (e.g., copper sulfate treatment, taste and odor monitoring, spills). The major special investigations for 2024 are outlined below.

Special Investigation: Croton Taste and Odor Monitoring

A total of 551 samples were collected for Geosmin and 2-methylisoborneol analysis at a total of 36 sites. These samples were collected in support of copper sulfate treatment and the operation of the Croton Water Filtration Plant and the Croton Falls and Cross River pump stations. There were no taste and odor events in 2024.

Special Investigation: Invasive Species Control

DEP conducted a special investigation to continue to evaluate the fate and transport of an applied chemical herbicide in New Croton Reservoir for the treatment of the aquatic invasive plant, Hydrilla. Fluridone (trade names, SONAR H4C and SONAR ONE) was applied by a contractor in two forms (i.e., pellet and liquid) at select treatment areas in the reservoir from June through September 2024. Samples were collected in New Croton Reservoir and at the Croton keypoint site to quantify the presence and extent of transport in the reservoir before, during, and after application. DEP collected grab samples at all sites weekly and sent them to a contract laboratory for fluridone analysis. Monitoring continued through December.

Special Investigation: Pump Station Monitoring

In support of the RWBT shutdown operation, the Croton Falls and Cross River pump stations began operating on October 1, 2024, to augment Ashokan Reservoir diversions into Kensico Reservoir. Enhanced monitoring began on September 9, 2024, and was conducted in accordance with the Water Quality Monitoring Plan for Croton Falls and Cross River Pump Station Operations (September 2024) to satisfy the Section 5.1 of the Revised 2017 FAD. These data were submitted to NYSDOH on September 24, 2024, with a request for approval to operate the pumping station. Approval was granted by NYSDOH on September 25, 2024, with no water quality issues during their operation. Details of the enhanced monitoring will be provided to NYSDOH in an after-action report published in early 2025.

Special Investigation: Copper Sulfate Treatment in the Croton System

In preparation for the RWBT shutdown, DEP continued copper sulfate treatments within Croton System reservoirs to control algal populations with the potential to release taste and odor compounds. Copper sulfate treatments occurred at the Croton Falls, Cross River, Muscoot, and New Croton Reservoirs based on the results of ongoing water quality monitoring. Total copper, photosynthetic production, phytoplankton presence and abundance, and 2-methylisoborneol and Geosmin monitoring was conducted before and after treatment.

Copper sulfate was applied from a contractor boat using an on-board tank and calibrated pumping system to disperse the copper sulfate at 0.3 mg/L. In total, there were four treatments each at Croton Falls and Cross River reservoirs, six treatments at New Croton Reservoir, and seven treatments at Muscoot Reservoir. All treatment applications were successful in depressing algal growth within the treated portion of the water column. The details of these treatments are

outlined in action reports which were prepared by DEP and submitted to NYSDOH and NYSDEC.

5.1.3 Water Quality Reports

DEP produces a Watershed Water Quality Annual Report for submission to NYSDOH and USEPA in July of each year. This document provides an annual overview of water quantity, water quality of streams and reservoirs, Kensico Reservoir water quality, and a summary of the year's major water quality modeling activities. For 2024, DEP's watershed monitoring was conducted at 320 sampling sites, resulting in 13,063 samples and approximately 253,207 analyses.

5.2 Multi-Tiered Water Quality Modeling Program

DEP's Water Quality Modeling Program uses models to quantify the impact of climate change, changes in land use, individual and grouped components of the watershed protection program, operation of the water supply system, and water demand on the quantity and quality of water delivered to the City. A detailed description of progress made in 2024 will be included in the Watershed Water Quality Annual Report, which will be completed on July 31, 2025. A summary of these activities is given here.

Climate indicators

In 2024, DEP continued assessing climate change indicators and associated extreme meteorology and hydrology indices. The purpose of these indices is to describe the degree of extreme conditions for a given year relative to the reference period of 1970-2000. This reference period is used to calculate the 10th and the 90th percentiles for each indicator, with any indicator outside these values tagged as 'extreme'. Counts of these extreme values are summed for each year to generate the indices timeseries. The meteorology index continues to show a higher level of extreme variation in the underlying meteorological indicators relative to the reference period, with 47% of the indicators outside the 10th – 90th percentile range in 2024 (as compared to 20% during the reference period). The hydrology extreme index did not show significant trend during the analysis period. Hydrologic conditions are highly sensitive to antecedent conditions and other influencing factors, introducing additional biases that can complicate the interpretation of hydrologic variables as direct indicators of climate change.

Extreme climate scenarios

During 2024 we completed and refined the analyses of 2023, in which we expanded our application and refinement of the methodology presented in Frei et al. (2022) to four multi-model sets of downscaled climate products and to all six WOH watershed. The four sets of results include: (1) MACA (CMIP5), (2) NASA Global Daily Downscaled Projections from CMIP6, (3) Localized Constructed Analogues (LOCA) downscaled precipitation projections from CMIP6, and (4) high-resolution global climate model projections from Princeton University and derived from NOAA's Seamless System for Prediction and Earth System Research (SPEAR-HI). We completed the analysis for the WOH watersheds, wrote and submitted a manuscript for

publication. This manuscript is currently in review. The next step in the analysis planned for 2025 will be to extract extreme precipitation scenarios for individual watershed, and identify the key subset of scenarios to be used as input to hydrological and system operations models in order to evaluate the potential impact on the water supply.

Drought modeling

In 2024, we began developing a statistical model to analyze drought in the City’s water supply. To that end, we extended gridded estimates of climatic parameters like precipitation and temperature across the WOH watershed region. The gridded climate dataset PRISM (Parameter-elevation Regressions on Independent Slopes Model) is available only from 1981 to the present; however, through our efforts in 2024, we extended the data back to 1890. We used point-station weather data from several locations in the region, analyzed to address correlations, collinearity, and missing values; and, used machine learning approaches to develop long-term continuous datasets. Comparative assessments of various machine learning approaches demonstrated that incorporating all stations as inputs for gap-filling yielded superior accuracy compared to single-station approaches. The gap-filling framework employed models ranging from linear regression to advanced machine learning and deep learning techniques, including Long Short-Term Memory. The results showed that single linear regression or machine learning models struggled with large data gaps. However, hybrid methods, such as combining machine learning with K-nearest neighbors algorithm, improved accuracy, while Long Short-Term Memory demonstrated the highest precision. Utilizing the gap-filled station data and a Random Forest machine learning model, we were able to estimate basin-average climate data, like PRISM dataset, back to 1890. In our future work, we will refine the approach developed here using advanced deep learning methodologies and employ the improved time series of climate data for drought modeling, and analysis of drought characteristics such as frequency, duration, and severity.

Climate variability and deciduous forest phenology

In 2024, we initiated a research project to assess the impact of climate variability on deciduous forest phenology in the WOH watershed region. Multitemporal remote sensing imagery from the Moderate Resolution Imaging Spectroradiometer (MODIS) Land Cover Dynamics Product (MCD12Q2) Version 6.1 was used to extract phenology data for the period 2001–2022. Additionally, MODIS Enhanced Vegetation Index data (MOD13A1) and Leaf Area Index data (MCD15A3H Version 6.1) were used to supplement the analysis. Preliminary results indicated that the annual green-up and mid-green-up stages exhibit a slight upward trend (delays) across the watershed, while the annual peak stage shows a downward or advancing trend. Analysis of the relationship between phenology and climate variables revealed a weak negative correlation with rainfall, suggesting that increased rainfall advances phenological events. Conversely, a positive correlation was observed between the number of hot or frost days and phenological stages, indicating delayed phenological responses under these conditions. Future work will explore how climate extremes, such as heatwaves, floods, droughts, and frost events, influence water quality in forested watersheds.

TASC-Forest model for simulating carbon and water cycling in forest ecosystem

In 2024, we integrated the Daily CENTURY (DAYCENT) based forest growth algorithm into SWAT-Carbon (Soil and Water Assessment Tool-Carbon) model, and renamed the integrated model as Terrestrial Aquatic Sciences Convergence-Forest (TASC-Forest) model. The TASC-Forest model can now simulate key forest processes, such as biomass and nutrient allocation, litterfall, death, and the transformation of various tree components into litter and soil carbon pools. We evaluated TASC-Forest's ability to simulate monthly carbon fluxes, i.e., net ecosystem exchange and ecosystem respiration, using flux tower observations from seven AmeriFlux sites across the conterminous U.S. and evapotranspiration data derived from MODIS (MOD16A2GF Version 6.1). Overall, TASC-Forest demonstrated strong performance in simulating net ecosystem exchange, ecosystem respiration, and evapotranspiration across diverse forest biomes, including evergreen, mixed, and deciduous forests. The model performed particularly well at deciduous sites compared to mixed and evergreen sites. We have written and submitted a manuscript based on this site scale study which is currently in review. In 2025, we plan to evaluate the model's applicability for watershed scale studies and address important issues related to carbon sequestration, as well as the deposition and transport of dissolved organic material and carbon within the watersheds. The TASC-Forest model is expected to provide a new watershed modeling tool for the integrated assessment of carbon and water cycling in the forested WOH watersheds.

Improving R-SWAT tool to streamline calibration of TASC-Forest model

TASC-Forest model requires estimates of biomass and nutrient content for each tree part (leaf, branch, wood, fine root, mature root, and coarse root) specific to each forest biome and stand age as initial conditions at the start of the simulation. To streamline this process, we added new capabilities in R-SWAT, an open-source software tool based on R, to facilitate forest biomass initialization, as well as sensitivity analysis, and calibration of the TASC-Forest model. These enhancements include procedures for utilizing raster datasets of forest age and biomass, as well as tabular data from published literatures or field studies, as inputs for model initialization.

Land use and climate impact on water quality in EOH streams

In 2024, we conducted a study to assess the effects of land use, climate, and atmospheric nitrogen deposition on stream nutrient dynamics in the urbanized Amawalk and forested Boyd Corners watersheds. Using 20 years of streamflow and water quality data alongside SWAT, we analyzed temporal trends in nutrient levels. Monitoring data indicated a consistent decline in nitrate in both watersheds, while total dissolved phosphorus decreased only in the Amawalk watershed. The reduction in nitrate was attributed to declining atmospheric nitrogen deposition, while the total dissolved phosphorus decrease in the Amawalk watershed was attributed to wastewater treatment upgrades and restrictions on phosphorus-containing lawn fertilizers. SWAT model scenarios also emphasized the role of topographic position in determining the impact of septic systems on stream water quality. SWAT simulated streamflows closely matched observed flows especially during wet years (> 1200 mm annual precipitation) in both watersheds. Water quality simulations exhibited variable performance: nitrate simulations were more

accurate in dry years in the suburban Amawalk watershed but performed better in wet years in the forested Boyd Corners watershed. This study highlights the value of long-term monitoring data that spans diverse hydrological conditions, enabling robust model calibration and validation. Detailed findings are presented in Mukundan et al. (2025).

Using HAWQS for modeling lower Delaware watershed inflows

Reliable projections of flows from the lower Delaware watersheds into Delaware River are crucial for assessing the impact of operational decisions on New York City’s water supply management under future climate scenarios. Historically, empirical approaches have been used to estimate flows from this expansive watershed area (>15,000 km²), which lies outside the Catskill-Delaware-Croton system. In 2024, we explored the potential of using the Hydrologic and Water Quality System for simulating inflows from the lower Delaware watersheds. Hydrologic and Water Quality System is a web-based, interactive modeling tool based on the SWAT framework, which eliminates the need for user-provided computational resources. It relies on standardized input data, including climate, land use, soil, and topography. Model setups were developed for the lower Delaware watersheds, specifically for regions downstream of the NYC reservoirs (Cannonsville, Pepacton, and Neversink). Streamflows simulated at selected locations, including Hale Eddy, Port Jervis, and Trenton, demonstrated satisfactory performance when compared with observed data from USGS gauging stations.

Septic systems vulnerability assessment

We tested a desktop method for assessing the vulnerability of septic systems in the WOH watersheds. The method utilized two septic inventory datasets: one representing “failed” septic systems (N=235), identified through notices of violation, and another representing “new” and properly functioning septic systems (N=265) installed in recent years. A machine learning model employing the XGBoost algorithm was trained using hydroclimatic, soil, and topographic data, supplemented by parcel data information as predictor variables. The model effectively identified the relative importance of predictors and predicted the likelihood of septic system failure with an average accuracy of 80% when validated against an independent testing dataset. To further analyze the effects of statistically significant predictors, a Conditional Inference Tree statistical model was applied. This new approach has the potential to complement existing criteria for identifying locations less suitable for septic system siting in the NYC WOH watershed region.

DBP studies

DEP is continuing to work on a multi-year project to develop disinfection byproduct (DBP) formation potential models for source water streams, fate and transport models for DBP precursors in reservoirs, and DBP model for the City’s distribution system. In 2024, we began testing of two-dimensional hydrothermal and water quality model CE-QUAL-W2 (W2) for predicting UV254 in Ashokan Reservoir. The East and West basins of Ashokan were modeled separately. For our earlier modeling work on Ashokan Reservoir, see Gelda et al. (2009). Model testing (calibration-validation) was performed for 2011-2022 (12 years), the longest period of available UV254 data in the diverted water. A key driver of the model is UV254 in Esopus

Creek. Here we estimated long-term, continuous UV254 in Esopus Creek by combining a general additive model for dissolved organic carbon (Wang et al. 2025) with DOC-UV254 regression analysis.

We modeled UV254 with first-order decay kinetics, where the net loss rate is temperature and concentration dependent. The first-order net loss rate coefficient, k was determined to be 0.002 d^{-1} for both basins of Ashokan Reservoir. In our earlier work, optimal values of k were determined to be 0.0 d^{-1} for Neversink Reservoir (DEP, 2023), 0.0025 d^{-1} for Cannonsville Reservoir (DEP, 2023), and 0.002 d^{-1} for West Branch Reservoir (DEP, 2024). All these values of k are indicative of nearly refractory, i.e., resistant to biodegradation, nature of organic matter exported from the watershed and into the water supply. The model performed good in predicting withdrawal UV254 (RMSE = $0.006 \text{ abs cm}^{-1}$), except during 2011-2012 due to uncertainty in estimates of loading of UV254 following Hurricane Irene in August 2011. Additional details on the data development and model performance will be presented in the Watershed Water Quality Annual Report in July 2025.

In 2024, DEP in collaboration with University of Massachusetts, Amherst, continued special study of DBP precursor compounds in Neversink watershed. The study included monitoring of ultraviolet spectral scan, dissolved organic carbon, total nitrogen, THMs, HAAs, haloacetonitriles, haloketones, chloropropanones, lignin, and amino acids.

Analysis of spectral absorbance data

We analyzed absorption spectra (a_{λ} ; $\lambda = 200 - 700 \text{ nm}$) monitored in diversion from Neversink and Cannonsville reservoirs during 2017-2023. Several metrics of quality of dissolved organic matter were calculated from these spectra, including absorbance at a specific wavelength, ratio of a_{255} to dissolved organic carbon, ratios of absorbance at two wavelengths, spectral slopes between two wavelengths, and ratios of spectral slopes. These metrics can provide indications of magnitude, aromaticity, molecular weight, and reactivity of dissolved organic matter.

Turbidity loading

We continued evaluating relative contributions of turbidity loading from Shandaken Tunnel and Esopus Creek watershed into the West Basin of Ashokan Reservoir. In 2023, Shandaken Tunnel contributed 4.2% of the Esopus Creek watershed turbidity loading.

Model application to evaluate impact of Boyd Corners Reservoir on West Branch Reservoir water quality

UV254 levels in Boyd Corners Reservoir outflow exhibit periodic increases and decreases that are primarily associated with combined effects of runoff from its own watershed, and in-reservoir kinetic processes. These fluctuations directly impact UV254 levels in the downstream West Branch Reservoir often within a few hours to a few days following the input from Boyd Corners Reservoir. The impacts are more noticeable in the ‘bypass’ mode as no dilution from the lower UV254 waters from the Delaware System occurs. Furthermore, the

duration, timing and magnitude of the impacts are governed by prevailing stratification regime and related hydrodynamics of the reservoir. We hypothesized that if a portion of Boyd Corners outflow is bypassed during runoff events, then its impact on West Branch Reservoir could be lessened. To test this, we considered “what-if” scenarios of reducing the outflow by 30 MGD and evaluated the impacts with a stand-alone W2 model (i.e., not operating within OST) for West Branch Reservoir. A combination of Boyd Corners outflow and the mode of operation for Delaware Aqueduct were considered. We found that reducing Boyd Corners Reservoir flow entering West Branch Reservoir improves (i.e., reduces) UV254 absorbance modestly. Furthermore, when Boyd Corners is spilling, reservoir mode is effective in reducing the impact of elevated UV254 of Boyd Corners Reservoir.

OST-W2 runs

We conducted several OST runs to guide operations of the Catskill Aqueduct and manage water quality in the aftermath of three storms during December 2023-January 2024. During these events, peak instantaneous flows at E16i on Esopus Creek were 21,800 CFS (December 18, 2023), 6150 CFS (January 10, 2024) and 5770 CFS (January 13, 2024). Peak turbidity was > 1250 NTU in the inflow and ~ 30 NTU in the West Basin. OST-W2 simulations projected that Kensico diversion turbidity would not exceed ~ 1.5 NTU at the 50th percentile level in the scenarios with Delaware waters augmenting the Catskill waters via shaft-4 interconnection for three weeks after the storm. Thus, Ashokan diversion with shaft-4 was considered feasible without adversely affecting Kensico water quality, and diversion was planned and executed while following the interim release protocol for Ashokan Release Channel operation.

We also conducted OST-W2 runs to guide operations of the Delaware System reservoirs after receiving 8.5 cm of rain during August 9-10, 2024. OST runs with W2=ON were routinely conducted during the Rondout-West Branch Tunnel shutdown project in October 2024. These runs allowed us to evaluate and forecast turbidity in Kensico Reservoir frequently and ensured that we maintained a low baseline turbidity (< 1.5 NTU) in the reservoir. Results of a run with Catskill Aqueduct inflow turbidity of 5 NTU, and Delaware Aqueduct inflow turbidity of 4 NTU projected that Kensico diversion turbidity would exceed 1.5 NTU, but with the addition of alum at CatAlum, it would remain < 1.5 NTU.

OST upgrades

During 2024, we performed 950 OST model simulations, including runs to support Rondout West Branch Tunnel outage (pre-, during, and post-outage) work, guide reservoir operations during storm events, and guide daily normal reservoir operations. Working with DEP in 2024, the Middle Atlantic River Forecast Center completed transition to the Sacramento watershed hydrology model, while the Northeast River Forecast Center completed improvements to the ensemble forecasts for higher precipitation days. These updates were incorporated in the Hydrologic Ensemble Forecast System for use in OST. We also started building a location-specific mixed Ensemble Post-Processor that combines several forecast post-processors. Furthermore, we continued working on improving OST with these features: (1) initializing EOH

reservoirs elevations with near real-time observations, (2) building a ‘climate mode’ to efficiently perform a large number of simulations, (3) modeling water quality in Pepacton, Cannonsville, and Neversink reservoirs, (4) developing a climate-adjusted historical baseline inflow dataset, (5) extending the inflow record to the past 500 years using tree-ring based reconstructed streamflows, (6) hosting OST onto DEP Azure cloud tenant, and (7) preparing a living documentation of OST on Confluence, a Web-based knowledge sharing platform.

5.3 Geographic Information System

DEP uses its Geographic Information System (GIS) for multiple purposes: to support numerous FAD and MOA programs; to manage the City’s interests in water supply lands and facilities; to display and evaluate the efficacy of watershed protection through maps, queries, and analyses; and to support watershed, reservoir, and operational modeling efforts. Primary GIS resources include a centralized geodatabase (the GIS library), the Watershed Lands Information System (WaLIS), and Global Positioning System (GPS) technology. This report summarizes GIS technical support for programs and modeling applications; the completion or acquisition of new GIS data layers; improvements to GIS infrastructure; and dissemination of GIS data.

5.3.1 GIS Technical Support

In 2024, DEP continued to use its GIS to perform technical support and data development, including GPS fieldwork, for a variety of watershed protection programs and modeling applications. A core function of the GIS is to create customized statistical reports and maps depicting land ownership, land cover extent, hydrographic and topographic features, riparian and flood zones, water supply facilities, or program implementation status over particular basins or political boundaries. Such analyses were used for program design and planning, engineering screening, regulatory jurisdiction determination, emergency response, water supply operations, and recreational outreach. Provided extensive support for the DEP wetland regulation negotiations. GIS staff analyzed the impact of pending State wetland regulatory changes on developable lands in the west of Hudson watershed.

GIS staff worked with the Forestry Program to complete the EOH Forestry Invasive Species GIS mobile application. This new application allows DEP staff to collect field data with DEP issued mobile devices. Using a secure DEP supported security application, DEP users can directly download and upload GIS data to DEP’s centralized geodatabase, using cellular or Wi-Fi networks. This supports the elimination of data silos, allowing users to directly add to our GIS library.

GIS staff also worked with the Stream Management Program to upgrade the Stream Analyst Extension Tool. This tool is a GIS extension custom written to incorporate field collected GPS data by DEP staff and also by county partners. The tool not only allows users to modify and link field collect data, but also allows county partners and DEP to centralize their data into a shared GIS geodatabase. This tool needed an upgrade to be compatible with ArcGIS Pro technology.

5.3.2 GIS Data Management

In addition to procuring and maintaining GPS hardware and software year-round, GIS staff process and upload field-collected GPS data into GIS layers that are incorporated into the GIS Library. In the 2024 summer field season, numerous GPS datasets were collected, corrected, QA-ed, and processed into GIS layers related to wildlife and wetland studies, forestry, property management, and land acquisition.

GIS staff started a GIS application workflow data schematic effort. Staff regularly got together to begin documentation of all workflow that is being performed inside the WaLIS application. Database and GIS geoprocessing script documentation is also being captured in this effort. The documentation is being written in workflow diagram schematics and in text format. This will ensure that future employees and programmers will be able to continue the effort and understanding of the last 25 years.

As part of ongoing annual GIS data maintenance, DEP regularly updated or overhauled several existing feature classes. These included mission-critical data for various DEP programs, such as countywide digital tax parcels, City-owned land or interests, state-owned land, water supply facilities, stream restoration projects, septic repairs, and engineering project locations. Annual updates on locations of sensitive, threatened, or endangered species on City-owned lands were received from the New York Natural Heritage Program to supplement data collected by the DEP Wildlife Studies Program. DEP obtained the latest version of SSURGO2 soils data from USDA and numerous other updates from the NYS GIS Clearinghouse, including NYSDOT transportation features, NYSDEC layers, and various public recreation layers.

5.3.3 GIS Infrastructure Improvement

During 2024, DEP continued to maintain its GIS infrastructure by upgrading ArcGIS Desktop software; diagnosing database performance issues; updating schemas and servers to improve database speed; building and testing new geodatabase scripts; evaluating and refining user security levels on servers for different databases; and backing up all databases. DEP maintained GPS units used by various programs by replacing aging units, updating data dictionaries, updating software, and tracking inventory for all GPS hardware and software.

GIS staff continued to work with DEP’s Bureau of Information Technology (BIT) on an initiative to implement best practices and upgrade GIS architecture throughout all DEP bureaus in collaboration with the GIS software vendor ESRI. The GIS Section collaborated with BIT and ESRI on ESRI enterprise licensing, harnessing the ArcGIS Enterprise development environment inside the Hawthorne Data Center, and finalized plans for fully utilizing ArcGIS Online to share GIS data to ensure redundancy and backups offsite, for better resilience.

DEP also continued to upgrade and maintain WaLIS, which currently operates on approximately 200 DEP user workstations. DEP’s developers provided routine WaLIS support throughout 2024 by creating custom server reports, customizing the WaLIS interface to resolve mapping or data entry issues, or facilitating and enhancing workflow. Staff continued to modify

workflow assignments along with multiple WaLIS software updates to improve efficiency, fix bugs, and to provide new enhancements.

5.3.4 Data Dissemination to Stakeholders

Using established in-house data sharing policies, DEP continued to review all outside requests for GIS data and provide these data to watershed partners and interested parties as required. DEP provided over 54 stakeholders and communities with semi-annual data updates in January and July for newly acquired and existing City-owned lands. DEP shared updated watershed recreation data with Ulster County, WAC, and Putnam County for their recreation website mapping applications, and to the NYC Open Data Portal. Throughout 2024, DEP responded to data sharing requests from Hudson Valley Pattern for Progress, Cornell Cooperative Extension of Ulster County, Urban Sense, NYSDOH, Hunter College, Greene County SWCD, and various counties, towns, and consultants working on DEP-related watershed projects.

GIS staff implemented a plan in late to disseminate DEP's most requested "shareable/public" watershed GIS data layers by establishing an online GIS data sharing platform using ESRI's ArcGIS Online. This will improve quality control by preventing out-of-date data from being used by the public and will reduce overhead on staff for individual data requests. Staff put this plan into action in 2024.

6. Regulatory Programs

A primary component of DEP’s overall watershed protection strategy is the enforcement of applicable environmental regulations, which include, but are not limited to the New York City Watershed Rules and Regulations, the NYSDOH Appendix 75-A Wastewater Treatment Standards, the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, and the New York State Environmental Quality Review Act. Of these, the primary mechanism for protection of the water supply is via administration of the WR&R.

DEP’s regulatory efforts are focused on three primary functions: review and approval of land development projects within the watershed; inspection of the following: wastewater treatment plants, new subsurface sewage treatment systems and active construction sites; and pursuit and resolution of violations of the WR&R.

6.1 Project Review

Land development projects in the City’s watershed, including those sponsored by DEP, are reviewed to ensure compliance with the WR&R. Activities that typically require DEP review and approval include new and modified wastewater treatment plants, sewer collection systems, subsurface sewage treatment systems (SSTS), projects requiring the preparation of stormwater pollution prevention plans; and the construction of impervious surfaces. In addition, DEP issues individual residential stormwater permits and stream crossing, piping or diversion permits for other stormwater-related activities. DEP also ensures that during construction, erosion control measures are properly installed and maintained and that for the post-construction condition, projects that require stormwater pollution prevention plans or individual residential stormwater permits have properly constructed necessary long-term best management practices. In addition, DEP reviews and offers comments on permit applications that have been submitted to NYSDEC for activities such as mining operations, timber harvesting, industrial activities, landfill closures, stream disturbance and wetland incursions. DEP’s input is sought by NYSDEC in accordance with the DEP/NYSDEC Memorandum of Understanding and via the SEQRA process.

Lists of the new projects received during the previous calendar year in both the select East of Hudson reservoir basins and all West of Hudson basins are included in a semi-annual Project Activities report. This report also includes brief summaries and maps reflecting project locations. In 2024, there were 5 new commercial subsurface sewage treatment system applications, 3 sewer collection system applications, 23 stormwater pollution prevention plans applications, and 8 variance applications. Additionally, there were 9 stream disturbance permit reviews, 1 private timber harvest reviews, one NYSDOT review, one “Other” type project, and 9 NYC Land Use Permit applications in the Catskill and Delaware watersheds in 2024.

6.1.1 SEQRA Coordination

DEP reviews and provides detailed comments on all SEQRA notices received for land development projects and activities in the City's watershed. DEP's SEQRA Coordination Section processes all applications, maintains a database of new and amended notices, tracks development trends in the watershed, and coordinates with local and state entities and authorities that regularly act as Lead Agency pursuant to SEQRA Law.

The semi-annual report includes a brief summary and mapping of all SEQRA reviews processed by DEP during the previous calendar year. There were 52 new SEQRA applications received in the Catskill and Delaware watersheds in 2024.

6.1.2 Delegation Agreements

The Westchester and Putnam County Health Departments perform reviews of new, modified, and repaired SSTs in accordance with their respective Delegation Agreements with DEP. The Ulster County Health Department performs reviews of new and modified SSTs and certain intermediate repairs in accordance with its Delegation Agreement with DEP.

During the calendar year 2024, DEP received documentation relative to 33 delegated SSTs in FAD basins; 30 of these reviews are attributed to septic systems in the WOH watersheds with the remaining 13 delegated SSTS applications located in the select EOH FAD reservoir basins.

6.2 Enforcement Activities

DEP investigates, documents and issues Notices of Violation (NOV) for a wide variety of errant activities including failing SSTs, non-compliant SWPPPs, projects that commence construction without prior DEP approval, and any activity that results in a pollutant-laden discharge in the watershed. Enforcement actions are prepared with input from attorneys from DEP's Bureau of Legal Affairs and the City Law Department. In addition to coordinating with NYSDEC, county health departments, municipal code enforcement officers, and the Catskill Watershed Corporation, DEP routinely refers water quality violations to partner agencies where DEP's authority under the WR&R relative to the activity is limited or non-existent. Examples of violations that DEP fully documents and refers to NYSDEC's regional offices are discharges from sites covered by Industrial SPDES Permits, such as concrete or asphalt manufacturing facilities. In 2024, DEP opened 9 new NOV's and closed 5 existing NOV's in FAD reservoir basins. Additional detail regarding these violations is included in the semi-annual Enforcement reports.

The primary function of the DEP Police with respect to enforcement is regular patrol of the watershed on a daily basis documenting a wide range of potential water quality incursions. Police employees receive over 300 hours of training in environmental law and regulations, provided in part by DEP watershed protection staff, as well as 170 hours of practical field training in water supply infrastructure protection. The DEP police have the authority to issue summonses and notices of warning/violation of the New York State Environmental Conservation

Law, the WR&R, as well as other state and local codes. DEP regulatory staff work cooperatively with the DEP Police to ensure that citizen complaints regarding potential illicit environmental activity are investigated and addressed in a timely manner.

6.3 Wastewater Treatment Plant Compliance and Inspection Program

DEP’s Wastewater Treatment Plant Compliance and Inspection Program conducts quarterly compliance inspections at each surface discharging WWTP that operates on a year-round basis. A minimum of two compliance inspections per year are conducted during the operating season at seasonal surface-discharging facilities. Similarly, at least two compliance inspections per year are conducted at non-contact cooling water discharges to surface waters, groundwater remediation systems, landfills, and oil/water separators. Treated industrial waste discharges to groundwater, via ground surface application, are inspected four times per year. This does not preclude DEP from performing inspections with greater frequency. DEP may also conduct unannounced facility inspections to manage instances of non-compliance, respond to abnormal or emergency operating conditions, react to mistakes or problems with self-monitoring data or record keeping, discuss special DEP laboratory sampling results, oversee modifications or expansions to a facility, and fulfill special requests by internal agency management.

When violations are identified at WWTPs, DEP coordinates enforcement activities with NYSDEC, USEPA, NYSDOH, and the New York State Attorney General’s Office through the quarterly Watershed Enforcement Coordination Committee meetings. At these meetings, the operational status of watershed WWTPs is discussed, and steps are taken to ensure adequate enforcement activities are pursued to achieve compliance.

6.3.1 Facility Compliance in the Catskill/Delaware Watershed

Thirty-one WOH WWTPs were inspected by DEP on a regular schedule in 2024. Of these, 26 are permitted for year-round discharge and five for seasonal discharge. Three of the 31 are wastewater treatment facilities permitted to discharge to groundwater. These are the hamlet of Chichester, Mountainside Farms, and Hanah Country Club. Three other facilities are classified as industrial non-contact cooling water discharges. These are Friesland Campina- DOMO, Kraft Dairy and Saputo Foods. Altogether, DEP conducted 196 scheduled compliance and emergency response inspections in the Catskill/Delaware watersheds in 2024.

Compliance with SPDES permits continued to improve among WWTPs in the Catskill/Delaware watersheds in 2024, due in large part to the inspection program.

Andes WWTP

The NYSDEC issued a Notice of Violation (NOV) in February 2021 for a pumpstation overflow that occurred on December 25, 2020 at the Andes WWTP. It was expected this would lead to an inflow and infiltration (I/I) investigation and some repairs of the collection system. Another pumpstation overflow occurred on April 8, 2022, however, to date no investigation of I/I issues in either 2021 or 2022 has occurred with the exception of specific inspection of certain sewer lateral connections.

The NYSDEC issued a second NOV to Andes on April 5, 2023. This NOV required a full investigation of the wastewater treatment plant collection system to identify all sources of I/I and submit a plan and schedule for eliminating I/I to an extent that ensures compliance, by April 1, 2024. Two more pump station overflows occurred on August 9, 2024 and December 11, 2024.

The Rural Water Association was retained to investigate I/I sources and conducted inspections in June, August, and October 2024. DEP is currently awaiting submission of a copy of the I/I report.

During the January 9, 2025 WECC meeting, NYSDEC reported they sent a referral for an Order on Consent for the pump station overflows beginning in 2020, and for failure to provide the I/I investigation report, remediation plan, and schedule as required by the end of 2024.

Hunter Highlands WWTP

As reported previously, NYSDEC issued a NOV on February 6, 2019 for collection system overflows and late reporting, relative to the Hunter Highlands WWTP. On October 28, 2021 EPA issued a Significant Non-Compliance letter to the facility for total suspended solids violations which occurred in February and June of 2021.

A NYSDEC Order on Consent, including a Schedule of Compliance (Schedule), was fully executed on November 9, 2022. In January 2023, the initial list of compliance items in the Schedule was completed, including restoring internet service, SCADA, call out functions, and effluent turbidity continuous monitoring and recording. Additionally, alarms are now fully operational, and the eyewash station is in good working order.

A WWTP Evaluation Engineer's Report including unit process analysis and a Collection System Operations and Maintenance (O&M) Plan were prepared by the Engineer and submitted to NYSDEC in February 2023 as required by the Schedule. NYSDEC and DEP issued comments February 2023 and revised documents were received in May 2023.

Revisions to the WWTP O&M Manual were submitted in March 2023, as required by the Schedule. NYSDEC and DEP reviewed and issued comments in May 2023. The revised submittal was due on November 9, 2023 and has not yet been received. Specifically, the submittal needs to include a detailed plan and implementation schedule to address ammonia removal in activated sludge tanks. The collection system repairs specified in the Collection System Corrective Actions Completion Schedule, to be completed by September 30, 2023, was extended by NYSDEC to March 31, 2024, and has not yet been received.

Additionally, by November 2024, Hunter Highlands was to submit a report detailing the results of inspection and cleaning of the entire sewer collection system. This has also not been completed. Therefore, a modified NYSDEC Order on Consent and Schedule is being prepared and may include suspended penalties and may require the owner to evaluate connecting to the Village of Hunter municipal WWTP.

On September 20, 2024 the USEPA (accompanied by DEP and NYSDEC staff) conducted an inspection of the facility. At that time, and for the next several months, the operations firm of H2O discussed their uncertain future operating the facility, as the owner has failed to make payments in over a year. Owner has since made ample payments to keep operators on the job, for the time being. The USEPA issued a Request for Information letter on December 2, 2024 as a follow-up to their inspection - due dates have now expired.

DEP and NYSDEC will continue to work cooperatively to seek solutions to other issues at the facility that are not specifically cited in the Schedule. These improvements include infrastructure repairs in the CBUD building, completion of SCADA upgrade, and repairs to the equalization lagoon.

Oh-Neh-Tah WWTP

The Oh-Neh-Tah seasonal summer camp's SPDES Permit expired in April 2023. In December of 2024 the NYSDEC shared the Notice of Availability for Review and new application to renew the SPDES Permit. NYSDOH and DEP responded and NYSDEC will move forward with the process subject to public notice.

In 2023, the WWTP operators resigned just prior to camp opening. New operators were hired but were unable to get the plant running in time for the approximate two week summer run wherein the camp is fully occupied. Oh-Neh-Tah pumped out their tanks before campers arrived, giving them adequate capacity to store the flow for the season. DEP communicated with camp representatives during 2023 and 2024, in an effort to have the WWTP functional for the 2024 season. The camp did not follow through in time, and the WWTP was again inoperable for the 2024 season. The NYSDOH, with input from DEP, granted the facility permission for a hold and haul operation for the 2024 season, with specific conditions. In December of 2024 the camp acquired the services of a WWTP operator for the 2025 season.

Mountainside Farms Dairy

Mountainside Farms Dairy exceeded their SPDES permitted limits for daily maximum flow and daily average flow every month during the early portion of 2024. Mountainside Farms Dairy has a current SPDES flow limit of 51,000 GPD daily avg and 64,000 GPD daily max. The facility has a pending Industrial SPDES permit renewal application with a request to modify flow limits and change the reporting location to effluent flow.

In addition to flow concerns stated above, the facility experienced two documented overflows in the past few years. The NYSDEC issued a NOV on November 3, 2021 for the June 3, 2021 overflow of the main pump station. And, NYSDEC issued an NOV on May 26, 2023 for a January 22, 2023 overflow of the lower pump station. NYSDEC Region 4 Division of Water is currently drafting an Order on Consent and new SPDES Permit to primarily address the permitted flow, new parameters, past exceedances, and pump station overflows.

DEP participates in compliance conferences with those facilities that continue to violate their SPDES permit limits and/or monitoring requirements. Compliance conferences are usually

conducted after repeated attempts by DEP to remediate the problem with the facility owner and/or operator have failed. DEP, in conjunction with NYSDEC and local regulatory authorities, issues an NOV prior to calling for a compliance conferences. DEP did not participate in any formal compliance conferences in 2024. Many problematic and outdated facilities, which used to exceed their permits on a regular basis, have been either consolidated and connected to another upgraded facility, upgraded as a standalone facility, converted to subsurface discharge, or totally abandoned; as a result, the number of problematic WWTPs has decreased greatly.

6.3.2 Facility Compliance in the East of Hudson Watershed

The West Branch, Boyd Corners, Croton Falls, Cross River, and Kensico Reservoir basins are of special interest because they contribute to waters of the Delaware System. The following is a summary of the WWTPs and collection systems inspected within the West Branch, Croton Falls, and Cross River basins. There are no WWTPs in the Kensico and Boyd Corners basins, but DEP does perform inspections of the collection system/pump stations maintained by Westchester County and the Towns of North Castle and Harrison within the Kensico basin. In 2024, DEP conducted 116 scheduled compliance and emergency response inspections for the WWTPs in the EOH FAD basins. Additionally, during fall activation and operation of the Cross River and Croton Falls pump stations, REP staff performed weekly reconnaissance inspections of eight plants in the respective reservoir basins. Throughout the operational period, no abnormal conditions were observed.

There are nine WWTPs in the West Branch, Croton Falls, and Cross River basins. All were in substantial compliance with their SPDES permit discharge limitations in 2024.

DEP performed compliance inspections of the Town of North Castle (Old Route 22, Cooney Hill Road, Route 120/Loudens Cove, New King Street, Old Orchard Street) and the Harrison (Park Lane) pump stations and collection system throughout the 2024 monitoring period. The inspections revealed no abnormal conditions. For monitoring of the Westlake Sewer Trunk Line, see Section 4.10.2.

6.3.3 Sampling of WWTP Effluents

WWTP and WRRF effluent results are reported to NYSDOH and USEPA semiannually in the Wastewater Treatment Plant Compliance and Inspection report. Sampling data are also provided to DEP's WWTP regulatory inspection staff to provide information about plant performance.

Sampling and analysis of surface-discharging WWTP effluents was conducted by DEP's state-approved laboratories throughout the year. In 2024, City-owned WRRFs were sampled in accordance with SPDES permit requirements. Results were reported to NYSDEC in SPDES discharge monitoring reports. In January of 2023, DEP requested permission to discontinue routine monitoring at non-City-owned plants as this monitoring duplicates monitoring already required and conducted at the non-City-owned plants. NYSDOH approved the request January 23, 2023. Therefore, no samples were collected for non-City-owned plants in 2024.

West of Hudson there were 29 WWTP and WRRF facilities with active SPDES permits. Of these plants, five are City-owned and 24 are non-City-owned. The 24 non-City-owned facilities are monitored on an as needed basis as per an addendum to the Watershed Water Quality Monitoring Plan (effective date May 1, 2023).

East of Hudson there were nine WWTP and WRRF facilities with active SPDES permits (one City-owned and eight non-City-owned) in FAD basins. Mahopac is the only EOH plant with composite sampling. Eight WWTPs are located within the Cross River and Croton Falls basins, and one is located in the West Branch Reservoir watershed.

In 2024, 1,705 analyses were performed on 591 influent and effluent samples from WWTPs and WRRFs in the Catskill, Delaware and Croton Systems. Of the 591 samples, 545 were collected from City plants and 46 were collected at non-City-owned plants.

Cross River and Croton Falls Reservoirs are not routinely considered FAD basins; however, they become part of the FAD system when their pump- stations are in operation. During pump station operations, WWTP and WRRF samples are required to be collected from eight plants in these basins including Mahopac, which is monitored monthly regardless of pump station operation. The pump stations were activated from September 9, 2024 through December 13, 2024.

6.4 Capital Replacement Program

The City is obligated to pay for capital replacement of watershed equipment and methods at eligible WWTPs required by the WR&R and not otherwise required by federal or state law. DEP provides funding to replace minor equipment (e.g., filters, membranes, pumps, meters) as needed to ensure the facility functions properly and in accordance with the WR&R. DEP can directly fund the replacement of equipment under established O&M agreements with each WWTP owner. In 2024, DEP's contract partner initiated contracting efforts with two WWTP facilities that had identified eligible equipment for capital replacement. DEP anticipates that the two WWTP facilities will secure quotes for the proposed work in early 2025.

7. In-City Programs

7.1 Waterborne Disease Risk Assessment Program

EPA's Surface Water Treatment Rule and DEP's Waterborne Disease Risk Assessment Program (WDRAP) share a common goal – public health protection. The objectives of the WDRAP help provide assurance that this goal is met. Components of WDRAP have evolved over time; but the essential purpose and the core organizational structure have remained consistent over the years. WDRAP is a joint agency program involving NYC Health Department and DEP. Established in 1993, the program has continued under a series of intra-city agreements between these two city agencies. The WDRAP agreement lays out each agency's roles and responsibilities. In 2022, DEP and the NYC Health Department renewed their collaboration by finalizing a new agreement which took effect July 1, 2022, and will continue through June 30, 2027.

WDRAP has two major ongoing functions:

- To obtain data on the rates of giardiasis and cryptosporidiosis in NYC, along with demographic and risk factor information on cases and patients.
- To provide a system to track gastrointestinal illness (as indicated by diarrhea or vomiting) to ensure rapid detection of any outbreaks.

Active surveillance in NYC has been ongoing since 1993 for giardiasis and 1994 for cryptosporidiosis. Electronic reporting of cases began in 2011. Public health epidemiologists from the NYC Health Department follow up on confirmed reported cases of cryptosporidiosis to collect additional information. The epidemiologists verify the data provided in the case reports, collect additional demographic and clinical information, and identify possible sources of oocyst exposure. Giardiasis cases receive similar attention if the patient works in a high-risk setting (e.g., food handler, health care worker, childcare worker) or attends, or is thought to attend, daycare.

A shift in recent years toward the use of syndromic multiplex panels has had a notable impact on both giardiasis and cryptosporidiosis surveillance in NYC and across the United States. An increase in the number of documented cryptosporidiosis cases in NYC first noted by WDRAP staff in late 2015 has continued through subsequent years. The proportion of giardiasis patients diagnosed exclusively by an syndromic multiplex panels test at a hospital or commercial laboratory has grown from 5% in 2015 to 58.7% in 2024 (Figure 7.1). Similarly, the proportion of cryptosporidiosis patients diagnosed exclusively by an this test at a hospital or commercial laboratory has grown from 20% in 2015 to 84.5% in 2024.

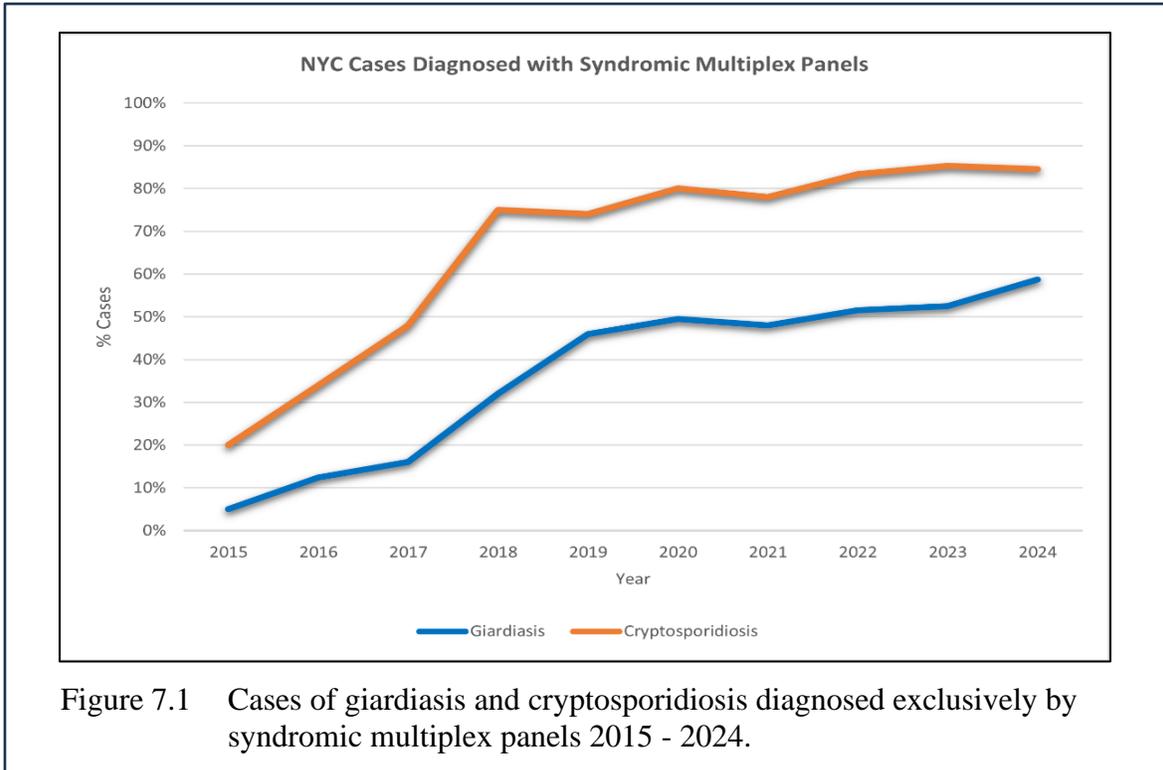


Figure 7.1 Cases of giardiasis and cryptosporidiosis diagnosed exclusively by syndromic multiplex panels 2015 - 2024.

All data from 2024 are preliminary as of this writing and are subject to change pending the results of confirmatory laboratory testing and any other needed adjustments. In 2024, there were 1468 cases of giardiasis and 342 cases of cryptosporidiosis reported to the NYC Health Department (as of January 2024). This is an 8.7% increase for giardiasis and a 16.3% decline for cryptosporidiosis from 2023. Epidemiologists completed 91 giardiasis patient interviews of patients in high transmission risk groups and conducted 263 cryptosporidiosis patient interviews in 2024.

While the case counts increased for giardiasis in 2024, there was not a similar increase for cryptosporidiosis. For giardiasis, this could be explained by the 6.2% increase in cases diagnosed exclusively by an syndromic multiplex panels test. However, the reason for the decline in cryptosporidiosis cases is unknown. Further analysis of the laboratory testing data is necessary to help determine the cause.

In addition to tracking reported cases of giardiasis and cryptosporidiosis, NYC has four syndromic surveillance systems in place to detect outbreaks of gastrointestinal illness:

1. Emergency Department Syndromic Surveillance: Electronic tracking of hospital emergency department logs is conducted to monitor chief complaints and diagnosis data including symptoms of gastrointestinal illness. Data from 53 hospitals is collected and analyzed daily.

2. **Over-the-counter Surveillance:** Sales of over-the-counter or non-prescription anti-diarrheal medications at major pharmacies are monitored electronically. Data from approximately 340 drug stores is received and analyzed daily.
3. **Clinical Laboratory Surveillance:** The number of stool specimens submitted to a large clinical laboratory for microbiological testing are tracked.
4. **Sentinel Nursing Home Surveillance:** Several sentinel nursing homes across NYC are monitored for gastrointestinal disease outbreaks.

The above systems are not specifically designed to detect outbreaks of giardiasis, cryptosporidiosis, or waterborne disease, rather they are designed to broadly detect an increase in gastrointestinal illness regardless of the cause. These systems are useful for rapid and sensitive detection of gastrointestinal illness outbreaks, and alerts from these systems could trigger rapid investigation of potential sources. In 2024, there were data transmission issues in the over-the-counter surveillance system starting on June 6, 2024, which lasted for a few weeks and resulted in fewer stores reporting to the system from one of the participating pharmacy groups. Later that same month, another data transmission issue was identified with a second group of participating pharmacies which also lasted for a few weeks; and on July 19, a global technical outage involving software from the cybersecurity firm CrowdStrike hit the over-the-counter system which further impacted the number of stores reporting medication sales through the end of July/early August. During this time, NYC Health Department staff actively worked with the different pharmacy groups to restore data workflows and backfill the missing data. To avoid a complete shutdown of the system, adjustments were made such that if data is not received from all three pharmacy groups, at 8 PM, the program will run with data from one or two available pharmacies until transmission issues are corrected. As of December 31, 2024, there are only four days with missing data from one of the three pharmacies. The NYC Health Department continues to work with the pharmacy chains to acquire the missing data. Since WDRAP has multiple elements including our mainstay Emergency Department Syndromic Surveillance system, there is some redundancy to ensure that we were not missing possible outbreaks during the period when fewer stores were reporting. All four syndromic surveillance systems continued to be operational in NYC in 2024, and there was no evidence of a drinking water-related outbreak, consistent with findings of prior years.

Each year a WDRAP annual report is prepared which provides much more detail than is provided here. The annual reports include more complete findings from disease surveillance and case follow-up (including demographic data and case interview results), summary results from syndromic surveillance programs, and WDRAP program implementation information. The WDRAP annual reports are a FAD requirement, and are submitted annually in March to USEPA, NYSDOH, and others as required. These reports, from 1997-2024, are also posted on DEP's website: <https://www1.nyc.gov/site/dep/water/waterborne-disease-risk-assessment.page>.

The additional WDRAP-related activity, annual update of the NYC’s Hillview Reservoir Cryptosporidium and Giardia Action Plan, was completed for 2024, as required by the Hillview Consent Decree, and is located at <https://www1.nyc.gov/assets/dep/downloads/pdf/water/water-monitoring/hillview-cryptosporidium-giardia-action-plan.pdf>

8. Education and Outreach

DEP collaborates with the Catskill Watershed Corporation (CWC), Watershed Agricultural Council (WAC), Cornell Cooperative Extension, Soil and Water Conservation Districts, Catskill Center, the Catskill Regional Invasive Species Partnership, the Lower Hudson Partnership for Invasive Species Management, Trout Unlimited, and other partners to increase knowledge and awareness among key audiences about source water protection, land conservation and stewardship, stream corridor protection, stormwater and wastewater, flood response and preparedness, invasive species, watershed recreation, riparian buffers, and other topics.

DEP disseminates information to a broad public audience through its [website](#), [press releases](#), and social media platforms. By the end of 2024, DEP was reaching over 14,900 followers on [NYC Water Facebook](#), over 8,800 followers on [NYC Watershed Facebook](#), over 23,100 followers on [NYC Water Twitter](#), and over 12,600 followers on [NYC Water Instagram](#). DEP's [NYC Water Flickr Page](#) contains over 12,260 photos and archival images.

Recreation and stewardship of City-owned lands are popular ways that DEP engages with certain audiences, including over 100,000 subscribers to the Watershed Recreation e-newsletter. In 2024, although DEP did not organize any in-person events on City lands, DEP continued to utilize a new expedited recreational permitting process for allowing organizations, schools, and other groups permission to use City-owned lands for low-impact outreach and recreation activities. DEP also collaborated with Ulster County to continue managing and maintaining the [Ashokan Rail Trail](#), which attracted approximately 175,000 visitors throughout 2024.

[DEP's Education Office](#) reached more than 40,000 students, educators, and other professionals in 2024 by conducting 400 environmental education programs and distributing over 20,000 resource materials; these programs included virtual and in-person field trips and professional learning opportunities, [new digital resources](#), classroom visits, and guided tours at the [Visitor Center at Newtown Creek](#). DEP's 2024 [Water Resources Art & Poetry Contest](#) engaged more than 1,700 students from over 100 schools in the watershed and New York City; contest winners were again featured in a watershed exhibit at the [Catskill Water Discovery Center](#). [Trout in the Classroom](#) engaged over 18,000 students and teachers from approximately 150 schools statewide. DEP sponsored virtual performance of the "[City That Drinks the Mountain Sky](#)" for over 4,000 students Citywide and throughout the watershed. DEP also collaborated with WAC to host a Watershed Forestry Bus Tour for over 50 non-formal educators from New York City. Due to this historic drought in fall 2024, DEP developed a resource guide of water conservation lessons and activities and demonstrated these materials for teachers attending New York City Public Schools' Climate Action Day trainings.

The [CWC Public Education Program](#) awarded 31 grants totaling \$197,222 to schools and organizations in the watershed and New York City; the estimated direct audience for these

programs is over 14,000 people. To date, CWC has awarded 764 educational grants totaling just over \$4.1 million, including 67 grants for public audiences and 697 grants for school-based audiences. CWC maintains a [networking website for watershed educators](#) and routinely posts press releases and program announcements on its main [organizational website](#).

The Watershed Agricultural Program conducted 36 farmer education programs attended by 1,237 total participants via both virtual and in-person events. Highlights included the Catskill Regional Agricultural Conference; two annual WAC Farm Tours; a series of on-farm workshops and tours; and the annual Delaware County Clean Sweep Chemical Disposal Day. WAC routinely posts program announcements on its [organizational website](#) in addition to promoting local farm and forestry products through the [Pure Catskills Campaign](#) and posting informational videos on the [WAC YouTube channel](#).

The WAC Forestry Program utilized the interactive [MyWoodlot](#) website to educate forest landowners and engage them in stewardship activities, while the [watershed model forests](#) continued to host educational events for all audiences. MyWoodlot also offers a [virtual model forest Storymap tour](#). In 2024, WAC sponsored nine logger training workshops for 137 participants and conducted 30 in-person tours for 2,176 participants, primarily New York City students. Twenty-nine teachers attended the annual [Watershed Forestry Teachers Institute](#) and 272 students participated in the 2023-2024 [Green Connections School Partnership Program](#).

The Stream Management Program offered a mix of educational events targeted to streamside landowners, municipal officials, watershed professionals, school-based audiences, and others. Highlights include the Ashokan Watershed Conference; Schoharie Watershed Month/Summit; Streams 101 Trainings; Watershed Wednesday Webinar Series; FEMA Map Services Center and Elevation Certificates Training; Realtor’s Flood Risk Training; Post-Flood Emergency Stream Intervention Training; Sediment and Erosion Control Training; Bioengineering Training; Stream Morphology Training for Municipal Officials; Citizen Science-Based BioBlitz; Stream Project Field Tours; Riparian Plantings; Knotweed Management Training; Eastern Hemlocks, Forest Health and Threats to the Future Training; Mycelial Streams Watershed Regeneration Conference; Exploring Upper Esopus Creek Watershed Film Screening; Legislative Watershed Bus Tour; Get To Know Your Stream Management Program Training; Stream Explorers Program; Watershed Detectives Club Afterschool Program; Stream Watch Program; Career Day events; and recreation-based programs designed to improve appreciation and understanding of stream ecology such as stream snorkeling, kayaking, and guided stream and forest walks. The [CatskillStreams.org](#) website continues to serve as a resource and repository for streamside landowners and local officials on dozens of stream-related topics.

Finally in 2024, DEP and watershed partners attended more than 200 community outreach events where staff communicated with the public and distributed information. The following is a partial list of event highlights: Belleayre Annual Fall Festival, Bovina Farm Day, Career Day (multiple locations), Catskill Outdoor Expo, Delaware County Fair, Delhi Harvest

Festival, Earth Day (various school events), Family Farm Day, Grahamsville Little World's Fair, Greene County Environmental Awareness Days, Greene County Youth Fair, Invasive Species Awareness Week, Maplefest, Marlboro Community Day, Margaretville Cauliflower Festival, Meredith Dairy Fest, New York City Watershed Science and Technical Conference, New York State Floodplain and Stormwater Manager's Association Annual Conference, New York Woodman's Field Days, Olive Day, Shandaken Tunnel SPDES Permit Outreach Meeting, Take Your Child To Work Day (multiple locations), Ulster County Fair, Westchester County Engineering Expo, and the Westchester County Regional Envirothon.

9. Miscellaneous Reporting Provisions

9.1 Water Conservation/Demand Management

Despite a steady increase in population since the 1980s, New York City’s average daily demand has decreased over the past several decades, with daily demand below the 1960s drought-of-record (1,405 MGD) since 2009 (Figure 9.1). Several factors are responsible for this decrease, such as increased efficiency and awareness of water conservation, as well as the implementation of DEP’s Water Demand Management Program.

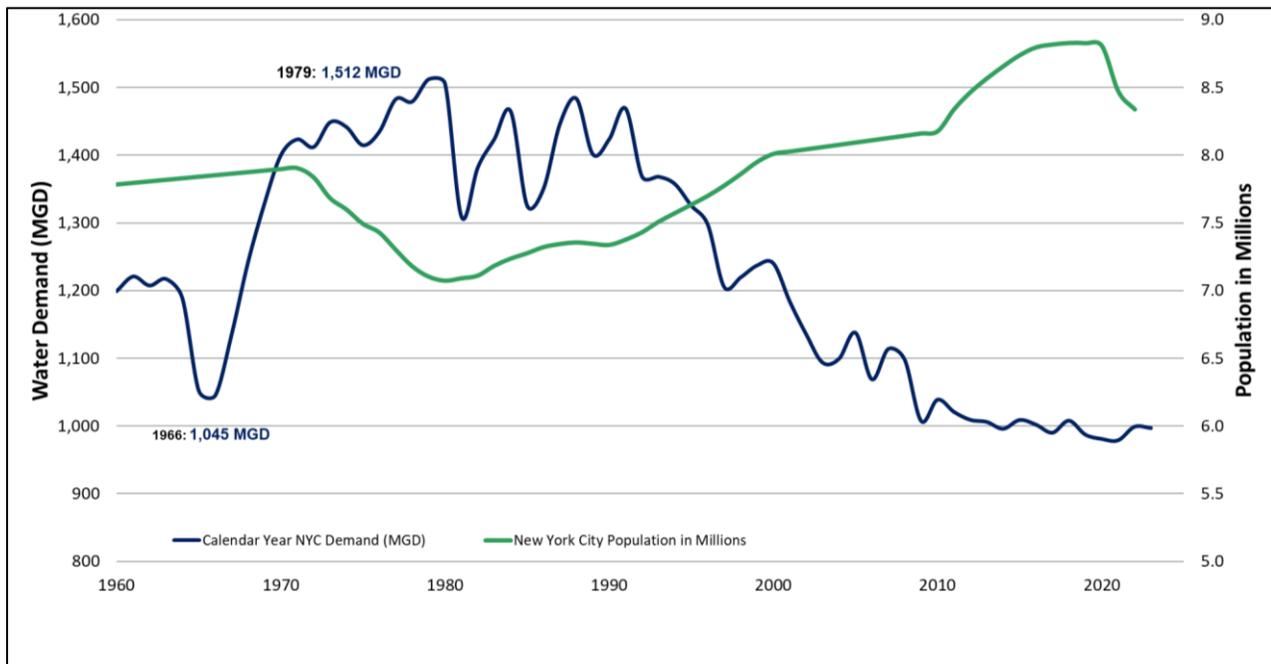


Figure 9.1 New York City historic water demand and population.

In 2013, DEP implemented a comprehensive Water Demand Management Program, as part of the Water for the Future Program, with the goal of reducing consumption by 50 MGD by 2022. After several years of continued declines in demand and based on the progress, the goal was revised to 20 MGD. In 2023, DEP surpassed this goal with 22.7 MGD of water savings. The initial driver of the Demand Management Plan was to reduce demand through conservation to offset the effects of the Delaware Aqueduct closure and ensure an adequate water supply for the city. The Demand Management Program has proven to be a cost-effective approach towards conserving water that has also created exciting opportunities and partnerships with multiple industries throughout New York City. This program has continued to provide benefits to the City, along with continued efforts to reduce nonrevenue water, optimize metering infrastructure,

and reduce losses in the distribution system with continuous improvement and monitoring efforts.

9.1.1 Water Demand Management Plan

As described in the 2018 Water Demand Management Plan and subsequent annual updates (<https://www1.nyc.gov/site/dep/water/water-conservation.page>), DEP evaluated various options and developed a cost-effective program with a focus on water demand management through conservation to ensure an adequate supply of water. The most cost-effective options became the top demand management strategies. The plan sets forth six major strategies:

- Municipal Water Efficiency Program: Involves retrofits of city-owned properties.
- Residential Water Efficiency Program: Focuses primarily on the Toilet Replacement Program for multi-family buildings.
- Non-Residential Water Efficiency Program: Collaboration with private sector organizations including restaurants, hotels, hospitals, and universities.
- Water Distribution System Optimization: Entails system repairs and upgrades, managing water pressure, and refining water meter accuracy and leak detection.
- Water Supply Shortage Management: Encompasses the review and revision of plans to prepare for a drought and other water shortages.
- Wholesale Customers Water Demand Management Program: Targets demand management planning and implementation for wholesale customers north of the City.

The following is a summary of DEP's recent progress in implementing these strategies.

Municipal Water Efficiency Program

DEP established partnerships and completed several projects with key municipal agencies and entities to support water efficiency measures in their facilities. Partners include the New York City Department of Education (DOE), the New York City Department of Parks and Recreation (DPR), the New York City Fire Department, the City University of New York (CUNY), New York City Health and Hospitals Corporation (HHC), New York City Department of Citywide Administrative Services, and New York City Department of Cultural Affairs – Cultural Institutions Group.

Beginning in 2013, DEP's partnership with DOE has funded the replacement of over 40,000 new and efficient fixtures in over 500 school facilities across all five boroughs to date. DEP completed the partnership in 2023 and in total, DOE retrofits saved 3.8 MGD.

DEP's partnership with CUNY included nearly 1,000 fixture upgrades at City College for a demand savings of 0.04 MGD. DEP and CUNY extended their partnership and executed an interagency agreement to replace inefficient fixtures at Queens College. DEP and CUNY replaced over 1,000 fixtures across four campus buildings at Queens College for an estimated savings of 0.03 MGD. These upgrades were completed in 2024.

In 2024, DEP continued its partnership with DPR and the Central Park Conservancy and Prospect Park Alliance. In Central Park, the North End Recirculation Project will include a pumping and filtration system to recirculate water in the Park's northern waterbodies and reduce flow to the City's combined sewer system. The project design is completed and is anticipated to save 0.48 MGD. In Prospect Park, DEP continued coordinating with Prospect Park Alliance to replace a valve on the make-up water line for the park's lake system. In 2022, Prospect Park Alliance completed the design; once completed, the project is expected to save 0.80 MGD.

DEP is also continuing to partner with HHC to complete an additional HHC retrofit project at Bellevue Hospital. Funding was transferred to HHC to replace 6 vacuum pumps that serve two medical vacuum systems. These pumps have far exceeded their useful life and are outdated, inefficient, and use a constant stream of water to create a vacuum seal within the pump. These retrofits are expected to greatly improve efficiency and result in significant water savings. Project design is currently being finalized and expected to be put out to bid for construction in 2025.

Residential Water Efficiency Program

In June 2019, DEP concluded the Toilet Replacement Program after five years of successful implementation. The program retrofitted approximately 13,300 toilets citywide for a savings of 0.63 MGD.

DEP worked with Honeywell to provide building owners with complimentary household water conservation surveys to help identify opportunities for water savings and detecting leaks leading up to .4 MGD of water savings. In total, DEP has achieved a demand savings of 1.03 MGD through these two initiatives.

Non-Residential Water Efficiency Program

The DEP Water Conservation and Reuse Grant Pilot Program incentivizes commercial and residential water conservation projects that achieve a minimum water savings of 2,740 gallons per day (1 million gallons per year). DEP has offered grant funding to one applicant and is currently in the process of confirming their funding and legal agreements. The project includes a 400,000 gallon per day water reuse system that contributes not only water conservation benefits, but also combined sewer overflow reductions. Overall, the pilot program is anticipated to save 0.2 MGD by 2025.

DEP has successfully completed several Water Challenges to different commercial sectors: hotels, restaurants, hospitals, and universities. Participants are encouraged to reduce their annual water consumption by at least 5% from their baseline year (measured as the 12-month period prior to the beginning of the Challenge). DEP prepares monthly reports to help participants track their consumption and their performance against the other participants. DEP also hosts quarterly workshops to help participants learn how to make their facilities more water efficient.

DEP's latest challenge, a two-year Water Challenge to Universities, was completed in August 2020. Collectively, the six participants—Fordham University: Lincoln Center Campus, The New School, Long Island University: Brooklyn Campus, Pace University, St. John's University, and Weill Cornell Medicine—reduced their monthly average water consumption by 11%, surpassing the 5% Water Challenge goal, for a total savings of 0.12 MGD.

Water Distribution System Optimization

Water distribution system optimization includes system repairs and upgrades, water pressure management, refining water meter accuracy, and leak detection. In 2024, DEP surveyed a total of 1,648.47 miles of water mains. As a result of leaks proactively found and repaired, DEP estimates that 12,528,920 gallons of water per day were saved.

Leaking and/or vandalized fire hydrants can result in significant water waste; an illegally opened fire hydrant can release more than 1,000 gallons per minute. In 2024, DEP repaired 7,283 hydrants, replaced 850, and provided other maintenance services to 8,607 additional hydrants.

DEP continually works to improve maintenance of the pressure zones within the City's water distribution system. In 2024, DEP completed 5,120 preventive maintenance inspections/calibrations on pressure regulating valves. DEP also overhauled 3 of the 444 pressure regulating valves in use citywide. In 2024, the number of breaks per 100 miles was 5.7, below the City's 10-year average of 6.3, and well below the accepted industry average of 25 breaks per 100 miles annually.

DEP's efforts to achieve universal metering of all DEP water and sewer accounts is motivated by the need to reduce non-revenue water and promote conservation among water users by providing accurate consumption information. The universal metering initiative is also critical to measuring the success of many other demand management strategies. Accurate consumption data enables DEP to determine whether target consumer groups have achieved projected consumption reductions or how demand management strategies may be adapted to improve their effectiveness. In 2024, DEP replaced 3,773 large meters.

To date, approximately 525,510 customers have signed up for My DEP to view their bills, water usage, and payment history online. This service also allows customers to pay their bills online and sign up for automatic billing (eBills); approximately 151,471 customers have signed up for eBills. To date, over 702,000 customers have signed up for leak alerts.

Water Supply Shortage Management

In May 2022, amendments to DEP's "Drought Emergency Rules" (15 RCNY Chapter 21) were formally adopted and promulgated. As amended, the rules are now titled the "Water Shortage Emergency Rules."

New York City's rulemaking process is governed by the procedure set forth in the City Administrative Procedure Act. DEP first initiated the process of amending the Drought Emergency rules in July 2013. In January 2022, the Mayor's Office of Operations and the New York City Law Department certified DEP's final draft amendments to the "Drought Emergency

Rules” (“Water Shortage Emergency Rules” as proposed by the amendments), and DEP subsequently noticed them for public review and comments and held a public hearing on the draft amendments in February 2022. The amendments to the rules were deemed final and effective as of May 13, 2022. The revisions to the rules expand their scope and applicability to include water shortages caused not only by hydrological droughts, but also other types of events such as planned and unplanned infrastructure outages.

The revisions also add, remove, and change certain water use prohibitions during the different stages of a water shortage emergency, to provide more clarity and better reflect DEP’s understanding of city water use. Although this action does not apply to routine residential water use such as drinking, bathing, or dishwashing, DEP expects that public awareness of the restrictions would lead to decreased residential water use during a declared water shortage emergency.

Wholesale Customers Water Demand Management Program

The Wholesale Customer Water Demand Management Program assisted DEP’s seven upstate wholesale customers (utility partners) in developing demand management plans for their systems, with a target 5% reduction in consumption. All seven utility partners developed demand management plans under this program, with a total two-year sustained water demand savings of 5.21 MGD (a 9% decrease from their 2013 baseline). Due to unforeseen circumstances brought on by the COVID-19 pandemic, much of the anticipated funding for implementation of this program was reallocated. However, in January 2023, DEP was able to reinitiate a partnership with the City of Yonkers, NYC’s largest wholesale customer, to implement a combination of tailored demand management strategies. This project is expected to achieve an additional estimated savings of 1.3 MGD.

9.2 Updates to Drought Management Plan

In 2024, the monthly average precipitation was above normal for about 58% of the year (based on historical average for the period 1993-2022). The NYC Delaware Basin Reservoir System storage stayed above the “Normal” storage level for the entire year and the probability of refill did not fall below 50% for the Catskill or Delaware Systems. The Rondout West Branch Tunnel shutdown began on October 1, 2024, causing the Delaware System to be inaccessible for water supply use. The previous month (September) had been a dry month with precipitation more than 3” below normal for that time of year. Followed by a record dry month in October with less than 1” of rain, a NYC Drought Watch was declared on Nov 02, 2024, and Drought Warning was declared on November 18, 2024. This was based on the newly revised “Drought Emergency Rules” (15 RCNY Chapter 21), adopting Water Shortage Emergency Rules that include water shortages caused by planned infrastructure outages (see Section 9.1.1). This refers to the City rule on drought, providing flexibility to declare a drought based on water shortages due to infrastructure outages, not exclusively on hydrology. Below refers to the rules governing DEP Drought declaration, which has not changed.

The Drought Management Plan has three phases — Drought Watch, Drought Warning, and Drought Emergency — that are invoked sequentially as conditions dictate. The Drought Emergency phase is further subdivided into four stages with increasingly severe mandated use restrictions. Guidelines have been established to identify when a Drought Watch, Warning, or Emergency should be declared and when the appropriate responses should be implemented. These guidelines are based on prevalent hydrological and meteorological conditions, certain operational considerations and other factors. In some cases, other circumstances may influence the timing of drought declarations.

- Drought Watch - Drought Watch is declared when there is less than a 50% probability that reservoirs in either of the two largest systems, the Delaware (Cannonsville, Neversink, Pepacton, and Rondout Reservoirs) or the Catskill (Ashokan and Schoharie Reservoirs), will fill by June 1, the start of the water year.
- Drought Warning - A Drought Warning is declared when there is less than a 33% probability that reservoirs in either the Catskill or Delaware System will fill by June 1.
- Drought Emergency - A Drought Emergency is declared when there is a reasonable probability that, without the implementation of stringent measures to reduce consumption, a protracted dry period would cause the City's reservoirs to be drained. This probability is estimated during dry periods in consultation with the New York State Drought Management Task Force and the New York State Disaster Preparedness Commission. The estimation is based on analyses of the historical record, the pattern of the dry period months, water quality, subsystem storage balances, delivery system status, system construction, maintenance operations, snow cover, precipitation patterns, use forecasts, and other factors. Because no two droughts have identical characteristics, no single probability profile can be identified in advance that would generally apply to the declaration of a Drought Emergency.

The Drought Management Plan was last revised in 2012 and DEP is currently working to update and revise the plan. DEP continues to encourage consumers to conserve water and to observe the City's year-round water use restrictions, which remain in effect. These restrictions include a prohibition on watering sidewalks and lawns between November 1 and March 31 and illegally opening fire hydrants.

9.3 Delaware Aqueduct Leak

DEP efforts to repair the Delaware Aqueduct continued in 2024 and included the following major activities:

- Completion of a total dewatering of the Rondout West Branch Tunnel. This was the first total dewatering of the tunnel since 1958. The tunnel was out-of-service for approximately 74 days during this operation.

- During this dewatering, additional partial excavation of the Rondout West Branch Tunnel Bypass tunnel East and West Connection Tunnels as well as partial excavation of the Shaft 6B Drainage Tunnel was conducted.

Tunnel Dewatering Preparation

The 50 million gallons per day pumping station, which can dewater the Rondout West Branch Tunnel under the expected conditions, is currently undergoing pump rehabilitation. Pump station exercises are conducted monthly with comprehensive testing of the pump station conducted annually.

Rondout West Branch Tunnel Bypass and Repair

The bypass tunnel project continues to make progress. The final concrete lining of the tunnel was completed in October 2021. Final lining of the access shafts was completed in July 2022, and construction of the access chamber superstructures is significantly completed. The Shaft 6B drainage tunnel pump station installation was completed and tested in June 2022.

The shutdown of the Rondout West Branch Tunnel for connection of the bypass to the existing tunnel is expected to commence in autumn 2025. During the execution of the connection, workers will grout the leaks in the Wawarsing area of the tunnel from within the dewatered tunnel. DEP expects the bypass project to be completed by May 2026.

Hydraulic Investigations of the Rondout West Branch Tunnel

Investigations of the Rondout West Branch Tunnel help DEP assess the nature and degree of leakage stemming from the aqueduct. Efforts to study the nature of the leak are described below.

- The Tunnel Monitoring Program has ended. The program’s purpose was to determine if tunnel conditions are changing. The monitoring efforts under this contract resulted in a determination of no substantial change during 2021.
- DEP in conjunction with our two contracts have since taken over tunnel leakage monitoring as part of the 2023 dewatering exercises, and 2024 full dewatering. These contracts have gathered data on tunnel leakage and surface expressions during these events.
- Data and analysis from the 2023 partial dewatering exercises noted that tunnel leakage rates have increased above the levels noted from leakage testing in 2008-2010. Data and analysis from the 2024 RWBT full dewatering determined that the increased leakage rates noted in 2023 is transient in nature and at full dewatering the leakage rates are within the current capacity of the Shaft 6B drainage tunnel pump station.

Catskill Aqueduct Repair and Rehabilitation

The Catskill Aqueduct Repair and Rehabilitation (CATRR) project focuses on the section of the aqueduct between Ashokan Reservoir in Ulster County and Kensico Reservoir in Westchester County. The project's scope focuses on inspection of the entire aqueduct, repairing deficiencies (including concrete and mechanical components), and removing a biofilm layer on the interior walls to improve the hydraulic characteristics of the tunnel and restore tunnel capacity. CATRR construction commenced in August 2018. The fourth and final shutdown was carried out between October and mid-December 2021 with significant scope achieved, including the stabilization of the Catskill Influent Weir at Kensico Reservoir, biofilm removal, valve replacement and repair of several steel pipe siphon locations, and wall and invert repairs in the Reynolds Grade Tunnel.

Two related projects include building chemical addition facilities at the Ashokan Screen Chamber and the Pleasantville Alum Plant to deliver chlorination and dechlorination chemicals and alum, respectively. The Pleasantville Alum Plant project reached substantial completion in October 2021. Substantial completion of the Ashokan Screen Chamber was reached in March 2023. Both projects have since completed and are currently under operation by DEP.

9.4 Catskill/Delaware Filtration Plant

The 1997 Filtration Avoidance Determination first required the City to produce a preliminary design for filtration facilities for the Catskill/Delaware water supply. The 2002 FAD required the City to provide biennial updates to the preliminary plant design for the Catskill/Delaware (CAT/DEL) system (in addition to constructing an ultraviolet light disinfection facility that began fully operating in October 2012). The 2007 FAD continued to require the City to provide a biennial report updating the preliminary design for filtration facilities. In 2013 and 2015, the City and NYSDOH agreed no design changes to the 2009 preliminary plans for the CAT/DEL filtration facilities were necessary. In recognition that the work supporting the existing preliminary plans was over 25 years old, the 2017 FAD required the City to contract for a comprehensive review of filtration methods and technologies, resulting in a new conceptual design for a filtration facility or facilities.

DEP completed the initial phase of the design project, which included bench scale studies, in 2020. Following evaluation of the results, DEP initiated phase two of the project in 2021. The second phase includes the design, construction, and operation of large-scale pilot plants; completion of pilot studies and a report; and completion of a full-scale conceptual design. The 2024 work included constructing a foundation and tent structure for the pilot equipment, updating pilot testing protocols, submitting permit applications, and working with the general contractor to advance the fabrication and installation of components of the pilot system. The Rondout West Branch Shutdown bailout impacted the schedule to commence the one-year pilot study, and study revisions were initiated in late 2024.

9.5 Arkville office

DEP has committed to locate staff in an office constructed in Arkville, N.Y. by the Catskill Watershed Corporation. The goal of sharing space is to further improve coordination on joint programs and to enhance accessibility for watershed communities. This collaboration also strengthens watershed partnership programs, fostering closer cooperation on key initiatives that protect water quality and support local communities.

The FAD requires DEP to assign at least 40 staff members to the Arkville office by December 31, 2026. As of the end of 2024, DEP had 36 full-time employees working in the building. DEP has allocated additional vacant positions to be based in Arkville; those positions will be filled as allowed by the City's hiring process.

References

- DEP. 2019. New York City Watershed Rules and Regulations. 1997, amended November 29, 2019. Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources. RCNY Title 15, Chapter 18.
- DEP. 2023. 2022 Watershed Water Quality Annual Report.
- DEP. 2024. 2023 Watershed Water Quality Annual Report.
- Frei, A., Mukundan, R., Chen, J., Gelda, R., Owens, E. M., Gass, J., & Ravindranath, A. (2022). A cascading bias correction method for global climate model simulated multi-year precipitation variability. *Journal of Hydrometeorology*, 23(5), 697-713. doi:<https://doi.org/10.1175/JHM-D-21-0148.1>
- Gelda, R. K., Effler, S. W., Peng, F., Owens, E. M., & Pierson, D. C. (2009). Turbidity model for Ashokan Reservoir, New York: Case Study. *Journal of Environmental Engineering*, 135(9), 885-895.
- Mukundan, R., Moknatan, M., & Gelda, R. K. (2025). Investigation and modeling of land use effects on water quality in two NYC water supply streams. *Journal of Environmental Management*, 373, 123993. doi:<https://doi.org/10.1016/j.jenvman.2024.123993>
- National Academies of Sciences, Engineering, and Medicine 2020. Review of the New York City Watershed Protection Program. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25851>.
- NYSDOH [New York State Department of Health]. 2017. New York City Filtration Avoidance Determination. 2017 FAD.
- NYSDOH [New York State Department of Health]. 2022. New York City Filtration Avoidance Determination. Revised 2017 FAD.
- USEPA [U.S. Environmental Protection Agency]. 1989. Drinking Water; National Primary Drinking Water Regulations; Filtration, Disinfection; Turbidity, Giardia lamblia, Viruses, Legionella, and Heterotrophic Bacteria; Final Rule. 54 Fed. Reg. 27486. June 29, 1989. WHFRL-3607-7. Washington, D.C.
- Wang, K., Mukundan, R., Gelda, R. K., & Frei, A. (2025). Modeling dissolved organic carbon export from water supply catchments in the northeastern United States. *Science of the Total Environment*, 963, 178532. doi: <https://doi.org/10.1016/j.scitotenv.2025.178532>

Appendices

Appendix Table 1 Streams, stream buffers, wetlands and deepwater habitats, floodplains and forest cover on lands protected pursuant to the FAD.

Land Protection Category	Total in CAT/DEL Watershed incl. Reservoirs (acres) ¹	% Total CAT/DEL Watershed Area	CAT/DEL Stream Length (miles) ²	% total CAT/DEL Stream Miles	CAT/DEL 300 ft. Riparian Buffer (acres) ³	% Total CAT/DEL Riparian Buffers	CAT/DEL Wetlands (acres) ⁴	% Total CAT/DEL Wetlands	CAT/DEL Forest Cover (acres) ⁵	% Total CAT/DEL Forest Cover	CAT/DEL Floodplain (acres) ⁶	% Total CAT/DEL Floodplain
<u>Publicly-Owned or Controlled lands⁷</u>												
NYC-owned Non-LAP Property (Pre-1997 or facility-related)	61,331	5.85%	105	2.73%	6,878	2.75%	27,013	62.06%	31,764	3.81%	29,921	55.33%
NYC-owned LAP Property (Post-1997, Fee Simple)	95,255	9.08%	382	9.96%	24,456	9.78%	2,363	5.43%	82,127	9.85%	2,070	3.83%
Land Protected by SAP Fee Simple	314	0.03%	4	0.12%	220	0.09%	33	0.08%	262	0.03%	56	0.10%
Land Protected by LAP NYC Conservation Easement	26,277	2.51%	107	2.79%	6,706	2.68%	444	1.02%	22,775	2.73%	490	0.91%
Land Protected by WAC Farm Easement	28,199	2.69%	120	3.14%	7,458	2.98%	406	0.93%	15,045	1.80%	1,368	2.53%
Land Protected by WAC Forest Easement	3,227	0.31%	6	0.16%	494	0.20%	19	0.04%	3,011	0.36%	50	0.09%
NYCFFBO - NYC-owned	51	0.00%	1.4	0.04%	42	0.02%	4	0.01%	35	0.00%	37	0.07%
FEMA FBO – NYC-owned	52	0.00%	0.9	0.02%	40	0.02%	7	0.02%	32	0.00%	42	0.08%
Subtotal NYC Lands and Easements	214,705	20.47%	727	18.97%	46,296	18.50%	30,289	69.59%	155,051	18.59%	34,035	62.93%
NY State-owned Land	210,079	20.03%	625	16.32%	42,562	17.01%	1,268	2.91%	207,825	24.92%	981	1.81%
Other in Protected Status	8,831	0.84%	45	1.17%	2,700	1.08%	360	0.83%	7,459	0.89%	488	0.90%
NYCFFBO - Municipally-owned	23	0.00%	0.6	0.01%	21	0.01%	2	0.01%	14	0.00%	20	0.04%
FEMA FBO – Municipally-owned	39	0.00%	0.5	0.01%	29	0.01%	2	0.00%	15	0.00%	36	0.07%
Total CAT/DEL Public Land:	433,678	41.36%	1,398	36.49%	91,607	36.62%	31,920	73.34%	370,364	44.40%	35,559	65.75%

Land Protection Category	Total in CAT/DEL Watershed incl. Reservoirs (acres) ¹	% Total CAT/DEL Watershed Area	CAT/DEL Stream Length (miles) ²	% total CAT/DEL Stream Miles	CAT/DEL 300 ft. Riparian Buffer (acres) ³	% Total CAT/DEL Riparian Buffers	CAT/DEL Wetlands (acres) ⁴	% Total CAT/DEL Wetlands	CAT/DEL Forest Cover (acres) ⁵	% Total CAT/DEL Forest Cover	CAT/DEL Floodplain (acres) ⁶	% Total CAT/DEL Floodplain
Private Watershed Lands												
Private Land	614,982	58.64%	2,433	63.51%	158,577	63.38%	11,606	26.66%	463,744	55.60%	18,520	34.25%
Total CAT/DEL Privately-owned Land:	614,982	58.64%	2,433	63.51%	158,577	63.38%	11,606	26.66%	463,744	55.60%	18,520	34.25%
Grand Total Land in CAT/DEL:	1,048,660	100.00%	3,830	100.00%	250,184	100.00%	43,526	100.00%	834,108	100.00%	54,080	100.00%

1. GIS Data Source: NYCDEP BWS, 12/2024. Land ownership acreage categories are calculated directly from areas of GIS polygons and therefore may not match exactly other survey-based acreage totals submitted by DEP. GIS data are clipped to the NYC watershed boundary. CAT/DEL includes all WOH basins plus West Branch, Boyd Corners, and Kensico. Reservoir basin boundaries derived from 1m LiDAR in 2014. Water features are from local-resolution National Hydrography Dataset (NHD) originally derived from 1m LiDAR in 2013 and last updated by DEP GIS staff in 2020.
2. Includes streams and river centerlines only as a linear measurement, wherever they intersect with the specified land category.
3. Riparian Buffers are calculated as a 300-foot area on both sides of watercourses (streams and rivers only, excludes ponds, lakes, and reservoirs). Any water features within these buffers were excluded from buffer acreages.
4. Includes Wetlands plus Deepwater Habitats. Acres of both are calculated from a combined GIS layer of NWI and DEC-mapped polygons and summarized by categories specified by DEP Wetlands Scientists, already used for FAD annual reporting purposes. Categories considered "Deepwater Habitats" include reservoirs or large lakes (L1), unconsolidated bottom (L2UB), riverbeds (RUB & RRB) or streambeds (RSB). Categories considered "Wetlands" include Palustrine Systems and exclude the Deepwater Habitats classes as well as all upland (U), and unconsolidated shore (L2US). These definitions are distinct from the definition of an NFC-qualified wetland under the WSP.
5. Forest features are from landcover classes derived from LiDAR, leaf-off and leaf-on imagery that was acquired by DEP in 2009. Specific classes included are Deciduous and Coniferous Trees from the landcover dataset, using the query "Landcover IN (1, 4)"
6. "Floodplains" are defined as 100-year Floodplain, areas with a 1% annual chance of flooding. The query used, "FLD_ZONE IN ('AO', 'AH', 'AE', 'A', 'VE')", is extracted from published FEMA DFIRM data. Some Wetlands, Floodplains, and Riparian Buffers overlap with each other, so these acreages cannot be added together for a "total water feature" figure.
7. All LAP properties are "Under Contract" or "Closed". "Other in Protected Status" means the land is believed to be under some form of permanent ownership by a land trust or municipal government.

Appendix Table 2 Solicitation outcomes by basin since 1997.

Kensico Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	20	405	41%
Offer Refused	8	78	8%
No Response	3	120	12%
Not Interested	6	357	36%
Other*	5	39	4%
Kensico Basin Sub-Totals:	42	999	

West Branch / Boyd Corners Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	210	9,466	67%
Active, Under Negotiation	2	336	2%
Offer Refused	41	362	3%
No Response	42	793	6%
Not Interested	48	2,933	21%
Other*	29	286	2%
West Branch / Boyd Corners Basin Sub-Totals:	372	14,177	

Ashokan Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	243	13,025	31%
Active, Under Negotiation	5	102	0%
Offer Refused	79	4,901	12%
No Response	164	9,580	23%
Not Interested	169	10,700	25%
Other*	66	3,940	9%
Ashokan Basin Sub-Totals:	726	42,248	

Cannonsville Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	278	27,496	21%
Active, Under Negotiation	3	247	0%
Offer Refused	74	6,462	5%
No Response	502	43,238	33%
Not Interested	431	45,671	34%
Other*	129	9,538	7%
Cannonsville Basin Sub-Totals:	1,417	132,652	

Neversink Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	30	4,836	22%
Offer Refused	9	1,188	5%
No Response	43	4,387	20%
Not Interested	51	10,162	46%
Other*	7	1,703	8%
Neversink Basin Sub-Totals:	140	22,276	

Pepacton Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	335	31,945	28%
Active, Under Negotiation	7	612	1%
Offer Refused	54	6,302	6%
No Response	272	23,665	21%
Not Interested	332	45,787	41%
Other*	78	4,603	4%
Pepacton Basin Sub-Totals:	1,078	112,914	

Rondout Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	154	8,384	29%
Active, Under Negotiation	1	47	0%
Offer Refused	24	903	3%
No Response	92	5,522	19%
Not Interested	155	12,845	45%
Other*	15	810	3%
Rondout Basin Sub-Totals:	441	28,512	

Schoharie Basin

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of Basin Acres</u>
Signed/Closed	393	29,068	33%
Active, Under Negotiation	12	957	1%
Offer Refused	81	5,532	6%
No Response	417	16,324	18%
Not Interested	343	23,508	27%
Other*	190	13,086	15%
Schoharie Basin Sub-Totals:	1,436	88,476	
Grand Totals:	5,652	442,253	

* "Other" includes properties solicited but now developed / ineligible, resolicitation under way (awaiting response), and contract rescinded.

"Project acres" are used for projects that are Signed/Closed, otherwise "solicited acres" are used. Includes all programs except WAC. Does not include inactive projects.

Appendix Table 3 Solicitation outcomes by county since 1997.

Dutchess County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	27	1,073	47%
Offer Refused	6	39	2%
No Response	7	102	5%
Not Interested	12	1,028	45%
Other*	3	18	1%
Dutchess County Sub-Totals:	55	2,261	

Putnam County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	183	8,393	70%
Active, Under Negotiation	2	336	3%
Offer Refused	35	323	3%
No Response	35	691	6%
Not Interested	36	1,905	16%
Other*	26	269	2%
Putnam County Sub-Totals:	317	11,917	

Westchester County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	20	405	41%
Offer Refused	8	78	8%
No Response	3	120	12%
Not Interested	6	357	36%
Other*	5	39	4%
Westchester County Sub-Totals:	42	999	

Delaware County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	622	58,301	25%
Active, Under Negotiation	11	808	0%
Offer Refused	131	12,453	5%
No Response	776	67,267	29%
Not Interested	749	78,751	34%
Other*	208	14,623	6%
Delaware County Sub-Totals:	2,497	232,203	

Greene County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
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Signed/Closed	317	25,390	33%
Active, Under Negotiation	10	342	0%
Offer Refused	59	4,518	6%
No Response	339	14,735	19%
Not Interested	279	20,457	27%
Other*	153	10,567	14%
Greene County Sub-Totals:	1,157	76,010	

Schoharie County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	70	4,630	27%
Active, Under Negotiation	2	755	4%
Offer Refused	19	1,157	7%
No Response	98	3,174	19%
Not Interested	79	4,863	29%
Other*	37	2,400	14%
Schoharie County Sub-Totals:	305	16,979	

Sullivan County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	71	5,770	23%
Active, Under Negotiation	1	47	0%
Offer Refused	18	1,211	5%
No Response	69	6,273	25%
Not Interested	119	9,490	38%
Other*	12	2,130	9%
Sullivan County Sub-Totals:	290	24,921	

Ulster County

<u>Current LAP Status</u>	<u>Number of Projects</u>	<u>Acres</u>	<u>% of County Acres</u>
Signed/Closed	353	20,662	27%
Active, Under Negotiation	4	12	0%
Offer Refused	94	5,950	8%
No Response	208	11,268	15%
Not Interested	255	35,112	46%
Other*	75	3,959	5%
Ulster County Sub-Totals:	989	76,963	
Grand Totals:	5,652	442,253	

* "Other" includes properties solicited but now developed / ineligible, resolicitation under way (awaiting response), and contract rescinded.

"Project acres" are used for projects that are Signed/Closed, otherwise "solicited acres" are used. Includes all programs except WAC. Does not include inactive projects

Appendix Table 4 Status of Acquisitions by town since January 1, 2010.

West of Hudson

Delaware County	City Acres	WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
Andes	5,793	2,029	7,822	7,690	102%			132	4,614
Walton	2,956	2,131	5,087	0	0%			0	2,000
Delhi	3,173	1,397	4,570	3,951	116%			619	2,371
Middletown	2,380	978	3,358	4,983	67%	1,625		0	2,990
Roxbury	2,817	487	3,304	0	0%	696		0	2,000
Bovina	2,073	402	2,475	2,785	89%	310		0	1,671
Kortright	986	1,401	2,387	0	0%	1,613		0	2,000
Stamford	1,366	886	2,252	4,539	50%	2,287	472	0	2,723
Hamden	934	1,093	2,027	3,640	56%	1,613	157	0	2,184
Meredith	835	438	1,273	0	0%	2,727	727	0	2,000
Tompkins	521	246	768	0	0%	3,232	1,232	0	2,000
Colchester	400	110	510	0	0%	3,490	1,490	0	2,000
Franklin	286	182	469	0	0%	3,531	1,531	0	2,000
Masonville	354	0	354	0	0%	3,646	1,646	0	2,000
Harpersfield	20	184	204	0	0%	3,796	1,796	0	2,000
Total	24,894	11,965	36,859						

Greene County	City Acres	WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
Lexington	1,838	155	1,994	3,771	53%	1,777	269	0	2,263
Windham	1,433	555	1,988	2,207	90%	219		0	1,324
Jewett	1,568	0	1,568	2,794	56%	1,226	109	0	1,676
Prattsville	1,236	139	1,375	2,346	59%	971	33	0	1,408
Hunter	1,226	0	1,226	2,726	45%	1,500	410	0	1,636
Ashland	974	0	974	1,948	50%	974	195	0	1,169
Halcott	567	61	628	1,571	40%	943	315	0	943
Total	8,842	910	9,752						

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Schoharie County		WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
City Acres									
Conesville	420	405	825	2,400	34%	1,575	615	0	1,440
Gilboa	409	0	409	0	0%	3,591	1,591	0	2,000
Jefferson	85	0	85	0	0%	3,915	1,915	0	2,000
Total	914	405	1,319						

Sullivan County		WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
City Acres									
Neversink	1,788	0	1,788	4,472	40%	2,684	895	0	2,683
Total	1,788	0	1,788						

Ulster County		WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
City Acres									
Olive	931	0	931	1,899	49%	968	209	0	1,139
Denning	710	128	839	5,046	17%	4,207	2,189	0	3,028
Wawarsing	524	0	524	0	0%	3,476	1,476	0	2,000
Woodstock	524	0	524	2,593	20%	2,069	1,032	0	1,556
Shandaken	473	0	473	1,450	33%		397	0	870
Hardenburgh	84	164	249	3,641	7%	3,392	1,936	0	2,185
Total	3,246	293	3,539						
WOH District Sub-Totals:	39,685	13,573	53,257	105,043	51%	51,786			

East of Hudson

Dutchess County	City Acres	WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
East Fishkill	16	0	16	0	0%	3,984	1,984	0	2,000
Total	16	0	16						
Putnam County	City Acres	WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
Kent	718	0	718	0	0%	3,282	1,282	0	2,000
Carmel	169	0	169	0	0%	3,831	1,831	0	2,000
Total	887	0	887						
Westchester County	City Acres	WAC Acres	Total Executed	EIS Projections thru 2022	% of EIS Projection	Acres to No Outgoing Solicitation	Acres to 1/2 mile = 50% SWC	Acres Exceeded	60% of Cap or 2K Max
North Castle	109	0	109	0	0%	3,891	1,891	0	2,000
Mount Pleasant	49	0	49	0	0%	3,951	1,951	0	2,000
New Castle	12	0	12	0	0%	3,988	1,988	0	2,000
Total	170	0	170						
EOH District Sub-Totals:	1,073	0	1,073						

Watershed Totals: 40,757 13,573 54,330 106,712

Out-Going Solicitation is prohibited in Shandaken per the 2010 Water Supply Permit.

SWC = Surface Water Criteria

"60% of Cap or 2k Max" refers to whether the LAP is limited to 60% of the town cap or 2,000 acres before solicitation constraints must be implemented.

Acquisition within 1/2 mile of designated areas is per 2018 LAP Solicitation Modifications.

This report uses DEP Acres so each parcel is counted within its respective town.

Difference between Project Acres and DEP Acres:

- *Project Acres - Acres for a project. Are originally set to the sum of the acres from the parcel data. These fields are editable by the closing staff or real estate staff.*
- *DEP Acres - Acres for each parcel. Are originally set to the acres field from the parcel data. This field is adjusted if the partial flag (on a parcel) is set or if we find out that the parcel data acreage is off. One project can be comprised of multiple parcels, therefore these numbers do not always match for a given project.*

Appendix Table 5 Contracts signed in the Catskill/Delaware system by reporting period.

Reporting Period: 1995 to 2023

R.E. Type	# of Contracts	Total Acres	Avg. Size of Project (ac)	SWC (ac)	Avg. % SWC	Slope (ac)	Avg. % Slope	Purchase Price
City CE	171	26,520	155	7,412	28%	16,774	63%	\$72,783,773
City FBO	33	72	2	70	97%	25	34%	\$6,993,069
City Fee	1,385	97,540	70	27,728	28%	58,355	60%	\$385,535,957
FEMA	64	74	1	65	87%	16	21%	\$453,575
SAP	37	290	8	221	76%	135	47%	\$2,129,992
WAC Farm CE	159	28,424	179	8,273	29%	15,125	53%	\$42,012,833
WAC Forest CE	10	3,110	311	486	16%	2,242	72%	\$3,058,020
subtotal	1,859	156,030	84	44,256	28%	92,672	59%	\$512,967,220

Reporting Period: 2024

R.E. Type	# of Contracts	Total Acres	Avg. Size of Project (ac)	SWC (ac)	Avg. % SWC	Slope (ac)	Avg. % Slope	Purchase Price
City FBO	1	1	1	1	91%	0	12%	\$410,000
City Fee	7	183	26	88	48%	117	64%	\$973,660
SAP	3	30	10	21	68%	9	28%	\$192,867
WAC Forest CE	1	140	140	66	48%	63	45%	\$213,750
subtotal	12	354	29	177	50%	189	54%	\$1,790,277

Program-to-date

R.E. Type	# of Contracts	Total Acres	Avg. Size of Project (ac)	SWC (ac)	Avg. % SWC	Slope (ac)	Avg. % Slope	Purchase Price
City CE	171	26,520	155	7,412	28%	16,774	63%	\$72,783,773
City FBO	34	74	2	71	97%	25	34%	\$7,403,069
City Fee	1,392	97,723	70	27,817	28%	58,473	60%	\$386,509,617
FEMA	64	74	1	65	87%	16	21%	\$453,575
SAP	40	320	8	242	76%	144	45%	\$2,322,859
WAC Farm CE	159	28,424	179	8,273	29%	15,125	53%	\$42,012,833
WAC Forest CE	11	3,250	295	552	17%	2,305	71%	\$3,271,770
Grand Totals:	1,871	156,384	84	44,432	28%	92,862	59%	\$514,757,498

Notes:

Survey acres are used to calculate project acres for closed properties. SWC (Surface Water Criteria) acres are based on GIS and tax parcel acres and may not be as accurate. Pursuant to the 1997 Memorandum of Agreement, SWC includes acreage that is within (a) 300 feet of a watercourse, (b) 1,000 feet of reservoirs,

c) areas designated as 1% return interval flood (100-year base flood), and/or (d) wetlands (defined as federal jurisdiction wetlands larger than five acres or designated by NYSDEC). Slope: Acres that are at or greater than 15% grade. In some cases, SWC acres may appear to be greater than project acres, this is because SWC acres are GIS based and project acres are survey based. Therefore, they do not always align.

Appendix Table 6 Contracts closed in the Catskill/Delaware system by reporting period.

Reporting Period: 1995 to 2023

R.E. Type	# of Contracts	Total Acres	Avg. Size of Project (ac)	SWC (ac)	Avg. % SWC	Slope (ac)	Avg. % Slope	Purchase Price
City CE	170	25,933	153	7,158	28%	16,495	64%	\$72,229,273
City FBO	26	64	2	62	97%	23	36%	\$4,421,069
City Fee	1,366	96,469	71	27,310	28%	57,778	60%	\$368,749,869
FEMA	64	74	1	65	87%	16	21%	\$453,575
SAP	33	273	8	207	76%	127	46%	\$1,852,502
WAC Farm CE	157	28,229	180	8,167	29%	15,084	53%	\$41,539,880
WAC Forest CE	9	2,982	331	452	15%	2,213	74%	\$2,891,334
subtotal	1,825	154,024	84	43,421	28%	91,736	60%	\$492,137,503

Reporting Period: 2024

R.E. Type	# of Contracts	Total Acres	Avg. Size of Project (ac)	SWC (ac)	Avg. % SWC	Slope (ac)	Avg. % Slope	Purchase Price
City FBO	5	6	1	5	89%	2	32%	\$2,007,000
City Fee	9	578	64	218	38%	307	53%	\$2,410,045
SAP	3	7	2	8	100%	4	48%	\$130,490
WAC Farm CE	2	195	98	106	54%	41	21%	\$472,953
WAC Forest CE	1	128	128	34	27%	29	22%	\$166,686
subtotal	20	915	46	371	41%	382	42%	\$5,187,174

Program-to-date Sub-Totals

R.E. Type	# of Contracts	Total Acres	Avg. Size of Project (ac)	SWC (ac)	Avg. % SWC	Slope (ac)	Avg. % Slope	Purchase Price
City CE	170	25,933	153	7,158	28%	16,495	64%	\$72,229,273
City FBO	31	70	2	68	97%	25	36%	\$6,428,069
City Fee	1,375	97,047	71	27,528	28%	58,085	60%	\$371,159,914
FEMA	64	74	1	65	87%	16	21%	\$453,575
SAP	36	281	8	215	77%	130	46%	\$1,982,992
WAC Farm CE	159	28,424	179	8,273	29%	15,125	53%	\$42,012,833
WAC Forest CE	10	3,110	311	486	16%	2,242	72%	\$3,058,020
Grand Totals:	1,845	154,939	84	43,792	28%	92,119	59%	\$497,324,677

Notes:

Survey acres are used to calculate project acres for closed properties. SWC (Surface Water Criteria) acres are based on GIS and tax parcel acres and may not be as accurate. Pursuant to the 1997 Memorandum of Agreement, SWC includes acreage that is within (a) 300 feet of a watercourse, (b) 1,000 feet of reservoirs, (c) areas designated as 1% return interval flood (100-year base flood), and/or (d) wetlands (defined as federal jurisdiction wetlands larger than five acres or designated by NYSDEC). Slope: Acres that are at or greater than 15% grade. In some cases, SWC acres may appear to be greater than project acres, this is because SWC acres are GIS based and project acres are survey based. Therefore, they do not always align.

Appendix Table 7 Parcels eased or acquired in 2024 with tax parcel detail.

Project ID	County	Town	Location	Basin	Priority Area	Tax Map Number	R.E. Type	Acres	Closing Date
3432	Delaware	Andes	Cross Mountain Road	Pepacton	4	365.-1-4.12	City Fee	77.9	03/15/2024
8577	Delaware	Andes	Barkaboom Road & NYC Hwy 30A	Pepacton	4	344.-1-30	City Fee	19.9	11/20/2024
3941	Delaware	Hamden	Meehan Road & Launt Hollow Road	Cannonsville	3	212.-1-18	City Fee	60.0	05/06/2024
3941	Delaware	Hamden	Meehan Road & Launt Hollow Road	Cannonsville	3	212.-1-19.142	City Fee	5.0	05/06/2024
1409	Delaware	Tompkins	Hathaway Pond Road	Cannonsville	1A	333.-1-1	City Fee	53.4	03/15/2024
2855	Delaware	Walton	Freer Hollow Road	Cannonsville	4	188.-2-32.12	City Fee	20.2	10/10/2024
4362	Greene	Halcott	219 Turkey Ridge Road	Pepacton	4	158.00-4-1.1	City Fee	209.2	07/24/2024
9621	Greene	Hunter	7755 Main St	Schoharie	4	164.10-2-31	City FBO	0.1	12/19/2024
9622	Greene	Hunter	7753 Main St	Schoharie	4	164.10-2-33	City FBO	0.2	12/19/2024
9623	Greene	Hunter	7751 Main St	Schoharie	4	164.10-2-34	City FBO	0.2	12/19/2024
9831	Greene	Hunter	78 Goodrich Ln	Schoharie	4	164.00-3-14.1	City FBO	2.5	10/23/2024
9938	Greene	Jewett	Shad Rd	Schoharie	4	132.00-2-5	SAP	1.0	10/02/2024
9938	Greene	Jewett	Shad Rd	Schoharie	4	132.00-2-6	City FBO	1.0	10/02/2024
9976	Greene	Lexington	Norwegian Rd	Schoharie	4	128.04-1-9	City FBO	3.2	12/19/2024
6243	Greene	Prattsville	Huntersfield Rd	Schoharie	4	43.00-2-35	WAC Farm CE	138.6	06/18/2024
6221	Greene	Windham	Siam Rd	Schoharie	4	61.00-1-86	WAC Farm CE	56.5	06/18/2024
8670	Greene	Windham	County Rt 56	Schoharie	3	114.00-1-36	City Fee	14.5	03/11/2024
9909	Greene	Windham	Tap Jam Rd	Schoharie	4	78.00-1-90	City FBO	2.3	03/25/2024
6290	Ulster	Denning	Wild Meadow	Neversink	4	42.-1-10	WAC Forest CE	128.2	12/18/2024
8202	Ulster	Olive	Route 28	Ashokan	2	36.11-1-16.200	City FBO	0.5	10/16/2024
8202	Ulster	Olive	Route 28	Ashokan	2	36.11-1-18	City FBO	0.1	10/16/2024
8202	Ulster	Olive	Route 28	Ashokan	2	36.11-1-19	City FBO	1.6	10/16/2024
8202	Ulster	Olive	Route 28	Ashokan	2	36.11-1-21	City FBO	0.5	10/16/2024
915	Ulster	Wawarsing	Sholam Road	Rondout	1A	66.4-2-74	City Fee	8.7	09/09/2024
9538	Ulster	Woodstock	Sickler Road	Ashokan	2	26-1-7	City Fee	109.5	08/02/2024
Totals:						25 tax lots		914.8 acres	

Appendix Table 8 Summary of LAP closed contracts by priority area.

Reporting Period: 1997 to 2023			
Priority Area	# of Contracts	Total Acres	Purchase Price (millions)
1A	134	5,150	\$34.4
1B	339	18,792	\$135.7
2	206	11,758	\$38.6
3	429	42,953	\$95.6
4	717	75,372	\$187.8
Total:	1,825	154,024	\$492.1

Reporting Period: 2024			
Priority Area	# of Contracts	Total Acres	Purchase Price (millions)
1A	2	62	\$0.1
1B	0	0	\$0.0
2	2	112	\$1.0
3	2	79	\$0.3
4	14	661	\$3.8
Total:	20	915	\$5.2

Program-to-date Totals			
Priority Area	# of Contracts	Total Acres	Purchase Price (millions)
1A	136	5,212	\$34.6
1B	339	18,792	\$135.7
2	208	11,870	\$39.6
3	431	43,033	\$96.0
4	731	76,033	\$191.5
Total:	1,845	154,939	\$497.3

Appendix Table 9 NYCFFBO purchase contracts by county.

County / Municipality	Project ID	Owner is (or will be)	Acres	Step	Step Date	FBO Category	Price
Delaware County							
Village of Fleischmanns	9316	City	0.2	Closed	12/30/20	1 - LFA	\$110,000
subtotals	1		0.2				\$110,000
Greene County							
Village of Hunter	9586	Village	0.1	Closed	6/30/21	1 - LFA	\$200,500
Village of Hunter	9621	Village	0.1	Closed	12/19/24	1 - LFA	\$75,000
Village of Hunter	9622	Village	0.2	Closed	12/19/24	1 - LFA	\$185,000
Village of Hunter	9623	Village	0.2	Closed	12/19/24	1 - LFA	\$152,000
Village of Tannersville	8934	Village	0.5	Closed	12/30/20	1 - LFA	\$165,000
Village of Tannersville	9486	Village	0.5	Closed	12/30/20	1 - LFA	\$24,000
Village of Tannersville	9487	Village	0.5	Closed	8/30/21	1 - LFA	\$155,000
Town of Hunter	9831	City	2.5	Closed	10/23/24	4 - Erosion	\$885,000
Town of Hunter	8847	City	21.5	Closed	2/21/20	4 - Erosion	\$344,000
Town of Hunter	9243	City	1.2	Closed	3/20/19	4 - Erosion	\$231,000
Town of Jewett	8883	City	4.8	Closed	9/7/17	4 - Erosion	\$167,000
Town of Lexington	8629	City	1.0	Contract	4/24/24	1 - LFA	\$215,000
Town of Windham	9573	Town	0.3	Closed	5/27/21	1 - LFA	\$164,000
subtotals	13		33.4				\$2,962,500
Schoharie County							
Town of Conesville	8963	Town	0.6	Closed	7/26/19	3 - Stream	\$9,100
Town of Conesville	8884	City	0.6	Closed	10/10/17	4 - Erosion	\$86,000
Town of Conesville	9306	City	2.8	Closed	3/5/20	1 - LFA	\$118,000
subtotals	3		4.0				\$213,100
Ulster County							
Town of Olive	9309	Town	1.3	Closed	9/30/19	1 - LFA	\$380,000
Town of Olive	9311	Town	1.6	Closed	10/29/21	1 - LFA	\$525,000
Town of Olive	9315	Town	0.3	Closed	12/30/19	1 - LFA	\$205,000
Town of Olive	8202	Town	2.8	Closed	10/16/24	1 - LFA	\$710,000
Town of Olive	9374	City	1.2	Closed	9/27/19	1 - LFA	\$240,000
Town of Olive	9381	City	0.9	Closed	10/23/19	1 - LFA	\$189,000
Town of Olive	9392	Town	1.2	Contract	8/22/24	1 - LFA	\$410,000
Town of Olive	9780	Town	1.5	Contract	2/17/23	1 - LFA	\$350,000
Town of Shandaken	9809	Town	0.3	Closed	12/14/23	5 - Inundation	\$253,000
Town of Shandaken	9830	Town	1.0	Closed	8/8/23	5 - Inundation	\$311,000
Town of Shandaken	9551	Town	12.1	Closed	4/24/23	1 - LFA	\$262,000
Town of Shandaken	9665	City	3.4	Closed	4/27/23	1 - LFA	\$85,000
Town of Shandaken	9393	City	1.6	Closed	3/24/20	1 - LFA	\$28,000
Town of Shandaken	9406	Town	0.5	Closed	9/23/19	1 - LFA	\$13,500
Town of Shandaken	9408	Town	0.5	Closed	10/4/19	1 - LFA	\$15,000
Town of Shandaken	9419	City	1.2	Closed	10/30/20	1 - LFA	\$154,000
Town of Shandaken	4988	City	4.4	Closed	12/17/21	1 - LFA	\$41,000
subtotals	17		35.8				\$4,171,500
Grand Total:	34	Projects	73.4	Acres			\$7,457,100