NEW YORK STATE | Department of Environmental Conservation

Lake Champlain Total Maximum Daily Load (TMDL) Watershed Implementation Plan

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Cover Photo Courtesy of the Lake Champlain Basin Program

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ACRONYMS	
ACEP	Agricultural Conservation Easement Program
AEM	Agricultural Environmental Management
AgNPS	New York State Agricultural Nonpoint Source Abatement and Control Program
AMA	Agricultural Management Assistance Program
BMP	Best Management Practices
CAFO	Concentrated Animal Feeding Operation
CDBG	Community Development Block Grant
CREP	Conservation Reserve Enhancement Program
CRF	Climate Resilient Farming
CRP	Conservation Reserve Program
CSP	Conservation Stewardship Program
CWICNY	Champlain Watershed Improvement Coalition of New York
CWSRF	Clean Water State Revolving Fund
DEC	New York State Department of Environmental Conservation
DFN	Debt for Nature Program
DMR	SPDES Discharge Monitoring Report
EDA	U.S. Economic Development Administration Public Works Program
EPA	U.S. Environmental Protection Agency
EPG	Engineering Planning Grant Program
EQIP	Environmental Quality Incentives Program
FWP	Farmable Wetlands Program
GIGP	Green Innovation Grant Program
HAB	Harmful Algal Bloom
I/I	Inflow and Infiltration
IMG	Intermunicipal Water Infrastructure Grant Program
ISC	Integrated Solutions Construction Grant Program
lbs/day	Pounds per Day
LCBP	Lake Champlain Basin Program
LCLGRPB	Lake Champlain-Lake George Regional Planning Board
LENS	Loading Estimator of Nutrient Sources
LGE	Local Government Efficiency Program
LTMP	Lake Champlain Long–Term Water Quality and Biological Monitoring Project
MS4	Municipal Separate Stormwater Sewer Systems
mt/yr	Metric Tons Per Year
NYS AGM	New York State Department of Agriculture and Markets
NYS SWCC	New York State Soil and Water Conservation Committee
OWTS	On–site Wastewater Treatment Systems
RCPP	Regional Conservation Partnership Program
RRAMP	Rural Roads Active Management Program
SOPs	Standard Operating Procedures

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SPDES	State Pollution Discharge Elimination System
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
USGS	U.S. Geological Survey
VTDEC	Vermont Department of Environmental Conservation
WASCoBs	Water and Sediment Control Basins
WIIA	Water Infrastructure Improvement Act
WQIP	Water Quality Improvement Project Program

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I. Executive Summary

Lake Champlain is one of the largest natural freshwater lakes in North America and its watershed boundary includes portions of New York, Vermont, and the Province of Quebec, Canada. The lake has historically experienced water quality impairment due to excessive phosphorus pollution. Section 303(d) of the Federal Clean Water Act requires states to identify waters for which water quality standards are not being attained and to establish a Total Maximum Daily Load (TMDL) for those waters for the pollutant of concern. The TMDL establishes pollutant loading thresholds from all contributing sources at a level necessary to attain the applicable water quality standards. In 2002, the U.S. Environmental Protection Agency (EPA) approved the *Lake Champlain Phosphorus Total Maximum Daily Load (TMDL)*, developed jointly by the New York State Department of Environmental Conservation (DEC) and Vermont Department of Environmental Conservation (VTDEC). For management purposes, the lake was divided into 13 segments, with corresponding contributing subwatersheds for each segment. Each segment was assigned a target in–lake concentration level for phosphorus. As the result of litigation against EPA Region 1, EPA updated the TMDL for the lake segments impacted by Vermont in 2016. The original 2002 TMDL for New York's segments was not impacted by the litigation.

While several of New York's lake segments currently meet the water quality goals set by the 2002 TMDL, others continue to exceed phosphorus targets. Conditions associated with excessive phosphorus pollution persist in sections of the lake, including harmful algal blooms, low water clarity, and excessive macrophyte growth. These conditions impact the use of Lake Champlain for drinking water, recreation, and fisheries habitat. Though improvements to water quality are still needed, New York has spent over $60 million of state funding and $70 million in state-sponsored loans on nearly three hundred water quality improvement projects in the Lake Champlain watershed across all sectors since 1995. A more targeted implementation strategy, based on more current land use data and estimated sources of phosphorus, is needed to more effectively target financial and technical resources.

This watershed implementation plan provides an updated analysis of the geographic sources of phosphorus pollution by each source sector (Agriculture, Urban, Forested, Septic, and Wastewater). The analysis was completed using the DEC's Loading Estimator of Nutrient Sources (LENS) screening tool and provides an estimate of the total phosphorus (TP) loads to the lake by each source sector. Subwatersheds were ranked for each source sector based on estimated annual loading per acre. The plan also provides a summary of past implementation efforts to date and provides recommendations on future projects that can be prioritized for implementation in the highest loading subwatersheds. This targeting strategy will allow us to achieve the largest amount of phosphorus reduction where it is most needed with the lowest cost over time. This plan will be used to guide and record implementation in preparation for the 2026 TMDL update, as outlined in the memorandum of understanding between the State of New York, the Government of Quebec, and the State of Vermont on the management of Lake Champlain.

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II. Lake Segment and Tributary Information

Lake Champlain is 120 miles long and 12 miles wide at its widest point, with a surface area of 283,400 acres. It has 587 miles of shoreline and 71 islands. The lake's maximum depth is 400 feet, with an average depth of 64 feet.[1] The deepest waters, known as Baldwin Deep, are located between Essex, New York and Charlotte, Vermont.[2] The major tributaries to the lake in New York are the Mettawee River, Poultney River, Putnam Creek, Boquet River, Ausable River, Little Ausable River, Salmon River, Saranac River, Little Chazy River, and Great Chazy River. New York represents 37% of the Lake Champlain watershed land area. The Province of Quebec accounts for 7% of the basin and the state of Vermont accounts for the remaining 56%. Water quality and flow data are routinely collected from each major tributary through a series of Lake Champlain Basin Long–Term Monitoring Program tributary sample stations (Figure 1). These tributaries supply Lake Champlain with approximately 6.8 trillion gallons of water per year.[3]

For the purposes of phosphorus management, the TMDL established 13 lake segments based on subwatershed boundaries. Seven segments are within New York including South Lake B, South Lake A, Port Henry, Otter Creek, Main Lake, Cumberland Bay, and Isle La Motte (Figure 2).

All waterbodies in New York State are classified according to their best uses/designated uses including public drinking water supply, swimming, fishing, and fish reproduction/habitat.[4] Water quality classifications for each lake segment and major tributaries are listed in Table 1. The classification AA or A is assigned to waterbodies used as a source of drinking water. Classification B indicates a best usage for swimming and other contact recreation, but not for drinking water. Classification C is for waters supporting fisheries and suitable for non-contact activities. Waters with classifications A, B, and C may also have a standard of (T), indicating that the waterbody may support a trout population, or (TS), indicating that the waterbody may support trout spawning (TS).

Much of the open water areas of the lake are classified as A(T), denoting a drinking water source or use ("A") that may support a trout population ("T"). The New York municipalities of Rouses Point Village, Essex, Port Kent, and Willsboro draw drinking water from Lake Champlain. The Lake Champlain Basin Program's *State of the Lake* report also indicated that a small number of shoreline residences and seasonal dwellings draw untreated water directly from the lake for potable purposes[5], although the New York State Department of Health does

[1] Information obtained from Lake Champlain Land Trust webpage at: https://www.lclt.org/
[2] Information obtained from Lake Champlain Land Trust webpage at: https://www.lclt.org/
[3] Information obtained from the Lake Champlain Basin Program's "Opportunities for Action": https://www.lcbp.org/about-us/opportunities-for-action/
[4] Classifications and best uses are described in Regulation 6 NYCRR Part 701: https://www.dec.ny.gov/chemical/23853.html
[5] Information obtained from Lake Champlain Basin Program's 2018 "State of the Lake" report https://www.lcbp.org/media-center/publications-library/state-of-the-lake/

not recommend use of these individual, unauthorized water intakes for potable water without proper treatment.

Table 1. Water Quality Classifications for New York Lake Segments and Major Tributaries

Lake Segment	Lake Segment Classification	Major Tributary	Major Tributary Classification
South Lake B	Class B	Mettawee River	Class C
		Poultney River	Class C
South Lake A	Class B	Putnam Creek	Class C(T)*
Port Henry	Class A(T)	N/A	N/A
Otter Creek	Class A(T)	N/A	N/A
Main Lake	Class A(T)*	Salmon River	Class C(T)*
		Little Ausable River	Class C
		Boquet River	Class C(T)*
		Ausable River	Class C(T)*
Cumberland Bay	Class B	Saranac River	Class C(TS)**, Class C
Isle La Motte	Class A(T)*	Little Chazy River	Class C
		Great Chazy River	Class C, Class A

*(T) denotes a trout water classification
**(TS) denotes a trout spawning water classification

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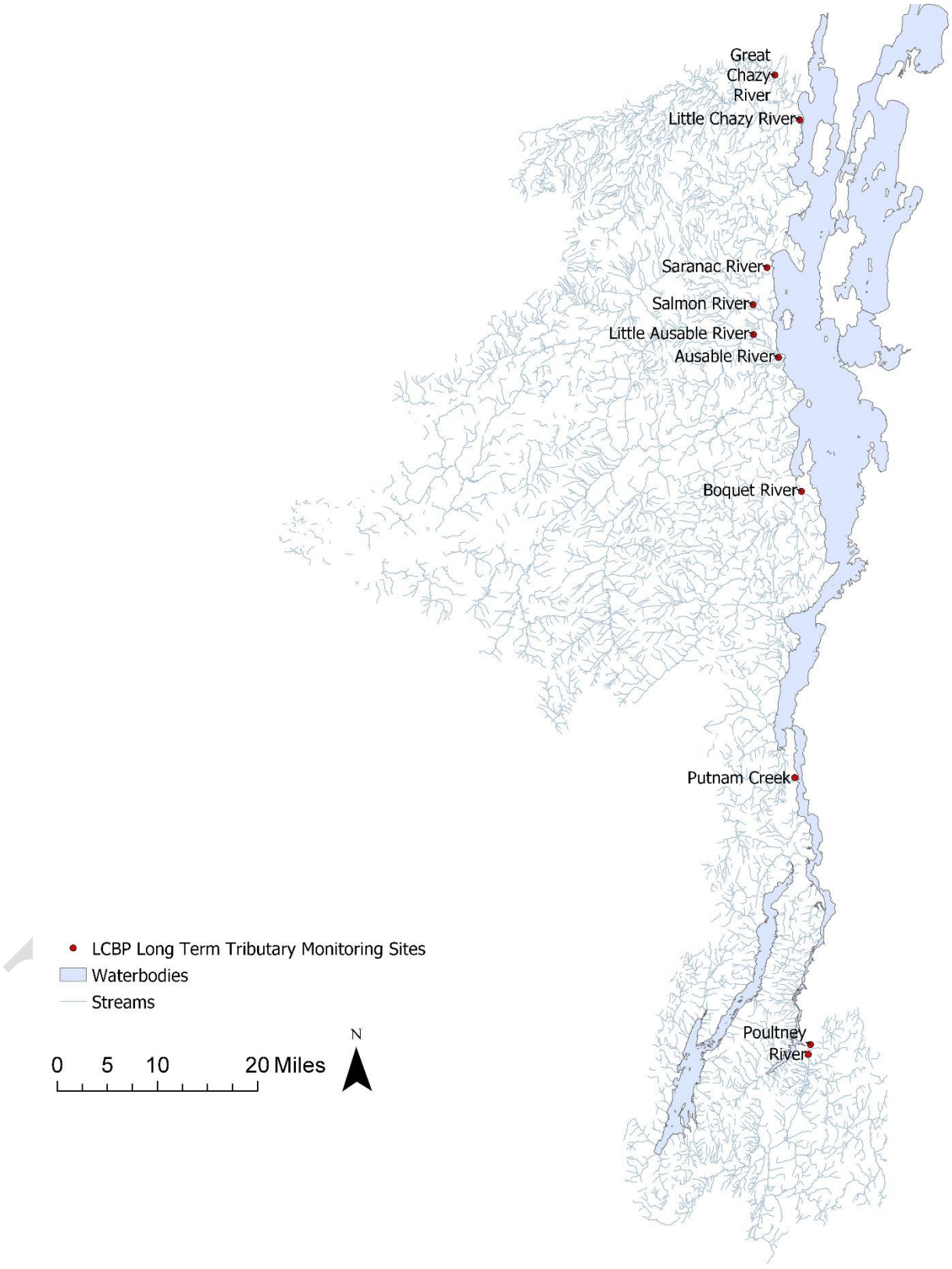

Figure 1. Major Tributaries to New York's Lake Segments

Figure 2. New York's TMDL Major Lake Segments

III. TMDL Criteria and Allocations

In–Lake Phosphorus Concentration Criteria

To establish the TMDL, intensive monitoring was conducted from 1990–1992 to determine baseline annual phosphorus loading to each lake segment. The total load to the lake was estimated at 647 metric tons per year (mt/yr) during the 1991 hydrologic base year.[6] Numeric in-lake concentration criteria, expressed as annual mean values in central, open-water regions of each lake segment, were established through a cooperative agreement between New York, Vermont, and Quebec[7], and were used as the basis for the TMDL. In–lake TP concentration criteria range from 0.010–0.054 mg/L for New York's seven segments (Table 2).

Table 2. TMDL In–Lake Concentration Criteria

Lake Segment	TP Concentration Criteria (mg/L)
South Lake B	0.054
South Lake A	0.025
Port Henry	0.014
Otter Creek	0.014
Main Lake	0.010
Cumberland Bay	0.014
Isle La Motte	0.014

The 2002 TMDL recommended that the criterion goal for South Lake B be reexamined based on further research on phosphorus sources and impacts to the South Lake region (segments South Lake A and South Lake B) of Lake Champlain.[8] South Lake A was characterized as naturally eutrophic (relatively high nutrients) in the 2002 TMDL due its shallow depth and wetland-like characteristics. Fisheries and wildlife habitat are dependent on a moderate degree of eutrophication in this segment[9] and a target was set at 0.025 mg/L to reasonably protect a moderate level of eutrophication. The Port Henry, Cumberland Bay, and Isle La Motte lake segments were assigned an in-lake phosphorus criterion of 0.014 mg/L. This value was selected to be protective of uses associated with oligotrophy (relatively low nutrients) and to limit nuisance algal conditions.[10] The Main Lake segment was assigned the lowest phosphorus concentration target in the TMDL (0.010 mg/L), along with Mallets Bay in Vermont. This target was considered achievable and represents a value associated with highly oligotrophic lakes.

[6] Loading estimates obtained from the 2002 Lake Champlain TMDL: https://www.dec.ny.gov/docs/water_pdf/champlain_final_tmdl.pdf
[7] The 1993 WQ Agreement established in-lake total phosphorus concentration goals for 13 segments of Lake Champlain: Lake Champlain Phosphorus Management Task Force. 1993. Report to the Lake Champlain Steering Committee.
[8] Recommendations for concentration targets for South Lake B established in 2002 Lake Champlain TMDL
[9] Information obtained from the 2002 Lake Champlain TMDL https://www.dec.ny.gov/docs/water_pdf/champlain_final_tmdl.pdf
[10] Information obtained from the 2002 Lake Champlain TMDL https://www.dec.ny.gov/docs/water_pdf/champlain_final_tmdl.pdf

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This target was considered appropriate for the two large, central, broad segments of the lake[11] and is protective of drinking water. The Towns of Essex, Port Kent, and Willsboro have direct drinking water intakes from this portion of the lake.

Phosphorus Reduction Allocations

Preliminary allocations of phosphorus reductions negotiated between New York, Vermont, and the EPA were documented in the *Lake Champlain Management Conference Plan*.[12] This plan also established the methodology for determining point source loading targets. An overall wasteload allocation was determined for point sources (wastewater treatment facilities) and individual wasteload allocations were assigned to facilities. The remaining load reductions needed to meet the in-lake criteria for each segment were assigned to nonpoint sources. The allocation for point sources and nonpoint sources was distributed among the lake segments. For management purposes, the allocations for the Port Henry and Otter Creek segments in New York were combined, due to the small area of the Otter Creek segment in New York (four square miles).

The combined loading target was set at 439 metric tons/year (mt/yr), with 319.2 mt/yr assigned to Vermont and 119.8 mt/yr assigned to New York. Of New York's phosphorus allocation, 35.50 mt/yr was divided among wastewater facilities located in the respective lake segment watersheds. The remainder of New York's allocation was assigned to nonpoint sources. The nonpoint source load allocation was distributed among agricultural, forest, and urban land sectors within each of the lake segments (Table 3).

Table 3. Nonpoint Source and Point Source Allocations by Lake Segment

Lake Segment	Agriculture Allocation (mt/yr)	Urban Allocation (mt/yr)	Forest Allocation (mt/yr)	Wastewater Allocation (mt/yr)	Total Segment Allocation (mt/yr)
South Lake B	14	6.9	1.1	1.94	23.94
South Lake A	0.4	2.2	0.7	7.9	11.20
Port Henry/Otter Creek	1	1.2	0.3	0.89	3.39
Main Lake	1.1	19.4	9	4.22	33.72
Cumberland Bay	1.1	5.1	1.9	17.12	25.22
Isle La Motte	14.9	3.1	0.9	3.43	22.33
TOTAL	17.6	34.8	13	35.5	119.8

[11] Information obtained from the 2002 Lake Champlain TMDL: https://www.dec.ny.gov/docs/water_pdf/champlain_final_tmdl.pdf

[12] Information obtained from Lake Champlain Management Conference 1996a: https://3paj56ulke64foefopsmdbue-wpengine.netdna-ssl.com/wp-content/uploads/2013/03/16_BackgroundTechnicalInformation_OpportunitiesForAction.pdf

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The total allocation of 119.8 mt/yr equates to a 21% reduction from 1991 estimated loading rates, requiring a reduction of 23.5 mt/yr from point sources and 7.7 mt/yr from all nonpoint sources (Table 4).

Table 4. Point Source and Nonpoint Source Reduction Targets by Lake Segment

Lake Segment	Point Source Reduction (mt/yr)	Nonpoint Source Reduction (mt/yr)
South Lake B	1.96	2.3
South Lake A	1.7	0.2
Port Henry/Otter Creek	0.91	0.2
Main Lake	2.88	2.3
Cumberland Bay	12.08	0.7
Isle La Motte	3.97	2
TOTAL	23.5	7.7

IV. Ambient Water Quality Trends

New York Segment In-Lake Water Quality

To consider the changes in TP over time in both the lake itself and the lake's New York tributaries, data were collected from the Lake Champlain Long-Term Water Quality and Biological Monitoring Program and from United States Geological Survey (USGS) stream gages. The Lake Champlain Basin Program's Lake Champlain Long–Term Water Quality and Biological Monitoring Project (LTMP) has collected yearly averages of TP concentrations from the epilimnion (the upper layer of water in a stratified lake) and, hypolimnion (lower, cooler layer of water in a stratified lake). Figure 3 shows observed annual averages of TP concentrations over time (1992–2019) for each New York lake segment in comparison to the segment's respective TMDL concentration criteria.

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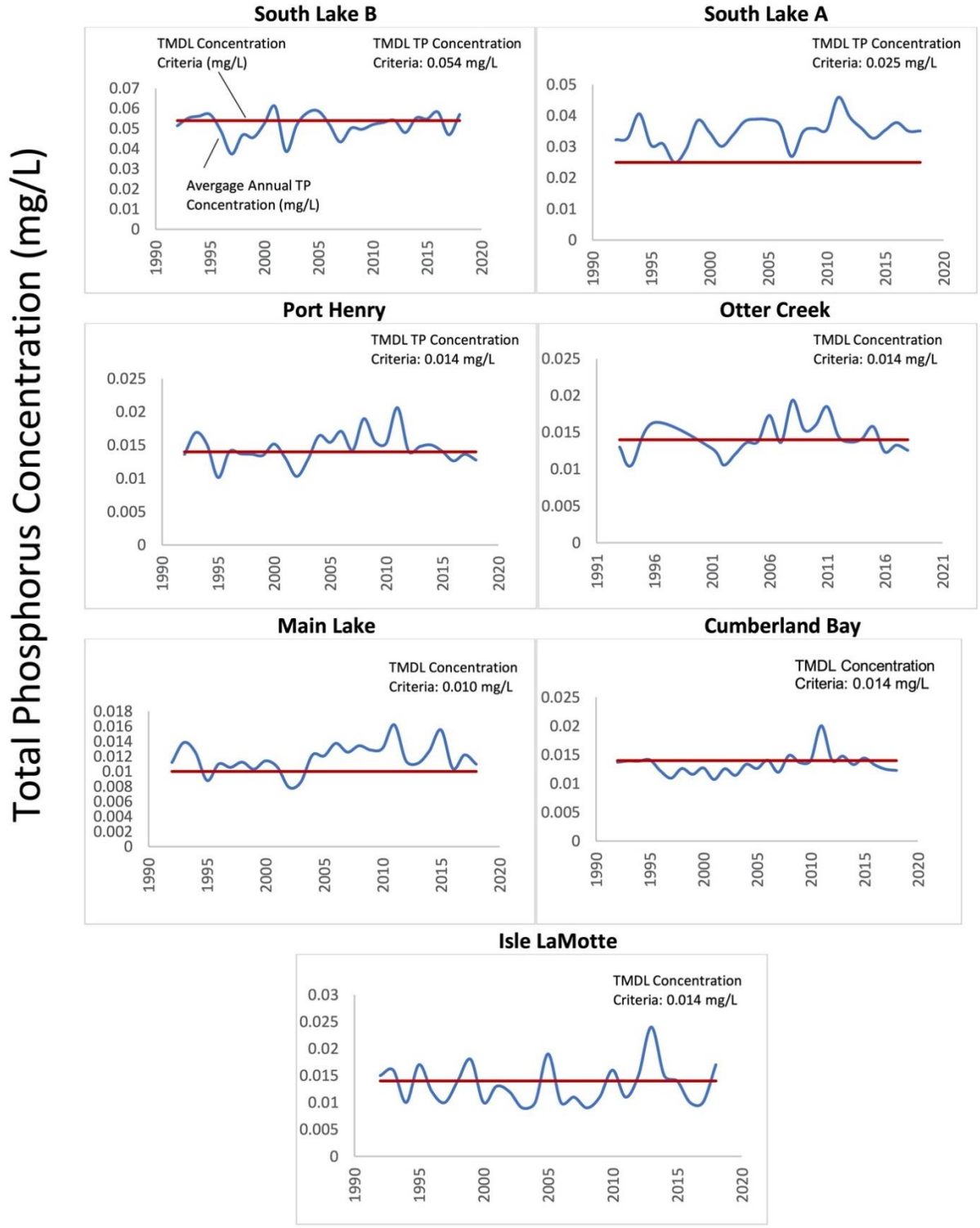

Figure 3. Annual Average Total Phosphorus Concentrations per New York lake segment between years 1992 and 2019

For the purpose of evaluating temporal trends in TP concentration in relation to each New York lake segment's respective concentration criteria, the mean TP concentration from 2002-2019 (the time period during which the TMDL was established) was compared against the baseline mean concentration from 1990-1991 and TMDL criteria. A summary is provided in Table 5.

Table 5. Observed TP Mean Concentration Compared to TMDL Criteria

Lake Segment	TMDL Total TP Criteria (mg/L)	TMDL Baseline TP Mean Concentration (1990–1991) (mg/L)	TP Mean Concentration (2002–2019) (mg/L)
South Lake B	0.054	0.058	0.052
South Lake A	0.025	0.034	0.036
Port Henry	0.014	0.015	0.015
Otter Creek	0.014	0.015	0.015
Main Lake	0.010	0.012	0.012
Cumberland Bay	0.014	0.014	0.014
Isle La Motte	0.014	0.012	0.017

As demonstrated in Figure 3 and Table 5, there have been TP concentration variations through time within each New York lake segment. TP concentrations during the baseline 1990–1991 period exceeded the TMDL criteria targets in five of New York's lake segment (Isle La Motte was below the target at that time and Cumberland Bay was right at the target). TP concentrations over the long-term monitoring period (2002–2019) exceeded the TMDL criteria targets in all New York lake segments except for South Lake B and Cumberland Bay. TP concentrations over time, while generally steady within each respective New York lake segment, exhibited some minor, temporary increases compared to earlier years, particularly in 2011.

In August 2011, Tropical Storm Irene caused major flooding events in the Lake Champlain Basin, which was further exacerbated by the already high lake water levels. During Tropical Storm Irene, a seiche (a change in water level due to atmospheric pressure), pushed water southward. Stream gages in the southern portion of the basin in Whitehall, N.Y. recorded a three–foot rise in water over an eight-hour period. Tropical Storm Irene was followed within two weeks by Tropical Storm Lee. These storms accelerated phosphorus deposition due to rapid erosion of streambanks, the lakeside, and the landscape in general.[13]

New York Segment Tributary Water Quality

To determine the relative contribution of TP from each of the main tributaries to Lake Champlain in New York, data was utilized from the LTMP and (USGS) stream gages[14] (Figure 1) to

[13] Information obtained from 2011 USGS report on flood impacts in NYS: https://pubs.usgs.gov/sir/2014/5058/pdf/sir2014-5058.pdf

[14] Tributary monitoring locations in the Lake Champlain Basin obtained from the Lake Champlain Basin Program's Lake Champlain Long-Term Water Quality and Biological Monitoring Project (LTMP) https://anrweb.vermont.gov/dec/_dec/LongTermMonitoringLakes.aspx

determine flow-normalized concentrations of TP. Flow-normalized estimates were used to reduce the annual variability in water flux. Trends were evaluated for two time periods: the first half of the period record (1991–2004), and the second half of the period record (2004–2017). Trend directions (increase or decrease) were assigned for each lake segment/major tributary's TP loading during each of the two time periods. Trend directions for New York lake segment/major tributaries are reported in Table 6. The analysis included all New York lake segments except for the Port Henry and Otter Creek segments, which do not have any major tributaries. Overall, TP loading from the majority of the tributaries has remained in a steady state.[15]

Table 6. TP Concentration Trends for New York's Major Tributaries[16]

Lake Segment	Major Tributary	First Period Trends (1991–2004)	Second Period Trends (2004–2017)
South Lake B	Mettawee River	No trend	No trend
	Poultney River	No trend	No trend
South Lake A	Putnam Creek	No trend	Increasing
Main Lake	Salmon River	No trend	No trend
	Little Ausable River	No trend	Decreasing
	Boquet River	No trend	No trend
	Ausable River	Increasing	No trend
Cumberland Bay	Saranac River	Increasing	No trend
Isle La Motte	Little Chazy River	No trend	No trend
	Great Chazy River	Increasing	No trend

Vermont Tributary Water Quality

TP loading trends between the period of 1991-2020 were also evaluated for Vermont tributaries as part of the aforementioned studies. During the period of 1992-2020, the Vermont lake segments of Malletts Bay Northeast Arm, St. Albans Bay, and Missisquoi Bay exceeded the TMDL TP concentration criteria, while the Burlington Bay and Shelburne Bay segments were below the TMDL TP concentration criteria. Vermont tributaries showed little change over time, with three of the main tributaries (Lewis, Little Otter and Missisquoi) increasing in TP loading, two of the main tributaries decreasing (LaPlatte and Pike) and two tributaries (Lamoille and Winooski) showing no trend between 1991 and 2017.

[15] Information obtained from tributary loading report (Vaughan, 2019) https://www.ccrpcvt.org/wp-content/uploads/2019/08/LC_Tributary_Loading_Report.pdf

[16] Data obtained from tributary loading report (Vaughan, 2019) https://www.ccrpcvt.org/wp-content/uploads/2019/08/LC_Tributary_Loading_Report.pdf

Harmful Algal Blooms

Harmful algal blooms (HABs) in freshwater generally consist of visible patches of cyanobacteria, also called blue-green algae. Cyanobacteria are naturally present in low numbers in most marine and freshwater systems. Under certain conditions, such as high nutrient concentrations and warm temperatures, cyanobacteria may multiply rapidly and form blooms. Several types of cyanobacteria may produce toxins and other harmful compounds that can pose a public health risk to people and animals through ingestion, skin contact, or inhalation. HABs often result in beach closures and limited use of the waterbody, which threatens tourism, aesthetics, and other recreational uses (swimming, fishing, boating) of the lake.

HABs in Lake Champlain have been an issue of increasing concern given the increase in the extent, duration, and impacts of HABs at various locations in the lake. In 2018, former Governor Cuomo initiated a Water Quality Rapid Response Team focused on creating strategic plans for 12 priority lakes across New York that experienced or are vulnerable to HABs. Lake Champlain and Lake George were selected as two of the 12 priority waterbodies for which *Harmful Algal Bloom Action Plans* were developed.[17] While HABs have been documented in many locations in Lake Champlain, the Lake Champlain HAB Action Plan focused on two lake segments: Port Henry and Isle La Motte.

Monitoring of HABs, their associated toxins, and the environmental conditions that potentially promote their formation has been performed since 2002 by the Lake Champlain Basin Program (LCBP). Oversight shifted to Vermont's DEC in 2012, who works closely with the Lake Champlain Committee, a bi-state nonprofit citizen's committee, and the Vermont Department of Health.[18] Table 7 shows the occurrences and subsequent beach closures due to harmful algal blooms per year since 2012.

Table 7. Harmful Algal Blooms in Lake Champlain (2012–2019)[19]

Year	Number of Harmful Algal Blooms	Days of Beach Closures
2012	3	15
2013	0	0
2014	3	11
2015	3	7
2016	8	18
2017	5	21
2018	4	17
2019	4	19
Total	30	108

[17] Information obtained from DEC's 2018 *Harmful Algal Bloom Action Plan* https://www.dec.ny.gov/docs/water_pdf/champlainhabplan.pdf

[18] Information obtained from Cyanobacteria Monitoring on Lake Champlain Summer 2017 (Shambaugh et al. 2017, LCBP 2018i) https://dec.vermont.gov/sites/dec/files/wsm/lakes/docs/2017%20Cyano%20final%20report_Apr%2024%202018.pdf

[19] Data Obtained from Vermont DEC HABs Tracking https://www.healthvermont.gov/tracking/cyanobacteria-tracker

Summary of Current Water Quality

While some of New York's lake segments currently meet the water quality goals set by the 2002 TMDL (South Lake B, Cumberland Bay), South Lake A, Port Henry, Otter Creek, Main Lake, and Isle La Motte exceed phosphorus targets set by the TMDL. Studies have shown a potential loss of $16.8 million annually for economic activities related to tourism in the Lake Champlain Watershed if water quality is allowed to degrade[20]; therefore, efforts to improve water quality should be maintained in subwatersheds of lake segments that meet the TMDL target and enhanced in subwatersheds that drain to the segments exceeding the TMDL phosphorus target.

V. Land Cover Analysis and Sources of Phosphorus

The New York portion of the Lake Champlain watershed is approximately 1,844,276 acres and is comprised of the following major land cover types: 89.8% forested areas (including forest, shrublands, grasslands, water, and wetlands), 8.7% agriculture (cultivated crops, hay and pasture), and 1.6% urban land (buildings, roads, and other impervious surfaces) (Figure 5 and Figure 6). Land cover data was obtained from the *Lake Champlain Basin Program's High-Resolution Land Cover Mapping project*.[21]

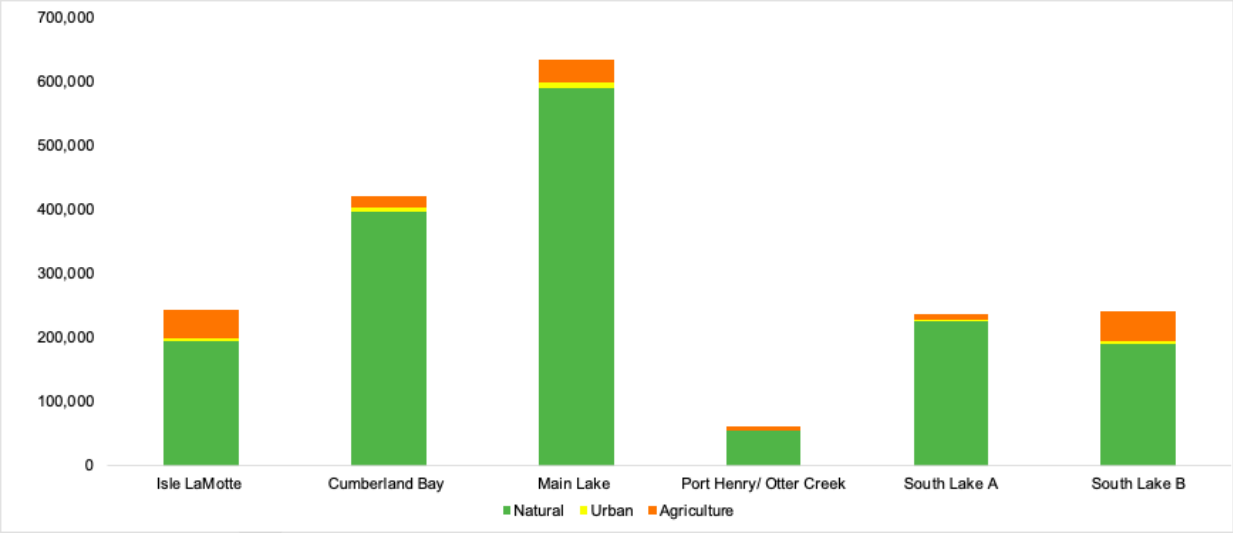

Figure 5. Acres of Land Cover Type by Lake Segment

[20] Lake Champlain Basin Program 2018 "State of the Lake" Report https://www.lcbp.org/media-center/publications-library/state-of-the-lake/

[21] Land cover data obtained from Lake Champlain Basin Program's High-Resolution Land Cover Mapping project. The mapping project used high-resolution data and LiDAR to create a 1-meter resolution land cover dataset: https://www.lcbp.org/publications/high-resolution-land-cover-mapping-of-the-lake-champlain-basin/

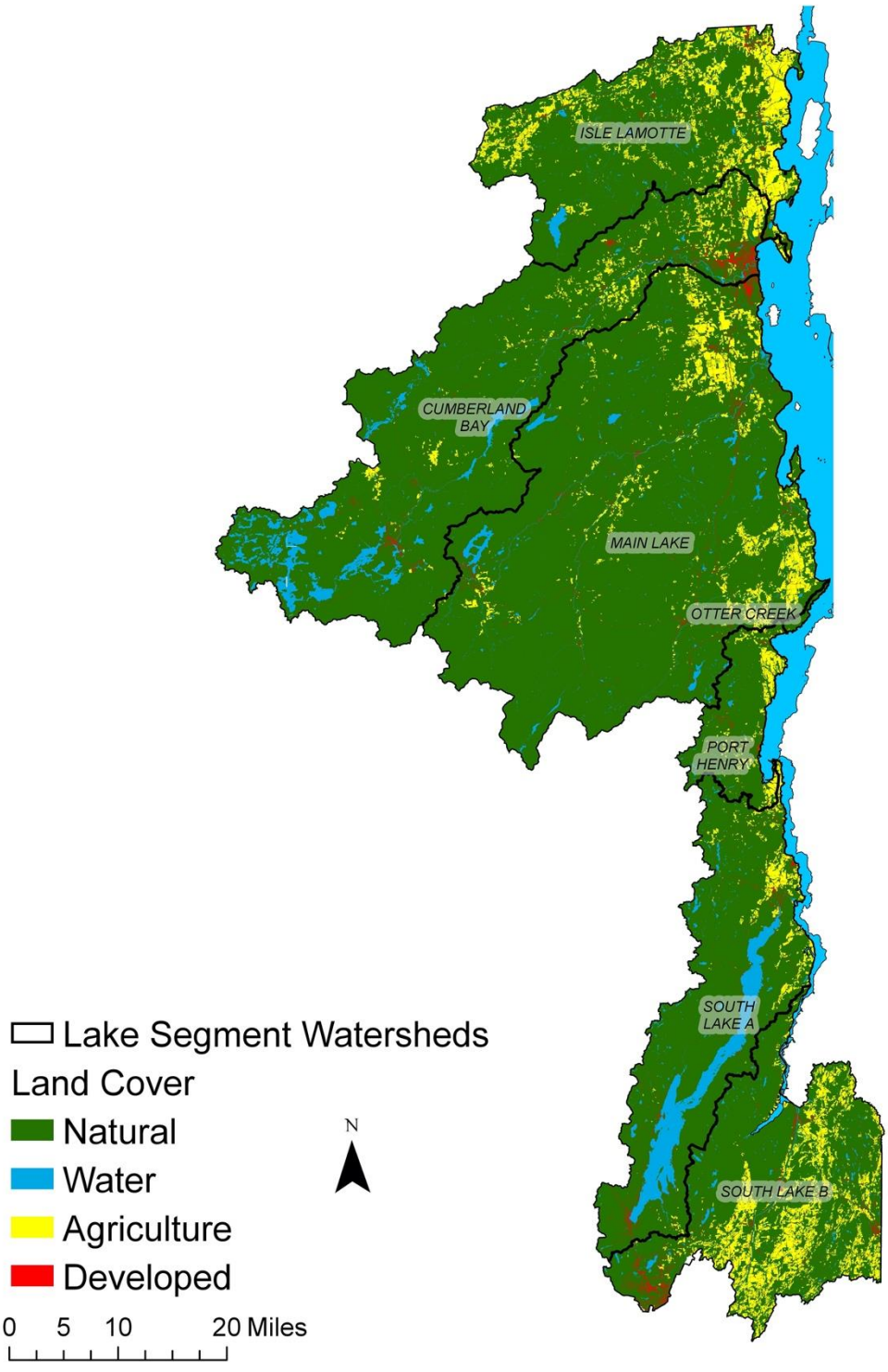

Figure 6. Land Cover by Lake Segment Watershed

To better prioritize future implementation actions across all source sectors, DEC completed a loading sector analysis to estimate the phosphorus contribution from both nonpoint sources (urban stormwater, agricultural runoff, failing septic systems, and erosion of natural areas) and point sources (wastewater treatment facilities with TMDL phosphorus limits) for each lake segment. Land cover and potential pollutant loading data provided in this section were estimated using DEC's Loading Estimator of Nutrient Sources (LENS) screening tool. In the 2002 TMDL, nonpoint source loads from agriculture, urban areas, and forest sectors were estimated based on 1991 baseline year loading. The TMDL did not originally account for loading from septic systems.

DEC's LENS tool is a simple watershed model that uses average, assumed meteorological conditions, estimated average annual loading rates from nonpoint sectors based on accepted literature values, and estimates of wastewater contribution. It employs land cover data, septic density information collected by the New York State Office of Real Property and Tax, and State Pollution Discharge Elimination System (SPDES) wastewater facility data.

LENS is a screening tool, used by the DEC, intended to assess the relative load contributions by subwatershed source to help determine the most appropriate watershed management approach and, for purposes of this implementation plan, support prioritization of water quality improvement projects and allocation of associated resources to reduce phosphorus.

LENS is not designed to be a comprehensive watershed analysis and does not include all data requirements used for landside or in-waterbody models used to develop TMDLs. Although LENS output has shown to be consistent with more comprehensive watershed analyses in New York State, there is uncertainty in the watershed loading estimates presented in this implementation plan. For example, LENS does not take into consideration: (1) other potential contributors of phosphorus to the lake such as groundwater, consistently underperforming septic systems, and streambank erosion; (2) internal sources of phosphorus (e.g., sediments, dreissenid mussels); and (3) existing best management practices (BMPs) and other nutrient reduction measures being implemented by the municipalities, agricultural community, Soil and Water Conservation Districts, and other stakeholders.

Therefore, LENS results discussed here should be considered a preliminary approximation of current external phosphorus sources to Lake Champlain. More refined quantification of phosphorus sources from the watershed should be determined through: (1) a detailed inventory of phosphorus sources from all suspected sectors within the watershed; (2) a detailed analysis of phosphorus load and budget that includes critical factors not accounted for in LENS; (3) the development of a robust land-side phosphorus loading model; and (4) an update of the TMDL. For the purpose of this analysis, the *Lake Champlain Basin Program's High-Resolution Land Cover data* was used in place of the most recent National Landcover Dataset that is typically used in the LENS tool. Wastewater loads were estimated using SPDES Discharge Monitoring Report (DMR) data from facilities using average loads over the period of January 31, 2017 to January 31, 2020. The wastewater load is estimated using DMR data which calculates the

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average daily phosphorus discharge over the past three years only for facilities listed in the TMDL.

The LENS tool indicates that the estimated contribution from each source sector varies by TMDL lake segment. In Figure 7 below, the entire basin-wide load is broken down by all source sectors (nonpoint source and wastewater). According to LENS and DMR estimates, agriculture provides the greatest load across all sectors (38%), followed closely by forested areas (36%). Lesser loading sectors include urban (15%), wastewater (10%), and septic (1%) sectors.

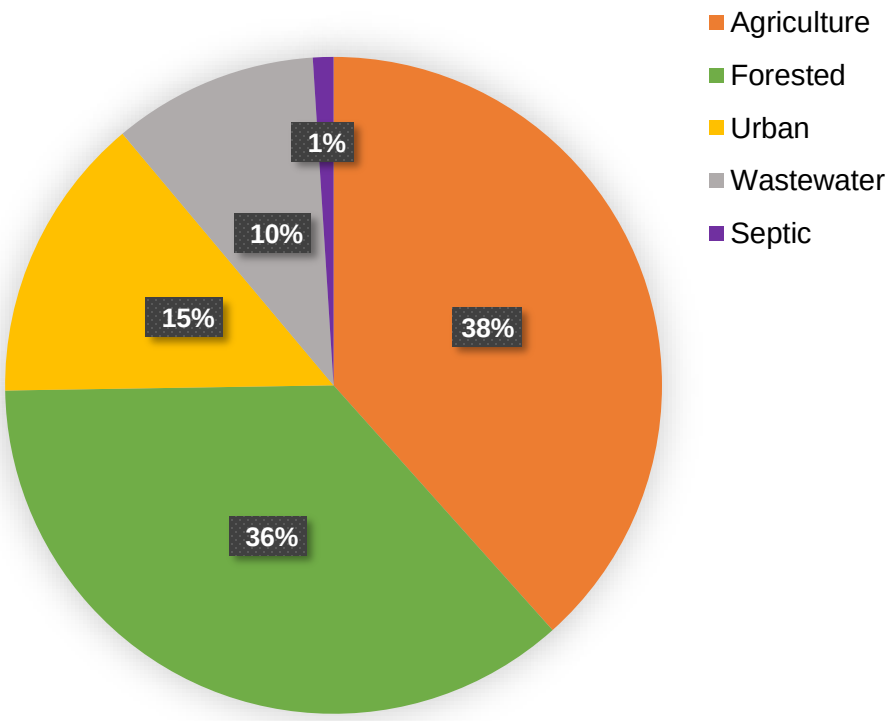

Figure 7. Phosphorus Load Estimate by Sector

The estimated annual phosphorus load by major source sector was also broken down by each of New York's lake segments (Table 9).

Table 9. Current Estimated Load by Sector

Lake Segment	Estimated Agriculture Load (mt/yr)	Estimated Forest Load (mt/yr)	Estimated Urban Load (mt/yr)	Estimated Wastewater Load (mt/yr)	Estimated Total Segment Load (mt/yr)
South Lake B	25.8	16.8	9.2	0.9	52.7
South Lake A	6.6	5.5	2.0	4.6	18.7
Port Henry/Otter Creek	6.6	3.0	1.3	0.4	11.3
Main Lake	22.9	33.5	13.1	16.0	85.5
Cumberland Bay	0.9	8.0	1.2	0.2	10.3
Isle La Motte	18.9	9.7	4.2	0.3	33.1
TOTAL	81.7	76.5	31.0	22.4	211.6

* The TMDL did not provide an allocation for the septic sector, though DEC estimates the septic load to be 2.09 mt/yr for the entire New York portion of the basin.

Overall, it is estimated that New York remains above the 119.8 mt/yr allocation assigned to New York in the TMDL. New York is meeting its allocation in the urban and wastewater sectors but is above the allocation in the agricultural and forested sectors. The TMDL did not provide an allocation for the septic sector.

Phosphorus loading per sector in Vermont was updated in Vermont's *2016 TMDL.* The base phosphorus load for the Vermont portion of the Lake Champlain Basin is an estimated 631 mt/yr. Agriculture, the largest sector, contributes 41% of the total load (261 mt/yr). The stream bank sector contributes 21% of the total load (130 mt/yr), the urban sector contributes 18% (114 mt/yr), the forest sector contributes 16% (101 mt/yr) and the wastewater sector contributes 4% (25 mt/yr) of the total load. Vermont's *2016 TMDL* required a TP reduction of 213 mt/yr (or 34%) of Vermont's 631 mt/yr base load.

It is important to note that the land use runoff coefficients used to determine loading for the 2002 TMDL are not consistent with the coefficients used in the LENS tool. In addition, the water quality models used in the original *2002 Lake Champlain TMDL* and the *2016 Vermont Lake Champlain TMDL* differ, meaning the original TMDL and the Vermont TMDL update cannot be compared directly. Despite the discrepancy in loading calculation methods, this watershed implementation plan relies on LENS-derived approximations of current external phosphorus

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sources to identify sectors where loads remain above the TMDL allocation and additional action is needed to improve water quality.

It should also be noted that the LENS loading estimates also do not take into account any reductions gained through past implementation in the nonpoint source sectors. Therefore, the agricultural, forestry, and urban sector load estimates will be reduced once New York is able to quantify implementation reductions from these sectors. See Section V: Past Implementation and Load Reductions for more information on past implementation and future plans to quantify load reductions from implementation.

New York signed a Memorandum of Understanding (MOU) with Vermont and EPA to begin the process to update the TMDL in 2026. The updated TMDL is expected to address loading calculation methods, account for reductions from past implementation, and will likely include new water quality models.

The LENS tool was used to estimate loading at the HUC 12 watershed scale for the entire New York portion of the Lake Champlain watershed (Figure 8). Each HUC 12 watershed was analyzed for each loading sector, as well as the highest load overall. Additionally, Table 10 shows the percentage each loading sector contributes for each individual HUC 12 subwatershed. The highlighted cells indicate the highest sector contribution for that respective HUC 12 subwatershed.

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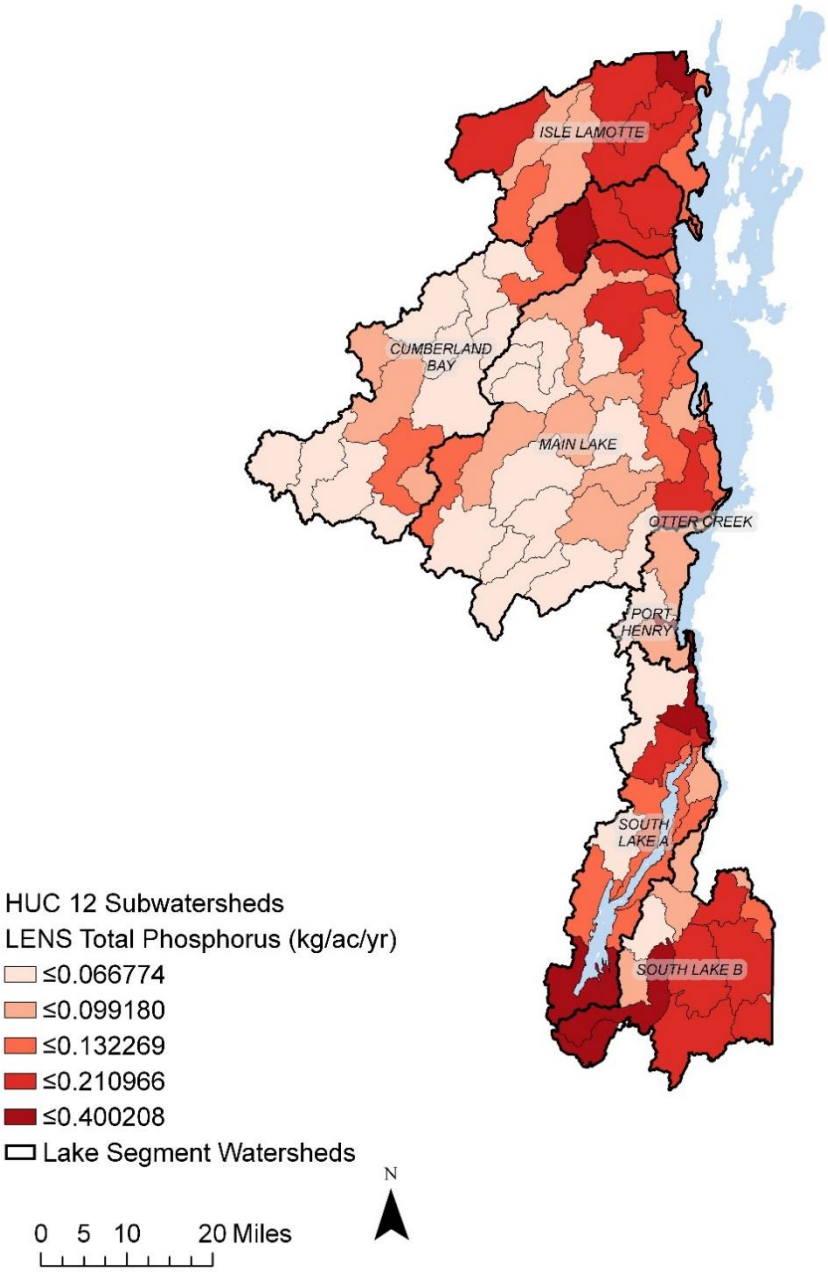

Figure 8. Estimated Annual Phosphorus Loading (kg/acre/year) by HUC 12 Watershed

Table 10. HUC 12 Subwatershed Source Sector Analysis

Lake Segment	HUC 12 Name	Overall Load (Percentage	Agriculture Load (Percentage)	Forested Load (Percentage)	Urban Load (Percentage)	Wastewater Source Load (Percentage)	Septic Load (Percentage)
Main Lake	Lake Champlain	12.55	36.60	9.20	15.34	38.85	0.00
South Lake A	McKenzie Brook-Lake Champlain	4.44	48.97	8.09	9.29	33.64	0.00
South Lake B	Wood Creek-Lake Champlain Canal	3.70	78.28	13.11	8.48	0.00	0.13
South Lake B	Mettawee River	2.62	63.29	22.63	14.09	0.00	0.00
Isle La Motte	Dead Creek	2.52	60.60	16.05	22.24	0.00	1.11
Port Henry	Hoisington Brook-Lake Champlain	2.49	57.25	24.63	13.01	5.11	0.00
South Lake B	Lake Champlain Canal	2.47	66.43	20.89	9.10	3.01	0.57
South Lake B	Halfway Creek	2.44	58.64	20.54	16.89	3.55	0.38
Main Lake	Little Ausable River	2.42	59.88	20.07	12.19	7.28	0.58
Isle La Motte	Bullis Brook-Great Chazy River	2.39	67.15	23.20	9.46	0.00	0.20
Isle La Motte	Little Chazy River	2.37	62.08	24.08	11.12	0.36	2.37
Isle La Motte	Headwaters North Branch Great Chazy River	2.36	63.34	28.38	8.29	0.00	0.00
Port Henry	Lower Boquet River	2.33	69.36	19.40	8.07	2.96	0.20
Main Lake	Kelly Brook-Saranac River	1.98	18.97	17.46	9.22	54.10	0.24
South Lake B	Poultney River-Head of Lake Champlain	1.93	58.65	20.72	12.41	7.49	0.73
Main Lake	Ausable River	1.80	46.50	29.67	21.08	2.23	0.52
Isle La Motte	Outlet Great Chazy River	1.77	65.22	6.38	14.98	6.29	7.13
South Lake B	Indian River	1.60	61.08	22.79	15.54	0.00	0.59
Main Lake	Saranac River	1.58	13.10	27.03	59.28	0.00	0.59
South Lake B	Charter Brook-Lake Champlain	1.47	43.93	42.71	13.35	0.00	0.00

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Lake Segment	HUC 12 Name	Overall Load (Percentage	Agriculture Load (Percentage)	Forested Load (Percentage)	Urban Load (Percentage)	Wastewater Source Load (Percentage)	Septic Load (Percentage)
South Lake B	Wells Brook-Mettawee River	1.44	31.06	40.00	21.32	7.6	0.00
Main Lake	Chubb River	1.35	6.02	36.53	12.60	44.50	0.35
Main Lake	Moose Creek-Saranac River	1.33	2.71	43.51	13.66	39.42	0.70
South Lake A	La Chute	1.33	14.07	26.07	10.97	47.84	1.06
Isle La Motte	King Brook-Great Chazy River	1.30	28.67	59.67	10.89	0.77	0.00
Cumberland Bay	Sumner Brook	1.28	23.46	55.56	13.23	7.38	0.37
Main Lake	Behan Brook-Saranac River	1.22	39.65	42.48	13.63	0.00	4.23
Isle La Motte	Corbeau Creek	1.18	63.57	25.11	10.93	0.00	0.40
South Lake A	Putnam Creek	1.17	20.97	66.68	11.95	0.00	0.40
South Lake B	Finel Hollow Brook-Poultney River	1.16	44.47	35.50	20.02	0.00	0.00
South Lake B	Headwater Lake George	1.12	6.11	55.08	38.39	0.00	0.42
South Lake B	Headwaters Halfway Creek	1.03	6.87	19.72	72.50	0.00	0.91
Main Lake	Middle East Branch Ausable River	1.02	12.12	76.65	10.77	0.00	0.46
Main Lake	Union Falls Pond-Saranac River	1.02	11.74	81.42	6.37	0.00	0.46
Main Lake	Upper West Branch Ausable River	1.01	19.78	73.30	6.45	0.00	0.46
Main Lake	Lower East Branch Ausable River	1.00	32.46	47.43	11.30	7.41	1.40
Main Lake	Middle Boquet River	0.96	12.98	69.82	16.22	0.00	0.98
Main Lake	Salmon River	0.95	42.74	26.24	29.54	0.00	1.48
Main Lake	Middle West Branch Ausable River	0.94	7.80	77.30	14.90	0.00	0.00

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Lake Segment	HUC 12 Name	Overall Load (Percentage	Agriculture Load (Percentage)	Forested Load (Percentage)	Urban Load (Percentage)	Wastewater Source Load (Percentage)	Septic Load (Percentage)
Main Lake	Headwaters Salmon River	0.94	27.46	60.98	11.06	0.00	0.50
Main Lake	North Branch Boquet River	0.89	53.84	33.73	6.68	0.00	5.76
Isle La Motte	North Branch Great Chazy River	0.85	37.55	52.90	9.00	0.00	0.55
South Lake B	Outlet Lake George	0.83	6.36	64.66	16.59	0.00	12.40
South Lake B	Indian Brook-Lake George	0.82	1.75	75.41	22.28	0.00	0.57
South Lake A	Bullwagga Bay	0.82	51.21	35.92	11.73	0.00	1.14
Main Lake	Headwaters North Branch Boquet River	0.74	1.79	81.77	12.02	0.00	4.42
Cumberland Bay	Lower Saranac Lake-Saranac River	0.72	2.34	78.84	16.87	0.00	1.95
Main Lake	Palmer Brook-Ausable River	0.71	7.55	57.88	13.18	20.73	0.66
Main Lake	Upper Boquet River	0.69	0.84	91.98	6.50	0.00	0.68
Cumberland Bay	Middle North Branch Saranac River	0.67	2.46	88.87	5.85	0.00	2.81
Main Lake	Upper East Branch Ausable River	0.65	5.08	80.33	12.42	0.00	2.17
Main Lake	Headwaters East Branch Ausable River	0.58	0.00	96.14	2.26	0.00	1.60
Main Lake	Spruce Mill Brook	0.58	11.59	66.36	19.64	0.00	2.41
South Lake B	Mill Brook	0.56	12.76	64.28	22.96	0.00	0.00
Isle La Motte	Headwaters Great Chazy River	0.55	11.38	77.69	10.93	0.00	0.00
Main Lake	Lower West Branch Ausable River	0.54	8.18	79.66	10.43	0.00	1.73
Cumberland Bay	Upper Saranac Lake	0.54	1.54	78.34	15.32	2.19	2.61
Port Henry	Black River	0.52	12.63	65.88	21.49	0.00	0.00

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Lake Segment	HUC 12 Name	Overall Load (Percentage	Agriculture Load (Percentage)	Forested Load (Percentage)	Urban Load (Percentage)	Wastewater Source Load (Percentage)	Septic Load (Percentage)
Cumberland Bay	Lower North Branch Saranac River	0.51	12.56	75.46	11.06	0.00	0.92
Main Lake	Black Brook	0.50	6.73	82.21	9.18	0.00	1.88
Main Lake	Willsboro Bay	0.50	21.59	51.93	12.40	0.00	14.07
Main Lake	Headwaters Little Ausable River	0.46	13.97	72.74	12.28	0.00	1.01
South Lake B	Mud Brook-Poultney River	0.45	39.73	36.54	18.59	0.00	5.15
Isle La Motte	True Brook	0.43	22.63	67.66	7.54	0.00	2.17
South Lake B	Hadlock Pond	0.42	17.14	58.12	15.73	0.00	9.01
South Lake A	Northwest Bay Brook	0.42	0.00	98.21	1.78	0.00	0.00
Cumberland Bay	Fish Creek Ponds	0.41	0.01	91.45	7.39	0.00	1.15
Cumberland Bay	Upper North Branch Saranac River	0.39	1.05	90.96	7.98	0.00	0.00
Cumberland Bay	Alder Brook	0.38	2.75	87.45	9.80	0.00	0.00
Main Lake	Silver Lake-Saranac River	0.36	5.47	83.02	8.93	0.00	2.58
South Lake A	Mill Brook	0.36	52.43	38.22	9.36	0.00	0.00
South Lake B	Mount Hope Brook-South Bay Creek	0.35	1.64	95.26	3.09	0.00	0.00
South Lake B	South Bay	0.34	18.68	70.29	11.04	0.00	0.00
South Lake B	Sabbath Day Point-Lake George	0.33	0.65	88.27	8.26	0.00	2.82
Main Lake	Ray Brook	0.32	12.98	64.16	21.39	0.00	1.47
Main Lake	Johns Brook	0.28	0.21	94.31	2.15	0.00	3.33
Main Lake	Outlet Taylor Pond	0.28	12.43	79.74	7.83	0.00	0.00
Main Lake	Cold Brook	0.26	0.07	99.90	0.03	0.00	0.00

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Agricultural Sector Loading

The agricultural sector consists of land cover types including pastures, hay fields, and cultivated crops. This sector has the second largest land cover in the basin overall, composing 8.7% of the total land area. While the agricultural sector is a small percent of the total land cover, according to the LENS analysis, it is estimated that the agricultural sector contributes 38% of the TP load. Potential phosphorus inputs from the agricultural sector can include fertilizer losses from field erosion, animal access to streams, silage and manure pit leachate, and excessive manure spreading on fields with a lack of vegetation to intercept excess nutrients.

Phosphorus loads from agricultural acres were estimated for each HUC 12 (Figure 9). Agricultural loading is concentrated in the northernmost lake segment (Isle La Motte) and southernmost lake segment (South Lake B). South Lake B contains many agricultural communities along the Poultney–Mettawee Rivers, similar to the Vermont side of this lake segment. Agriculture is the second largest land cover type in South Lake B segment watershed and contributes approximately 77% of the total load for this segment. Agriculture accounts for approximately 60% of the phosphorus load for the Isle La Motte segment.

Port Henry has a moderate level of agricultural loading. 10% of the land cover in this segment watershed is agriculture and accounts for 50% of the phosphorus load for this segment. The Main Lake has very little agricultural acres (approximately 6% of total acres) but agriculture contributes 32% of the segment's load. There is also very little agricultural land cover in the South Lake A and Cumberland Bay lake segment watersheds (less than 4%), and it subsequently contributes only 24% and 22% of TP load for each segment, respectively.

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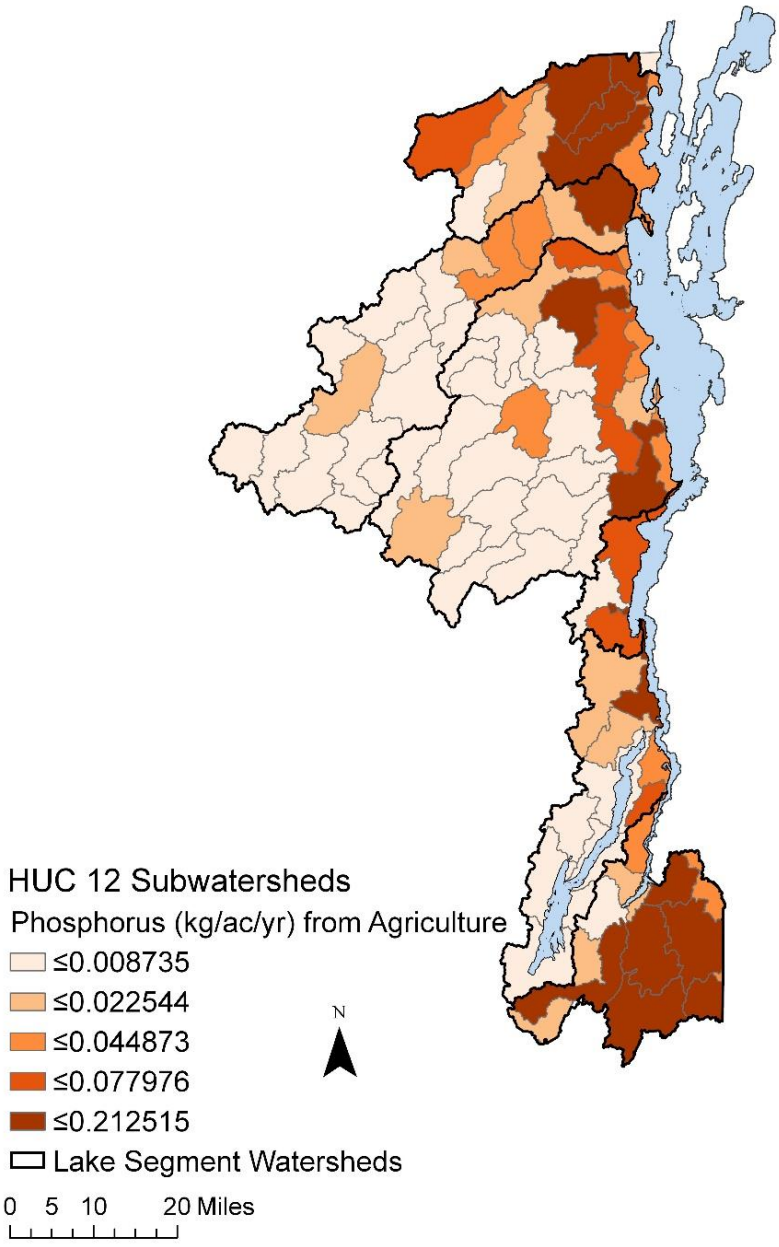

Figure 9. Agricultural Sector Loading (kg/acre/year) by HUC 12 Watershed.

Forested Sector Loading

The forested sector is the largest sector in terms of land cover, at 89% of the land area in the New York portion of the basin (1,655,242 acres) and is estimated to contribute 36% of the total load across all sectors. Phosphorus loads from forested acres were estimated for each HUC 12 (Figure 10).

The Main Lake, Cumberland Bay and South Lake A segments contain the greatest forested land cover and are located almost entirely within the Adirondack Park. Subsequently, Main Lake has a high forested sector land cover (93%) and the land accounts for 54% of the phosphorus load while Cumberland Bay is comprised of 95% forested land cover and contributes 59% of the segment's load. The Main Lake and Cumberland Bay segments encompass the High Peaks region of the Adirondacks (highest elevations in New York State), which contain highly erosive slopes.

South Lake A has 95% forested land cover and the contributes 61% of the total basin load, the highest in the basin. Additionally, Lake George is located within this segment and accounts for 28,451 acres of open water. The Port Henry lake segment is located entirely within the Adirondack Park, with forested land cover dominating 88% of the landscape and contributing nearly 37% of the phosphorus load to the lake segment. The Isle La Motte segment is comprised of 80% of the forested land cover and contributes 28% of the phosphorus load. South Lake B has an estimated 76% forest land cover with just 20% of its load coming from the forested sector.

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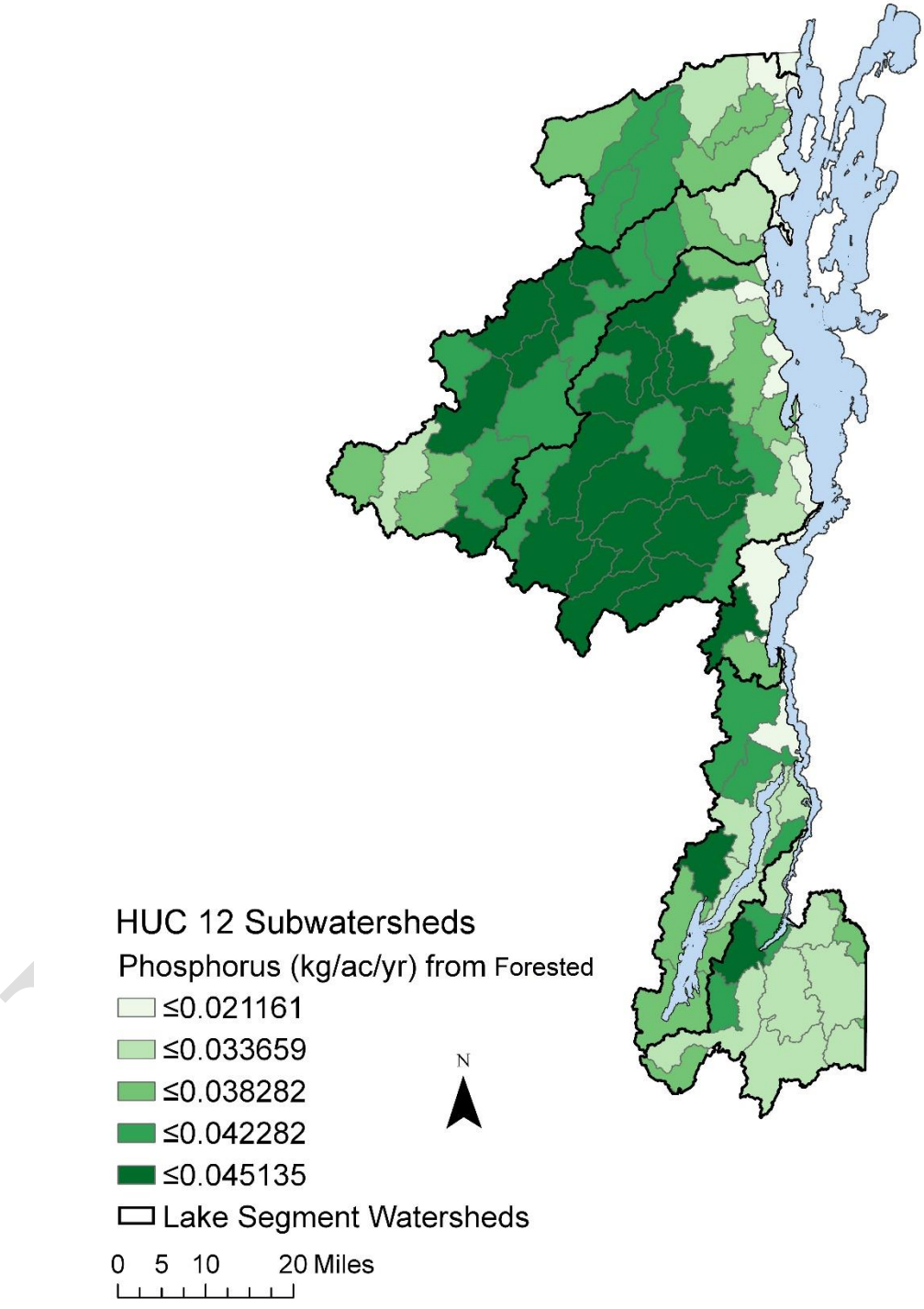

Figure 10. Forested Sector Loading (kg/acre/year) by HUC 12 Watershed

Urban Sector Loading

The urban sector is the smallest land cover sector in the watershed overall. The LENS analysis estimates that the urban sector composes just 2% of the land area (28,949 acres) and contributes 15% of the TP across all sectors. The urban sector consists of building, roads, and other impervious areas. Phosphorus loads from urban acres were estimated for each HUC 12 (Figure 11).

South Lake B has the highest concentration of urban land cover and associated loads. South Lake B contains the largest population density, including Queensbury, Fort Ann, Whitehall, and Dresden. There is very little urban land cover in South Lake A, contributing less than 16% of the nonpoint source phosphorus load to the segment. Port Henry has a relatively low urban land use. Port Henry encompasses only a few municipalities (Westport, Moriah, and Crown Point) that are relatively low in population size. The Main Lake segment has little development; the largest village within the segment is Lake Placid. Urban land cover composes 2% of the land cover in Cumberland Bay and 19% of the phosphorus load. The largest population center is Plattsburgh, which is located on the shoreline of Lake Champlain. Urban land cover in Isle La Motte is minimal, composing only 2% of the land cover and contributing 11% of the phosphorus load for the segment.

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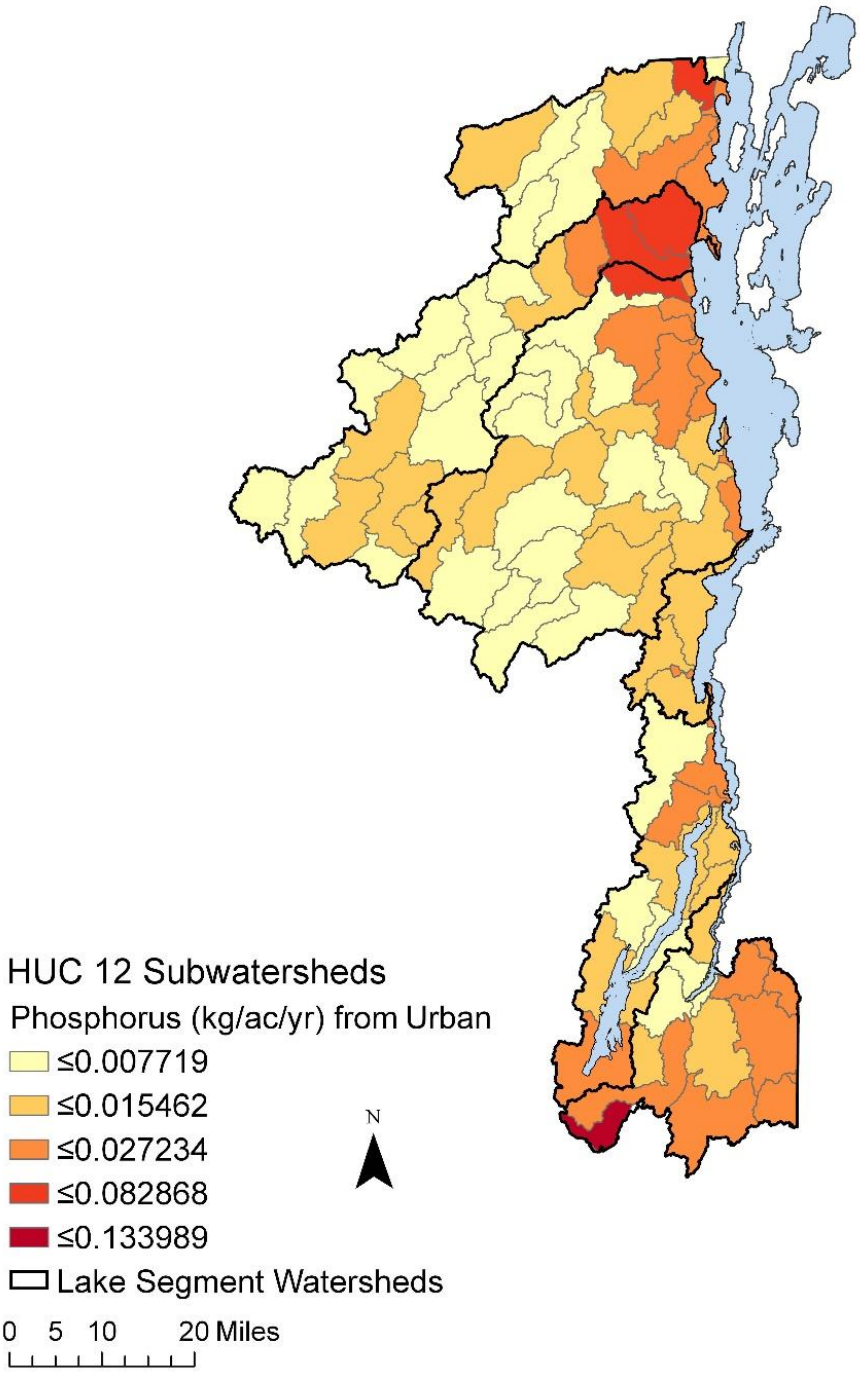

Figure 11. Urban Sector Loading (kg/acre/year) by HUC 12 Watershed

Wastewater Sector Loading

In the 2002 TMDL, 25 municipal wastewater facilities were given individual wasteload allocations in pounds per day (lbs/day). The wastewater load contribution from these facilities is an estimated 10% of the TP load to the basin. Wastewater load was estimated using SPDES Discharge Monitoring Report (DMR) data from facilities in the TMDL using average daily loads (lbs/day) over a three-year period (2017–2020) (Table 11).

New York's wastewater treatment plants are all discharging phosphorus at levels below their respective wasteload allocations assigned under the 2002 TMDL. Combined, the facilities are discharging 134.3 lbs/day or 40,020 lbs/yr. This translates to 22.23 mt/yr, which is 13.27 mt/yr less than the 35.5 mt/yr point source allocation in the 2002 TMDL.

Table 11. Wastewater Facility TMDL Wasteload Allocation and Average Load

Lake Segment	Facility	TMDL Wasteload Allocation (lbs/day)	Current Average Load (lbs/day)
South Lake B	Fort Ann STP	1.33	1.1
	Village of Granville WWTP	4.30	1.4
	Great Meadows Correctional	1.67	0.8
	Washington Correctional	0.72	0.2
	Whitehall STP	3.60	1.9
South Lake A	Crown Point WWTF	1.03	0.7
	International Paper Co. Ticonderoga Mill	37.80	16.4
	Ticonderoga WPCP	8.90	8.2
Port Henry	Port Henry/Moriah Joint WWTP	3.34	2.2
	Westport WWTP	2.00	1.6
Main Lake	Ausable Forks Community WWTP	4.47	1.9
	Keeseville WWTP	2.00	0.5
	Lake Placid WPCP	13.00	7.8
	Peru STP	3.43	2.3
	Peru/Valcour SD STP	0.32	0.2
	Wadhams WWTF	0.24	0.1
	Willsboro WWTF	1.73	0.8
	Essex SD#1*	0.27	0.09
Cumberland Bay	ADK Fish Culture Station	0.45	0.2
	Cadyville WWTP	0.25	0.1
	Dannemora STP	20.30	13.7
	Plattsburgh WPCP	65.50	55.1
	Saranac Lake STP	13.50	6.8
	St. Armand SD WWTP	1.70	1.2
Isle La Motte	Altona Correctional	0.50	0.1

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	Champlain WWTP	3.09	1.4
	Chazy WWTF	0.60	0.1
	Rouses Point WWTP	15.78	7.6
	TOTAL [22]	211.78	134.3

*Facility built after release of 2002 TMDL.

The following trades have been approved by DEC since the TMDL was finalized in 2002 (Table 12). Essex SD#1 was built in 2011. A new facility is also proposed for the Town of Elizabethtown.

Table 12. Wastewater Facility Allocation Trading

Facility Trading Allocation	2002 TMDL Wasteload Allocation (lbs/day)	Trade	Current Permitted Wasteload Allocation (lbs/day)	Facility Receiving Allocation	2002 TMDL Wasteload Allocation (lbs/day)	Wasteload Allocation for Receiving Facilities (lbs/day)
Westport SD#1	2.4	0.4	2.0	Town of Moriah	2.94	3.34
Willsboro SD#1	2.0	0.27	1.73	Essex SD#1		0.27
TBD	TBD	TBD	TBD	Elizabethtown	-	TBD

The 2002 TMDL did not account for small discharges from either industrial or Private, Commercial, and Institutional (PCI) discharges. Below are the definitions for each of these discharge types:

Industrial: Industrial discharges are discharges resulting from industrial, manufacturing, trade or business processes. Industrial treatment facilities are classified as major, minor, or non-significant based on the characteristics of the wastewater, complexity of treatment processes, and the facility's design flow.

PCI: PCI facilities primarily discharge domestic sewage with no addition of industrial waste. PCI discharges generally refer to wastewater generated by a single facility or building complex under single ownership and may or may not be under public ownership. Examples include restaurants, schools, apartment complexes, mobile home parks, and campgrounds. PCI facilities discharging 1,000-10,000 gallons per day of treated sanitary waste to groundwater may not require an individual SPDES permit if they qualify and obtain coverage under the PCI general permit.

There are 49 industrial facilities (26 surface water discharges, 23 groundwater discharges) and 157 PCIs (29 surface water discharges, 128 groundwater discharges) within the New York portion of the Lake Champlain Basin. Additional outreach and monitoring of these facilities may be required in order to quantify the total phosphorus loading from these facilities before the update of the TMDL.

[22] Wyeth-Ayerst, Chazy, originally in the TMDL, was converted to groundwater discharge.

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Septic Sector Loading

Phosphorus loads from individual septic systems are estimated using default coefficients and an assumed deficiency rate for septics in close proximity (<250 ft) to surface waters. LENS estimates the septic sector loading to contribute 1% of the total load across all sectors. LENS uses default coefficients for household size and phosphorus effluent released per person per year. Septic loads are estimated by multiplying average household size, number of septics within the subwatershed, percentage of failing septic systems and amount of phosphorus released per person annually. The result is an estimated annual pollutant load for septic systems within the subwatershed. Septic density information was obtained from the New York State Office of Real Property and Tax.

The default coefficients used in the septic system phosphorus load calculation are presented in Table 13. Default values were selected based on literature review of loading models and the default values used in well-established models (e.g., GWLF).[23]

Table 13. Parameter and Default Coefficients for Septic System Loading

Parameter	Default Value	Units
Individuals per household	2.6	person/house
P-effluent per person per year	1.5	gallon/person/day
P-seasonal uptake (May-Oct)	0.4	gallon/person/day
P-total system deficiencies	25%	-

To determine the number of septics within 250 feet of a waterbody, a buffered area is created around the NHD streams and waterbody layer using ArcGIS. Tax parcel data is overlayed the buffered area. Since the tax parcel data does not identify the exact location of the septic system on the parcel, the septic system is assumed at the tax parcel centroid. Summer and winter population are separated to account for seasonal residences that are not being used in the winter and the phosphorus uptake from plants (generally grasses) growing over the septic system adsorption field that occurs during the growing season. From that selection, parcels with the property classification of seasonal residence are selected and used to calculate the winter population using septic systems. The phosphorus load from septic systems was calculated based on equations from the Watershed Treatment Model[24] and GWLF model[25]were used:

Winter septic system load: 0.5 x P released person^{-1}yr^{-1} x average household size x number of homes with systems x % of systems with deficiencies

[23] Default coefficients for septic load are outlined in DEC's 2015 Vision Approach http://www.dec.ny.gov/docs/water_pdf/dowvision.pdf
[24] Caraco, Deb P.E. 2013. "*Watershed Treatment Model 2013 Documentation*." Center for Watershed Protection.
[25] Douglas A. Haith, Ross Mandel, Ray Shyan Wu. 1992. "*Generalized Watershed Loading Functions Version 2.0 User's Manual.*" Ithaca, New York: Department of Agricultural & Biological Engineering, December 15.

Winter Phosphorus Load = 0.5 x *P* x *IH* x *H* x *Sd* x 365 x 0.00227

Summer septic system load: 0.5 x (P released person^{-1}yr^{-1}– seasonal uptake) x average household size x number of homes with systems x % of systems with deficiencies

Summer Phosphorus Load = 0.5 x (*P-Su)* x *IH* x *H* x *Sd* x 365 x 0.00227

L= Winter Phosphorus Load + Summer Phosphorus Load

Where:

L is the phosphorus pollutant load (lbs/yr.)

P is phosphorus released per person annually (gallon/person/year)

IH is the average individuals per household (person/house)

H is the number of homes with septic systems *within 250ft of a waterbody*

Sd is percent of systems with deficiencies (failure rate)

Su is seasonal uptake by plants

Conversion factor is 0.00227

For each lake segment, the number of septics, percentage of septics within 250 feet of a surface waterbody and the total estimated load per year were determined (Table 14). Phosphorus loads from septics were estimated for each HUC 12 (Figure 12).

Table 14. Estimated Seasonal Septic Systems Load by Lake Segment

Lake Segment	Winter TP Load (mt/yr)	Summer TP Load (mt/yr)	TP Load (mt/yr)
South Lake B	0.47	0.46	0.93
South Lake A	0.02	0.01	0.03
Port Henry/Otter Creek	0.03	0.04	0.07
Main Lake	0.35	0.33	0.68
Cumberland Bay	0.08	0.11	0.19
Isle La Motte	0.11	0.10	0.20
TOTAL	1.06	1.05	2.11

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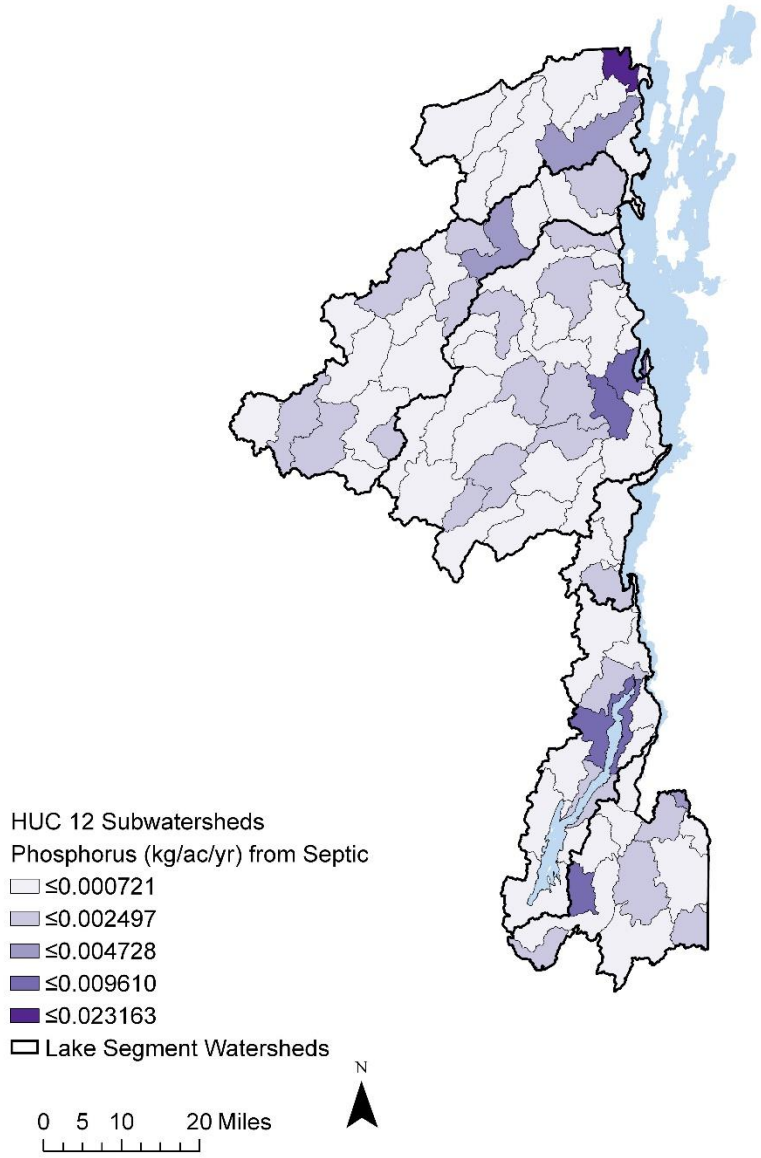

Figure 12. Septic Sector Loading (kg/acre/year) by HUC 12 Watershed

VI. Past Project Implementation and Load Reductions

New York has spent over $60 million of state funding and nearly $70 million in state-sponsored loans on nearly three hundred water quality improvement projects in the Lake Champlain watershed across all sectors since 1995. New York state agencies prioritize grant funding for TMDL watersheds to support implementation to meet water quality goals. Projects and funding spent on all sectors are listed in Table 8 and shown in Figure 4 below. A list of funding programs used to support implementation are listed in Appendix A.

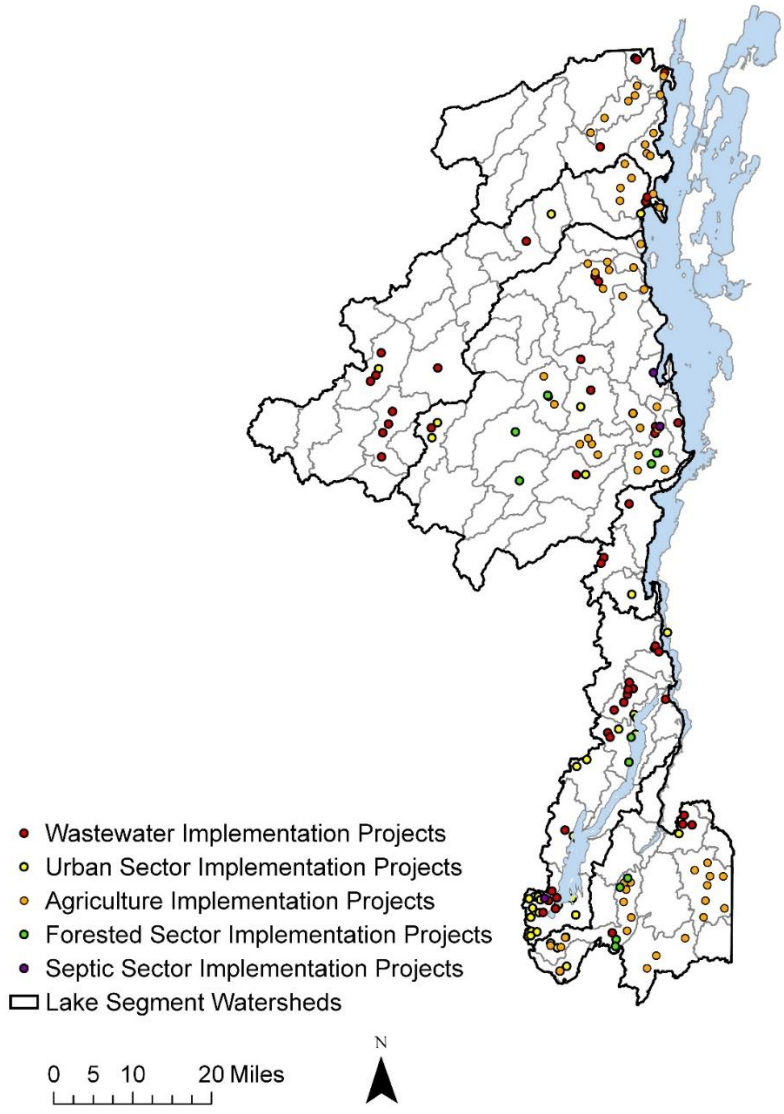

Figure 4. Past Implementation Projects 1995–2019

Table 8. State Funding Summary (1995–2019)

Sector	State Funding Spent	Number of Projects Funded	Funding Program
Agriculture*	$18,700,000	74	AgNPS, CRF, AEM
Forest	$4,000,000	14	WQIP
Urban	$7,500,000	40	WQIP, EPG, EFC, GIGP
Wastewater**	$118,000,000	118	WQIP, EPG, EFC, CWSRF, ESD
Septic	$164,000	3	WQIP

*Agriculture Sector: $17.4 million in competitive grant funds, $1.3 million in county-wide allocation
** Wastewater Sector: $52 million in grant funds, $69 million in loans

Quantifying Load Reductions

DEC and partners are in the process of quantifying the phosphorus load reductions achieved by past implemented projects. The Lake Champlain-Lake George Regional Planning Board received a Lake Champlain Basin Program grant to begin quantifying load reductions from implementation projects identified in their *2018 Subwatershed Assessment and Management Plan.*[26] DEC is also developing a new nonpoint project tracking database that will calculate load reductions from state-funded nonpoint source projects. These projects will allow us to better understand reductions made from completed implementation projects, as well as project load reductions for future implementation.

DEC has also been in communication with VTDEC regarding load reduction calculations and how to maintain consistency between the two states related to standard operating procedures (SOPs) for implementation tracking and accounting. DEC and VTDEC applied in 2020 for Lake Champlain Basin Program funding to acquire a contractor to review interstate implementation project tracking and accounting methods. This project proposes to have an external review of DEC and VTDEC's Tracking and Accounting SOPs and give recommendations on how to ensure basin-wide consistency. The states could use this external review to inform future revisions to SOPs and improve the state's overall TMDL tracking and accounting methods.

[26] Information obtained online at: https://lclgrpb.org/blog/lake-champlain-non-point-source-pollution-subwatershed-assessment-and-management-plan/

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VII. Future Project Implementation

DEC has included a list of potential implementation projects for agricultural sector (Appendix B), forested sector (Appendix C), urban sector (Appendix D), wastewater sector (Appendix E), and septic sector (Appendix F). DEC's state and federal partners offer a variety of funding programs for project planning and implementation. These opportunities are listed in Appendix A and are project locations can be viewed on an ArcGIS online map at: https://nysdec.maps.arcgis.com/apps/instant/minimalist/index.html?appid=a13eb7251a0143c18de23d3e2ccd920c.

Projects were identified by the Lake Champlain-Lake George Regional Planning Board (LCLGRPB), along with its partners in the Champlain Watershed Improvement Coalition of NY (CWICNY) in the *Lake Champlain Nonpoint Source Pollution Subwatershed Assessment and Management Plan* (Subwatershed Assessment). The *Subwatershed Assessment* was created to assist local and regional resource managers in New York in identifying targeted projects and programs for phosphorus reduction. The *Subwatershed Assessment* identifies specific planning and implementation efforts for phosphorus reduction.

In addition to the potential implementation projects, funding for a watershed coalition coordinator for CWICNY would assist in the facilitation of implementation of these potential projects in the basin. In an effort to continue the growth of basin-wide implementation efforts, a coordinator position for CWICNY is a necessary asset to alleviate the "bottleneck" in which implementation cannot feasibly increase without an increase in capacity. The CWICNY coordinator position would be anticipated to develop, administer and help implement water quality improvement projects under the direction of the CWICNY President and Board of Directors. Work will include the following, with potential for growth with new funding opportunities:

- Create new and enhance existing education and outreach programs
- Provide coordination between CWICNY and stakeholders in the Lake Champlain Basin
- Conceptualize project planning, development and implementation
- Provide technical assistance
- Organize technical trainings
- Manage contracts for state line-item funding received from the LCBP through NYSDEC
- Apply for state and federal grant opportunities

Agricultural Sector Programs and Best Management Practices

Agricultural implementation is achieved through a combination of regulatory requirements and voluntary implementation. A coordinated effort between DEC, the New York State Department of Agriculture and Markets (NYS AGM), the New York State Soil and Water Conservation Committee (NYS SWCC), and county soil and water conservation districts (SWCDs) actively support increased planning for, use, and implementation of conservation practices with best management practices (BMPs). There are two primary and intertwined programs in New York's Lake Champlain watershed that address the environmental impacts of agriculture operations:

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DEC's Concentrated Animal Feeding Operation (CAFO) regulatory program[27] and NYS AGM's voluntary Agricultural Environmental Management (AEM program).[28] Currently, 187 farms in the basin are enrolled in the AEM program.

To best mitigate the excess erosion and nutrient loading in the agricultural sector, a series of priority best management practices are recommended for areas of high agricultural loading. Due to the high proportion of load for a small land area, these areas are considered a high priority for agricultural funding as projects spanning a smaller area can have a larger effect on water quality improvement. Each of these BMPs reduce or trap nutrient runoff, while also improving farm efficiency. Recommended BMPs include, but are not limited to, access control systems, comprehensive nutrient management plans, conservation tillage, cover crops, erosion control systems, forest buffers, grass buffers, livestock heavy use area protection, manure incorporation/injection, manure waste storage, prescribed rotational grazing system, and silage leach control and treatment systems. A full list of agricultural BMPs can be found in NYS AGM's *Agricultural Best Management Practices Catalogue*.[29]

Forested Sector Regulations and Best Management Practices

While forested or "background" load is present and necessary for biological cycling, the magnitude of this load still provides opportunities for excess nutrients to reach the lake. In the Lake Champlain basin, natural settings require some level of mitigation to reduce erosion and intercept nutrients before they reach the lake. For the purpose of this document, the forested sector consists of undeveloped land like forests, grasslands, wetlands, streams, and barren land. Seventy-three percent of the basin is located within the Adirondack Park and much of the landscape is composed of forests, wetlands, streams, bare rock, and other natural features, making it an important focus for implementation.

Due to the steep topography of the watershed, erosion is likely the highest contributor of phosphorus inputs. Stormwater runoff from high elevations and unstable stream corridors result in greater levels of soil erosion, and subsequently, higher susceptibility of nutrient runoff. Additionally, rural and forest roads and roadside ditches within these natural land covers channelize and increase the volume of stormwater conveyance, which heightens erosion and transports phosphorus-laden sediment with greater ease. Inputs from this sector can also come from areas where active silviculture is taking place on private lands from timber harvesting.

In areas outside of the Adirondack Park, a state permit is not required for harvesting timber specifically, but a state permit is required when crossing certain classified streams or working in certain designated wetlands. DEC Foresters have provided BMP documents and guidance for

[27] More information on DEC's CAFO permitting program can be found online at: https://www.dec.ny.gov/permits/6285.html
[28] More information on NYS Department of Agriculture and Market's AEM Program can be found online at: https://agriculture.ny.gov/soil-and-water/agricultural-environmental-management
[29] Agricultural Best Management Practice Catalogue is available online at: https://agriculture.ny.gov/system/files/documents/2021/06/ag_bmp_catalogue_1.pdf

use by the timber harvesting industry, including effective ways of preventing sediment-laden runoff from harvesting activities.

Within the Adirondack Park, special regulations apply for forest harvesting by the Adirondack Park Agency under the Adirondack Park Agency Act; New York State Wild, Scenic and Recreational Rivers System Act; and New York State Freshwater Wetlands Act. Timber harvesting activities requiring an Adirondack Park Agency permit include: clearcutting more than 3 acres of wetland, clearcutting of more than 25 acres in upland areas, construction of wood roads in wetlands and various harvesting activities within designated river, including any cutting or new wood road in or within 100 feet of the mean high water mark of a river, and new bridges.

To best mitigate any excess erosion and nutrient loading in the forested sector, a series of priority BMPs are recommended for the lake segments where the primary load source is derived from the forested sector. These priority BMPs include: hydroseeding, rural and forest road management, streambank stabilization, culvert repair and replacement, and road ditch stabilization. Additional information on these BMPs can be found on DEC's Nonpoint Program webpage.[30]

Urban Sector Regulations and Best Management Practices

The urban sector consists of anthropogenically altered, non–agricultural land like villages, homes, and urban areas. Overall, the New York portion of the Lake Champlain watershed is rural and not heavily developed. Pollution from developed areas is derived from stormwater runoff. Impervious surfaces, such as parking lots and rooftops, shed rainwater quickly and do not allow stormwater to soak into the ground.

Intensely developed areas are currently regulated under EPA's Stormwater Regulation that was promulgated under the Clean Water Act in 1990 (Phase I).[31] The Phase II Stormwater Regulation expanded the Phase I program in 2000 by requiring additional operators of small municipal separate stormwater sewer systems (MS4) in urbanized areas and operators of small construction sites to implement programs and practices to control polluted stormwater runoff. To implement the federal Phase II Stormwater Regulation, DEC developed two SPDES general permits: one for Small Municipal Separate Storm Sewer Systems (MS4)[32] in urbanized areas and one for Stormwater Discharges from Construction Activity (Construction Stormwater).[33] There are five regulated MS4s in the Lake Champlain basin: Glens Falls City, the Town of Queensbury, the Town of Lake George, the Village of Lake George, and the Town of Kingsbury.

[30] DEC Nonpoint Source Program Guidance and Technical Assistance: https://www.dec.ny.gov/chemical/96777.html
[31] EPA Phase II Stormwater Rule https://www.epa.gov/npdes/stormwater-phase-ii-final-rule-fact-sheet-series
[32] More information on DEC's Stormwater MS4 permit can be found online at: https://www.dec.ny.gov/chemical/43150.html
[33] More information on DEC's Construction Stormwater Permit can be found online at: https://www.dec.ny.gov/chemical/43133.html

To best mitigate the excess erosion and phosphorus loading in the urban sector, a series of priority best management practices are recommended for areas of high loading, including but not limited to bioretention/rain gardens, erosion and sediment control for dirt and gravel roads, filter strips, urban riparian buffers, permeable pavement, and infiltration practices. Some practices may also provide additional co–benefit of holding excessive stormwater flows in flood–prone areas. More information on urban best management practices can be found in the New York State Stormwater Design Manual[34] and DEC Nonpoint Source Program webpage.

Wastewater Treatment Regulations and Implementation

New York relies on enforcement of its SPDES permit program to eliminate pollutants from New York's waters and maintain the highest quality of water possible. DEC implements the SPDES program through the issuance of wastewater discharge permits, including both individual permits and general permits.[35]

A permit, once issued, requires the owner or operator to comply with specific conditions. For larger, more complex facilities, these requirements typically include limits on physical, chemical, or biological characteristics of the discharge. For smaller facilities, including those discharging to groundwater, the permit may simply require maintaining data and information at the facility site for review by DEC staff during an inspection. In addition to the specific conditions found in the permit document itself, the SPDES permit also references "general conditions" required by the SPDES regulation 6 NYCRR Part 750–2. This regulation contains requirements that are applicable to all permittees, including records retention, proper operation and maintenance of a treatment plant, and requirements to report treatment plant bypasses and noncompliance events to DEC.

DEC monitors SPDES–permitted facilities and the quality of wastewater they discharge through active and passive methods consisting of receiving DMRs on a recuring basis, performing routine inspections, responding to citizen complaints, and recurring certification of wastewater treatment operators. 25 wastewater facilities in the basin are subject to TMDL allocations. Information on individual facility TMDL allocations and current loading can be found in Section IV of this document.

Wastewater Trading – Phosphorus Load Allocations for Wastewater

New York does not have any phosphorus allocations in the Lake Champlain Basin for new or expanded discharges from wastewater treatment facilities. All such discharges must offset by a matching 100% reduction of existing discharge allocations and SPDES permits must be modified to include enforceable provisions to implement offsets. Facilities may secure offsets for new or expanded loads by:

[34] NYS Stormwater Design Manual: https://www.dec.ny.gov/chemical/29072.html
[35] More information on DEC's SPDES permit program can be found online at: https://www.dec.ny.gov/permits/6054.html

- Consolidation with other existing wastewater treatment systems for which wasteload allocations (WLA) have been provided;
- Expanded facilities may upgrade to improve treatment to meet load limits; or
- Voluntary wasteload allocation trading among existing facilities based on current wasteloads.

DEC is willing to consider water quality trading among SPDES dischargers with a WLA as a means of providing flexibility for the implementation of this TMDL. Water quality trading is a voluntary option that regulated point sources can use to meet the water quality–based effluent limits in their SPDES permits. The TMDL provides for trading among point sources within the same lake segments, provided there is no net increase in the WLA assigned to the specific lake segment where the trade is implemented. Trades among individual WLAs within the same lake segment may be implemented and documented in the individual SPDES permits of those agreeing to the trade through corresponding adjustments among the SPDES permit limits. DEC may consider the nature of the loads, e.g., bioavailable phosphorus content, when trading between sources is being considered to ensure the trade will not cause additional local water quality problems.

Wastewater Treatment Plant Optimization

DEC is working to add technology–based effluent concentration limits for TP for each TMDL wastewater facility in an effort to maximize phosphorus removal for facilities in the Lake Champlain Basin. Technology based concentration limits are appropriate based on New York State regulation in 6 NYCRR Part 750-2.8(a)(5), which states: "The permittee and operator shall operate the wastewater treatment facility in such a manner as to minimize the discharge of pollutants to a degree that is achievable when compared to standard practices for operation of such wastewater treatment facilities." Every TMDL wastewater facility has a mass loading limit in their permit. Many of these facilities are discharging less than their total SPDES permitted flow. These facilities are able to meet their mass loading limits while possibly discharging a higher phosphorus concentration than the lowest concentration level that the existing phosphorus removal equipment could achieve. DEC will work with these facilities to maximize their treatment capabilities based on existing phosphorus removal equipment installed at the facility. Supported with federal funding, DEC has contracted with the New York Rural Water Association to provide wastewater treatment plant optimization services to these facilities. Services include operator technical assistance, facility audit and optimization reports, and operator training. These services are being offered at no cost to the municipality. Any facility upgrades needed to meet the technology–based effluent concentration limits for TP will be prioritized for funding under DEC's Water Quality Improvement Project (WQIP) grant program.

Additional funding may also address common needs within the watershed for major capital upgrades or reconstruction of wastewater treatment facilities, as well as repair and replacement of aging sewer collection systems. There are multiple communities in the watershed that experience excessive inflow and infiltration (I/I) into their sewer collection and conveyance

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systems that need assistance with identifying and removing the inflow of stormwater or groundwater into the sewer systems in problem areas.

Septic Sector Regulations and Programs

Septic systems, also called on–site wastewater treatment systems (OWTS), are a common form of waste management within the Lake Champlain basin. Best management practices to reduce phosphorus loading from OWTS include OWTS repair and proper maintenance (e.g., routine pump outs), OWTS replacement or upgrade, and connection to sewer infrastructure. Residential OWTS are regulated by the New York State Department of Health (NYS DOH) or are delegated to county health departments. New residential systems less than 1,000 gallons per day are required to achieve specific design criteria in NYS DOH regulations (Part 75–A).

Larger OWTS, including private, commercial, and institutional systems, are regulated by DEC. DEC requires all subsurface discharges greater than 1,000 gallons per day to obtain SPDES permits and to adhere to New York State groundwater water quality standards. For sanitary subsurface systems greater than 30,000 gallons per day, compliance with groundwater effluent standards for nitrate is required. Construction standards for these systems are found in DEC's *Design Standards for Intermediate–Sized Wastewater Treatment Systems*. These design standards were last revised in 2014. In addition, DEC has identified substandard OWTS as a significant contributor to pollutants in urban stormwater runoff. Regulated MS4 municipalities are required to implement a process to identify and eliminate such illicit discharges to the MS4s. This requirement is expected to reduce the number of sub–standard systems in urban areas. While New York State does not routinely inspect residential OWTS, several watershed–based programs have been developed. In some areas, local inspection and enforcement programs exist. As a means to protect water resources in a cost–effective manner, municipal management of OWTS is encouraged. DEC encourages municipalities to conduct OWTS inspections and to develop OWTS management strategies.

The State Septic System Replacement Fund Program provides funding to replace cesspools and failing septic systems in New York that are causing a known water quality impairment to a waterbody. Round 1 of the program started in 2018 after the 2017 Clean Water Infrastructure Act allocated $75 million for the program. Clinton County and Essex County both participated in Round 1 of the program and successfully spent approximately $200,000 in the Lake Champlain Basin. It is anticipated that Round 2 will expand the number of counties participating across New York State as well as in the Lake Champlain Basin.

VIII. Adaptive Management

This implementation plan is intended to be an adaptive document that may require updates and amendments, or evaluation as projects are implemented, research is completed, new

conservation practices are developed, implementation projects are updated, or priority areas within the watershed are better understood.

Part of the adaptive management process will be to analyze ambient water quality over time. Data collected from DEC's water quality monitoring programs, in conjunction with the Lake Champlain Basin Program's Long–Term Monitoring Program, will be used to assess trends in water quality and readjust implementation actions based on water quality data.

DEC will also track implementation and calculate load reductions associated with point and nonpoint source projects. Wastewater reductions are already tracking as part of the SPDES Program via EPA's ICIS data system. DEC is in process of developing a statewide nonpoint source BMP database. The database will house project information including project description, location, amount of BMPs installed, funding, and nutrient reduction on BMP projects that occur under regulated construction stormwater and MS4 programs or through voluntary grant–funded projects. Within the database, nutrient reductions are calculated for each project for nitrogen, phosphorus, and sediment.

Local support and implementation of the recommended actions in this plan are crucial to achieve water quality goals set by the TMDL. DEC and other state agency partners, together with federal partners, stand ready to assist all localities in securing funding and expeditiously implementing priority projects.

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Appendix A. Funding Programs

Funding Program	Description	Sector	Funding Source
Agricultural Environmental Management (AEM) Base Program	The AEM Base Program is administered by the NYS SWCC and provides noncompetitive technical assistance funding to SWCDs to inventory and assess farms in priority watersheds, plan and design BMPs, and evaluate effectiveness of planning and BMPs on priority farms based on County AEM Strategic Plans and Annual Action Plans.	Agriculture	State
Climate Resilient Farming (CRF)	The CRF Program is a new competitive grant program administered by the NYS SWCC to reduce the impact of agriculture on climate change (mitigation) and to increase the resiliency of New York State farms in the face of a changing climate (adaptation). The CRF Program operates with three distinct tracks, in recognition of the different applications and benefits of various BMP systems for mitigation and adaptation: Manure Storage Cover and Flare Systems (Track 1), Water Management Systems (Track 2), and Soil Health Systems (Track 3). SWCDs are the only entities eligible to apply for CRF funding.	Agriculture	State
New York State Agricultural Nonpoint Source Abatement and Control Program (AgNPS)	The AgNPS program is a competitive financial assistance program administered by the NYS SWCC that assists farmers in abating and preventing water pollution from agricultural activities by providing technical assistance and financial incentives. SWCDs are the only entities eligible to apply for AgNPS funding. Funding is used to plan, design, and implement priority BMP systems, including cost–share funding to farmers. Farmers are eligible to receive between 75% and 87.5% of BMP implementation costs depending on their contribution to the project.	Agriculture	State

Funding Program	Description	Sector	Funding Source
Agricultural Conservation Easement Program (ACEP)	The Farm Bill of 2014 established ACEP and repealed the Wetland Reserve Program (WRP), Grassland Reserve Program (GRP), and Farm and Ranch Lands Protection Program (FRPP). ACEP provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, USDA's NRCS helps American Indian tribes, state and local governments, and non–governmental organizations protect working agricultural lands and limit non–agricultural uses of the land.	Agriculture	Federal
Agricultural Management Assistance (AMA) Program	Through the AMA program, NRCS provides financial assistance funds annually to producers to: construct or improve water management structures or irrigation structures; plant trees to form windbreaks or to improve water quality; and mitigate risk through production diversification or resource conservation practices including soil erosion control, integrated pest management, or the transition to organic farming.	Agriculture	Federal

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Funding Program	Description	Sector	Funding Source
Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP) and Farmable Wetlands Program	CRP and CREP are administered by the USDA's FSA, with USDA's NRCS and the SWCDs providing technical land eligibility determinations, conservation planning, and practice implementation. CRP is a voluntary program for agricultural landowners. Through CRP, farmers can receive annual rental payments in exchange for removing farmland from production and establishing long–term vegetative cover for the goal of improving water quality, controlling soil erosion, and increasing wildlife habitat. Annual rental payments are based on the agriculture rental value of the land. Participants enroll in CRP contracts for 10 to 15 years. CREP is an offshoot of CRP. CREP is funded in partnership between state and federal governments. In New York, CREP is funded by NYS AGM and USDA. Through the state–federal program partnership, cost–share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices is available. Additional incentive payments are also available for selected practices. Incentive payments can be received at the time of contract enrollment (signing incentive payment or SIP) and after a practice is established (practice incentive payment or PIP). Practices eligible under CREP include riparian buffers, filter strips, wetland restoration, grassed waterways, establishment of permanent grasses, and tree planting.	Agriculture	Federal
Conservation Stewardship Program (CSP)	CSP is a voluntary conservation program that helps producers building on existing conservation efforts. It encourages producers to undertake additional conservation activities while maintaining and managing those existing benchmark conservation activities.	Agriculture	Federal

Funding Program	Description	Sector	Funding Source
Debt for Nature (DFN) Program	DFN, also known as the Debt Cancellation Conservation Contract Program, is a unique program for eligible landowners that protects important natural resources and other sensitive areas while providing a debt management tool. DFN is available to persons with Farm Service Agency (FSA) loans secured by real estate. These individuals may qualify for cancellation of a portion of their FSA indebtedness in exchange for a conservation contract with a term of 50, 30, or 10 years. The conservation contract is a voluntary legal agreement that restricts the type and amount of development that may take place on portions of the landowner's property.	Agriculture	Federal
Environmental Quality Incentives Program (EQIP)	EQIP is a program administered by USDA's NRCS. EQIP assists farm, ranch, and forest production and improves and protects environmental quality and is authorized under the federal Farm Bill. This offers financial and technical assistance to help agricultural producers voluntarily implement conservation practices.	Agriculture	Federal
Regional Conservation Partnership Program (RCPP)	The 2014 Farm Bill created RCPP. RCPP encourages partnerships between local, state, or private entities, and NRCS to install and maintain conservation practices in priority projects areas. In New York, conservation practices are implemented by applicants in collaboration with NRCS through the existing EQIP and ACEP NRCS programs.	Agriculture	Federal
The Farmable Wetlands Program (FWP)	FWP is a voluntary program to restore farmable wetlands and associated buffers by improving the land's hydrology and vegetation. Eligible producers in all states can enroll eligible land in the Farmable Wetlands Program through CRP. FWP is designed to prevent degradation of wetland areas, increase sediment trapping efficiencies, improve water quality, prevent soil erosion, and provide habitat for waterfowl and other wildlife.	Agriculture	Federal

Funding Program	Description	Sector	Funding Source
Lake Champlain Basin Program (LCBP)	The Lake Champlain Basin Program is a Congressionally designated initiative to restore and protect Lake Champlain and its surrounding watershed. LCBP works with partners in New York, Vermont, and Québec to coordinate and fund efforts to address challenges in the areas of phosphorus pollution, toxic substances, biodiversity, aquatic invasive species, and climate change. Since 1992, the Lake Champlain Basin Program has awarded more than $8 million in local grants and funded more than eighty important research and demonstration projects about the Champlain Basin. The local grants are key to implementing the plan, *Opportunities for Action*, at the grassroots level. Research and demonstration projects provide the sound science that is key to implementing the plan. Additional technical support to communities has been provided through the Watershed Environmental Assistance Program, in cooperation with the U.S. Army Corps of Engineers.	Agriculture, Forested, Wastewater	Federal
Clean Water Act Section 604(b):	The Federal Clean Water Act provides for funding to states for regional water quality management planning projects. EPA awards 604(b) grants to states, which in turn award funding to regional planning and interstate organizations. Support for stormwater programs is typically an eligible project type in the 604(b) program. Through the 604(b) –funding program, DEC supports regional planning councils around the state, including the Lake Champlain–Lake George Regional Planning Board	Forested, Urban	Federal
Five Star and Urban Waters Restoration Grant:	The National Fish and Wildlife Foundation (NFWF) offers grant funding for projects that address water quality issues in priority watersheds, such as erosion due to unstable streambanks, pollution from stormwater runoff, and degraded shorelines caused by development. Ecological improvements may include one or more of the following: wetland, riparian, forest, and coastal habitat restoration; wildlife conservation; community tree canopy enhancement; water quality monitoring and	Forested, Urban	Federal

Funding Program	Description	Sector	Funding Source
	green infrastructure best management practices for managing runoff. Awards range from $20,000 to $50,000.		
Integrated Solutions Construction (ISC) Grant Program:	The ISC Grant seeks to incentivize a multi–faceted approach to the water quality challenges caused by stormwater. Under this program, EFC provides grant dollars for the incorporation of green infrastructure practices into CWSRF–financed CSO/SSO/stormwater projects. The grant covers 50% of a municipality's construction cost up to $5 million. Successful applicants will construct projects that treat a minimum of 25% of the water quality volume from a combined, sanitary, or storm sewer system.	Forested, Urban	State
Army Corps of Engineers Section 542 Program:	Section 542 authorizes the Secretary of the Army to establish a program for providing environmental assistance to non–federal interests in the Lake Champlain Watershed. The goal of the Lake Champlain Watershed Environmental Assistance Program is to provide assistance with planning, design and construction of projects that contribute to protection and enhancement of the water quality, water supply, ecosystem and other water related issues within the watershed. The Lake Champlain Basin Program is the administrative partner of the U.S. ACE to implement this program under terms of the General Management Plan.	Urban, Wastewater	Federal
New York State Septic System Replacement Fund	The Septic System Replacement Fund provides funding to replace cesspools and septic systems in New York State. This grant program's goal is to reduce the environmental and public–health impacts associated with the discharge from cesspools and septic systems. The program targets cesspools and septic systems in close proximity to certain waterbodies. The state provides participating counties with funds to work with local property owners. Participating counties provide grant to reimburse the property owner for up to 50% of the costs (up to a maximum of $10,000) of their eligible septic system. To learn more about the program, visit the NYS Environmental Facilities Corporation website at:	Septic	State

Funding Program	Description	Sector	Funding Source
	https://www.efc.ny.gov/SepticReplacement or search on “NYS EFC Septic System Replacement Program”.		
Green Innovation Grant Program (GIGP):	GIGP supports projects across New York State that utilize unique stormwater infrastructure design and create cutting–edge green technologies. GIGP–funded projects range from rain gardens to stream “daylighting” projects. GIGP provides funding for transformative projects that: utilize green infrastructure components to protect and improve water quality; spur innovation in the field of green infrastructure for stormwater; build capacity to construct and maintain green infrastructure; and provide multiple benefits in the communities where they are built.	Urban	State
Climate Smart Communities Grant Program:	The Climate Smart Communities (CSC) grant program provides funding for municipalities to perform inventories, assessments, and planning projects that advance their ability to address climate change at the local level and become certified Climate Smart Communities. Some eligible adaptation projects also provide water quality benefits (such as establishing urban tree canopy).	Forested, Urban	State

Funding Program	Description	Sector	Funding Source
Environmental Justice Grant Program:	DEC's Office of Environmental Justice offers Community Impact Grants to provide community–based organizations with funding for projects that address various environmental and public health concerns. The program has a particular focus on low–income and minority communities that have historically been burdened by environmental problems. More than $5 million via 145 grants have been given to organizations statewide that have made exceptional improvements in the communities they serve. Projects that have been funded include research, community gardens, tree plantings, education and curriculum development, urban farming training, habitat restoration, water quality monitoring, air quality monitoring, and more.	Forested, Urban	State
Local Waterfront Revitalization Program:	NYS Department of State (DOS) provides matching grants on a competitive basis to eligible villages, towns, cities, and counties located along New York's coasts or designated inland waterways for planning, design, and construction projects to revitalize communities and waterfronts. Green infrastructure and stormwater retrofit projects are eligible under this grant opportunity.	Forested, Urban	State
Trees for Tribs Program:	Since 2007, DEC's Trees for Tribs Program has been working to reforest New York's tributaries, or small creeks and streams, which flow into and feed larger rivers and lakes. The goal of the program is to riparian buffers in order to prevent erosion, increase flood water retention, improve wildlife and stream habitat, as well as protect water quality. Trees for Tribs has engaged more than 8,751 volunteers in planting more than 101,416 trees and shrubs at 614 sites across New York State. Grants of up to $100,000 are available through this program with no match requirement.	Forested, Urban	State

Funding Program	Description	Sector	Funding Source
Urban and Community Forestry Grant Program:	DEC's Division of Lands and Forests offers grants that provide support and assistance to communities in comprehensive planning, management, and education to create healthy urban and community forests. Eligible projects include tree inventories and management plans, tree planting, maintenance and education programming. Funds are made available from the New York State Environmental Protection Fund. Grants of up to $75,000 are available per community.	Forested, Urban	State
Water Quality Improvement Project (WQIP) Program:	DEC administers the WQIP program, a competitive, reimbursement grant program that funds projects to address documented water quality impairments. Non–agricultural nonpoint source grants are provided through the program, including funding for green infrastructure, road ditch stabilization, and riparian buffers.	Forested, Urban, Wastewater, Septic	State
Clean Water State Revolving Fund (CWSRF):	The CWSRF provides low–interest rate financing to municipalities to construct water quality protection projects, such as sewers and wastewater treatment facilities. A variety of publicly owned water quality improvement projects are eligible for financing. EPA provides funding to states to capitalize the CWSRF program. New York's Environmental Facilities Corporation (EFC) uses this federal money, along with the required state match funds, to fund projects for the purpose of preserving, protecting, or improving water quality. As borrowers repay their loans, repayments of principal and interest earnings are recycled back into the CWSRF program to finance new projects and allow the funds to "revolve" over time. EFC provides both short and long–term financings, at zero or low interest to accommodate municipalities of all population sizes with varying financial needs.	Wastewater	State

Funding Program	Description	Sector	Funding Source
Engineering Planning Grant Program (EPG):	DEC, in conjunction with EFC, offers grants to municipalities to help pay for the initial planning of eligible CWSRF or WQIP water quality projects. $3 million in funding was available through EPG in 2018. The goal of the EPG program is to advance water quality projects to construction, so successful applicants can use the engineering report funded by the grant to seek financing through other programs.	Wastewater	State
Intermunicipal Water Infrastructure Grant (IMG) Program:	The Clean Water Infrastructure Act of 2017 also included the Intermunicipal Water Infrastructure Grant Program (IMG). In 2017, $30 million was available for the IMG program, which will provide grants for water quality infrastructure projects to be undertaken by two or more cooperating municipalities. IMG funding will be awarded to projects for construction, replacement, or repair of water quality infrastructure, or for compliance with environmental and public health laws. Projects may include shared water quality infrastructure or interconnection of multiple municipal water systems. IMG grants are available for both drinking water and sewage treatment works projects.	Wastewater	State
Local Government Efficiency (LGE) Program:	The Local Government Efficiency (LGE) Program is administered by the NYS DOS and provides state funding to local governments for the development of projects that will achieve savings and improve municipal efficiency. Funding is available for local governments considering the consolidation and sharing of management of public infrastructure including water and sewer.	Wastewater	State
Water Infrastructure Improvement Act (WIIA):	The Clean Water Infrastructure Act of 2017 invests $2.5 billion in clean and drinking water infrastructure projects and water quality protection across New York. It provides at least $1 billion for the New York State Water Infrastructure Improvement Act of 2017 (WIIA), which authorizes EFC to provide grants to assist municipalities in funding water quality infrastructure. WIIA grants are available for both drinking water	Wastewater	State

Funding Program	Description	Sector	Funding Source
	and sewage treatment works (clean water) projects.		
Rural Water Revolving Loan Fund:	Administered by the National Rural Water Association, the Rural Water Loan Funding is a program that provides low–cost loans for short–term repair costs, small capital projects, or pre–development costs associated with larger projects to small water and wastewater utilities. Repaid funds are used to replenish the fund to make new loans.	Wastewater	Federal
U.S. Economic Development Administration (EDA) Public Works Program:	This program assists distressed communities to upgrade their physical infrastructure in order to attract new industries and expand business opportunities. Traditional public works projects, including water and sewer system improvements, are eligible under this program.	Wastewater	Federal
Water & Waste Disposal Loan and Grant Programs in New York:	Administered by USDA Rural Development, the purpose of this program is to support water and waste disposal systems in rural areas with populations of less than 10,000 people. Long–term, low–interest loans are available through the program, and grants may also be available.	Wastewater	Federal

Funding Program	Description	Sector	Funding Source
Community Development Block Grant (CDBG):	The NYS CDBG program is a federally funded program administered by the New York State Office of Community Renewal that provides financial assistance to eligible cities, towns, and villages with populations under 50,000 and counties with an area population under 200,000, in order to develop viable communities by providing decent, affordable housing, and suitable living environments, as well as expanding economic opportunities, principally for persons of low and moderate income. Grants are available for private water/wastewater system assistance, including construction or rehabilitation of septic systems, and installation of lateral connections to low–and moderate–income households from the public water/sewer mains. Applications for funding of lateral connections can be stand–alone projects or can be part of a larger public infrastructure project. Public infrastructure projects eligible for funding include sanitary sewage collection and treatment.	Wastewater, Septic	State

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Appendix B: Potential Agricultural Projects

County	TMDL Watershed	Subwatershed	Agriculture Highest Loading Sector	Project Description	Projected Cost
Clinton	Isle La Motte	Bullis Brook/Great Chazy River	X	Livestock exclusion fencing and riparian buffer program	$150,000
Clinton	Isle La Motte	Bullis Brook/Great Chazy River	X	Completion of five comprehensive nutrient management plans	$100,000
Clinton	Isle La Motte	Bullis Brook/Great Chazy River	X	Implementation of three manure management systems	$1,500,000
Clinton	Cumberland Bay	Dead Creek	X	Implement manure storage and silage leachate projects on five farms	$2,500,000
Clinton	Cumberland Bay	Dead Creek	X	Nutrient Management Plans and implementation of cover cropping, reduced tillage and improved manure management on five farms	$1,500,000
Clinton	Cumberland Bay	Lake Champlain		Improved manure management and agronomic practices to include manure incorporation,	$2,000,000

County	TMDL Watershed	Subwatershed	Agriculture Highest Loading Sector	Project Description	Projected Cost
				dragline systems, cover crops and reduced tillage practices on three farms	
Clinton	Isle La Motte	Lake Champlain		Livestock exclusion fencing and riparian buffers along Riley Brook	$30,000
Clinton	Main Lake	Little Ausable River	X	Three acres of critical area seeding and one heavy use area on one farm	$20,000
Clinton	Main Lake	Little Ausable River	X	Implementation on silage leachate control system on one farm	$300,000
Clinton	Main Lake	Little Ausable River	X	Implementation of satellite waste storage on two farms	$400,000
Clinton	Main Lake	Little Ausable River	X	Livestock exclusion fencing and vegetative buffer on one farm on the Little Ausable River	$50,000
Clinton	Isle La Motte	Outlet Great Chazy River	X	Implement one manure waste storage system	$260,000
Clinton	Isle La Motte	Outlet Great Chazy River	X	Implement watershed agricultural riparian buffer program	$225,000

County	TMDL Watershed	Subwatershed	Agriculture Highest Loading Sector	Project Description	Projected Cost
Washington	South Lake B	Lake Champlain Canal		Reduce nutrient runoff using manure storage and cover crops on five agricultural operations	$2,500,000
Washington	South Lake B	Mettawee River	X	Build one manure waste storage system	$400,000
Washington	South Lake B	Mettawee River	X	Mettawee River streambank restoration and buffer installation program	$525,000
Washington	South Lake B	Poultney River/Head of Lake Champlain	X	Implementation of improved three manure waste storages, two silage leachate control systems and cover crops	$2,500,000
Washington	South Lake B	Wood Creek/Lake Champlain	X	Implementation of regional cover cropping program	$100,000
Washington	South Lake B	Wood Creek/Lake Champlain	X	Manure management and barnyard runoff mitigation program	$750,000
Washington	South Lake B	Wood Creek/Lake Champlain	X	Stream buffer program for agricultural operations in the watershed	$200,000

Appendix C. Potential Forested Sector Projects

County	TMDL Watershed	Subwatershed	Forest Highest Loading Sector	Project Description	Projected Cost
Clinton	Isle La Motte	Bullis Brook/Great Chazy River		Implementation of Trees for Tribs on Great Chazy River	$50,000
Clinton	Cumberland Bay	Lake Champlain		Shoreline stabilization along Lake Champlain and abandoned jetties in the Town of Plattsburgh	$150,000
Clinton	Cumberland Bay	Lake Champlain		Stabilize eroding streambank at Sailor's Beach	$50,000
Clinton	Main Lake	Little Ausable River		Implement Trees for Tribs Program along Little Ausable River	$50,000
Clinton	Isle La Motte	Outlet Great Chazy River		Dredging of delta at mouth of Great Chazy River	$1,500,000
Clinton	Isle La Motte	Outlet Great Chazy River		Implement streambank restoration program on Great Chazy	$500,000
Essex	Port Henry/Otter Creek	Hoisington Brook/Lake Champlain		Removal of a sediment delta located at the mouth of Hoisington Brook	$80,000

County	TMDL Watershed	Subwatershed	Forest Highest Loading Sector	Project Description	Projected Cost
Essex	Main Lake	Lake Champlain		Culvert retrofit and grade control structure placement to address undercutting in Port Douglass	$150,000
Essex	Main Lake	Lower Boquet River		Complete a stormwater and erosion Boquet River tributary assessment	$15,000
Essex	Port Henry/Otter Creek	McKenzie Brook/Lake Champlain		Channel stabilization and riparian buffer installation on Stony Brook at Moriah Country Club	$30,000
Essex	South Lake A	Outlet Lake George		Stabilization of 100 feet of shoreline on Black Point Road	$50,000
Essex/Clinton	Cumberland Bay	Lake Champlain		Implementation of a watershed–wide shoreline outfall reconnaissance and stabilization program	$250,000
Warren	South Lake B	Headwaters Halfway Creek		Address stream crossing on Halfway Brook, Crandall Park Tributary, Unnamed Tributary by SUNY ADK, and Cemetery Brook	$1,750,000

County	TMDL Watershed	Subwatershed	Forest Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake B	Headwaters Halfway Creek		Crandall Pond Outlet reconstruction	$500,000
Warren	South Lake A	Headwaters Lake George		Removal of English Brook delta	$1,500,000
Warren	South Lake A	Headwaters Lake George		West Brook watershed assessment for natural stream design and erosion control	$15,000
Warren	South Lake A	Headwaters Lake George		Implementation of streambank stabilization and erosion control projects from West Brook watershed assessment	$100,000
Warren	South Lake A	Headwaters Lake George		Removal of West Brook delta	$1,500,000
Warren	South Lake A	Headwaters Lake George		English Brook streambank stabilization	$200,000
Warren	South Lake A	Indian Brook/Lake George		Removal of Finkle Brook delta	$400,000
Warren	South Lake A	Indian Brook/Lake George		Trout Lake and Trout Brook watershed assessment	$15,000
Warren	South Lake A	Indian Brook/Lake George		Streambank erosion reduction in Dula Pond headwaters	$20,000

County	TMDL Watershed	Subwatershed	Forest Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Indian Brook/Lake George		Stewart Brook streambank stabilization, stormwater infiltration	$100,000
Warren	South Lake A	Indian Brook/Lake George		Finkle Brook watershed erosion assessment	$10,000
Warren	South Lake A	Indian Brook/Lake George		Trout Lake and Trout Brook watershed assessment	$15,000
Warren	South Lake A	Outlet Lake George		Comprehensive Hague Brook erosion study	$15,000
Warren	South Lake A	Outlet Lake George		Removal of Hague Brook delta	$800,000
Washington	South Lake B	Halfway Creek		Vaughn Road bank stabilization	$45,000
Washington	South Lake A	Headwaters Lake George		Trout Pavilion Road in–stream sediment basin	$30,000
Washington	South Lake A	Indian Brook/Lake George		Perform watershed assessment of Fort Ann portion of LG watershed	$10,000
Washington	South Lake B	Mettawee River		Stabilization of streambank on Upper Turnpike Road	$1,500,000
Washington	South Lake B	Mettawee River		Assessment of culverts within the Town, especially those connecting wetlands	$15,000

County	TMDL Watershed	Subwatershed	Forest Highest Loading Sector	Project Description	Projected Cost
Washington	South Lake B	Mettawee River		Remediation of failing culverts identified in assessment in the Town of Whitehall	$350,000
Washington	South Lake B	Mettawee River		Assessment of culverts within the town, especially those connecting wetlands in the Town of Whitehall	$15,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Stabilization of Country Route 10 Roadway slides	$200,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Reduce bank erosion on Wood Creek	$100,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Poultney River streambank restoration and buffer installation program	$250,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Poultney River streambank restoration and buffer installation program	$100,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Promote forestry BMPs and expand RC&D Skidder Bridge Program	$65,000

County	TMDL Watershed	Subwatershed	Forest Highest Loading Sector	Project Description	Projected Cost
Washington	South Lake B	Wood Creek/Lake Champlain		Promote forestry management plans and BMPs in the Town of Granville	$60,000
Washington	South Lake B	Wood Creek/Lake Champlain		Streambank stabilization on Bond Creek	$60,000

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Appendix D. Potential Urban Sector Projects

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Clinton	Cumberland Bay	Dead Creek		Implement residential green infrastructure program in the City of Plattsburgh	$50,000
Clinton	Cumberland Bay	Dead Creek		Promote and implement Urban Forestry Program	$75,000
Clinton	Cumberland Bay	Dead Creek		Stormwater drainage study for water quality impacts on Tom Miller Road/Newell Avenue subwatershed	$50,000
Clinton	Cumberland Bay	Lake Champlain		Reduce roadside erosion and stabilize ditch in Beekmantown	$10,000
Clinton	Cumberland Bay	Lake Champlain		Cumberland Head roadway ditching and outfall assessment	$30,000
Clinton	Cumberland Bay	Lake Champlain		GI infiltration work at GI infiltration work at the U.S. Oval municipal parking lot and roadway. Implementation and education	$600,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Clinton	Cumberland Bay	Lake Champlain		Route 3 corridor impervious surface reduction and stormwater retrofits	$2,000,000
Clinton	Cumberland Bay	Lake Champlain		Implementation of green infrastructure plan for the City of Plattsburgh	$1,000,000
Clinton	Cumberland Bay	Lake Champlain		Promote and implement City of Plattsburgh Urban Forestry Program	$45,000
Clinton	Cumberland Bay	Lake Champlain		Cumberland Head Road green space Creation	$350,000
County	Isle La Motte	Outlet Great Chazy River		Implement residential stormwater reduction program for the Village of Champlain	$100,000
Essex	Main Lake	Ausable River		Installation of sediment basins and infiltration pond to collect road ditch runoff from Interstate 87 and Route 9 into Butternut Pond	$80,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex	Main Lake	Ausable River		Upgrade of stormwater management system within the Village of Keeseville	$100,000
Essex	Main Lake	Lake Champlain		Restabilization of Lakeshore Road by either road relocation or lakeshore stabilization	$200,000
Essex	Main Lake	Lake Champlain		Implementation of grey and green infrastructure stormwater reduction projects in the Hamlet of Port Douglass	$150,000
Essex	Main Lake	Lake Champlain		Installation of stormwater management controls at DEC boat launch parking lot	$30,000
Essex	Main Lake	Lake Champlain		Implementation of grey and green stormwater reduction projects in the Hamlet of Port Kent	$150,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex	Main Lake	Lake Champlain		Installation of green and gray stormwater infrastructure at Buena Vista Mobile Estates	$175,000
Essex	Main Lake	Lower Boquet River		Implementation of a roadside erosion reduction program	$100,000
Essex	Main Lake	Lower Boquet River		Implement county roadside erosion control program	$150,000
Essex	Main Lake	Lower Boquet River		Stabilize Road erosion on Mirriam Forge Road along Boquet River	$30,000
Essex	Main Lake	Lower Boquet River		Improvements to Town of Essex DPW site for stormwater pollution control	$150,000
Essex	Main Lake	Lower Boquet River		Upgrade Town of Willsboro stormwater system	$50,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex	Main Lake	Lower Boquet River		Complete study to address flooding and stormwater issues on Lewis–Wadhams Road Study	$60,000
Essex	Main Lake	Lower Boquet River		Implement recommendations in Lewis–Wadhams Road Study	$250,000
Essex	Main Lake	Lower Boquet River		Improvements to Town of Willsboro DPW site for stormwater pollution control	$150,000
Essex	Main Lake	Lower Boquet River		Joe Rivers Road roadside stabilization project	$20,000
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Installation of sediment basins and erosion control practices on Mountain Spring Road	$40,000
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Implementation of a county roadside erosion reduction program	$100,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Installation of sediment basins and erosion control practices on McConley Road	$10,000
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Complete a town stormwater assessment and management plan in the Town of Westport	$20,000
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Implement projects identified in stormwater assessment in the Town of Westport	$250,000
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Implementation of stormwater control measures at Essex County Fair Grounds	$300,000
Essex	Port Henry/ Otter Creek	McKenzie Brook/Lake Champlain		Install catch basin and remove debris around railroad bridge in the Town of Moriah	$50,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex	Port Henry/ Otter Creek	McKenzie Brook/Lake Champlain		Stormwater and flooding mitigation at the outlet of Mill Brook	$120,000
Essex	Port Henry/ Otter Creek	McKenzie Brook/Lake Champlain		Implement recommendations in hamlet stormwater management plan in the Town of Moriah	$1,000,000
Essex	Port Henry/ Otter Creek	McKenzie Brook/Lake Champlain		Installation of sediment basins and erosion control practices on Vineyard Road	$50,000
Essex	Port Henry/ Otter Creek	McKenzie Brook/Lake Champlain		Complete a hamlet stormwater assessment and management plan in the Town of Moriah	$20,000
Essex	South Lake A	Headwaters Lake George		Installation of 15 drywells within the Village of Lake George	$90,000
Essex	South Lake A	Headwaters Lake George		Installation of pervious pavement at the Beach Road parking lot	$500,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex	South Lake A	Headwaters Lake George		Installation of pervious pavement at the Fort William Henry Resort	$600,000
Essex	South Lake A	Headwaters Lake George		Installation of pervious pavement at the Boardwalk Restaurant parking lot	$400,000
Essex	South Lake A	Headwaters Lake George		Creation and implementation of a program within the Village and Town of Lake George that mirrors Onondaga County's Save the Rain Program	$5,000,000
Essex	South Lake A	Headwaters Lake George		Creation and adoption of Village of Lake George redevelopment/ retrofit code requirements	$15,000
Essex	South Lake A	Headwaters Lake George		Green infrastructure retrofits at Lake George High School—green roof, cisterns, rain gardens, pervious pavers, etc.	$300,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Essex, Warren, Washington	South Lake A	Headwaters Lake George		Implementation of Village of Lake George MS4 Stormwater Management Program Plan	$250,000
Essex, Washington	South Lake A	Headwaters Lake George		Installation of porous pavement at the Town/Village of Lake George Municipal Center	$500,000
Warren	South Lake A	Headwaters Lake George		Creation and adoption of Town of Lake George redevelopment/retrofit code requirements	$15,000
Warren	South Lake A	Headwaters Lake George		Implementation of Town of Lake George MS4 Stormwater Management Program Plan	$250,000
Warren	South Lake A	Headwaters Lake George		Installation of check dams and live stakes on Interstate 87 stormwater swales discharging to West Brook	$20,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Headwaters Lake George		Coolidge Hill Road stormwater remediation	$20,000
Warren	South Lake A	Headwaters Lake George		Implementation of additional stormwater controls along Route 9 corridor	$300,000
Warren	South Lake A	Headwaters Lake George		Town–wide stormwater reduction implementation program in the Town of Lake George	$250,000
Warren	South Lake A	Headwaters Lake George		Installation of stormwater controls west of Tahoe Resort	$200,000
Warren	South Lake A	Headwaters Lake George		Front Street homeowner green infrastructure education and implementation program	$200,000
Warren	South Lake A	Headwaters Lake George		Removal of paved drainage ditches an installation of vegetated swales with check dams at I–87 Exit 22 southbound off–ramp	$50,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Headwaters Lake George		Installation of vegetated swales and 2 drywells on Pickle Hill Road	$25,000
Warren	South Lake A	Headwaters Lake George		Installation of improved buffers and porous pavers at Dunham's Bay Marina Bay Road Parking lot	$95,000
Warren	South Lake A	Headwaters Lake George		Installation of drywells on Lockhart Loop	$10,000
Warren	South Lake A	Headwaters Lake George		Assembly Point, Cleverdale, Rockhurst, and Pilot Knob homeowner green infrastructure education and implementation program	$50,000
Warren	South Lake A	Headwaters Lake George		Assembly Point stormwater reduction and infiltration	$20,000
Warren	South Lake A	Headwaters Lake George		Cleverdale/ Rockhurst stormwater reduction and infiltration	$10,000
Warren	South Lake A	Headwaters Lake George		Installation of a hydrodynamic separator on Joques Farm Road	$75,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Headwaters Lake George		Installation of a hydrodynamic separator near/in Shepard's Park	$75,000
Warren	South Lake A	Headwaters Lake George		Installation of a hydrodynamic separator to capture stormwater flowing to Beach Road	$90,000
Warren	South Lake A	Headwaters Lake George		Retrofit of Lake George Village DPW for increased stormwater protection	$250,000
Warren	South Lake A	Headwaters Lake George		Engineering assessment of Prospect Mountain Brook watershed for runoff velocity reduction and flood attenuation	$30,000
Warren	South Lake A	Headwaters Lake George		Implementation of recommendations in the Prospect Mountain Brook Watershed Assessment	$1,000,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Headwaters Lake George		Complete a comprehensive analysis of the effects of alternative de–icing products as they pertain to phosphorus inputs	$40,000
Warren	South Lake A	Indian Brook/Lake George		Installation of a hydrodynamic separator and double stack drywell at the Town of Bolton DPW site	$100,000
Warren	South Lake A	Indian Brook/Lake George		Installation of porous asphalt at Rogers Park Lot	$100,000
Warren	South Lake A	Indian Brook/Lake George		Upgrade 9N stormwater conveyance system	$5,000,000
Warren	South Lake A	Indian Brook/Lake George		Bolton hamlet stormwater reduction program	$125,000
Warren	South Lake A	Indian Brook/Lake George		Installation of vegetated swales on Valley Woods Road	$60,000
Warren	South Lake A	Indian Brook/Lake George		Install check dams and live stakes in new stone lined ditches on Frank Cameron Road	$10,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Indian Brook/Lake George		Installation of porous asphalt on Dula Street parking lot	$125,000
Warren	South Lake A	Indian Brook/Lake George		Install trench drain and stormwater infiltration units along road next to Fort Ann Beach	$15,000
Warren	South Lake A	McKenzie Brook/Lake Champlain		Installation of green infrastructure practices to intercept stormwater around Monitor Bay	$25,000
Warren	South Lake A	McKenzie Brook/Lake Champlain		Stormwater system improvements in the Hamlet of Crown Point	$250,000
Warren	South Lake A	Outlet Lake George		Implementation of Stormwater runoff controls on Baldwin Road/Black Point Road and surrounding area	$250,000
Warren	South Lake A	Outlet Lake George		Implementation of Tin Pan Alley stormwater assessment	$100,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Outlet Lake George		Install porous pavement at Mossy Point Boat Launch	$150,000
Warren	South Lake A	Outlet Lake George		Installation of stormwater infiltration/retention at Steamboat Landing	$100,000
Warren	South Lake A	Outlet Lake George		Installation of green infrastructure practices for stormwater retention on Outlet Drive	$7,000
Warren	South Lake A	Outlet Lake George		Address roadside erosion issues throughout the town on local, county, and state road	$60,000
Warren	South Lake A	Outlet Lake George		Purchase of roadside sweeper/vacuum to be shared by all municipalities	$300,000
Warren	South Lake A	Outlet Lake George		Route 8/Route 9N intersections stormwater reduction engineering report	$50,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Outlet Lake George		Reconstruction of Royal Anchorage Way to reduce erosion and stormwater velocity	$200,000
Warren	South Lake A	Outlet Lake George		Black Point Road/ Anthony's Nose stormwater assessment	$15,000
Warren	South Lake A	Outlet Lake George		Completion of a Gull Bay Upland stormwater assessment	$15,000
Warren	South Lake A	Outlet Lake George		Gull Bay stormwater reduction implementation project as identified in Army Corps of Engineers study	$50,000
Warren	South Lake B	Halfway Creek		Increase in educational campaign focused on Town–wide phosphorus–free fertilizer law in the Town of Queensbury	$2,500

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake B	Halfway Creek		Implementation of Town's MS4 Stormwater Management Program Plan	$400,000
Warren	South Lake B	Halfway Creek		Drywell installation on Birch Rd/Chestnut Rd	$5,000
Warren	South Lake B	Halfway Creek		Assessment of stormwater runoff from Six Flags Great Escape property	$3,000
Warren	South Lake B	Halfway Creek		Implementation of recommendations in Six Flag Great Escape assessment	$300,000
Warren	South Lake B	Halfway Creek		Town of Kingsbury DPW site stormwater containment and infiltration	$100,000
Warren	South Lake B	Headwaters Halfway Creek	X	Stormwater reduction and separate sewer system clay pipe elimination in the City of Glens Falls	$1,000,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake B	Headwaters Halfway Creek	X	Lake Sunnyside homeowner green infrastructure education and implementation program	$25,000
Warren	South Lake B	Headwaters Halfway Creek	X	Perform stormwater runoff assessment in area west of Aviation Mall to Foster Avenue	$3,000
Warren, Washington	South Lake B	Headwaters Halfway Creek		Implementation of recommendations made in Aviation Mall/Foster Avenue Assessment	$100,000
Washington	South Lake B	Headwaters Halfway Creek	X	Broadacres neighborhood stormwater infiltration project	$110,000
Washington	South Lake B	Headwaters Halfway Creek	X	Implement curbside infiltration utilizing green infrastructure practices in the Town of Queensbury and City of Glens Falls	$250,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Washington	South Lake B	Headwaters Halfway Creek	X	Improved implementation of City of Glens Falls MS4 Program	$100,000
Washington	South Lake B	Headwaters Halfway Creek	X	Installation of 2 drywells on Greenway Circle	$20,000
Washington	South Lake B	Headwaters Halfway Creek	X	Repair access road to Wilkie Reservoir	$20,000
Washington	South Lake B	Headwaters Halfway Creek	X	Repair access road to Butler Pond Reservoir	$20,000
Washington	South Lake B	Lake Champlain Canal		Comprehensive stormwater runoff assessment for the Champlain Canal	$200,000
Washington	South Lake B	Mettawee River		Outreach and assistance to quarries for proper management of pumped groundwater	$200,000
Washington	South Lake B	Wood Creek/Lake Champlain		Implement stormwater management needs on State Route 40	$400,000
Washington	South Lake B	Wood Creek/Lake Champlain		Town of Hartford DPW stormwater management	$220,000

County	TMDL Watershed	Subwatershed	Urban Highest Loading Sector	Project Description	Projected Cost
Washington	South Lake B	Wood Creek/Lake Champlain		Stormwater management assessment and implementation along Towpath Road	$50,000

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Appendix E. Potential Wastewater Projects

County	TMDL Watershed	Subwatershed	Wastewater Highest Loading Sector	Project Description	Projected Cost
Clinton	Cumberland Bay	Lake Champlain	X	Creation and implementation of a comprehensive pollution reduction stormwater and wastewater study for Cumberland Bay area	$1,000,000
Clinton	Cumberland Bay	Lake Champlain	X	Implementation of Plattsburgh's CSO Long–Term Control Plan	$10,000,000
Clinton	Main Lake	Little Ausable River		Sanitary Sewer main and municipal pump station reconstruction in the Town of Peru	$4,000,000
Essex	Main Lake	Ausable River		Upgrade of wastewater treatment plant in Keesville	$2,000,000
Essex	Main Lake	Lake Champlain	X	Willsboro Point sanitary sewer assessment	$120,000
Essex	Main Lake	Lake Champlain	X	Wastewater sewer line extension throughout the Town of Essex Hamlet	$400,000
Essex	Main Lake	Lake Champlain	X	Implement recommendations in Willsboro Point Sanitary sewer assessment	$2,000,000

County	TMDL Watershed	Subwatershed	Wastewater Highest Loading Sector	Project Description	Projected Cost
Essex	Main Lake	Lower Boquet River		Improvement of tertiary wastewater treatment system in the Town of Willsboro	$50,000
Essex	Main Lake	Lower Boquet River		Upgrade Hamlet of Wadhams WWTP	$250,000
Essex	Main Lake	Lower Boquet River		Upgrade of Town of Willsboro WWTP	$2,000,000
Essex	Port Henry/ Otter Creek	Hoisington Brook/Lake Champlain		Upgrade of Town of Westport wastewater treatment plant	$500,000
Essex	South Lake A	Outlet Lake George		Wastewater system assessment in Outlet Drive subwatershed	$20,000
Warren	South Lake A	Headwaters Lake George		Community septic system assessment for Assembly Point and Cleverdale/Rockhurst	$200,000
Warren	South Lake A	Headwaters Lake George		Sanitary Sewer extension up Route 9N to the Tahoe Resort	$10,000,000
Warren	South Lake A	Headwaters Lake George		Wastewater infrastructure repairs on Sewell Street	$40,000

County	TMDL Watershed	Subwatershed	Wastewater Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake B	Halfway Creek		Dream Lake wastewater assessment and priority action plan for remediation	$15,000
Warren	South Lake B	Headwaters Halfway Creek		Continued implementation of City of Glens Falls CSO Long–Term Control Plan	$5,000,000
Washington	South Lake A	Headwaters Lake George		Perform feasibility analysis for establishment of an RME for on–site septic operations on Pilot Knob	$30,000
Washington	South Lake A	Outlet Lake George		Crown Point Wastewater system assessment and community system installation	$200,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Establish marina pump out station at Village of Whitehall WWTP	$100,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Village of Whitehall WWTP upgrades	$20,000,000
Washington	South Lake B	Poultney River/Head of Lake Champlain		Village of Whitehall wastewater system upgrades and I&I reduction	$2,000,000

County	TMDL Watershed	Subwatershed	Wastewater Highest Loading Sector	Project Description	Projected Cost
Washington	South Lake B	Wood Creek/Lake Champlain		Retrofit of Fort Ann wastewater treatment plant	$5,000,000

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Appendix F. Potential Septic Sector Projects

County	TMDL Watershed	Subwatershed	Septic Highest Loading Sector	Project Description	Projected Cost
Clinton	Cumberland Bay	Dead Creek		Perform on–site wastewater assessments at Stony Acres Mobile Home Park	$40,000
Warren	South Lake B	Halfway Creek		Creation of a septic disposal district around Glen Lake	$30,000
Warren	South Lake B	Halfway Creek		Implementation of Glen Lake septic disposal district, including replacement of outdated systems	$500,000
Warren	South Lake B	Headwaters Halfway Creek		Implementation of Lake Sunnyside septic disposal district, including replacement of outdated systems	$250,000
Warren	South Lake B	Headwaters Halfway Creek		Creation of a septic disposal district around Lake Sunnyside	$20,000

County	TMDL Watershed	Subwatershed	Septic Highest Loading Sector	Project Description	Projected Cost
Warren	South Lake A	Headwaters Lake George	X	Community septic system assessment for Assembly Point and Cleverdale/Rockhurst	$200,000
Warren	South Lake A	Headwaters Lake George	X	Implementation of the Town of Lake George Septic initiative	$500,000
Warren	South Lake A	Headwaters Lake George	X	Implementation of community septic system assessment on Assembly Point and Cleverdale/Rockhurst	$2,000,000
Washington	South Lake A	Headwaters Lake George	X	Perform feasibility analysis for establishment of an RME for on–site septic operations on Pilot Knob	$30,000
Washington	South Lake A	Headwaters Lake George	X	Creation of on–site septic district on Pilot Knob	$700,000