Quality Assurance Project Plan
Lake Classification and Inventory Program: Lake Special Studies

New York State
Department of Environmental Conservation
Division of Water
Bureau of Water Assessment and Monitoring

Prepared by NYSDEC Division of Water

Effective: 05/15/2025
Expires: 05/15/2026

Approval/Acceptance Sheet

This quality assurance project plan (QAPP) will be approved prior to the start of work. Modifications to an approved QAPP will require a subsequent round of review and approval before implementation. A data usability assessment report (DUAR) is required for the completion of the project.

Brian Duffy — 05/20/2025

LCI Program Manager – Brian Duffy, NYSDEC — Date

Matthew P. Kraft — 5/19/2025

LCI Program Coordinator – Matthew Kraft, NYSDEC — Date

LCI Quality Assurance Officer – Leanna Pierson, NYSDEC[1] — Date

Lindsey DeLuna — 05/15/2025

DOW Quality Assurance Officer – Lindsey DeLuna, NYSDEC — Date

[1]The LCI Quality Assurance Officer will not be available for signatures before the start of the project. Signature from the Project Manager acknowledges that the LCI QAO will review and endorse this QAPP upon their return.

Lake Special Studies QAPP Update Log

Prepared/Revised By:	Date:	Revision No:	Summary of Changes:
Alene Onion Matthew Kraft	3/13/2020 July 2020	1	Drafted Added Drinking Water Supply lakes Added QA/QC field duplicates
Alene Onion	3/8/2021	V21-1	Added 2021 projects and made edits to align with the LCI QAPP Pilot new sample bottle labeling process.
Sabrina Xie, Alene Onion, Matthew Kraft	3/3/2023	V22-1	Added 2023 projects and made edits to align with 2023 LCI QAPP
Matthew Kraft	5/27/2023	V22-2	Zooplankton collection and analysis added to the Honeoye Special Study
Matthew Kraft	7/22/2023	V22-3	Added Lake Welch Assessment Sampling
Matthew Kraft	5/24/2023	V-23-1	Removed COVID19 protocols Remove Lake Welch Special Study Updated PWS study sites Updated contract laboratory information Added Otsego Lake Special Study
Matthew Kraft	8/23/2023	V-23-2	Added two additional special studies: Blythea Lake BWP Sampling and BWRM TMDL Sampling
		V-24-1	Inclusion of Finger Lakes Modified QA/QC sections Updated current Special Studies
Matthew Kraft Chase Novello	5/1/2025	V25-1	Updated special studies and associated information Updated data handling and data validation and verification procedures Updated sampler information Updated reporting items Updated program staff Updated laboratory information

No substantive changes include updating references, correcting typographical errors, and clarifying certain language to make the document more useful and effective.

Budget Information

QA Project Name:	LCI Special Studies
Effective Dates:	6/1/2025
Project Budget (non-laboratory):	$5,000
Project Budget (laboratory):	$80,000
Funding Source:	Environmental Protection Fund (laboratory)/ & Performance Partnership Grant (non-laboratory)
Cost Center:	Laboratory: 200375-00-24, 237453-MF-24 & 716114-E2-20 Non-laboratory: 204604-FG-22

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DISTRIBUTION LIST

The following individuals must receive a copy of the approved QAPP to complete their role in this project. Note if copy will be electronic or hard copy.

Name	Title	Organization	Document type
Brian Duffy	Program Manager	NYSDEC, Division of Water, Monitoring and Assessment Section	Electronic
Matthew Kraft	Project Coordinator	NYSDEC, Division of Water, Monitoring and Assessment Section	Electronic
Leanna Pierson	LCI QA Officer	NYSDEC, Division of Water, Monitoring and Assessment Section	Electronic
Zachary Smith	Data Management Coordinator	NYSDEC, Division of Water, Monitoring and Assessment Section	Electronic
Lindsey DeLuna	DOW QA Officer	NYSDEC, Division of Water, Standards and Analytical Support Section	Electronic
Jason Fagel	Lab Coordinator	NYSDEC, Division of Water, Standards and Analytical Support Section	Electronic
Meghan Pedro	Laboratory Manager	ALS Environmental	Electronic
Sampling personnel	Central and Regional Offices	NYSDEC, Division of Water	Electronic

INTRODUCTION

This document has been prepared to meet the Quality Assurance/Quality Control (QA/QC) requirements for Lake Classification Inventory Special Studies (Lake Special Studies) conducted as part of the Division of Water Monitoring Program Strategy, which are used for making waterbody assessments or in support of NYSDEC management programs.

Lake Special Studies are conducted when a combination of sampling locations and/or parameters are required which are not covered by the LCI Statewide QAPP (QAPP-LCI-0001). Many are conducted at the request of a DEC Regional Office or due to specific department interest. Reasons for requesting a survey include documentation of severity of a perceived problem, total maximum daily load modeling data requirements, documentation of possible improvement following upgraded treatment, or problem track-down. The methods used in Lake Special Studies are dependent on the specific applicable conditions, but may include field measurements, water chemistry sampling from the epilimnion and hypolimnion, and biological sampling.

An attempt is made to coordinate Lake Special Studies with the basins that are currently being sampled in the LCI network. However, exceptions are made based on program priority and need.

The 2025 Lake Special Studies and their purpose are as follows:

Public Water Source Assessment
The purpose of this study is to collect samples from ponded drinking water sources that are unassessed and likely impaired to support an assessment and Drinking Water Source Protection Program (DWSP2) priorities. Only one lake is being included in this effort for 2025 (see Table 6).

Finger Lakes Assessment
This study involves collecting samples from the eleven Finger Lakes for the purpose of fully assessing the main segment of each lake. Samples will be collected by staff and interns of the Finger Lakes Watershed Program in each of June, July, August and September, in 2024 and 2025.

Department Interest Sampling
Ten lakes will be sampled once at the request of internal staff and external partners. These lakes were requested through our sampling solicitation process. These lakes are shown in Table 6. These will be single visit sampling events in 2025. The purpose of the monitoring varies by lake and is described in further detail below.

I. Project Management

1. Organization/Responsibilities

The following outline describes the staff involved with the LCI Monitoring Program and their respective roles.

LCI Program Management

New York State Department of Environmental Conservation
Division of Water, Bureau of Water Assessment & Monitoring
Monitoring and Assessment Section
Brian Duffy, Section Chief, 518-402-8731

Responsibilities

- Management of the LCI Program
    - Determine sampling strategy and overall monitoring network design, including site selection strategies, parameter selection, sampling frequency, etc.

LCI Program Coordinator

New York State Department of Environmental Conservation
Division of Water, Bureau of Water Assessment & Monitoring
Monitoring and Assessment Section
Matthew Kraft, LCI Program Coordinator (518)-402-8260

Responsibilities

- Coordination of Sampling
    - Selects site locations, parameters for sampling according to the LCI sample design.
    - Conduct occasional and appropriate program reviews and implement modifications to enhance monitoring effort as necessary.
    - Respond to all inquiries concerning the LCI Monitoring Program.
    - Draft, maintain and modify (when necessary) the official signed copy of the QAPP.
    - Train participating staff.

- Management of Analytic Data Results
    - Coordinate sampling logistics between sampling staff and the analytic laboratories.
    - Coordinate receipt of data from laboratory with laboratory staff and Division Quality Assurance officers.
    - Provide water quality assessment and expertise in data evaluation.

LCI Quality Assurance Officer

New York State Department of Environmental Conservation
Division of Water, Bureau of Water Assessment & Monitoring
Monitoring and Assessment Section
Leanna Pierson, LCI Quality Assurance Officer, (518)-402-8258

Responsibilities

- Coordination of Sampling
  - Assist Program Coordinator in drafting the quality assurance/quality control documents for the LCI Monitoring Program.
  - Assist program coordinator in the selection of locations, parameters to be sampled.
  - Coordinate with QA Officer annual field audits of sampling staff to ensure proper sample collection methods are used and discuss problems and/or needs.
  - Distribute electronic copies of this Quality Assurance Plan to all participating staff.
  - Works with the Data Management Coordinator on QA/QC evaluations and management of data.

- Management of Analytic Data Results
  - Review, edit (if necessary), and store the data generated by the LCI Monitoring Program within Monitoring and Assessment Section's database and/or other Division, Agency, State or Federal database.
  - Review all water quality and quality control data results for adherence to appropriate specifications.
  - Enter all data from sample collection electronic data field forms into the lakes monitoring databases.
  - Provide water quality assessment and expertise in data evaluation.

Data Management Coordinator

New York State Department of Environmental Conservation
Division of Water, Bureau of Water Assessment & Monitoring
Monitoring and Assessment Section
Zachary Smith

Responsibilities

- Management of Analytic Data Results
- Review, edit (if necessary), and store the data generated by the LCI Monitoring Program within Monitoring and Assessment Section's database (WQMA) and/or other Division, Agency, State or Federal database.
- In coordination with the LCI QAO, conducts automated quality assurance and quality control analysis of data to ensure adherence to appropriate specifications.
- Enter all field and laboratory data into the Monitoring and Assessment Section database (WQMA).

Field Sampling Coordinators

New York State Department of Environmental Conservation
Division of Water, Bureau of Water Assessment & Monitoring
Monitoring and Assessment Section
Alene Onion, Chase Novello, and Leanna Pierson

Responsibilities

- Coordinate the purchase of equipment, and supplies.
- Manage float plans and staff communication during field sampling.

Central Office Primary Samplers

Alene Onion, 518-402-9029 (alene.onion@dec.ny.gov)
Matthew Kraft, 518-402-8260 (Matthew.Kraft@dec.ny.gov)
Chase Novello, (518) 408-2325 (chase.novello@dec.ny.gov)
Leanna Pierson, 518-402-8258 (Leanna.Pierson@dec.ny.gov)
Giancarlo Coppola, 518-402-8196 (Giancarlo.Coppola@dec.ny.gov)
Brian Duffy, 518-402-8731 (Brian.Duffy@dec.ny.gov)
Lewis McCaffrey, 315-426-7514 (Lewis.McCaffrey@dec.ny.gov)
Tony Prestigiacomo, 315-426-7452 (Anthony.Prestigiacomo@dec.ny.gov)
Alexis Davis, 315-426-5489 (Alexis.Davis@dec.ny.gov)

Responsibilities

- Sample Collection
  - Collect lake samples in assigned geographic areas as scheduled following prescribed sampling procedures and quality assurance methods.
  - Collect biological (harmful algal bloom, plant, etc.) samples following prescribed procedures and quality assurance methods.
  - Process samples as scheduled following prescribed sampling procedures and quality assurance methods.
  - Transport or secure proper shipping of samples to the appropriate laboratory following prescribed procedures and quality assurance methods.
  - Maintain LCI Monitoring Program field equipment.

Central Office Secondary Samplers (must be accompanied by primary sampler)

Carrie Buetow, 518-357-2268 (carrie.buetow@dec.ny.gov)
Sarah Rickard, 518-402-8155 (sarah.rickard@dec.ny.gov)
Keleigh Reynolds, 518-402-8179 (Keleigh.Reynolds@dec.ny.gov)
Charles Stoll, 518-285-5699 (Charles.Stoll@dec.ny.gov)
Andrea Conine, 518-402-8267 (Andrea.Conine@dec.ny.gov)
Zach Smith, 518-402-8235 (Zachary.Smith2@dec.ny.gov)
Kelsey Alvarez del Castillo, 518-408-2318 (kelsey.alvarezdelcastillo@dec.ny.gov)
Gabriel Yerdon, 315-426-7452 (Gabirel.Yerdon@dec.ny.gov)
Summer Interns (TBD)

Responsibilities

- Sample Collection
  - Assist primary sampling staff in the collection of lake samples following prescribed sampling procedures and quality assurance methods.

NYSDEC Staff Managing Laboratory Contracts
Jason Fagel, ALS Laboratory coordinator, 518-402-8156 (jason.fagel@dec.ny.gov)
Matthew Kraft, Rhithron Laboratory Coordinator, 518-402-8260 (Matthew.Kraft@dec.ny.gov)

Responsibilities

Manage analytical laboratory contracts
Conduct as-needed technical laboratory audits

DOW Assistant Quality Assurance Officer
Lindsey DeLuna, Division of Water Quality Assurance Officer, (518) 402-9252
(lindsey.deluna@dec.ny.gov)
NYSDEC Standards & Analytical Support Section

Responsibilities

Review the QA project plan to verify that those elements outlined in the EPA Standard for QA Project Plans (CIO-2105-S-02.1) were successfully discussed.

Analytical Laboratories
The complete list of laboratories that will be used in this monitoring program appears in Table 1.

Table 1 Analytical Laboratories

LABORATORY NAME	LOCATION	LABORATORY SPECIALTY
ALS Environmental-Rochester (Former Columbia Analytical Services)	Rochester, NY	Dilute water systems
Upstate Freshwater Institute	Syracuse, NY	Harmful Algal Blooms (subcontractor to ALS for select HAB parameters)
Rhithron Associates, Inc.	Missoula, MT	Sediment Diatom Taxonomy
TBD (contract in development)	N/A	Macroinvertebrate Taxonomy

Responsibilities

- Provide sample containers and paperwork per requested list of parameter analysis.
- Maintain NYSDEC DOH ELAP accreditation for LCI selected parameters that NYSDOH ELAP issues certificates for.
- Provide expertise in sample collection protocols.
- Provide expertise in analytic methods.
- Analyze water quality samples and report results.
- Provide analysis of specified parameters for water column.
- Transmit analytic data to NYS-DEC via agreed upon media/format.
- Implement internal quality assurance/quality control procedures.

Analytical Laboratory Contact Information

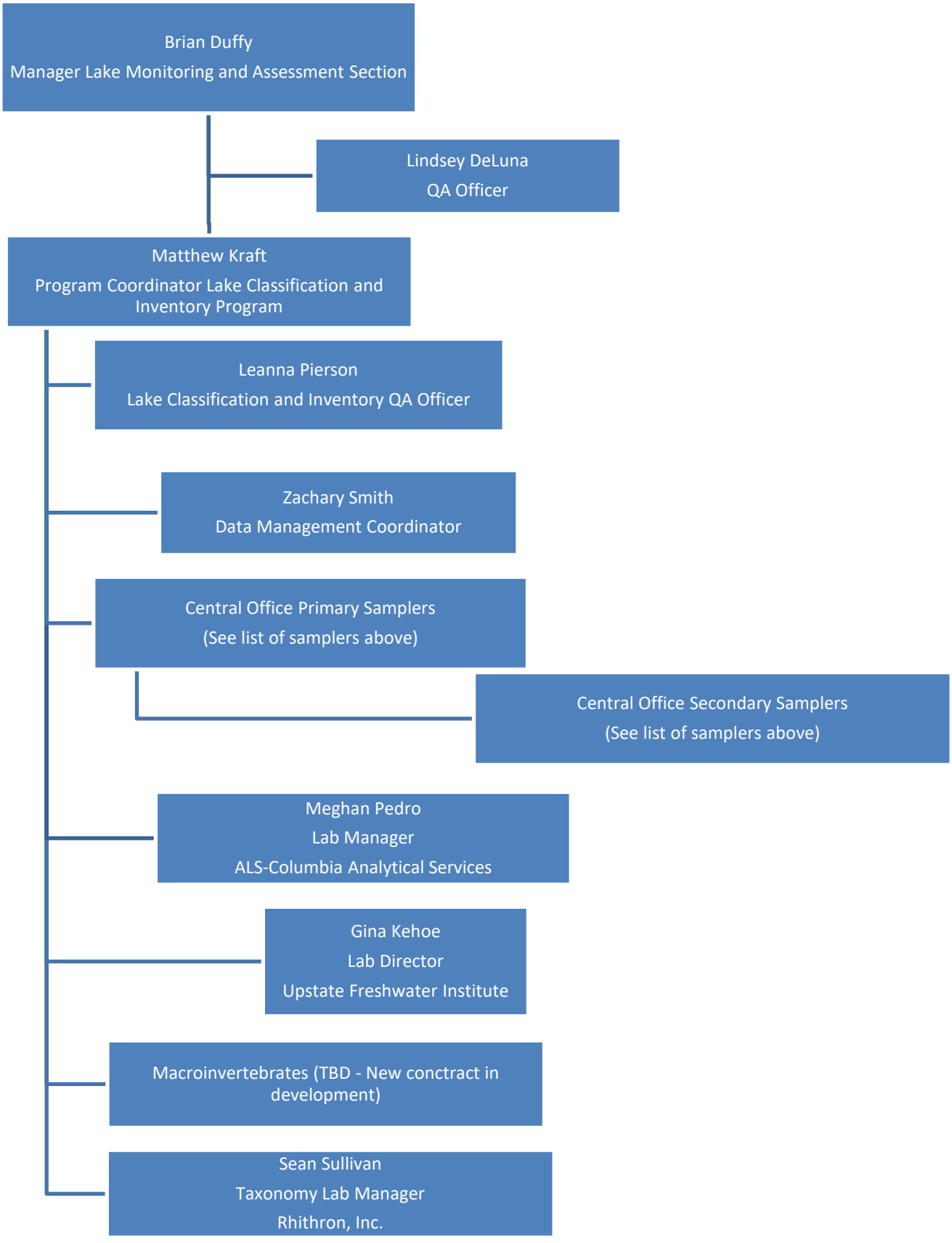
ALS Environmental- Rochester (Water column samples)
Meghan Pedro
1565 Jefferson Road
Building 300, Suite 360
Rochester, NY 14623
Telephone: 585-288-5380
Email: Meghan.Pedro@alsglobal.com

UFI Upstate Freshwater Institute (HAB samples – subcontract to ALS Environmental)
Gina Kehoe
224 Midler Park Drive
Syracuse, NY 13206
Telephone: (315) 431-4962
Email: ginak@upstatefreshwater.org

Macroinvertebrates
TBD – New contract in development

Rhithron Associates, Inc. (Diatoms)
Sean Sullivan
Taxonomy Lab Manager
33 Fort Missoula Road
Missoula, Montana 59804
phone: (406)-721-1977
Email: ssullivan@rhithron.com

Project Organization Chart



2. Background – Description of Problem

The purpose of this document is to define the justification and study design for the Lake Special Studies. Lake Special Studies follow the procedures outlined in the LCI QAPP (NYSDEC 2023) except for the combination of locations and parameters sampled. Sampling parameters for special studies may include any of those sampled as part of LCI sampling (summarized in Table 2).

Public Water Source Assessment
The Drinking Water Source Protection Program (DWSP2) was established to support communities who want to proactively protect their drinking water sources. More about this program can be found at https://www.dec.ny.gov/chemical/115250.html. As part of this effort, the LCI program is monitoring unassessed active public water sources that are likely impaired, based on preliminary screening data. The objective of the study is to collect sufficient data to support an assessment according to NYS's Consolidated Assessment and Listing Methodology (CALM) .Since the sampling for this effort will be statewide, beyond the watershed basins that the LCI annual monitoring program is focused on, this is included as a special study.

Finger Lakes Assessment
The NYSDEC Finger Lakes Watershed Program is seeking to update the assessment status of every main segment in each of the Finger Lakes in accordance with NYS's Consolidated Assessment and Listing Methodology (CALM). As part of this effort, the Finger Lakes Watershed Program, in coordination with the LCI program, is monitoring each lake in 2024 and 2025. Since the sampling for this effort will be outside the watershed basins that the LCI annual monitoring program is focused on, this is included as a special study.

Department Interest Sampling
Ten lakes will be sampled once at the request of internal staff and external partners. These lakes were requested through our sampling solicitation process, and are generally lacking data entirely, or without recent data (>10 years old). These lakes are shown in Table 6. These will be single visit sampling events in 2025. Data will be provided to the individuals or entities that requested the sampling.

Table 2: Potential Sampling Parameters for any LCI Special Study

	Indicator	Description
Visual Assessments	**Use Impairment Assessment**	The use impairment assessment is collected to evaluate recreational use conditions and public perception of water quality, and to link these assessments to conjointly collected water quality data
	General Lake Perception Assessment	The general lake perception assessment is a visual assessment used by USEPA National Lakes Assessment and is collected to evaluate general conditions of the waterbody, shoreline, and the visible watershed.
Water Column Parameters	**Salt Parameters**: Chloride*, Sodium and Specific Conductance	To detect the impacts of road salt
	Total Metals Parameters: Arsenic*, Copper*, Iron*, Magnesium*, Manganese*, and Nickel*	To detect water source water quality standard excursions.
	Dissolved Metals Parameters: Aluminum^{O}, Arsenic^{O}, Copper^{O}, Nickel^{O}, Potassium and Zinc^{O}	To detect fishing use water quality standard excursions. Potassium is included for possible copper evaluations using EPA's draft aquatic life criteria.
	Mineral Parameters: Alkalinity, Calcium, Hardness^{O}, Sulfate*	To generally characterize conditions including buffering capacity (Alkalinity), zebra mussel vulnerability (Calcium). To detect fishing use (Hardness) and water source (Sulfate) water quality standard excursions
	Trophic Parameters: Chlorophyll *a*, Secchi Depth, Total Nitrogen, Total Phosphorus^, True Color	To indicate anthropogenic eutrophication as impacting phytoplankton or macrophyte growth

	Indicator	Description
	Other Nutrient Parameters: Ammonia*^O, Dissolved Phosphorus, Nitrate*, Nitrite*O, TKN, Total and Dissolved Organic Carbon, Total Dissolved Solids*^O, UV254	To generally characterize conditions including nutrient levels, and specific ultraviolet absorbance (UV254/DOC). To detect fishing, recreational, and water source use water quality standard excursions.
	In Situ Parameters: Chlorophyll *a* (probe), Dissolved Oxygen*^O, Oxidative Reduction Potential, Ph*^O, Temperature	To detect concentrations across the depth profile. To detect fishing, recreational, and water source use water quality standard excursions.
	HABs Parameters: BBE fluoroprobe and Microcystin	To detect both the presence and the potential impacts of harmful algal blooms.
	Contaminants of Emerging Concern (CECs) 40 PFAS chemicals, 5 total metals (vanadium, molybdenum, cobalt, strontium, and chromium), chlorate, and 1,4-dioxane	To determine the presence or absence, distribution, and concentration of emerging contaminants
Biological Monitoring	**Macrophyte Sampling**	Focuses on high-risk area monitoring for nuisance macrophyte species and/or endangered aquatic plant species.
	Sediment Diatoms and radiometric dating	Focuses on collection and identification of diatoms from lake sediment at the water chemistry sampling location. Radiometric dating is used to estimate the date of the earliest diatom samples in the cores (for natural lakes only).
	Macroinvertebrate Sampling	To detect impacts to aquatic life based on a composite macroinvertebrate sample.

* Indicates parameters with water quality standards for source_of_water_supply use
^ Indicates parameters with water quality standards for recreational use
ᵒ Indicates parameters with water quality standards for fishing use

Table 3: Project Schedule

Task	Completion Date
Work plan	April 1, 2025
Final QAPP	April 30, 2025
Sample Collection	June-September 2025
Data Analysis	October 2025 – March 2026
Draft Reports	December 2025 – March 2026
Final Reports	April 2026

3. Project / Task Description

The Lake Special Studies project will sample 23 lakes during 2025.

Public Water Source Assessment
We will be sampling one public water source (Table 6) that is active and unassessed. We will collect samples applicable to class A waters to assess public water source use. The waterbody will be sampled three times during the sampling season (June-September).

Finger Lakes Assessment
Eight samples will be collected over two years (2024-2025) from each of the Finger Lakes. We will collect all parameters relevant to class A waterbodies. To capture seasonal variability the lakes will be sampled four times in 2025 over the course of the sampling season (June-September). The 2025 sampling, combined with the samples collected in 2024, should satisfy the requirements of NYS's Consolidated Assessment and Listing Methodology (CALM) to update water quality assessment for these waterbodies.

Department Interest Sampling
Ten lakes will be sampled once at the request of internal staff and external partners. These lakes were requested through our sampling solicitation process. These lakes are shown in Table 6. The rationale for the monitoring of these waterbodies is shown in Table 4 below.

Table 4: Department interest site monitoring purpose/rationale.

WATERBODY_NAME	SITE_CODE	PURPOSE/RATIONALE FOR MONITORING
CRANBERRY POND	0301CRA0155_DH	Investigate elevated nutrients, lack of existing data.
LONG POND	0301LON0154_DH	Investigate elevated nutrients, lack of recent data (>10 years old)
BUCK POND	0301BUC0153_DH	Investigate elevated nutrients, lack of recent data (>10 years old)
BLIND SODUS BAY	0302BLI0077_DH	Investigate elevated nutrients, lack of recent data (>10 years old)

WATERBODY_NAME	SITE_CODE	PURPOSE/RATIONALE FOR MONITORING
SOUTH COLWELL POND	0303SCO1039A_DH	Investigate elevated nutrients, lack of recent data (>10 years old)
GOOSE POND	0303GOO1037B_DH	Investigate elevated nutrients, lack of recent data (>10 years old)
LAKEVIEW POND	0303LAK1031_DH	Investigate elevated nutrients, lack of recent data (>10 years old)
LYNDONVILLE RESERVOIR	0301UWB0172_DH	Investigate impacts to primary/secondary recreation
SILVER CREEK RESERVOIR	0105SIL0157_DH	Investigate conditions in a Class A reservoir. Lack of recent data (>20 years old)
ALBION RESERVOIR	0301ALB0166_DH	Investigate conditions in a Class A reservoir. No previous data.

Table 5: Applicable biological, physical, and chemical parameters for the 2025 surveys.

	PWS Sampling	Finger Lakes	Department Interest
Use Impairment Assessment	X	X	X
General Lake Perception Assessment	X	X	X
Salt Parameters:	X	X	X
Total Metals Parameters:	X	X	X
Dissolved Metals Parameters:	X	X	X
Mineral Parameters:	X	X	X

	PWS Sampling	Finger Lakes	Department Interest
Trophic Parameters:	X	X	X
Other Nutrient Parameters:	X	X	X
In Situ Parameters:	X	X	X
HABs Parameters:		X	
Contaminants of Emerging Concern		X (x1)	
PFAS-PFOA		X (x1)	
Macrophyte Sampling:			
Sediment:			
Sediment Diatoms			
Macroinvertebrate Sampling			

Table 6: Site information for sampling locations of 2025 Lake Special Studies

WATERBODY_NAME	SITE_CODE	LATITUDE	LONGITUDE
Public Water Source Assessment			
FONDA RESERVOIR	1201FON0678A_DH	42.93873	-74.45562
Finger Lakes Assessment			
CONESUS LAKE	0402CON0067_DH	42.75473	-77.7154
HEMLOCK LAKE	0402HEM0044_DH	42.71993	-77.6106
CANADICE LAKE	0402CAN0043_DH	42.71743	-77.5681
HONEOYE LAKE	0402HON0057_DH	42.7513	-77.5087
CANANDAIGUA LAKE	0704CAN0286_DH	42.7783	-77.3055
KEUKA LAKE	0705KEU0388_DH	42.55041	-77.1495
SENECA LAKE	0705SEN0369_DH	42.58536	-76.8977
CAYUGA LAKE	0705CAY0296_DH	42.55517	-76.5975
OWASCO LAKE	0706OWA0212_DH	42.79532	-76.49902
SKANEATELES LAKE	0707SKA0193_DH	42.91806	-76.4154
OTISCO LAKE	0702OTI0175_DH	42.85559	-76.2735
Department Interest			
CRANBERRY POND	0301CRA0155_DH	43.300525	-77.697274
LONG POND	0301LON0154_DH	43.289667	-77.693572
BUCK POND	0301BUC0153_DH	43.28033	-77.666657
BLIND SODUS BAY	0302BLI0077_DH	43.338274	-76.728279
SOUTH COLWELL POND	0303SCO1039A_DH	43.699726	-76.194159
GOOSE POND	0303GOO1037B_DH	43.71578	-76.198337
LAKEVIEW POND	0303LAK1031_DH	43.748121	-76.206829
LYNDONVILLE RESERVOIR	0301UWB0172_DH	43.321792	-78.391097
SILVER CREEK RESERVOIR	0105SIL0157_DH	42.47055	-79.09329
ALBION RESERVOIR	0301ALB0166_DH	43.2273	-78.2507

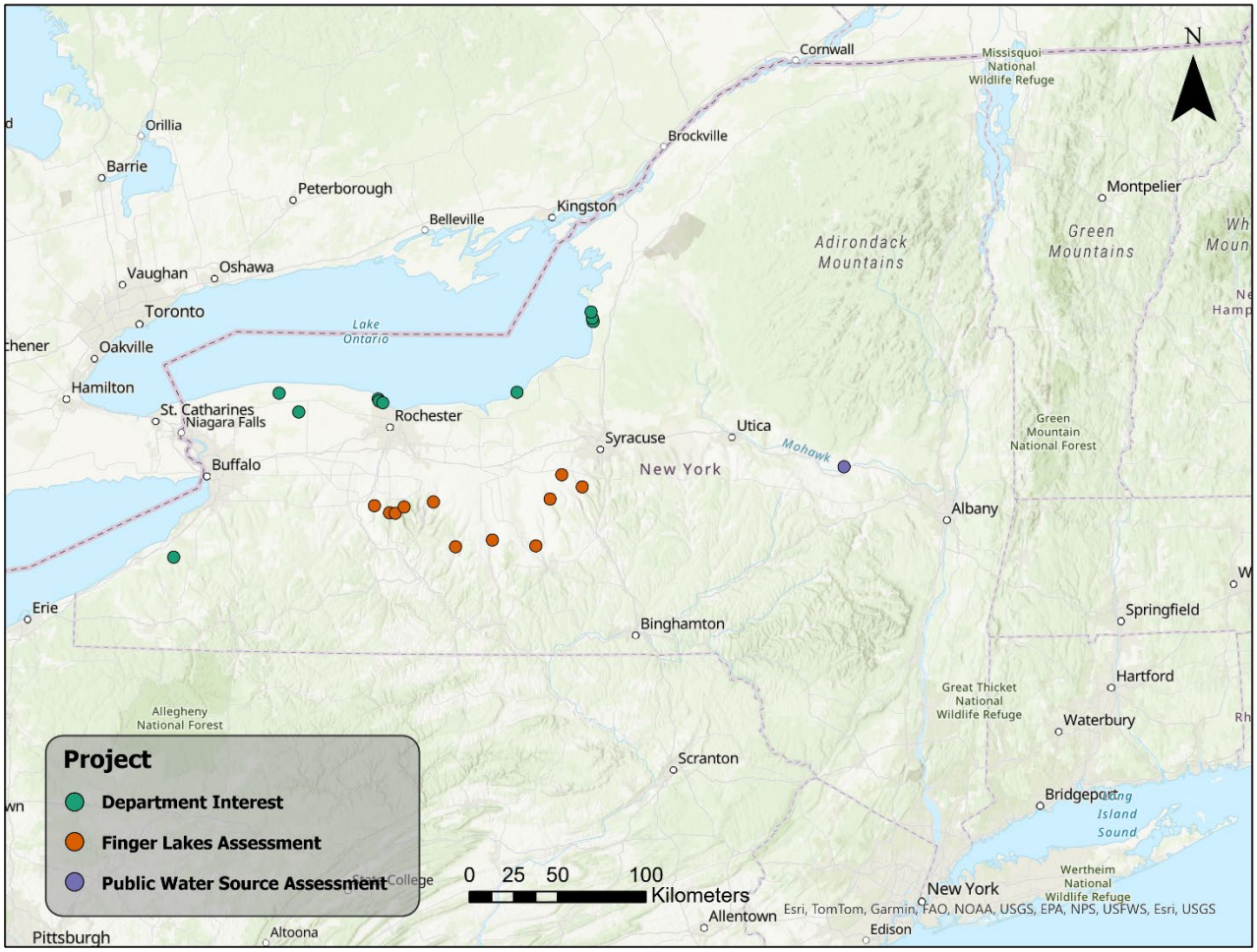


Figure 1: Special Studies Sampling Locations

4. Quality Objective and Criteria

Table 7: Data Quality Indicators, definitions and example activities and criteria.

Data Quality Indicator (DQI)	Definition	QC Activities	DQI Criteria
Precision	Measure of agreement among repeated measurements of the same property under identical, or substantially similar, conditions.	Collection and analysis of field and laboratory replicates (duplicates)	See SOP 110: Data Verification and Validation: Water Chemistry Precision is evaluated using the Relative Percent Difference (RPD) between the target sample and a

Data Quality Indicator (DQI)	Definition	QC Activities	DQI Criteria
			duplicate sample as defined in SOP 110.
Accuracy	Measure of the overall agreement of a measurement to a known value.	Matrix spike (MS) samples and matrix spike duplicate (MSD) samples are collected along with regular water quality samples and spiked in the analytic laboratory with a known concentration of analyte. The samples are then analyzed to determine the accuracy (percent recovery) of the analytic results for a given matrix. Equipment blanks are used to determine if the sampling or preparation process is contaminating the samples. If an equipment blank shows contamination, it indicates an issue with the accuracy of the measurements, as the results may be artificially elevated due to external sources.	See SOP 110: Data Verification and Validation: Water Chemistry Matrix spike samples are acceptable if the percent recovery is 100% +/- the accuracy criteria specified in Table 8. Matrix spike duplicates are also used to evaluate laboratory precision as described in the precision section above. Equipment blank samples are less than the limit of quantitation (see SOP 110 for additional details).
Representativeness	Measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variation at a sampling point, a	Collection and analysis of field and laboratory replicates (duplicates)	See SOP 110: Data Verification and Validation: Water Chemistry Precision is evaluated using the Relative Percent Difference (RPD) between the target sample and a duplicate sample as defined in SOP 110.

Data Quality Indicator (DQI)	Definition	QC Activities	DQI Criteria
	process condition, or an environmental condition.		
Comparability	Measure of confidence that two or more data sets can contribute to a common analysis.	Data collected represent the system characterized.	Adherence to QAPP and lab SOPs, including holding times, defined detection/quantitation limits, common units, and consistent rules for reporting.
Completeness	Measure of the amount of valid data obtained from a measurement system, expressed as a percentage of the number of valid measurements that should have been collected.	Follow standard operating protocols and QAPPs and completion of targeted sampling parameters and frequency	The collection of eighty percent (80%) of samples will be the minimum acceptable level of completeness.
Sensitivity	Capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.	Compare to reporting or detection limits from existing data or for decision-making.	Methods selected are sufficiently sensitive to provide meaningful interpretation of standards/guidance values and/or adequately characterize conditions in the context of the goals and objectives of the program.

Criteria for detection limits, precision, and accuracy for water column chemistry parameters are listed in Table 8 of this document. These data quality requirements are consistent with those used in the NYSDEC Rivers and Streams Rotating Integrated Basin Studies Project (RIBS QAPP 2023) and are consistent with requirements provided by USEPA. These also satisfy the data requirements associated with the state water quality standards, 6 NYCRR Part 703.

Table 8: Analytic Specifications and QA/QC Requirements - in Water Column

Parameter	Analytic Lab	Method	Precision	Accuracy	Calibration	Blanks	Quantitation Limit
In Situ Parameters							
Temperature	In Situ	SM 2550 B	± 1˚C	± 1.5˚C	N/A	~	(Range: -5 to 70˚C)
Dissolved Oxygen, field		SM 4500-0 G	± 1%	± 6%	Daily		(Range: 0 to 50 mg/L or 0 to 500%)
pH, field		SM 4500-H + B	± 0.05 SU	± 0.2	Weekly		(Range: 0 to 14 SU)
Conductivity, field		SM 2510 B	± 0.001mS/cm	± 1%	Weekly		(Range: 0 to 200 mS/cm)
ORP, field		SM 2580 B	± 20 mV	± 20mV	Weekly		(Range: -999 to 999 mV)
Chlorophyll-*a* & phycocyanin		10200 H	0 to 100 RFU	N/A	Weekly		(Range: 0 to 100 RFU or 0 to 100 µg/L)
Salt Parameters							
Chloride	ALS Environmental-Rochester	EPA 300.0	^	± 25%	~	Every 10 Samples	2.0 mg/L
Sodium		EPA 200.7					1000 ug/L
Metals Parameters							
Aluminum, dissolved (field filtered filtrate)	ALS Environmental-Rochester	EPA 200.8	^	± 25%	~	Every 10 Samples	10 ug/L
Arsenic, total		EPA 200.8					1.0 ug/L
Arsenic, dissolved (field filtered filtrate)		EPA 200.8					1.0 ug/L
Copper, total		EPA 200.8					20 ug/L
Copper, dissolved (field filtered filtrate)		EPA 200.8					20 ug/L
Iron, total		EPA 200.7					100 ug/L
Magnesium, total		EPA 200.7					1000 ug/L

Parameter	Analytic Lab	Method	Precision	Accuracy	Calibration	Blanks	Quantitation Limit
Metals Parameters (continued)							
Manganese, total	ALS Environmental-Rochester	EPA 200.7	^	± 25%	~	Every 10 Samples	10 ug/L
Nickel, total		EPA 200.8					1 ug/L
Nickel, dissolved (field filtered filtrate)		EPA 200.8					1 ug/L
Potassium, dissolved		EPA 200.7					2000 ug/L
Zinc, dissolved (field filtered filtrate)		EPA 200.8					5 ug/L
Minerals Parameters							
Total Alkalinity	ALS	SM 2320B	^	NA	~	Every 10	2.0 mg/L
Calcium	ALS	EPA 200.7	^	± 25%	~	Every 10	1000 ug/L
Hardness	ALS	SM 2340C	^	± 25%	~	Every 10	0.05 mg/L
Sulfate	ALS	EPA 300.0	^	± 25%	~	Every 10	2.0 mg/L
Trophic Parameters							
Chlorophyll *a* (field filtered filter)	ALS	SM 10200H (Fluorometric)	^	± 25%	~	Every 10 Samples	0.4 ug/L
Nitrogen, Total	ALS	calculated					~
Phosphorus, Total	ALS	EPA 365.1					0.005 mg/L
True Color	ALS	SM 2120B					1 CU
Secchi Disk Depth	In Situ		~	~	~	~	0.1 m
Other Nutrient Parameters							
Ammonia	ALS Environmental-Rochester	ASTM D6919-09	^	± 25%	~	Every 10 Samples	0.01 mg/L
Total Organic Carbon		SM20 5310C					1.0 mg/L
Dissolved Organic Carbon (field filtered filtrate)		SM20 5310C					1.0 mg/L
TKN		EPA 351.2					0.1 mg/L
Nitrate/Nitrite (NOx)		EPA 353.2					0.05 mg/L
Nitrite		E353.2					0.05 mg/L

Parameter	Analytic Lab	Method	Precision	Accuracy	Calibration	Blanks	Quantitation Limit
Other Nutrient Parameters (continued)							
Total Dissolved Solids	ALS Environmental-Rochester	SM 2540C	^	± 25%	~	Every 10 Samples	10 mg/L
Phosphorus, Total Dissolved (field filtered filtrate)		EPA 365.1					0.005 mg/L
UV-254		SM 5910B					0.0063 cm^{-1}
HABs Parameters							
Total Microcystins**	UFI	EPA 546	N/A	N/A	~	Every 10 Samples	0.3 µg/l
Chlorophyll a, unextracted**	UFI	Bbe Moldaenke, 2014	± 0.01 µg/L	± 20%L	~	Every 10	0.02 µg/l
Contaminants of Emerging Concern							
See QAPP-WQM-0057_V24-2: Probability Based Monitoring of Contaminants of Emerging Concern in New York State Lakes and Streams							

^ Precision is calculated using the following equation: %RPD > (0.9465x^-0.344)100 +5, where: x = sample / detection limit %RPD = [diff(duplicate pair)/av(duplicate pair)]*100. See SOP 110: Data Verification and Validation for more details.
**HABs parameters are only run on HABs samples. Standard methods will differ among laboratories. ESF has specific methods for LC-MSMS analysis of cyanotoxins .

5. Special Training/Certifications

The LCI program has primary samplers located in Central Office. Yearly training is conducted by means of a two-day session conducted in the office and at a local waterbody, to learn and/or review field procedures for sample collection, field sheet completion, and multi-probe meter calibration procedures.

In addition to sampling training, all staff must have U.S. Coast Guard approved boating certification.

The Program Manager will ensure that all individuals involved with the project receive and are familiar with this quality assurance document and to the relevant standard operating procedures, to ensure proper adherence to sampling procedures. DEC staff are required to complete a self-certification form attesting that they have read and understand the Quality Assurance Project Plan and the relevant Standard Operating Procedures.

Staff will follow all safety procedures outlined in program-specific SOPs (SOP-203, SOP-211, SOP-212) and shall be familiar with the Division of Water Health and Safety Plan (NYSDEC, 2019) and Boating Safety Program (NYSDEC, 2022) prior to sampling. These document are accessible from the DOW SharePoint Health & Safety page.

6. Document and Records

Electronic Field Data Collection Forms and Physical Field Data Sheets

The LCI Program collects all field data using field data collection forms through ArcGIS Survey 123. These forms contain the fields to enter observational data. The submitted forms are sent to NYSDEC's ArcGIS Online account and are saved in an LCI group accessible by the program coordinator, section chief, and LCI QA Officer. The actual survey form is accessible to anyone in the NYSDEC ArcGIS Online account, however the returned surveys with data are only available to the group members. Specifics regarding the ArcGIS Survey 123 data input procedures are outlined in SOP 102 Data Handling and Archival.

The information collected in the electronic forms is stored locally on the iPad or smartphone device being used and is uploaded to the Department on Environmental Conservation ArcGIS Online account, a cloud-based service. Once the survey is completed on the electronic device, the collector is given the option to store the survey as a draft or to submit ("send") the survey for upload to the ArcGIS Online server. If the survey is saved as a draft, it remains stored locally on the device and can be reopened and edited before being uploaded to the server. If cellular internet service is unavailable when the survey is submitted to be uploaded, the survey data is stored locally on the device until it is connected to a cellular or Wi-Fi internet connection. Once the device is reconnected to the internet, all surveys queued to be sent to the server are automatically uploaded.

Analytical Laboratory Results

Complete data packages are required for the LCI Monitoring Program to provide data validation capability. Data packages will be delivered to the respective Laboratory Coordinator, in accordance with the requirements of the NYSDEC Prescribed Analytical Protocols (PAP) (2022), and to the LCI Program Coordinator. For parameters not covered by the PAP, data packages are delivered to the respective Laboratory Coordinator in accordance with the standing contract. The LCI QA Officer will review the results and discuss any irregularities with QA staff and the LCI Program Coordinator.

Linking Field Data to Analytical Laboratory Data
Details about labeling and chain of custody for lab samples can be found in Section II, 4. Sampling Handling and Custody.

Aquatic Macrophyte Identifications
The scientific name of any aquatic macrophytes that is submitted to Central Office for identification or identified in the field will be added to the corresponding electronic record that contains the field data collected in conjunction with the macrophyte.

Sediment Diatoms
Field data and sampling information are recorded using a series of electronic field datasheets in Survey123. Sample species enumeration data will be provided by the contract laboratory in tabular format and stored on the LMAS network drive.

Macroinvertebrates
All sampling information including sampling location information, field data, habitat assessments, sample species enumeration data, and water chemistries data are entered into a custom-built system linked through R programing software. Field data are recorded using a series of electronic field datasheets in Survey123. Additional information regarding documents and records can be found in SOP-AMB-208 section 11.

Calibration Logbooks
A calibration/maintenance logbook is kept with each multiprobe unit in accordance with SOP 211: Use, Calibration, Maintenance and Storage of Multi-probe meters used to Measure Water Quality Parameters.

Records Retention
As specified by the NYS DEC Office of General Counsel Department Retention Schedules all records from the LCI Monitoring Program are to be retained for at least 10 years following the completion of the basin study.

All results will be summarized in a final DUAR report to be prepared by the LCI QA Officer.

II. DATA GENERATION AND ACQUISITION

1. Rationale of Monitoring Design

The selection of sampling locations for Lake Special Studies uses a combination of historical data when available, information on known pollution sources and landscape nutrient loading, and desktop and field reconnaissance.

Public Water Source Assessment
Sampling will be conducted according to applicable SOPs. LCI Class A parameters will be sampled to determine whether there are potential impairments in these waterbodies and their designated use as a source of drinking water. In 2025, this waterbody will be sampled three times to make progress towards satisfying the criteria for an assessment in accordance with NYS's Consolidated Assessment and Listing Methodology (CALM).

Finger Lakes Assessment
Sampling will be conducted according to applicable SOPs. Locations are selected to fit in with CSLAP sample sites, usually the deep hole, as is also done in normal LCI sampling. LCI Class A parameters will be sampled to determine whether there are potential impairments which are impacting designated uses in the lake. Sampling will occur four times over the course of 2025. Together with the sampling that was conducted in 2024, the sampling effort in 2025 should satisfy the criteria for an assessment in accordance with NYS's Consolidated Assessment and Listing Methodology (CALM).

Department Interest Sampling
Monitoring data requested by internal NYSDEC staff and external partners will be collected to meet the objectives outlined in their requests. Sampling will be conducted according to applicable SOPs. Where water quality data has been requested, single water quality sampling events will be conducted with the suite relevant to the respective waterbodies.

Sample Distribution/Map
Details on sampling locations are provided in
Figure 1 and Table 6.

Sampling Schedule
An approximate sampling schedule for the Lake Special Studies is shown in Table 9 below. A more detailed sampling schedule is maintained by the LCI Coordinator on the Monitoring and Assessment Section's LCI Microsoft Teams Page.

Table 9: Lake Special Studies Sampling Schedule

Month Sampling	**Public Water Source Assessment**	**Finger Lakes Assessment**	**Department Interest**
June		X	X
July	X	X	X
August	X	X	X
September	X	X	X

2. Sampling Methods

Sampling Methods

Table 10 lists SOPs used in the LCI Program's Lake Special Studies. SOPs are referenced below and are maintained on the NYSDEC internal website. When sampling procedures as described in SOPs are not followed exactly, modifications are recorded on the field sheets.

As per SOP 203: Collection of Lake Water Quality Samples, the volume of water filtered for Chlorophyll *a* is specific to each lake. The volume filtered by the LCI program is determined by the Secchi disk depth and is listed in Table 11.

Preservation and holding time requirements for all project samples are detailed Table 12.

Collection of lake macroinvertebrate samples will follow the methodology "Lakes Composite Sampling for Benthic Macroinvertebrates" described in SOP-AMB-208 section 7.2.5.

Field Sheets

The electronic field data collection form is completed at every site and includes location specific data, visual assessments, sample identifiers and volume filtered for Chlorophyll a. The form is accessible online through Survey123 (LCI Field Data). A separate survey is used to collect survey information for lake macroinvertebrate sampling and physical habitat assessment (LCI Lake PHAB Survey). The data recorded in the electronic field data collection form is stored on ArcGIS online. At the end of the field season, the LCI QA Officer will collect and review this field data and submit it to the central database. An electronic record of each survey is stored on the Department of Environmental Conservation ArcGIS Online account.

Table 10. SOPs followed during the LCI Program

ID	Title
SOP-GEN-101	Sample Handling, Transport, and Chain-of-Custody
SOP-GEN-102	Data Handling and Archival
SOP-GEN-103	Equipment Cleaning
SOP-GEN-110	Data Verification and Validation: Water Chemistry
SOP-AMB-211	Use, Calibration, Maintenance and Storage of multi-probe meters used to measure water quality parameters
SOP-AMB-203	Collection Of Lake Water Quality Samples

ID	Title
SOP-AMB-212	Harmful Algal Bloom Sampling and Analysis
SOP-AMB-208	Biomonitoring Field Methods
SOP-AMB-214	Biological Monitoring Laboratory Methods: Enumeration and Identification

Table 11: Volume of Water to be filtered for Chlorophyll a Analysis

Secchi Disk Depth	Volume of raw water to filter
< 1 meter	250 ml
>1 & < 2 meters	500ml
> 2 meters	1000ml

*This table provides only a guide to a reasonable compromise. If staff can filter more water without seriously increasing the filtering time they should do so. If the filter is noticeably green and staff has not filtered the specified amount, then less water may be filtered. The actual volume of filtered water needs to be recorded in the electronic field form and on the laboratory chain of custody form. This information is used in the calculation of chlorophyll *a* concentration.

3. Equipment Testing, Maintenance and Calibration Procedures

Field instruments and equipment testing, inspection and maintenance will be performed in this sampling program as per the most recent version of the NYSDEC SOP-GEN-103: Sampling Equipment Cleaning, the NYSDEC SOP-AMB-211, and per the manufacturer's instructions. The Monitoring and Assessment Section maintains an inventory tracking process to ensure that replacement parts and consumables are available to staff should the need arise. Replacement equipment and consumables are stored in either the laboratory or clean storage areas at the USGS Water Science Center at 425 Jordan Rd. Troy, NY 12180.

Contract lab instrumentation will be operated per NYSDOH ELAP certification requirements. Parameters for which NYSDOH ELAP does not issue certificates, contract lab instrumentation will be operated per the instructions in the NYSDEC Prescribed Analytical Protocol-Volume 5 (2022).

AIS Spread Prevention
Equipment must be cleaned between lakes to prevent the spread of aquatic invasive species as per SOP-AMB-203: Collection of Lake Water Quality Samples.

Storage
All sampling bottles and equipment related to sampling will be stored and maintained by LCI Monitoring Program sampling staff. Prior to use, all equipment will be checked to ensure good operating conditions and cleanliness. Manufacturer's specifications will be followed in carrying out routine maintenance.

Calibration
Calibration of multiprobe meters will be done at the beginning of each sampling week, and again if results indicate that re-calibration is necessary, except for dissolved oxygen, which must be calibrated each day. See SOP-AMB-211: Use, Calibration, Maintenance and Storage of Multi-probe Meters used to Measure Water Quality Parameters.

4. Sampling Handling and Custody

The collection method, sample container, preservative method, and holding time for all the analytes are provided in Table 12.

Chain of Custody

All sample handling, transport, and custody procedures are detailed in NYSDEC-DOW SOP 101 Sample Handling, Transport, and Chain of Custody. Individual sample containers are labeled with pre-printed waterproof labels with a unique sample ID. The unique sample ID is assigned with the use of a FileMaker database, WaterSampleLabels2. The sample ID is composed of **YYP####**, where:

- **YY** represents the two-digit year within which the sample will be collected (e.g., “25” for “2025”);
- **P** represents the sampling program (e.g., “L” for “LMAS”);
- **####** represents a unique four digit number assigned sequentially to samples as they are added to the database (e.g., 0001, 0002).

Each sample container must contain the following elements:

- Unique sample ID
- Date
- Time
- Analytes to be analyzed
- Indication of the presence of a preservative
- Field information

Within the FileMaker database, WaterSampleLabels2, each sample ID is associated with a unique combination of the following fields:

- Program – LMAS
- Year – 2025
- month – corresponding to the month the sample will be collected
- site_id – corresponding to the location ID in the LMAS database
- qc_type – specifies whether the sample is a matrix spike, field replicate or equipment blank
- info_type – specifies where in the water column a sample will be collected. OW is for the epilimnion and BS is for the hypolimnion
- matrix – specifies what materials will be sampled: water or sediment
- user_label – a combination of the keys above to inform the field sampler
- bottle_set – which combination of parameters are to be sampled
- cooler_set – a field to combine samples together to be sampled in the same day

A *Chain of Custody Record/Form* will be completed by sampling personnel and submitted to analytic laboratories with the samples (see Figure 2 and Figure 3 for example chain of custody forms).

Chain of Custody forms serve as a request for analysis (Figure 2 -). All sections of the Chain of Custody/Laboratory Analysis Request must be fully completed, including project name (LCI), project contact (LCI Program Coordinator), sampler’s name and signature, sample ID, date and time of sampling, sample matrix (e.g., water), the number of containers per sample analysis requested, lake name with location within the water column, and sample relinquished by.

Transport and Shipping Procedures
Group all containers from the same site together in the same cooler. Make sure each cooler has a chain of custody exclusive to its contents and sample type. Upon arrival at the laboratory, containers will be re-grouped according to the types of analyses to be run.

Samples are delivered to the appropriate analytical laboratory for analysis within twenty-four hours of shipping, by courier service (FedEx), pick up by the laboratory or delivery by sampling staff. Upon arrival at the laboratory, samples must be refrigerated at <6° C until all analyses are completed. Processing and analysis of samples will begin immediately upon receipt.

Upon receipt at the analytical laboratory, the time of sample receipt and start of analysis along with any problems encountered with equipment or samples will be recorded, and subsequently reported in the data package. Complete information on laboratory procedures is contained in the PAP (NYSDEC, 2023).

Mailing addresses for LCI Monitoring Program analytical laboratories are:
ALS Environmental- Rochester (Water column samples)
ALS Environmental,
ATTN: Meghan Pedro
1565 Jefferson Road
Building 300, Suite 360
Rochester, NY 14623
Telephone: 585-288-5380

UFI Upstate Freshwater Institute (HAB samples)
Upstate Freshwater Institute (UFI)
Attn: Gina Kehoe
224 Midler Park Drive
Syracuse, NY 13206
Telephone: (315) 431-4962

Biggs Laboratory - Wadsworth Center (for DOH HAB samples)
Biggs Laboratory
Wadsworth Center
B765
Albany, NY 12201

Macroinvertebrate samples
TDB – New contract in development

Rhithron Associates, Inc. (diatom samples)
ATTN: Sean Sullivan
33 Fort Missoula Road
Missoula, Montana 59804
phone: (406)721-1977

Table 12: Water column sampling specification

Parameter	Sample Type	Sample Container	Bottle Filling	Preservation Method	Holding Time
Alkalinity	Depth Integrated or Grab (collect from churn)	Plastic; Glass	NO HEADSPACE or air bubbles; do not aerate	Chill to ≤6ºC	14 days
Ammonia	Depth Integrated or Grab	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	28 days
Calcium	Depth Integrated or Grab	Plastic; Glass	Fill to neck	Chill to ≤6ºC	28 days
Chloride	Depth Integrated or Grab	Plastic; Glass	Fill to neck	Chill to ≤6ºC	28 days
Carbon, *total organic*	Depth Integrated or Grab	Glass	To top	H2SO4 Chill to ≤6ºC	28 days
Carbon, *dissolved organic*	Depth Integrated or Grab, Filtered	Glass	To top	H2SO4 Chill to ≤6ºC	28 days
Chlorophyll-*a*	Depth Integrated or Grab	Filter	N/A	Chill<6^0	24 days
Chlorophyll-*a direct field measurement*	In-situ	none	N/A	N/A	N/A
Conductance-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Dissolved Oxygen-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Hardness	Depth Integrated or Grab	Plastic; Glass	Fill to neck	HNO3 Chill to ≤6ºC	6 months
Harmful Algal Blooms	SB or R: Grab	Plastic; Glass	Fill to neck	None	48 hours
Metals, *Total Recoverable*	Depth Integrated or Grab	Plastic; Glass	Fill to neck	HNO3 Chill to ≤6ºC	6 months
Metals, *Dissolved*	Depth Integrated or Grab, Filtered	Plastic; Glass	Filter	HNO3 Chill to ≤6ºC	6 months
Nitrate-Nitrite	Depth Integrated or Grab	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	48 hours
Nitrite	Depth Integrated or Grab	250 ml plastic	Fill to neck	Chill to ≤6ºC	48 hours
Nitrate	Depth Integrated or Grab	Plastic; Glass	Calculated value	--	48 hours

Parameter	Sample Type	Sample Container	Bottle Filling	Preservation Method	Holding Time
Nitrogen, Kjeldahl	Depth Integrated or Grab	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	28 days
Oxidation-Reduction Potential – *direct field measurement*	In-situ	None	N/A	N/A	N/A
pH-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Phosphorous, *Dissolved*	Depth Integrated or Grab, Filter	Plastic; Glass	Filter, Fill to neck	Chill to ≤6ºC	48 hours
Phosphorous, Total	Depth Integrated or Grab	Plastic; Glass	Fill to neck	H2SO4 Chill to ≤6ºC	28 days
Phycocyanin-*direct field measurement*	In-situ	none	N/A	N/A	N/A
Sodium	Depth Integrated or Grab	Plastic; Glass	Fill to neck	Chill to ≤6ºC	28 days
Solids: Total Dissolved	Depth Integrated or Grab	Plastic; Glass	Fill to neck	Chill to ≤6ºC	7 days
Sulfate	Depth Integrated or Grab	Plastic; Glass	Fill to neck	Chill to ≤6ºC	48 hours
True Color*	Depth Integrated or Grab	Plastic	Fill to neck	Chill to ≤6ºC	48 hours
Temperature – *direct field measurement*	In-situ	None	N/A	N/A	N/A
UV254*	Depth Integrated or Grab	Plastic	Fill to neck	Chill to ≤6ºC	48 hours
Contaminants of Emerging Concern	See QAPP-WQM-0057_V24-2: Probability Based Monitoring of Contaminants of Emerging Concern in New York State Lakes and Streams				

* The 2-day holding time for True Color, Nitrate, Nitrite, Sulfate, TDP and UV-254 is recognized and every effort is made to have samples at the lab within the holding time although this may not always be possible. Results from samples analyzed past their holding time will be given a qualifier which will be maintained within the division's database.

CHAIN OF CUSTODY – ALS Rochester

Page __ of __

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Division of Water

(This COC for use with ALS Rochester only)

Project Name: LCI	Project Number: LCI24	NYSDEC SDG:
Sampler Collector:	Sampler Signature:	Sampler Phone No.:
Project Manager: Matthew Kraft	X Report to Project Manager Report to:	**Bill to Project Manager:** Jason Fagel
Address: 625 Broadway, 4th Floor Albany, NY 12233-3502	Address:	**Address:** 625 Broadway, 4th Fl Albany, NY 12233-3502
Phone: (518) 402-8260	Phone:	**Phone:** 518-402-8156
Email: Matthew.Kraft@dec.ny.gov	Email:	**Email:** jason.fagel@dec.ny.gov

Matrix Codes:
WW = Wastewater
GW = Groundwater
W = Ambient Water
SE = Sediment
SL = Sludge
T = Tissue
O = Other __DI WATER____

Preservative Codes:
(Please include in ( ) on "Analyses Ordered" line):
1 = Cool to < 6°C
2 = 0.008% $Na_2S_2O_3$
3 = H_2SO_4 to pH < 2
4 = HNO_3 to pH < 2
5 = NaOH to pH > 12
6 = 5 mL/L 12N HCl
7 = 5 mL/L BrCl
8 = HCl to pH < 2
9 = H_3PO_4 to pH < 2
10 = Protect from light
11 = Freeze to < -10°C
12 = Other _____

Sample Key	Collection Date MM/DD/YY	Collection Time (HH:MM)	Matrix Code	MS/MSD	# Containers	Analyses Ordered (list): A Epi	A Hypo	B Epi	B Hypo	HAB Parameters	Chl A Volume (ml)	NYSDEC Sample ID

Special Analysis Instructions:

						Laboratory Receipt Notes:
Relinquished by Sampler:	Date:	Time:	Received by:	Date:	Time:	
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Sample Temp.: _____°C Properly Preserved: Y / N Samples Intact: Y / N

Figure 2: ALS Laboratory Chain of Custody Form.

NEW YORK STATE | Department of Environmental Conservation

Contract#	C009621
Company/Organization:	NYS DEC Stream Biomonitoring Unit
Total # of Samples this project:	
# of Samples Shipped this shipment:	

	MSSIH_EVENT_SMAS_HISTORY_ID	PROJECT	MSSIH_EVENT_SMAS_SAMPLE_DATE	MSSIH_BIOSAMPLE_COLLECT_METHOD	Number of Replicates	WAA ID	COMMENTS
1	07-OWLI-3.0	FL TRIBS RAS	7/16/2019	Kick:Standard	4		Quart Jar
2	07-OWAL_T9-0.1	FL TRIBS RAS	7/16/2019	Kick:Standard	4		Quart Jar
3	07-SCKR-0.1	FL TRIBS RAS	7/16/2019	Kick:Standard	4		Quart Jar
4	07-DUCH-0.3	FL TRIBS RAS	7/16/2019	Kick:Standard	4		Quart Jar
5	07-VENE-1.5	FL TRIBS RAS	7/16/2019	Kick:Standard	4		Quart Jar
6	07-OWAL_T46-0.1	FL TRIBS RAS	7/16/2019	Kick:Standard	4		Quart Jar
7	07-SKAT_T2-0.1	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
8	07-SKAT_T5-0.1	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
9	07-GROU-1.5	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
10	07-BSWP-0.1	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
11	07-SKAT_T89-0.2	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
12	07-SKAT_T93a-0.5	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
13	07-MASH-0.1	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
14	07-REED-0.1	FL TRIBS RAS	7/17/2019	Kick:Standard	4		Quart Jar
15	07-THOL-1.8	FL TRIBS RAS	7/18/2019	Kick:Standard	4		Quart Jar
16	07-CATH-0.6	FL TRIBS RAS	7/18/2019	Kick:Standard	4		Quart Jar
17	07-GLNK-0.2	FL TRIBS RAS	7/18/2019	Kick:Standard	4		Quart Jar
18	07-BGST-0.1	FL TRIBS RAS	7/18/2019	Kick:Standard	4		Quart Jar
19	07-KEUK-0.1	FL TRIBS RAS	7/18/2019	Kick:Standard	4		Quart Jar
20	07-KASH-0.3	FL TRIBS RAS	7/18/2019	Kick:Standard	4		Quart Jar

Relinquished By/ Date:			Condition:
Company:			
Received By/ Date:			Condition:
Company:			

Figure 3: Watershed Assessment Associates Chain of Custody Form.

CHAIN OF CUSTODY – ALS Rochester / UFI / DOH | Page _1_ of _1_

Division of Water
(This COC for use with ALS Rochester & UFI for HAB samples only)

Project Name/Team: NYSDEC HABs Program	Case Code: HABS23	SDG:
Contract No.: **C010495**	Sampler Collector:	Sampler Phone No.:
Project Coordinator: Matthew Kraft	**Report to Project Manager:** Brian Duffy	**Bill to Project Manager:** Jason Fagel
Address: 625 Broadway, 4th Floor Albany, NY 12233-3502	**Address:** 625 Broadway, 4th Floor Albany, NY 12233-3502	**Address:** 625 Broadway, 4th Fl Albany, NY 12233-3502
Phone: (518) 402-8166	**Phone:** 518) 402-8731	**Phone:** 518-402-8156
Email: matthew.kraft@dec.ny.gov	**Email:** brian.duffy@dec.ny.gov	**Email:** jason.fagel@dec.ny.gov

Matrix Codes: WW = Wastewater; GW = Groundwater; W = Ambient Water; SE = Sediment; SL = Sludge; T = Tissue; O = Other __DI WATER____

Preservative Codes: (Please include in (_) on "Analyses Ordered" line): 1 = Cool to < 6°C; 2 = 0.008% $Na_2S_2O_3$; 3 = H_2SO_4 to pH < 2; 4 = HNO_3 to pH < 2; 5 = NaOH to pH > 12; 6 = 5 mL/L 12N HCl; 7 = 5 mL/L BrCl; 8 = HCl to pH < 2; 9 = H_3PO_4 to pH < 2; 10 = Protect from light; 11 = Freeze to < -10°C; 12 = Other

Sample Key	Collection Date (MM/DD/YY)	Collection Time (HH:MM)	Matrix Code	Equip. Blank (EB)	Duplicate (FR)	# Containers	Analyses Ordered (list): Fluoroprobe	MCs & NODs (EPA/600/R-17/344)	ATX & CYN (EPA/600/R-17/130)	MC (EPA 546)	NYSDEC Sample ID	Lab Sample ID/ Lab Notes
	06/_____/2023		W								1701UWB0986B_DH_N_OW_B	

Special Analysis Instructions:

Relinquished by Sampler:	Date:	Time:	Received by:	Date:	Time:	Laboratory Receipt Notes: Sample Temp.: _____°C; Properly Preserved: Y / N; Samples Intact: Y / N
Relinquished by:	Date:	Time:	Received by:	Date:	Time:	

Figure 4: Harmful algal bloom chain of Custody form for ALS Rochester and Upstate Freshwater Institute.

NEW YORK STATE Department of Environmental Conservation

Contract:	C011802
Company Name:	NYSDEC Lake Classification and Inventory Program
Number of Samples in shipment:	7

LOCATION_HISTORY_ID	INFORMATION_TYPE	REPLICATE	SAMPLE_NAME	EVENT_LMAS_SAMPLE_DATE	EVENT_LMAS_SAMPLE_TIME	PURPOSE	Box_number
0104GRE5309_DH	SEDT	1	2001GRE5S51	9/30/2020	12:00:00	Probability Sampling 2020-2021	1
0502MILXXX1_DH	SEDT	1	2005MILXS31	7/22/2020	12:30:00	Probability Sampling 2020-2021	1
0601ARN0362_DH	SEDT	1	21L0500	9/27/2021	10:15:00	Probability Sampling 2020-2021	1
0602LUD0099_DH	SEDT	1	2006LUD0S31	7/21/2020	16:45:00	Probability Sampling 2020-2021	1
0602STE0101_DH	SEDT	1	21L0501	9/27/2021	13:35:00	Probability Sampling 2020-2021	1
0602WHI5358_DH	SEDT	1	21L0502	9/27/2021	16:15:00	Probability Sampling 2020-2021	1
0603CAY0008_DH	SEDT	1	2006CAY0S31	7/22/2020	16:00:00	Probability Sampling 2020-2021	1

Relinquished by:	Condition:
Date:	
Received by:	Condition:
Date:	

Figure 5: Chain of custody form for diatom samples (Rhithron, Inc.).

5. Analytical Methods

Analytical methods used in this sampling program are provided in the Table 8 and at the laboratories specified in Table 1. Samples will be analyzed as per the NYSDOH ELAP certification and the NYSDEC Prescribed Analytical Protocol (PAP) (2023). The standard turnaround time for laboratory analyses is 30 days, however, expedited turnaround times ranging from 24 hours to 10 days may be requested for an additional fee.

Macroinvertebrate samples will be processed by Watershed Assessment Associates, LLC. according to the methods prescribed in SOP-AMB-214. Results of the macroinvertebrate taxonomy are to be received from the contract laboratory no later than four months from the receipt of the samples unless specified otherwise.

Any additional certified laboratories that are used for this project will be communicated to the NYSDEC Project Manager and noted in the final reports.

The objective of the LCI Monitoring Program quality control methodology is to establish and maintain standards sufficient to help ensure environmental data is of known and documented quality to meet water quality assessment needs. An integral part of sample quality is collection of representative samples. The usefulness of the data obtained from any monitoring program depends upon how accurately that data describes the characteristics of the waterbody being studied. The samples that are collected for analyses must accurately represent the studied waterbody and be unaffected by collection procedures, sample preservation and sample handling.

6. Quality Control

To monitor the integrity of the LCI field sampling effort, field replicates, matrix duplicates, matrix spike duplicates, equipment blanks and field blanks are employed. The collection of these quality control samples is described below and will apply to all sampling completed by the LCI program (Routine, Screening, Special Studies, and RMN). Evaluation of laboratory performance is covered under the New York State Department of Health's Environmental Laboratory Approval Program (NYSDOH ELAP). The LCI Monitoring Program adheres to New York State Public Health Law (PHL) § 502 requiring environmental laboratory analyses of samples originating from New York State be performed by a laboratory certified by NYSDOH ELAP. For those LCI parameters that ELAP does not issue a certificate for, the analyzing laboratory must follow analytical method and laboratory quality control protocols including but not limited to method blanks, laboratory control samples and calibration standards.

Equipment Blanks are collected after sampling equipment has been rinsed following standard operating procedures. Deionized/distilled water is processed through the sample collection equipment and preserved following established sample handling protocols. The sample is submitted for analysis to identify possible contamination from the sampling procedure (equipment, sample containers, preservatives and handling) and to document the effectiveness of rinsing of sampling equipment to prevent cross contamination.

Equipment blanks are collected at one site per team during each week of sampling. This frequency corresponds to between five percent (5%) and ten percent (10%) of the collected samples. Equipment Blank Samples are analyzed for each of the sampled analytes.

Field Replicates are an independent sample collected as close as possible to the same point in space and time as the sample and treated exactly as the sample for sample processing transport and analysis. Sampling field replicates will be performed at the beginning of the year to examine RPD between samplers (See SOP #110 for calculating RPD). Corrective actions, including retraining and examining methods between samplers, will be taken if RPD is unacceptable and will be noted in the DUAR. Precision here will evaluate if sampling performed by multiple samplers is within acceptable RPD limits.

Multiple pairwise comparisons will be used here to evaluate differences between samplers.

Methods: Samplers will perform field replicate sampling using separate equipment to determine difference between samplers/sample methods. This method will attempt to sample concurrently, or close in time to one another as possible. The Class A LCI screening suite will be collected and analyzed for this analysis.

Matrix Spikes and Matrix Spike Duplicates

Accuracy (Matrix Spikes)

Matrix spike (MS) samples and matrix spike duplicate (MSD) samples are collected along with regular water quality samples and spiked in the analytic laboratory with a known concentration of analyte. The samples are then analyzed to determine the accuracy (percent recovery) of the analytic results for a given matrix.

Matrix spike samples and matrix spike duplicate samples are collected one time during each week of sampling. This frequency corresponds to between five percent (5%) and ten percent (10%) of the samples.

Precision (Matrix Spike Duplicates)

In addition to insight on matrix effects and laboratory performance, MS and MSD samples are used to provide an equivalent metric of precision to a laboratory duplicate. Parameters that are not amenable to spiking (e.g. Chlorophyll, Color, UV254) will still have laboratory duplicates performed and precision measured. The precision between the MS and MSD will be calculated and reported by the laboratory.

For those LCI parameters that NYSDOH ELAP does not issue a certificate for, the analyzing laboratory must follow routine laboratory control protocols as outlined in 40 CFR Part 136.7 (2017).

Analysis of internal analytical laboratory quality control samples are to be conducted as prescribed per analytical method and when not defined in the method by an equivalent approved method. Each analytical laboratory is responsible for maintaining internal quality control as a part of their quality assurance plan. Each laboratory provides LCI Monitoring Program personnel with an evaluation of their internal quality control for each batch of analysis.

Representativeness

Representativeness in water column samples is attained by selection of proper sampling equipment and procedures to obtain an integrated sample of water from a cross section of the waterbody, as well as from different depths.

Completeness

Completeness is a measure of the number of samples intended to be collected and analyzed compared to the number of samples actually collected and analyzed, expressed as a

percentage. The collection of eighty percent (80%) of samples will be the minimum acceptable level of completeness.

Sediment Diatoms
The contract laboratory identifying and enumerating sediment diatom samples must perform internal quality control evaluations. The lead taxonomist must randomly select 10% of each analyst's processed samples to be re-identified and re-enumerated by the same analyst, and randomly select 10% of each analyst's processed samples to be re-identified and re-enumerated by a secondary (internal) analyst. If a secondary internal analyst is not available, 10% of the samples must be re-identified by a secondary external laboratory.

Lake Macroinvertebrates
Quality control of lake macroinvertebrate sampling is described in SOP-AMB-214 Section 11.

7. Quality Control Evaluation
The quality control results for water chemistry samples are evaluated according to SOP-GEN-110: Data Validation and Verification.

When QC samples fail to comply with the criteria established above, the Program Coordinator will initiate an investigation of the laboratory with the NYSDEC Division of Water Quality Assurance Officer and the corresponding laboratory manager to conduct procedures necessary to correct the problems contributing to violating these criteria. If these procedures prove inadequate to solve the problems, the Program Coordinator and DOW Quality Assurance Officer will determine if this laboratory needs to be replaced by an alternative laboratory that has successfully completed these QC checks as part of a recent monitoring program.

8. Supplies and Consumables
Inspection of supplies and consumables must be made upon arrival of new materials and immediately before their use in the field or laboratory. For newly arrived supplies and consumables all materials must be in their original packaging and free of noticeable damages. For materials already obtained and about to be used no noticeable defects will be allowed. The Primary Samplers are responsible for assuring the quality of all supplies and consumables for each of their sampling trips.

9. Data Management

Field Data
Sample collection information (station, collection date, time), field observations, and water column profile data (temperature, dissolved oxygen, pH, conductivity, ORP, water clarity, Phycocyanin, water depth) are compiled from the electronic field survey forms and instruments, and then stored as raw data on the network drive (L:\DOW\BWAM Share\data), organized by data type (e.g., profiles, field data, etc.). The data is then processed and prepared for addition to the WQMA database.

Laboratory Data
Complete data packages are required for the LCI Program to provide data validation capability. Data packages will be delivered to the Contract Laboratory Coordinator in accordance with the requirements of the Prescribed Analytical Protocols (NYSDEC October 2022). Together, the LCI Quality Assurance Office (LCI-QAO) and the Data Management Coordinator (DMC) will review and assign data-flags indicating the quality of the data (e.g., reject, non-detect, estimated value,

etc.). The Data Management Coordinator (DMC), in coordination with the LCI-QAO, will review laboratory assigned data-flags and process data through automated review scripts that identify data anomalies. The Contract Laboratory Coordinator (CLC) will review the identified data anomalies and make suggestions on data usability and internal flagging. The CLC will subsequently meet with the DMC and LCI-QAO to provide a summary of their review and discuss recommended data handling. Any results flagged as rejected by the laboratory will still be housed in the WQMA database for tracking. Any re-analysis from the laboratory will be noted in the raw data file, and results will be stored in the WQMA database.
Investigation of laboratory values may result in confirmation of the results by the analytical laboratory, comparison of the value against other results from the same site, inserting an appropriate data qualifier, and/or accepting the value without qualification. Data qualifiers have been established to characterize laboratory values according to established QA/QC processes (see SOP-GEN-110: Data Validation and Verification for a listing and definitions). Once data results have been reviewed and confirmed, water column data are stored in the WQMA database. Data collected will be labeled with a project code, and applicable QAPP number to ensure traceability. All raw data will be housed on the L drive.
All data generated by the LCI Program sampling will be evaluated by the WQMA data team prior to data ingestion. Additional information regarding environmental information management can be found in SOP-GEN-110: Data Validation and Verification and SOP-GEN-102: Data Handling and Archival.

III. ASSESSMENT AND OVERSIGHT

Program assessments will be conducted to evaluate the validity of the field data collection and analytical activities conducted as part of this monitoring program. All field staff will be provided training by one of the Primary Samplers at the onset of the monitoring program, likely during the initial sampling run at one of the program lakes. A calibration day is held before the start of field season to ensure that primary field staff are sampling in a consistent manner. During the calibration day, all primary samplers collect one sample and discuss the specifics of each step. The purpose is to clarify and resolve different perceptions and opinions about the sampling procedures.

Random field audits of field staff may be conducted by the LCI QA Officer, NYSDEC DOW QA Officers and/or the Lakes Monitoring and Assessment Section Chief and will be used to assess the performance of the sampling operations. Results for these assessments will be reported to the Program Coordinator, who will provide recommendations for any necessary corrective actions (from retraining and modifying procedures to replacing staff associated with the sampling team to modifying the choice of contract laboratories) to the Section Chief of the Lakes Monitoring and Assessment Section who will inform the Bureau Director of the Bureau of Water Assessment and Management. The responsibility for ultimately approving these corrective actions lies with these identified staff.

1. Performance and System Audits

As required by NYS Public Health Law 502, environmental samples must be analyzed by laboratories accredited by the New York State Department of Health Environmental Laboratory Approval Program (ELAP). This program involves performance evaluation samples and annual on-site audits. For laboratories performing analysis on parameters not covered under NYSDOH ELAP, the DOW Contractor Laboratory Coordinator (CLC) may conduct audits to meet demonstration of competency requirements. The NYSDEC DOW CLC may conduct laboratory audits for laboratories directly under contract with DOW solely to determine compliance with the

Prescribed Analytical Protocols (PAP) and non-NYS DOH ELAP DOW program requirements. Any DOW audit findings will be addressed by implementation of appropriate corrective actions. Audit reports are retained and available for US EPA review upon request.

2. Corrective Actions

Revisions to the Quality Assurance Project Plan are to be approved by the Program Coordinator who will notify those on the distribution list of the revision.

Major sources of errors may include analytical and equipment problems and those resulting from the deviation from intended plans and procedures. If these problems occur in the field, corrective actions should be taken as described in SOP-AMB-203. For contract laboratories, the PAP and applicable analytical methods contain the procedures the laboratory is to follow when problems are encountered in the chemical analysis of samples.

Deviation from intended plans and procedures should be noted by the person observing the deviation and reported to project staff responsible for the operation or analysis in question. The appropriate project personnel shall (1) develop a corrective action plan within 2-weeks to ensure that future sampling, analyses, etc. are conducted in accordance with the QA procedures presented in this QAPP; (2) rerun procedures in the appropriate manner and re-analyze samples, if sufficient sample material is available and holding times are not exceeded; and (3) report all problems and deviations to the LCI Program Manager, who will also be consulted during the development of any proposed corrective action plans. All deviations from intended plans and procedures are to be recorded in the appropriate field or laboratory notebooks.

3. Reports to Management

The Water Quality Standards & Analytical Support Section will perform a full data validation review on a minimum of 5% of all SDG packages for each chemical matrix in the LCI Program. Additional SDG data validation reviews will be performed as identified by MAS program staff in their initial review of the data. This evaluation together with the analysis of the completeness, precision, and accuracy of the program will provide a level of confidence to the data set and to the interpretations and conclusions drawn from the data.

The complete data packages provided to the Data Management Coordinator and the Contract Laboratory Coordinator by the analytical laboratory will report on analytical methods, sample holding times and laboratory preparation techniques that have deviated from the methods contained in this QAPP.

As soon as possible after receipt of data packages from the analytical laboratories, data are reviewed, compiled, and assessed using the established criteria in this QAPP and other procedures defined in the Consolidated Assessment and Listing Methodology (CALM) (NYSDEC 2021) and individual data reports.

Individual lake reports are generated automatically using R scripts and are made available internally and to the public ArcGIS Online and the DEC Info Locator.
The data generated by LCI Program will be provided to the Water Assessment and Implementation Section within DOW to be included in integrated reporting (303(d) and 305(b)) to the United State Environmental Protection Agency.

Public Water Source Assessment
The LCI Program will provide the DWSP2 program the complete data set for the lakes sampled as part of this project, as well as a summary of any water quality standards excursions. This data will also be used to inform the development of source water protection plans for municipalities participating in the DWSP2 Program. Data will also be provided to the Watershed Assessment and Implementation Section (WAIS) to inform assessment updates.

Finger Lakes Assessment
The LCI Program will provide the NYSDEC Finger Lakes Watershed Program the complete data set for the study. The data will also be provided to the Watershed Assessment and Implementation Section (WAIS) to support assessment updates.

Department Interest Sampling
Data generated from the Department Interest Sampling will be provided to the staff or external partner who requested the data be collected.

4. Project Fiscal Information

The budget for the LCI project is maintained as part of the overall spending plan of the NYSDEC Division of Water.

5. Data Validation and Usability

Field Results
Field data (observational surveys and vertical profiles) are reviewed in multiple steps. For observational field data, Survey123 forms have built in validation to ensure that entries are limited to only valid options. During preparatory steps to process the data for inclusion in the database, new values are checked against existing values to check those entries (field names and values) match expected entries. For in-situ data collected with multi-parameter sondes, MAS programs maintain a calibration record for each sonde, which ensures that the instruments are properly calibrated on a routine basis (see SOP-AMB-211 for additional details). Vertical profile data is also processed through a R script to prepare the data for inclusion in the database. This script checks to make sure that values are within a valid range for each parameter. Additionally, this data from vertical profiles is plotted and checked visually for any anomalies that may be indicative of issues with the data.

Water chemistry
Data results generated by the LCI Program are reviewed at three separate stages. First, analytical laboratory staff follows specific laboratory protocols to assure the quality and validity of the data. For additional information, refer to the NYSDEC Prescribed Analytical Protocols (2022). Second, MAS program staff process the electronic data delivery files (EDDs) and run them through QA/QC procedures. This includes an evaluation of precision, accuracy, equipment blanks, and other tests. SOP-GEN-102 Data Handling and Archival and SOP-GEN-110 Data Validation and Verification detail these procedures.
Laboratory QA sample evaluation shall include analysis of (1) matrix spikes to determine the average percent recovery and standard deviation and (2) method blanks, which will be compared to respective batch results. Methods defined in SOP-GEN-110 Data Validation and Verification, will be utilized to quantify the precision, accuracy, and completeness of laboratory data resulting from this project. Results from these statistical calculations will be useful in determining whether data quality requirements have been met.

Biological
Biological data results are validated per the methods detailed in SOP-AMB-208, 214 and 216; and include internal checks among taxonomists, comparison of voucher specimens with the laboratory reference collection, and quality control subsampling on 5% of all samples. For contract laboratories conducting biological identifications, quality control requirements are contained in the corresponding contracts and applicable SOPs.

Usability Determination
All data will be reviewed to determine its validity prior to use and distribution. Those data not meeting the previously identified criteria for precision, accuracy, and blank values will be flagged with the appropriate qualifiers. An indication as to why flagged data did not meet the minimum QA/QC criteria will be provided. Laboratory and final validator qualifiers are listed and detailed in SOP-GEN-110 Data Validation and Verification. This information will be noted in the final QA/QC report or DUAR.
After the above QA/QC calculations and examinations have been performed for all data, the results will be summarized in a data usability assessment report (DUAR). This will include a discussion and summary of the accuracy, precision, completeness, comparability, and representativeness observed during the study.

6. Verification and Validation Methods

Data in this monitoring program will be verified and validated by the LCI QA Officer and Data Management Coordinator. Data for each of the parameters will be compared with the detection limits and precision/accuracy data provided in Section I; the analytical laboratory performs these comparisons on results that they generate. In general, data verification and validation methods were discussed in the Data Management section (above).

If data validity cannot be verified, these data will be qualified in the database according to SOP 110: Data Validation and Verification. This information will be noted in the final Data Usability and Assessment Report (DUAR).

7. Reconciliation with use Requirements

As noted in Section III, uncertainty in the data allowed for use in the monitoring programs end-product will be limited to that found acceptable in the data verification and validation process.

8. Reporting

Data Outputs
Data outputs are designed to achieve the needs of the objectives as outlined in section 3: Project / Task Description. Monitoring data generated by the LCI Program in communicated in a variety of ways including through lake reports and the publicly accessible DOW Monitoring Data Portal. For deliverables specific to each special study, see the Reports to Management

After the quality assurance and quality control evaluations have been performed, the results will be summarized in a final DUAR by the LCI QA Officer. This DUAR will be reviewed and approved by the DOW QA Officer, Program Coordinator, and Section Chief prior to distribution.

IV. References

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NYSDEC. 2022. Prescribed Analytical Protocols. Available as a CD-ROM from Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. 2023. Consolidated Assessment and Listing Methodology. Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. Most Recent ≥ V24-2. Standard Operating Procedure: Collection of Lake Water Quality Samples. NYSDEC SOP #203. Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. Most Recent ≥ V25-1. Standard Operating Procedure: Data Verification and Validation: Water Chemistry. NYSDEC SOP #110. Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. Most Recent ≥ V25-1. Standard Operating Procedure: Data Handling and Archival, NYSDEC SOP #102. Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

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NYSDEC. Most Recent ≥ V25-1. Standard Operating Procedure: Sampling Equipment Decontamination/ cleaning, NYSDEC SOP #103, Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. Most Recent ≥ V25-1. Standard Operating Procedure: Biomonitoring Field Methods, NYSDEC SOP #208, Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. Most Recent ≥ V25-1. Standard Operating Procedure: Use, Calibration, Maintenance and Storage of Multi-probe meters used to Measure Water Quality Parameters, NYSDEC SOP #211. Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

NYSDEC. Most Recent ≥ V25-1. Standard Operating Procedure: Collection of Harmful Algal Bloom Samples, NYSDEC SOP #212, Division of Water, New York State Department of Environmental Conservation, 625 Broadway, Albany, New York.

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Tyree, M. A., Bishop, I. W., Hawkins, C. P., Mitchell, R., & Spaulding, S. A. (2020). Reduction of taxonomic bias in diatom species data. *Limnology and Oceanography: Methods*, *18*(6), 271-279.