

Black River Adaptive Modeling (BRAM): Data Summary and Gap Identification Report



Black River at Felts Mills, Rutland, NY. Photo by Emily Fell.



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Black River Adaptive Modeling (BRAM): Data Summary and Gap Identification Report

Project name	Black River Adaptive Modeling (BRAM)
Project no.	SE370
Document type	Report
Version	3
Date	May 2024
Prepared by	Ramboll, CC Environment & Planning, Upstate Freshwater Institute
Prepared for	NYSDEC

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Abbreviations

Abbreviation	Definition
AVGWLF	ArcView Generalized Watershed Loading Function
BRAM	Black River Adaptive Modeling
BWRM	Bureau of Water Resource Management
CAFOs	Concentrated animal feeding operations
CCE	CC Environment & Planning
CDL	Cropland Data Layer
DEM	Digital elevation model
DMR	Discharge Monitoring Report
DQI	Data quality indicator
EPA	Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GIS	Geographical Information Systems
HUC	Hydrologic unit code
ICIS	Integrated Compliance Information System
NASS	National Agricultural Statistics Service
NCEI	National Centers for Environmental Information
NOAA	National Oceanic and Atmospheric Administration
NYSDEC	New York State Department of Environmental Conservation
NYSOGS	New York State Office of General Services
POTW	Publicly owned treatment works
RCRA	Resource Conservation and Recovery Act
RIBS	Rotating Intensive Basin Surveys
SOP	Standard operating procedure
SPDES	State Pollutant Discharge Elimination System
SSURGO	Soil Survey Geographic Database
SWAT	Soil & Water Assessment Tool
SWCD	Soil & Water Conservation District
TMDL	Total Maximum Daily Load
TRI	Toxic Release Inventory
TSCA	Toxic Substance Control Act
TSDF	Treatment Storage and Disposal Facilities
TSS	Total suspended solids
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WWTP	Wastewater treatment plant

1. Background

The Black River Watershed covers approximately 1.2 million acres of the western slopes of the Adirondack Mountains and the eastern edge of the Tug Hill Plateau, and drains into Lake Ontario near Dexter, New York. Due to its unique location, the Black River Watershed has a wide variety of environmental conditions, including climate, topography, land cover, geology, and hydrology. The watershed contains heavily forested areas among its eastern reaches that lie within the Adirondack Park boundary, while the area to the west includes a more extensive areas of agricultural production and developed landscapes associated with the City of Watertown (Figure 1).

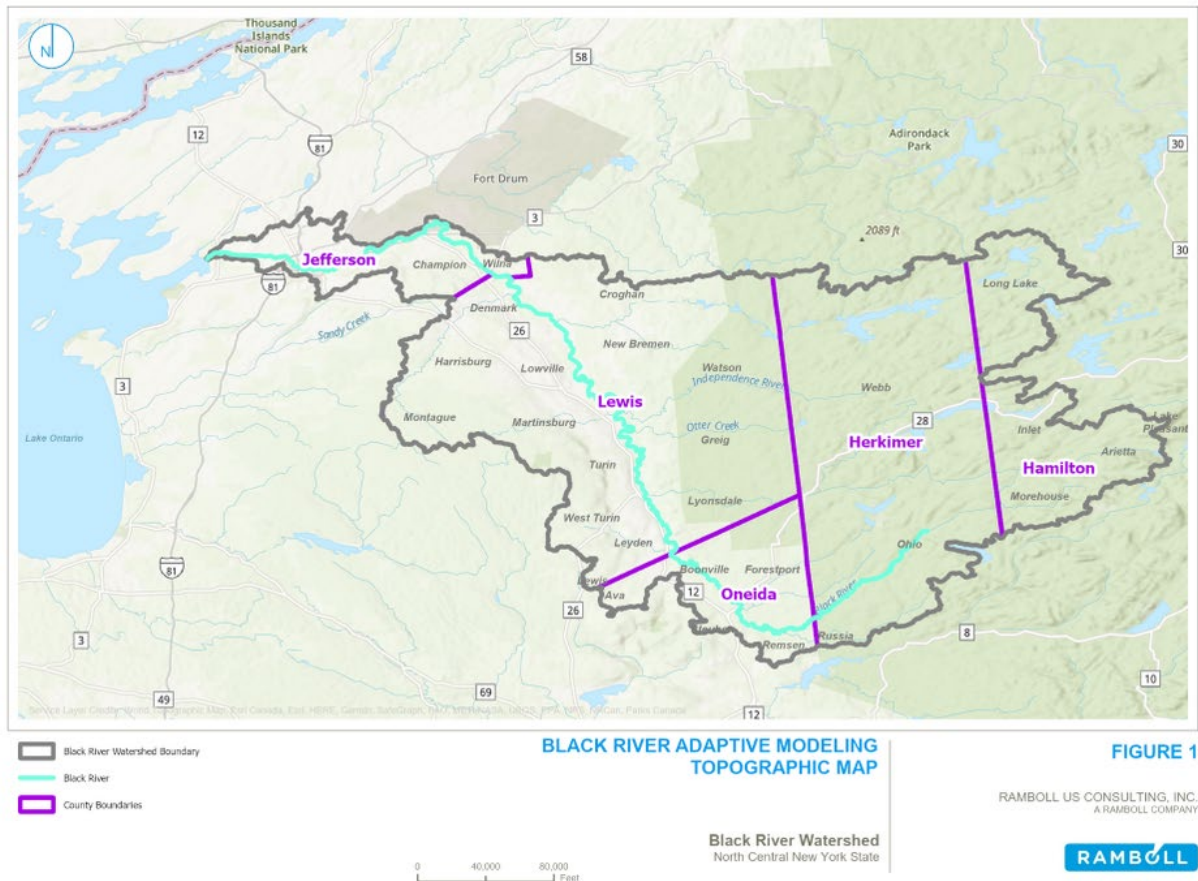


Figure 1. Topographic Map of the Black River Watershed

In 2010, New York State Department of Environmental Conservation (NYSDEC) in cooperation with the Tug Hill Commission, Jefferson and Lewis County Soil & Water Conservation Districts, and Water Quality Coordinating Committees developed the [Black River Watershed Management Plan](#) with of goal of examining the watershed's existing conditions, identifying factors negatively impacting water quality, and recommending strategies for protection and improvement of water quality within the watershed. An update to the plan was written in 2016, titled the [Black River Nine Element Watershed Management Plan](#) (2016 Nine Element Plan), in order to make the 2010 plan consistent with the Environmental Protection Agency's (EPA's) requirements for a [nine element watershed plan](#). In the 2016 Nine Element Plan, nutrient and sediment loading from the watershed was included based on modeling from the Black River Watershed Management Plan, which used ArcView Generalized Watershed Loading Function (AVGWLF) at the hydrologic unit code (HUC)-11 scale. Since the 2016 Nine Element Plan, the HUC-11 scale was cataloged as legacy, and is no longer available for use in comparing watershed strategy implementation metrics to corresponding

conditions assumed in the model. This change has inhibited adaptive management and evaluating project progress from the 2016 Nine Element Plan.

To overcome this challenge, this project, Black River Adaptive Modeling (BRAM) Phase I, has compiled and analyzed data as the first step in considering whether additional planning, implementation actions and/or modeling efforts should be explored. This document summarizes data sources and datasets that were evaluated for potential use in future modeling, planning, and implementation efforts, and identifies data gaps.

One type of model commonly used in watershed modeling is a Soil and Water Assessment Tool (SWAT). A SWAT model is a tool developed by Texas A&M University, which simulates quality and quantity of water, land management practices, and land uses within a watershed. SWAT models have been used in multiple New York State clean water plans, such as Total Maximum Daily Loads (TMDLs) and Nine Element Plans. In order to run a SWAT model, the following data are required: Digital Elevation Model (DEM)/terrain, land cover/crop land, meteorological data, and soils data. Additional datasets help customize the model to accurately reflect an individual watershed's conditions, which include:

- Crop rotation – watershed specific, local data with Soil & Water Conservation Districts (SWCDs) or regional NYSDEC offices
- Stream discharges – United States Geological Survey (USGS) monitoring gages or comparable
- Fertilizers/manure – Cornell University, Concentrated Animal Feeding Operations (CAFOs)
- Nutrient loads (total phosphorus, total nitrogen) – State Pollutant Discharge Elimination System (SPDES) facilities and USGS monitoring gages
- Total suspended solids (TSS) – SPDES facilities and USGS monitoring gages
- Septic systems – can be estimated and approximated using NYS tax parcel data and Bureau of Water Resource Management (BWRM) standard operating procedures (SOPs)
- Reservoirs – if any, data may be available through NYS Dams or dam owner

Additional planning efforts that have been applied in other watersheds include the development of a Watershed Implementation Plan (or WIP), which was developed for the Lake Champlain Total Maximum Daily Load to support additional implementation.

2. Stakeholder Engagement

Due to the nature of BRAM Phase I (data compilation), engagement and outreach were focused on stakeholders that could help provide data to contribute towards the data assessment and gap analysis. A Planning Committee was developed to advise and provide datasets to the project team, identify additional stakeholders to engage with, as well as share new water quality concerns. Planning Committee meetings occurred monthly with discussions revolving around updates on data collection, data usability assessment, and data gaps, among other project topics. Representatives from the following organizations participated in the Planning Committee:

- Hamilton County SWCD
- Herkimer County SWCD
- Jefferson County SWCD
- Lewis County SWCD
- NYSDEC
- Oneida County SWCD
- Tug Hill Commission

Based on Planning Committee recommendations, a watershed stakeholder kickoff meeting was held virtually on January 25, 2023, to provide all interested stakeholders an overview of the BRAM Phase I purpose and steps, and to solicit any potentially relevant data. A total of 22 participants attended the kickoff meeting. Additional public engagement with the watershed stakeholders involved a presentation of Phase I updates during the Black River Annual Watershed Conference held in Carthage, New York on June 14, 2023.

A field trip was held on April 24, 2023, to engage with the Planning Committee and other interested stakeholders, including the Lewis County Highway Department and Trout Unlimited. The project team received feedback from the stakeholders on data gaps and water quality concerns within the Black River watershed. The project team and available stakeholders visited the following locations, also visible in Figure 2:

- Fish Island Park, Dexter, NY
- Marble Street Park, Watertown, NY
- Long Pond Road at Balsam Creek in Croghan, NY
- 7516 E State Street, Lowville, NY
- Jeb's Restaurant, Lowville, NY (Lunch)
- Hawkinsville Dam (County Rd 61/Edmonds Rd.), Boonville, NY
- Fulton Chain of Lakes (Arrowhead Park), Inlet, NY

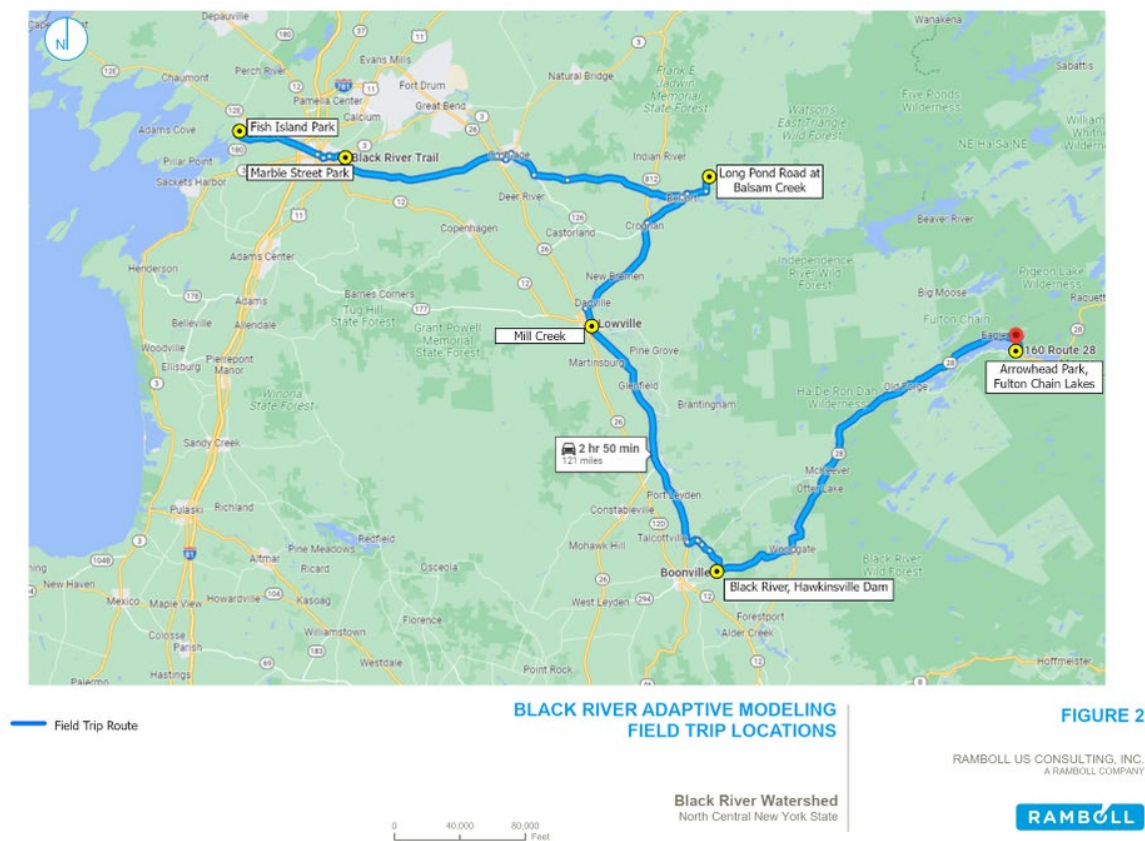


Figure 2. Map of the Locations Visited During the Black River Watershed Field Trip

3. Data Sources

NYSDEC, New York State Office of General Services (NYSOGS), Ramboll, Upstate Freshwater Institute (UFI) and CC Environment & Planning (CCE) worked with the Tug Hill Commission, County SWCDs, and other local groups to identify new water quality concerns, available datasets, and gauge local interest in best management practices and implementation strategies to include in the anticipated future plan (e.g., expanded water quality monitoring). Datasets were collected from public resources, stakeholders, and municipalities. The data directory of all datasets collected for Phase I of the BRAM project can be found in Appendix A. A brief description of each dataset is provided below.

1. **Geographical Information Systems (GIS) data** were collected within a wide range of categories to map boundaries within the watershed, evaluate land use/land cover, geology, and topography, and document water quality monitoring locations and possible areas that may need additional best management practices. Data included:
 - a. Black River watershed and HUC-12 subwatershed boundaries from the New York State GIS Clearinghouse.
 - b. DEM from United States Geological Survey (USGS) at the 1 (~30 meter) and 1/3 arc (~10 meter) second scale. NYS 1- and 2-meter DEM data are not available in the Black River watershed, but are not required to complete a SWAT model.
 - c. Soil Survey data from the United States Department of Agriculture (USDA) Natural Resource Conservation Service's Soil Survey Geographic Database (SSURGO).
 - d. USGS's 2019 National Land Cover Database.
 - e. USDA National Agricultural Statistics Service's (NASS) Cropland Data Layer (CDL) for 2008 – 2022.
 - f. CAFO locations from NYSDEC.
 - g. Potential sources of contamination from NYSDEC, including:
 - i. Brownfields
 - ii. Permitted locations under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Toxic Substance Control Act (TSCA)
 - iii. Integrated Compliance Information System (ICIS) locations for permitted discharge of wastewater into a river
 - iv. National Pollutant Discharge Elimination System (NPDES) facilities
 - v. Resource Conservation and Recovery Act (RCRA) Hazardous Waste Treatment Storage and Disposal Facilities (TSDF)
 - vi. Superfund Sites
 - vii. Toxic Release Inventory (TRI) locations
 - viii. SPDES wastewater treatment facilities
 - ix. Locations issued a SPDES General Permit for Phase II Stormwater Regulations
 - h. Locations of water wells as reported to NYSDEC since 2000.
 - i. Culvert assessments from the North Atlantic Aquatic Connectivity Collaborative
2. **Hydrologic data from the United States Geological Survey (USGS)** through lake and stream stations. USGS has 27 active stream gages and 7 active lake gages within the Black River watershed (Table 1, Table 2, Table 3, and Table 4).
3. All available parameters and data from each station were pulled. Desired parameters for use in a SWAT model include phosphorus, nitrogen, total suspended solids, and flow.

Table 1. USGS Gage Station Discharge Data

Location Name	Site Number	Site Type	Start	End	Discharge (cubic feet per second, cfs)				
					Number of Samples	Minimum	Mean	Median	Maximum
Beaver R BLW Stillwater Dam NR Beaver River NY	4257000	Stream	9/30/1924	9/29/1987	23,010	0	393.3	397	3,590
Beaver River at Croghan NY	4258000	Stream	9/19/1930	Current	33,963	22	633	588	4,700
Big Moose Lake Outlet Near Big Moose NY	4253650	Stream							
Black River at Dadville NY	4256059	Stream							
Black River at North Lake Dam at Atwell NY	425080000	Stream							
Black River at Watertown NY	4260500	Stream	7/18/1920	Current	37,678	137	4,278.9	2,990	5,200
Black River Near Boonville NY	4252500	Stream	3/27/1911	Current	41,079	7	746.2	490	1,110
Brooktrout Lake Outlet Near Old Forge NY	4253073	Stream							
Bubb Lake Outlet Near Eagle Bay NY	4253735	Stream							
Buck Creek Near Inlet NY	4253296	Stream	11/9/1988	Current	8,768	0.01	2.6	1.3	53.9
Buck Creek, North Tributary, Near Inlet NY	4253295	Stream	6/17/1998	8/28/2023	9,142	0	0.2	0.06	5.7
Buck Creek, South Tributary, Near Inlet NY	4253294	Stream	9/30/1998	8/28/2023	9,098	0	0.5	0.27	12
Cascade Lake Outlet Near Eagle Bay NY	4253710	Stream							
Constable Pond Outlet Near Big Moose NY	4253626	Stream							
Dart Lake Outlet Near Big Moose NY	4253679	Stream							
First Lake at Old Forge NY	4253400	Lake							
Grass Pond Outlet Near Old Forge NY	4254605	Stream							
Independence River at Donnattsburg NY	4256000	Stream	7/1/1942	Current	29,660	15.6	203.1	125	5,410
Indian Lake Outlet Near Old Forge NY	4253094	Stream							
Limekiln Lake Outlet Near Old Forge NY	4253160	Stream							
Lost Pond Outlet Near Old Forge NY	4253047	Stream							
Middle Branch Lake Outlet Near Old Forge NY	4254600	Stream							
Middle Settlement Lake Outlet Near Old Forge NY	4254610	Stream							
Moose River at McKeever NY	4254500	Stream	10/1/1905	9/29/1970	22,643	42	805.9	510	12,900
Moss Lake Outlet Near Eagle Bay NY	4253720	Stream							
Muskrat Lake Outlet Near Old Forge NY	4253097	Stream							
N BR Moose R at Lake Rondaxe Dam NR Eagle Bay NY	4253780	Stream							
Queer Lake Outlet Near Eagle Bay NY	426545570	Stream							
Sixth Lake Near Old Forge NY	4253300	Lake							
South Lake Near Dam Near Atwell NY	4250804	Lake							
Squash Pond at Outlet Near Big Moose NY	4253634	Lake							
Stillwater Reservoir Near Beaver River NY	4256500	Lake							
West Pond at Outlet Near Big Moose NY	4253637	Lake							
Windfall Pond at Outlet Near Big Moose NY	4253657	Lake							

Table 2. USGS Gage Station Total Phosphorus Data

Location Name	Site Number	Site Type	Start	End	Total Phosphorus (mg/L)					
					Samples	Detects	Minimum	Mean	Median	Maximum
Beaver R BLW Stillwater Dam NR Beaver River NY	4257000	Stream								
Beaver River at Croghan NY	4258000	Stream								
Big Moose Lake Outlet Near Big Moose NY	4253650	Stream	12/4/2017	7/5/2023	42	34	0.004	0.005	0.005	0.01
Black River at Dadville NY	4256059	Stream								
Black River at North Lake Dam at Atwell NY	425080000	Stream	12/6/2017	7/6/2023	42	33	0.003	0.007	0.007	0.013
Black River at Watertown NY	4260500	Stream	11/19/1974	4/10/2019	282	275	0.009	0.030	0.030	0.73
Black River Near Boonville NY	4252500	Stream	3/27/1991	5/7/1991	7	2	0.000	0.003	0.000	0.01
Brooktrout Lake Outlet Near Old Forge NY	4253073	Stream	11/12/2018	7/24/2023	22	8	0.004	0.006	0.006	0.009
Bubb Lake Outlet Near Eagle Bay NY	4253735	Stream	11/2/2017	7/5/2023	34	26	0.003	0.007	0.006	0.02
Buck Creek Near Inlet NY	4253296	Stream								
Buck Creek, North Tributary, Near Inlet NY	4253295	Stream								
Buck Creek, South Tributary, Near Inlet NY	4253294	Stream								
Cascade Lake Outlet Near Eagle Bay NY	4253710	Stream	11/2/2017	7/5/2023	35	25	0.003	0.006	0.005	0.015
Constable Pond Outlet Near Big Moose NY	4253626	Stream	12/4/2017	7/6/2023	36	32	0.003	0.006	0.005	0.013
Dart Lake Outlet Near Big Moose NY	4253679	Stream	11/28/2018	7/5/2023	42	23	0.003	0.005	0.005	0.009
First Lake at Old Forge NY	4253400	Lake								
Grass Pond Outlet Near Old Forge NY	4254605	Stream	10/11/2017	7/10/2023	37	26	0.003	0.007	0.006	0.021
Independence River at Donnattsburg NY	4256000	Stream	4/21/1972	4/21/1972	1	0	-	-	-	-
Indian Lake Outlet Near Old Forge NY	4253094	Stream	12/6/2017	7/18/2023	26	25	0.004	0.009	0.007	0.029
Limekiln Lake Outlet Near Old Forge NY	4253160	Stream	11/1/2017	7/6/2023	42	20	0.003	0.006	0.006	0.013
Lost Pond Outlet Near Old Forge NY	4253047	Stream	7/11/2018	7/24/2023	6	6	0.009	0.026	0.026	0.051
Middle Branch Lake Outlet Near Old Forge NY	4254600	Stream	11/1/2017	7/10/2023	28	27	0.004	0.007	0.007	0.013
Middle Settlement Lake Outlet Near Old Forge NY	4254610	Stream	11/1/2017	7/10/2023	32	29	0.004	0.007	0.007	0.017
Moose River at McKeever NY	4254500	Stream								
Moss Lake Outlet Near Eagle Bay NY	4253720	Stream	10/4/2017	7/5/2023	45	29	0.004	0.005	0.005	0.009
Muskrat Lake Outlet Near Old Forge NY	4253097	Stream	10/18/2017	7/18/2023	26	21	0.003	0.007	0.006	0.013
N BR Moose R at Lake Rondaxe Dam NR Eagle Bay NY	4253780	Stream	12/4/2017	7/6/2023	48	33	0.003	0.005	0.005	0.007
Queer Lake Outlet Near Eagle Bay NY	426545570	Stream	11/1/2017	7/5/2023	33	15	0.003	0.004	0.004	0.009
Sixth Lake Near Old Forge NY	4253300	Lake								
South Lake Near Dam Near Atwell NY	4250804	Lake	11/13/2017	7/6/2023	39	23	0.003	0.008	0.004	0.081
Squash Pond at Outlet Near Big Moose NY	4253634	Lake	11/2/2017	7/6/2023	36	34	0.004	0.012	0.0095	0.036
Stillwater Reservoir Near Beaver River NY	4256500	Lake								
West Pond at Outlet Near Big Moose NY	4253637	Lake	11/2/2017	7/5/2023	39	36	0.003	0.008	0.007	0.038
Windfall Pond at Outlet Near Big Moose NY	4253657	Lake	7/10/2018	7/5/2023	6	6	0.006	0.008	0.009	0.01

Table 3. USGS Gage Station Total Nitrogen Data

Location Name	Site Number	Site Type	Start	End	Total Nitrogen (mg/L)					
					Samples	Detects	Minimum	Mean	Median	Maximum
Beaver R BLW Stillwater Dam NR Beaver River NY	4257000	Stream								
Beaver River at Croghan NY	4258000	Stream								
Big Moose Lake Outlet Near Big Moose NY	4253650	Stream								
Black River at Dadville NY	4256059	Stream								
Black River at North Lake Dam at Atwell NY	425080000	Stream								
Black River at Watertown NY	4260500	Stream	11/19/1974	6/23/1994	200	196	0.21	0.81	0.74	2.8
Black River Near Boonville NY	4252500	Stream	3/27/1991	5/7/1991	7	7	0.29	0.56	0.44	1.1
Brooktrout Lake Outlet Near Old Forge NY	4253073	Stream								
Bubb Lake Outlet Near Eagle Bay NY	4253735	Stream								
Buck Creek Near Inlet NY	4253296	Stream								
Buck Creek, North Tributary, Near Inlet NY	4253295	Stream								
Buck Creek, South Tributary, Near Inlet NY	4253294	Stream								
Cascade Lake Outlet Near Eagle Bay NY	4253710	Stream								
Constable Pond Outlet Near Big Moose NY	4253626	Stream								
Dart Lake Outlet Near Big Moose NY	4253679	Stream								
First Lake at Old Forge NY	4253400	Lake								
Grass Pond Outlet Near Old Forge NY	4254605	Stream								
Independence River at Donnattsburg NY	4256000	Stream								
Indian Lake Outlet Near Old Forge NY	4253094	Stream								
Limekiln Lake Outlet Near Old Forge NY	4253160	Stream								
Lost Pond Outlet Near Old Forge NY	4253047	Stream								
Middle Branch Lake Outlet Near Old Forge NY	4254600	Stream								
Middle Settlement Lake Outlet Near Old Forge NY	4254610	Stream								
Moose River at McKeever NY	4254500	Stream								
Moss Lake Outlet Near Eagle Bay NY	4253720	Stream								
Muskrat Lake Outlet Near Old Forge NY	4253097	Stream								
N BR Moose R at Lake Rondaxe Dam NR Eagle Bay NY	4253780	Stream								
Queer Lake Outlet Near Eagle Bay NY	426545570	Stream								
Sixth Lake Near Old Forge NY	4253300	Lake								
South Lake Near Dam Near Atwell NY	4250804	Lake								
Squash Pond at Outlet Near Big Moose NY	4253634	Lake								
Stillwater Reservoir Near Beaver River NY	4256500	Lake								
West Pond at Outlet Near Big Moose NY	4253637	Lake								
Windfall Pond at Outlet Near Big Moose NY	4253657	Lake								

Table 4. USGS Gage Station Total Suspended Solids Data

Location Name	Site Number	Site Type	Start	End	Total Suspended Solids (mg/L)					
					Samples	Detects	Minimum	Mean	Median	Maximum
Beaver R BLW Stillwater Dam NR Beaver River NY	4257000	Stream								
Beaver River at Croghan NY	4258000	Stream								
Big Moose Lake Outlet Near Big Moose NY	4253650	Stream								
Black River at Dadville NY	4256059	Stream								
Black River at North Lake Dam at Atwell NY	425080000	Stream								
Black River at Watertown NY	4260500	Stream	11/19/1974	7/11/2019	117	52	0	11.6	8.0	59
Black River Near Boonville NY	4252500	Stream	3/27/1991	8/7/1991	5	5	1.0	4.4	2.0	14
Brooktrout Lake Outlet Near Old Forge NY	4253073	Stream								
Bubb Lake Outlet Near Eagle Bay NY	4253735	Stream								
Buck Creek Near Inlet NY	4253296	Stream								
Buck Creek, North Tributary, Near Inlet NY	4253295	Stream								
Buck Creek, South Tributary, Near Inlet NY	4253294	Stream								
Cascade Lake Outlet Near Eagle Bay NY	4253710	Stream								
Constable Pond Outlet Near Big Moose NY	4253626	Stream								
Dart Lake Outlet Near Big Moose NY	4253679	Stream								
First Lake at Old Forge NY	4253400	Lake								
Grass Pond Outlet Near Old Forge NY	4254605	Stream								
Independence River at Donnattsburg NY	4256000	Stream								
Indian Lake Outlet Near Old Forge NY	4253094	Stream								
Limekiln Lake Outlet Near Old Forge NY	4253160	Stream								
Lost Pond Outlet Near Old Forge NY	4253047	Stream								
Middle Branch Lake Outlet Near Old Forge NY	4254600	Stream								
Middle Settlement Lake Outlet Near Old Forge NY	4254610	Stream								
Moose River at McKeever NY	4254500	Stream								
Moss Lake Outlet Near Eagle Bay NY	4253720	Stream								
Muskrat Lake Outlet Near Old Forge NY	4253097	Stream								
N BR Moose R at Lake Rondaxe Dam NR Eagle Bay NY	4253780	Stream								
Queer Lake Outlet Near Eagle Bay NY	426545570	Stream								
Sixth Lake Near Old Forge NY	4253300	Lake								
South Lake Near Dam Near Atwell NY	4250804	Lake								
Squash Pond at Outlet Near Big Moose NY	4253634	Lake								
Stillwater Reservoir Near Beaver River NY	4256500	Lake								
West Pond at Outlet Near Big Moose NY	4253637	Lake								
Windfall Pond at Outlet Near Big Moose NY	4253657	Lake								

4. **National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) daily climate summary data.** The parameters that NOAA stations have the ability to record are precipitation, snowfall, snow depth, maximum temperature, minimum temperature, and temperature at time of observation. 34 NOAA climate stations were identified within the watershed, with 20 only having historical data from the 19th and 20th centuries. 12 recent stations (2018 or current) are listed below (Table 5). Data were compiled from 1970 through 2022 depending on how long each station has been active.

Table 5. NOAA Climate Stations

Station	Town	Elevation (m)	Parameters*	Years Active	Comments
Beaver Falls USC00300500	Croghan	225.6	PRCP, SNOW, SNWD	1934 - Current	Lacking temperature data.
Big Moose 3 SE USC00300668	Webb	591.3	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1931 - Current	
Black River USC00300707	Watertown	158.5	PRCP, SNOW, SNWD, TOBS	2011 - Current	Lacking maximum and minimum temperature data.
Boonville 4 SSW USC00300785	Boonville	472.4	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1949 - Current	
Chases Lake USC00301388	Glenfield	390.4	PRCP, SNOW, SNWD, TOBS	2018 - Current	Lacking maximum and minimum temperature data.
Fort Drum USC00302934	Fort Drum	213.4	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1975 - Current	Temperatures started in 2012.
Glenfield 1 W USC00303250	Martinsburg	329.2	PRCP, SNOW, SNWD, TOBS	2015 - 2018	Lacking maximum and minimum temperature data.
Hooker 12 NNW USC00303961	Copenhagen	450.5	PRCP, SNOW, SNWD	1911 - Current	Lacking temperature data.
Lowville USC00304912	Lowville	263.0	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1891 - Current	
Old Forge USC00306184	Old Forge	532.8	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1907 - Current	
Stillwater Reservoir USC00306184	Woods Lake	515.1	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1925 - Current	
Taylorville USC00308412	Croghan	303.3	PRCP, SNOW, SNWD, TOBS	2011 - Current	TOBS started in 2020. Lacking maximum and minimum temperature data.
Watertown USC00309000	Watertown	151.5	PRCP, SNOW, SNWD, TMAX, TMIN, TOBS	1893 - Current	

*PRCP = Precipitation, SNOW = snowfall, SNWD = snow depth, TMAX = maximum temperature, TMIN = minimum temperature, TOBS = temperature at the time of observation

5. **Hamilton County SWCD lake monitoring.** Hamilton County SWCD has been conducting water quality monitoring since 1993, including at six lakes within the Black River Watershed (Fourth, Fifth, Sixth, Seventh, Eighth, and Limekiln Lake). They sample a wide range of parameters, with total phosphorus, total nitrogen, and total suspended solids being useful in a SWAT model.
6. **City of Watertown Raw Black River measurements, 2020 – 2022.** The City of Watertown collects daily water quality measurements within the Black River at their wastewater treatment

plant. This includes measurements for turbidity, pH, alkalinity, color, temperature, and UV-254.

7. **SUNY Jefferson SCI 199 macroinvertebrate data.** A SUNY Jefferson class led by Mr. Larry Danforth conducts stream monitoring for macroinvertebrate and nutrient data during the spring. Macroinvertebrate data from 2019 was shared with the project team.
8. **SUNY Jefferson SCI 199 nutrient data.** A SUNY Jefferson class led by Mr. Larry Danforth conducts stream monitoring for macroinvertebrate and nutrient data during the spring. Nutrient data from 2022 was shared with the project team.
9. **NYSDEC discharge monitoring report (DMR) data, January 2012 – January 2023.** Facilities with a SPDES permit are required to submit monthly discharge data to NYSDEC as part of their permit conditions. This data includes flow and total suspended solids measurements with some facilities also required to report phosphorus and nitrogen as well. Data was compiled from 27 facilities, including 19 municipal wastewater treatment facilities, 1 closed landfill, 1 energy production facility, and 6 industrial facilities.
10. **Black River sewer discharge data, December 2020 – March 2023.** Untreated and partially treated sewage discharges must be reported to NYSDEC by publicly owned treatment works (POTWs) and publicly owned sewer systems (POSSs). Historical sewage discharge data is retrieved from NY-Alert in batches. Data is estimated based on the existing systems, models, and personal knowledge of the sewer systems. Data quality is not checked by NYSDEC. Data includes location, duration of discharge event, and estimated number of gallons of sewage discharged, and reason for discharge.
11. **NYSDEC annual water withdrawal reports, 2009 – 2022.** Facilities that withdrawal 100,000 gallons per day or more are required to acquire a permit from NYSDEC, which then requires regular reporting. This includes averages, maximums, and permitted limits.
12. **NYSDEC Rotating Intensive Basin Surveys (RIBS) program, 2019 – 2020.** The NYSDEC RIBS program assesses water quality throughout N.Y., with monitoring occurring within various lakes and streams. There are 84 monitoring sites within the Black River watershed. A wide range of chemical parameters are measured, with the most important for a SWAT model being total nitrogen, total phosphorus, and the various sediment measurements.
13. **City of Watertown Wastewater Treatment Plant (WWTP) Black River water measurements.** Interns have collected data at upstream, midstream, and downstream locations relative to the WWTP during the summers of 2018 – 2022. Parameters measured include total suspended solids, total solids, total dissolved solids, biochemical oxygen demand, total phosphorus, ammonia, total kjeldahl nitrogen, potassium, low level mercury, and total organic carbon.

4. Usability Assessment: Criteria

Sources of data and information that may be used in a SWAT model were evaluated for usability. Data sources that may be used in SWAT model calibration and testing were evaluated based on a matrix similar to the Army Corps of Engineers (USACE)'s Housatonic River data usability matrix.¹ Analyses that were not conducted in a laboratory were not included in this data usability assessment. Historical data and datasets that were analyzed in a laboratory were considered in this assessment. Table 6 lists the six criteria and levels used to grade each of the datasets.

Table 6. BRAM Phase I Data Usability Assessment Matrix

Criteria	Level A - Acceptable, Unrestricted Use in SWAT Model	Level B - Acceptable, Use with Caution, Some Use Restrictions May Apply	Level C - Conditionally Acceptable for Limited Uses	Level D - Not Acceptable for SWAT Model
Criterion 1: Overall Quality of and Level of Detail in Report(s)	Accompanying report provides complete description of study design with justification and rationale.	Report is generally complete and well-written but lacks sufficient detail in a few areas.	Accompanying report is incomplete but does provide sufficient information for one or more parameters of interest.	No information available on background and conduct of study.
Criterion 2: Formal Documentation of Procedures	Work Plan, Quality Assurance Project Plan (QAPP), chain-of-custody records, SOPs, and similar field and laboratory documentation exist and are available for review.	Documentation exists for most areas but is insufficient or lacking in a few areas considered non-critical.	Documentation generally not available but sufficient information is known or available via other sources to establish validity of field and analytical procedures.	Documentation non-existent, not available for review, or status unknown.
Criterion 3: Analytical Methods Used and Detection Limits Achieved	Analytical procedures follow documented standard methods such as EPA or ASTM.	Analytical procedures non-standard but sufficiently documented to establish validity of and ensure confidence in data.	Analytical procedures non-standard and not well-documented, but data are believed to be valid due to other information provided.	Insufficient information provided or available via other sources to establish validity of data.
Criterion 4: Data Review, Validation, and Quality Assurance	Study incorporated all or most of the full range of QA/QC procedures, e.g., blanks, spikes, dups, data review, and data validation.	Study generally employed and documented established QA/QC procedures but did not conduct data validation.	Non-standard or incomplete QA/QC procedures were followed.	No QA/QC procedures employed or documented.
Criterion 5: Assessment of Data Quality Indicators (DQIs)	Study had established DQIs and data substantially meet all acceptability criteria for completeness, comparability, representativeness, precision, and accuracy.	DQIs not established, but data appear to meet minimum standards for DQIs.	DQIs not established, data appear to not satisfy minimum standards for one or more non-critical DQIs.	Data fail to meet minimum standards for one or more critical DQIs, or not possible to evaluate DQIs.
Criterion 6: Data History and Overall Apparent Data Quality	Data are recent (i.e., within the past 10 years), reported in standard units, and are reasonable and internally consistent. Methods followed meet current standards for scientific investigation and were followed consistently.	Data appear to be of acceptable quality but derive from a study conducted more than 10 years ago. Methods may not meet current standards but are judged to have produced data equivalent to current methodologies.	Portions of the data appear to be of questionable quality due to age, changes in methods, and/or failure to follow current standards for scientific investigation.	The overall data quality is questionable due to outmoded methodologies, poor performance, and/or apparent lack of consistency with current standards.

¹ Quality Assurance Project Plan. Volume IV. Appendix F. Protocol for Evaluating Data Usability for Historical Data Sets. Contract No. DACW33-00-D-0006. Environmental Remediation Contract General Electric (GE)/Housatonic River Project, Pittsfield, Massachusetts.

8 January 1999 (DCN: GEP2-123098-AAET)

Revised May 2003 (DCN: GE-022803-ABLZ)

5. Usability Assessment: Results

Datasets were scored either Level A, Level B, Level C, or Level D based on a simple calculation. For each criterion, Level A equated to 4 points, Level B to 3 points, Level C to 2 points, and Level D to 1 point. The total points for each dataset were summed, and a final score was given based on the following information below. If any criterion received a Level D, the entire dataset received a score of Level D.

- Level A = 18-24 points
- Level B = 11-17 points
- Level C = 5-10 points
- Level D = 1-4 points

Level A indicated that based on the six criteria, the dataset was acceptable for use in a SWAT model. Level D, the lowest score, indicated that the dataset cannot be used in a SWAT model, but may be used for reference or education (Table 7). The full data usability matrix and screening can be found in Appendix B.

Table 7. Grading Results from the Data Usability Assessment

Dataset Name	Criteria						Score
	1. Overall Quality and Details	2. Formal Documentation	3. Analytical Methods	4. Data Review, Validation, and Quality Assurance	5. Assessment of DQIs	6. Data History	
Hamilton County SWCD Lake Monitoring	A	A	A	A	A	A	Level A
City of Watertown Raw Black River Measurements	C	C	A	B	B	A	Level A
SUNY Jefferson (SCI 199) Macroinvertebrate	C	D	C	D	C	C	Level D
SUNY Jefferson (SCI 199) Nutrient Data	C	D	C	D	C	C	Level D
NYSDEC Discharge Monitoring Report (DMR)	A	A	A	A	B	A	Level A
Black River 2021 Sewer Discharge Data (NY-Alert)	D	D	D	D	D	A	Level D
NYSDEC Water Withdrawals	D	D	D	D	D	A	Level D
NPDES Facilities	A	A	A	A	A	A	Level A
NYSDEC RIBS Program	A	A	A	A	A	A	Level A
City of Watertown WWTP Black River Water Measurements	B	B	A	A	A	B	Level A

6. Findings and Data Gap Identification

During the data collection and data usability assessment phase, findings and data gaps for the future potential modeling were compiled. These four major points were noted and pertain to tracking outcomes of implementing watershed improvements:

1. The Black River watershed contains multiple unique areas that will need to be carefully monitored to accurately capture nutrient loading and water quality.

- The majority of anthropogenic (developed or agricultural) land of the Black River watershed is located in the western portion of the watershed (Figure 3).
- The Tug Hill Plateau, Adirondack Mountains, and separating valley have very different slopes, temperatures, and other characteristics.
 - Due to these characteristics, a model would require several points of calibration and testing to accurately capture each of these unique areas.

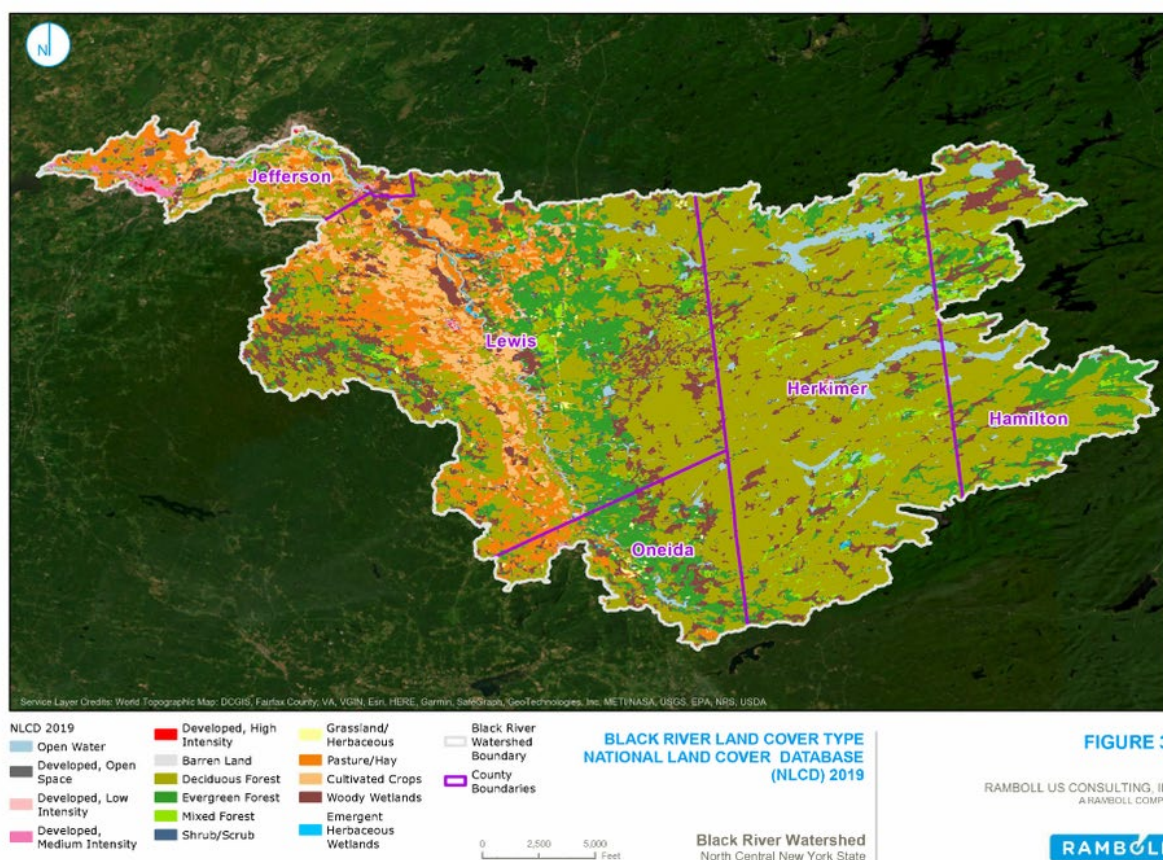


Figure 3. Land Cover Types within the Black River Watershed

2. Available flow data are sufficient for modeling the Black River Watershed, however parameters such as TSS and TN have limited data.

- There are only a few current USGS and RIBS monitoring locations that track all of the required modeling parameters for tracking water quality (flow, total nitrogen, total phosphorus, and total suspended solids) (Figure 4). Having combined flow and nutrient data is crucial to understand the dynamics of storm events and when the highest nutrient loading to the Black River and other waterbodies is occurring.
- 5 USGS gages regularly track flow, which are sufficient for flow model calibration. TN and TSS data are very limited within the watershed. Additional monitoring efforts would help fill these data gaps and aid best management practice decisions (Table 3 and Table 4).

- Of the 34 USGS stream and lake monitoring sites, only 2 have TSS data that could be used towards a modeling effort. Although TSS data are not required to create a basic model, data are required in order for sediment to be considered as a pollutant of focus in a Nine Element Plan. Additional TSS monitoring will be helpful for any potential future modeling to accurately capture sediment loading and movement throughout the watershed, and FLUX32 (another estimating program) requires monitoring data to estimate sediment loads for a model calibration. TSS monitoring can also help identify sediment impairments and erosion risks, and determine additional streambank stabilization opportunities.

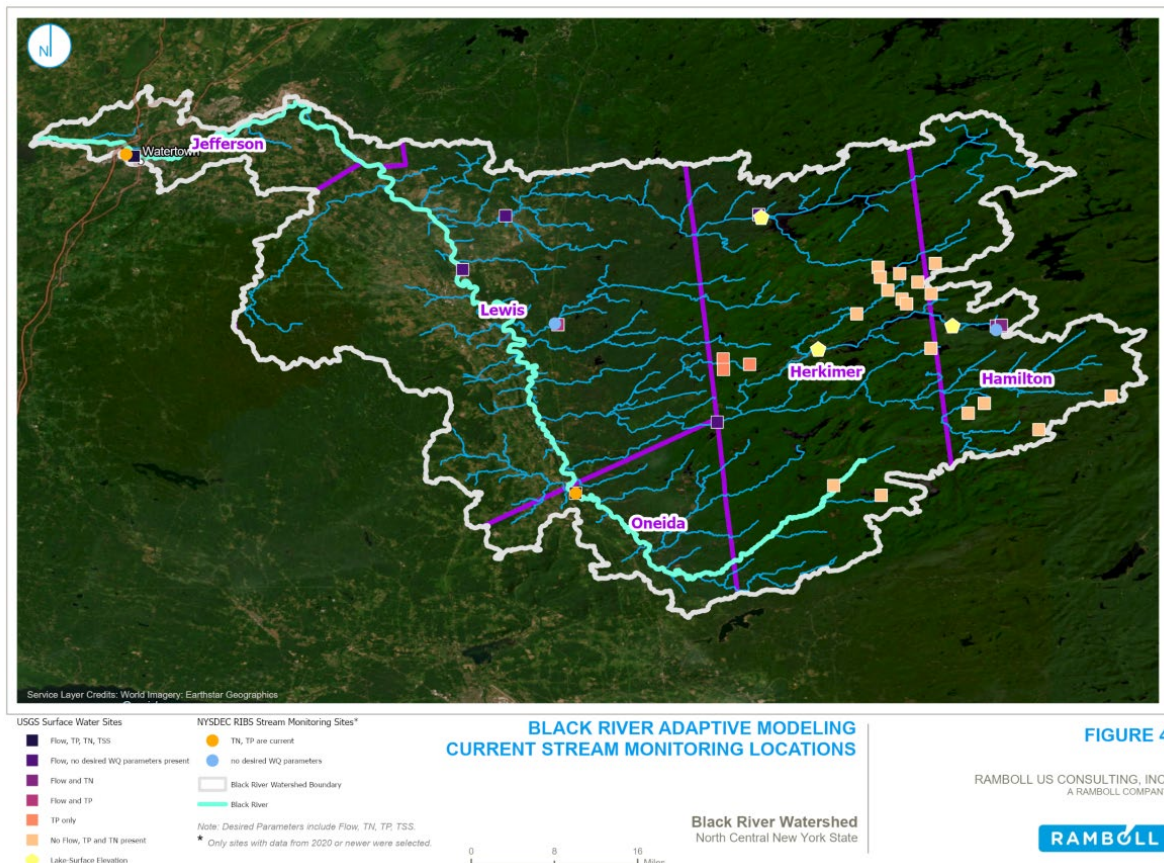


Figure 4. Current Water Quality Monitoring in the Black River Watershed

3. Additional stream monitoring locations in Jefferson and Lewis Counties are needed to reduce data gaps and would improve a model's calibration and testing, as well as help track outcomes of implementing management actions.

- As mentioned previously, the majority of anthropogenic (developed or agricultural) lands of the Black River watershed are within Jefferson and Lewis Counties. In order to identify sources of nutrients and help prioritize projects, additional monitoring of flow and concentrations of total phosphorus, total dissolved phosphorus, total nitrogen, and total suspended solids are recommended in these areas. Additionally, it is important to periodically collect samples during storm or high flow events to understand how rapid flow change impacts nutrient loading.
- Ideally, these stations should track flow, total phosphorus, total dissolved phosphorus, total nitrogen, total suspended solids, and standard in situ parameters (temperature, specific conductance, pH, dissolved oxygen, and turbidity).
- Suggested stream monitoring locations include (Figure 5):

- **FJEFF_BlacD-WS (Black River, Fish Island State Park, Dexter, NY):** Track water quality upstream of the dam, which is the first barrier from Lake Ontario.
- **FJEFF_BlacM-WS (Black River, Watertown, NY):** Track water quality upstream and downstream of the dam, as well as identifying any water quality issues that may be stemming from the city.
- **FJEFF_BlacU-WS (Black River, Felts Mills, NY):** Capture any unique water quality findings due to Black Rivers meandering patterns in the northern part of the watershed, while identifying any potential nearby point source concerns.
- **FLEWI_DeerR-WS (Deer River, Denmark, NY):** Location is near a stream gage that already exists (USGS 04258700 Deer River at Deer River). Would like to resume recording daily statistics and have regular grab sampling because Deer River is a major tributary in the Black River watershed.
- **FLEWI_BeavR-WS (Beaver River, Castorland, NY):** Beaver River is a major tributary that will capture nutrients traveling to the Black River from more forested areas. The monitoring location was selected to capture nutrient loading occurring in the tributary before it reaches the Black River. Monitoring could be used to evaluate the septic replacement program effectiveness at reducing nutrient loading, and justify additional funding.
- **FLEWI_Millic-WS (Mill Creek, Lowville, NY):** Track water quality in a priority subwatershed identified in the 2010 Black River Watershed Management Plan and 2016 Nine Element Plan.
- **FLEWI_RoarB-WS (Roaring Brook, Lowville, NY):** Track water quality in a subwatershed that has a high percentage of agriculture.
- **FLEWI_IndeR-WS (Independence River, Glenfield, NY):** the Independence River subwatershed is a major wetland area in the watershed and would help modeling efforts accurately capture nutrient loading from more heavily forested areas.
- **FONEI_Black-WS (Black River, Boonville, NY):** Track water quality downstream of the Hawkinsville Dam given the Black River's high variability in flow at this location.

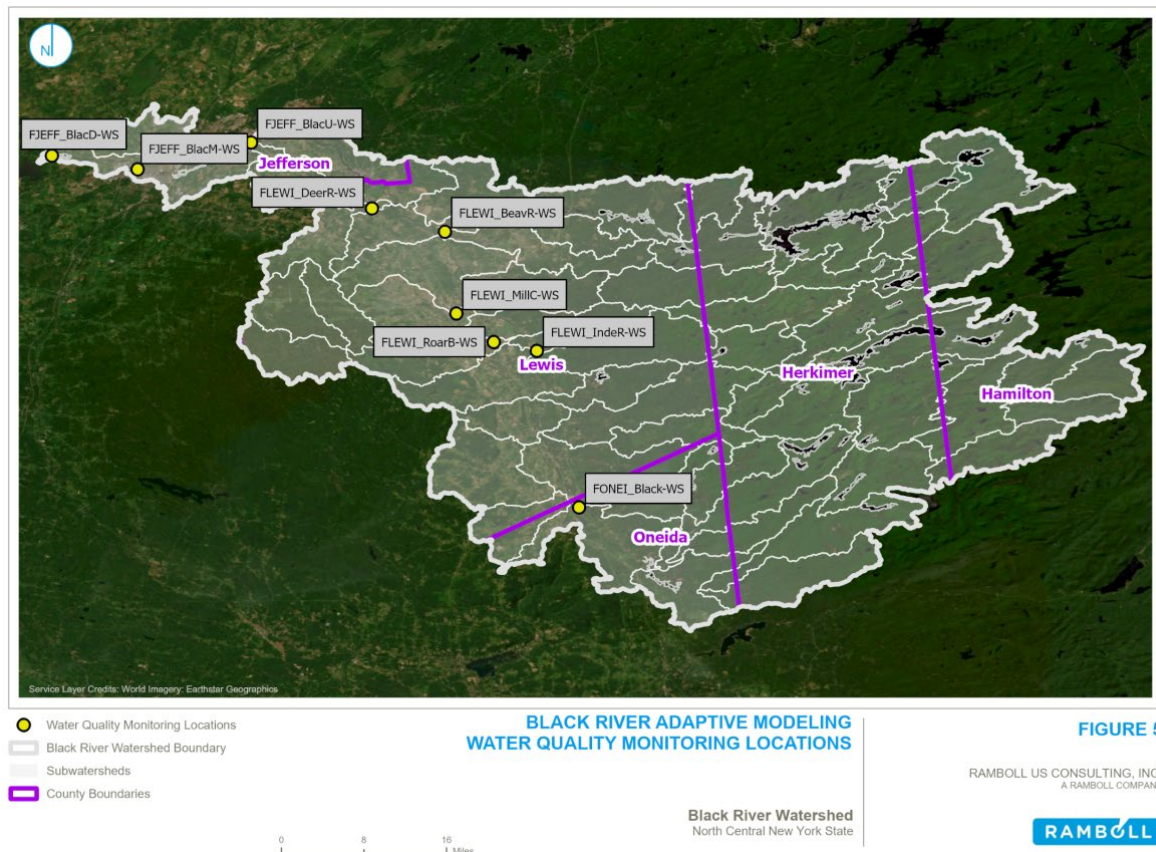


Figure 5. Potential Stream Monitoring Locations

4. Daily climate data from NOAA are sufficient for monitoring weather patterns and potential modeling.

The required climate parameters for SWAT are available from nine stations, with seven of those nine stations being active (Figure 6). The following climate stations have or currently track maximum temperature, minimum temperature, and precipitation:

- Big Moose 3 SE, Webb, NY (1931 – present)
- Boonville 4 SSW, Boonville, NY (1949 – present)
- Fort Drum, Fort Drum, NY (1975 – present)
- Lowville, Lowville, NY (1891 – present)
- Old Forge, Old Forge, NY (1907 – present)
- Stillwater Reservoir, Woods Lake, NY (1925 – present)
- Watertown, Watertown, NY (1893 – present)
- Rectors Corners, Montague, NY (1986 – 1990)
- Forestport, Forestport, NY (1942 – 1978)

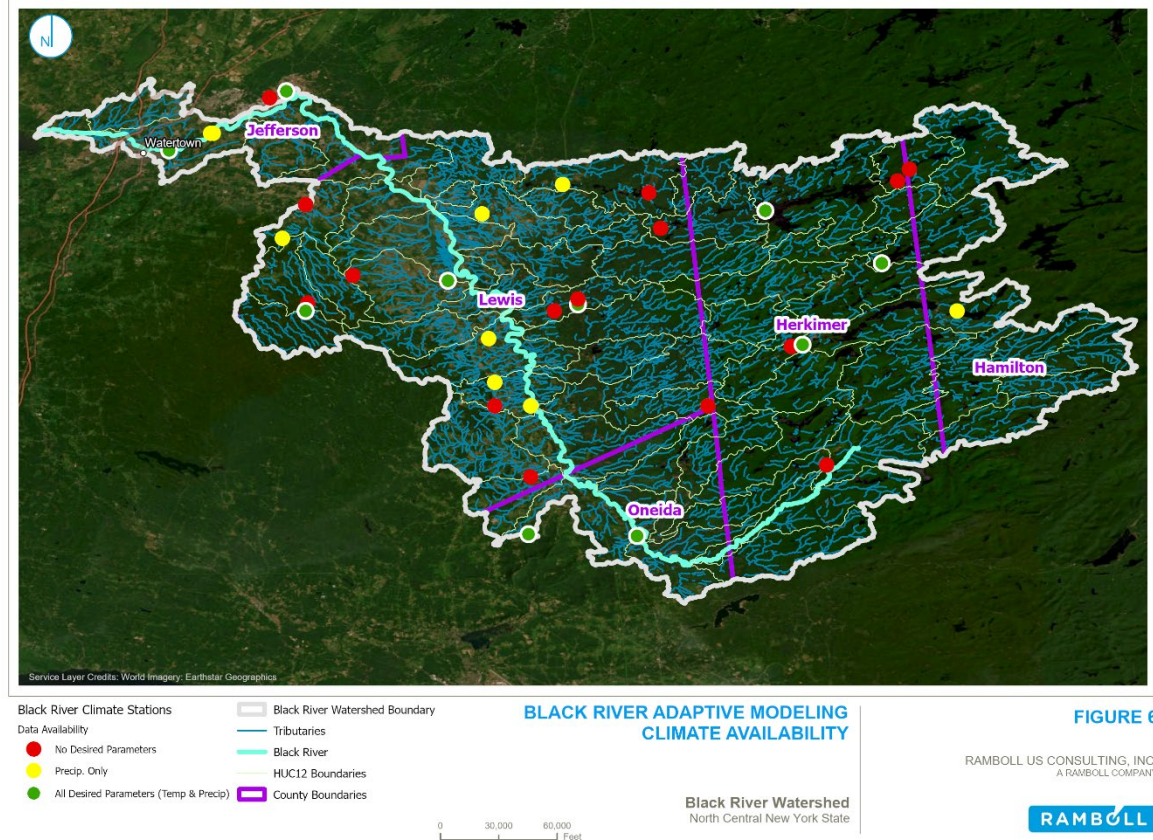


Figure 6. NOAA NCEI Climate Stations

7. Conclusion

This data summary and gap identification report helps build a foundation of current conditions and available data since the 2016 Nine Element Plan, while also giving Black River Watershed stakeholders a sense of data needed to consider additional modeling efforts, management plan updates, additional best management practices, and tracking the outcomes of watershed plan implementation.

Based on the findings described in Section 6, Upstate Freshwater Institute (UFI) is coordinating with Hamilton, Herkimer, Jefferson, Lewis, and Oneida County Soil and Water Conservation Districts (SWCDs) to gather additional water quality data in 2024 and 2025 in accordance with a state-approved monitoring quality assurance project plan (QAPP). This additional nutrient data has multiple benefits, including a better understanding of where nutrient loading is occurring in the watershed, and considering whether an updated management plan, modeling effort, or actions are necessary. UFI held two in-person water quality monitoring trainings on November 3 and November 21, 2023, to share methods used to collect water samples and the equipment used. A summary of the trainings and laboratory results from the eight sites sampled can be found in Appendix C.

NYSDEC, Tug Hill Commission, Hamilton, Herkimer, Jefferson, Lewis, and Oneida County SWCDs, and other interested stakeholders should continue to collaborate on Black River Watershed programs, projects, water quality monitoring, and other efforts to protect the watershed. As results from the water quality monitoring effort are shared, the Black River Watershed community may consider new or additional best management practices in areas that appear to have high nutrient loading. The Black River Watershed is a unique watershed with crucial agricultural areas and section of the Adirondacks, both of which should continue to implement adaptive management and be protected for generations to come.

Appendix A

Data Directory

GIS Sources

Type	Folder	Title	Description	Source	Years (or last updated)	Location	SWAT Useability
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	City/town boundaries for New York	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	County boundaries for New York	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	County boundaries for New York clipped to shoreline	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	Native American territory boundaries for New York	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	State boundary for New York	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	State boundary for New York clipped to shoreline	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	NYS_Civil_Boundaries.shp.zip	Village boundaries for New York	NY GIS Clearinghouse http://gis.ny.gov/civil-boundaries/	2022	NYS_Civil_Boundaries.shp.zip	No
Administrative	Admin	Black, HUC-8 Subbasin (ID 04150101)	Watershed boundary for the Black River watershed	WikiWatershed https://modelmywatershed.org/	2016	Black, HUC-8 Subbasin (ID 04150101).zip	Yes
Administrative	Admin	NYS_HUC12_Coordinate_Map	Boundaries of HUC12s in NYS	NYSAGM/ArcGIS https://www.arcgis.com/home/item.html?id=a4585a903a914445a0fcb62a559e00bc	2022	https://services1.arcgis.com/pr6NuHKvKjlxrHUE/arcgis/rest/services/NYS_HUC12_Coordinate_Map_WFL1/FeatureServer	Yes
Administrative	Admin	Tax_Parcels	NYS Tax Parcels centroids. Parcel polygon and centroid data only for counties who gave the NYS GIS Program Office (GPO) permission to share this data with the public or were obtained from public sources. Parcel data for other counties must be obtained directly from them. The GPOs goal is to eventually include parcel data for all counties in New York State. Work to obtain additional permission to share data from other counties is ongoing. Please refer to the metadata for more information.	NY GIS Clearinghouse http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1300	2022	NYS-Tax-Parcel-Centroid-Points.gdb.zip	No
Administrative	Admin	Tax_Parcels	NYS Tax Parcels polygons. Parcel polygon and centroid data only for counties who gave the NYS GIS Program Office (GPO) permission to share this data with the public or were obtained from public sources. Parcel data for other counties must be obtained directly from them. The GPOs goal is to eventually include parcel data for all counties in New York State. Work to obtain additional permission to share data from other counties is ongoing. Please refer to the metadata for more information.	NY GIS Clearinghouse http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1300	2022	NYS-Tax-Parcels-SHP.zip	No
Elevation	Elevation	BRWS_DEM_AOI	USGS Elevation data	USGS Downloads TNM Download v2 (nationalmap.gov)		BRWS_DEM_AOI.zip	Yes
Hydrography	Hydrography	USGS_Current_Surface_Water_Gage_Sites.zip	Current Surface Water USGS Gage Sites	USGS Water Resources of the United States—National Water Information System (NWIS) Mapper (usgs.gov)	2023	USGS_Current_Surface_Water_Gage_Sites.zip	Yes

Type	Folder	Title	Description	Source	Years (or last updated)	Location	SWAT Useability
Hydrography	Hydrography	GageLoc.zip	USGS gage locations, 2015	USGS https://www.sciencebase.gov/catalog/item/577445bee4b07657d1a991b6	2015	GageLoc.zip	Yes
Hydrography	Hydrography	NHD_H_0414_HU4_GDB.zip	Hydrography dataset for HUC4 0414 - 2018	USGS TNM Download (v2.0) https://apps.nationalmap.gov/downloader/#/	NHDPlus Version 2 released in 2012	NHD_H_0414_HU4_GDB.zip	No
Landuse	Land_Cover	Land_Cover_US_2019	Land cover data for the continental US, 2019	MRLC https://www.mrlc.gov/	2019	nlcd_2019_land_cover_l48_20210604.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2022	National cropland data layer for 2022				Yes
Landuse	Land_Cover	Cropland_National_Layer_2021	National cropland data layer for 2021	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2021	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2020	National cropland data layer for 2020	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2020	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2019	National cropland data layer for 2019	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2019	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2018	National cropland data layer for 2018	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2018	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2017	National cropland data layer for 2017	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2017	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2016	National cropland data layer for 2016	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2016	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2015	National cropland data layer for 2015	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2015	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2014	National cropland data layer for 2014	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2014	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2013	National cropland data layer for 2013	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2013	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2012	National cropland data layer for 2012	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2012	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2011	National cropland data layer for 2011	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2011	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2010	National cropland data layer for 2010	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2010	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2009	National cropland data layer for 2009	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2009	polygonclip_20221221150822_2021988088.zip	Yes
Landuse	Land_Cover	Cropland_National_Layer_2008	National cropland data layer for 2008	USDA NASS https://nassgeodata.gmu.edu/CropScape/	2008	polygonclip_20221221150822_2021988088.zip	Yes

Type	Folder	Title	Description	Source	Years (or last updated)	Location	SWAT Useability
Soils	Soils	BRWS_Soils	SSURGO dataset clipped to the Black River watershed.	USDA Web Soil Survey Web Soil Survey - Home (usda.gov)	Version 6, 2022. Template database = 2003.	BRWS_Soils.zip	Yes
Agricultural Practices/BMPs	Ag_Practices	Water_Withdrawals	Data regarding water withdrawals has been collected since 1990. Data is currently collected in accordance with therequirements of ECL 15-1501, which requires a DEC permit and annual usage reporting for all facilities using water for any purpose and having the capacity to withdraw 100,000 gallons or more per day of surface or groundwater.	NY GIS Clearinghouse/NYSDEC https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1265	2022	water_withdrawals.zip	Yes
Agricultural Practices/BMPs	Ag_Practices	CAFOs	Concentrated Animal Feeding Operation (CAFO) is an animal feeding operation (farm) that meets certainanimal size thresholds and that also confines animals for 45 days or more in any 12-month period in an area that doesnot produce vegetation. New York State has more than 500 CAFOs, the majority of which are dairy farms with 300 ormore cows and associated livestock operations.	NYS DOS Geographic Information Gateway http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/details.page?uuid=%7B41A46804-C130-4E89-B99C-7D257596AD94%7D	2016	CAFOs	Yes
Water_Quality	Water_Quality	Brownfield.csv	Brownfield potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA actice, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	Brownfield.csv	Maybe
Water_Quality	Water_Quality	FIFRA and TSCA.csv	FIFRA and TSCA potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA actice, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	FIFRA and TSCA.csv	Maybe
Water_Quality	Water_Quality	Integrated Compliance Information System (ICIS).csv	Integrated Compliance Information System (ICIS) potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA actice, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	Integrated Compliance Information System (ICIS).csv	Maybe
Water_Quality	Water_Quality	NPDES Facilities.csv	NPDES Facilitiespotential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA actice, RCRA inactive, RCRA large quantity generators, Superfunds,	U.S. EPA DWMAPS	2017	NPDES Facilities.csv	Yes

Type	Folder	Title	Description	Source	Years (or last updated)	Location	SWAT Useability
			Superfund National Priority List, and Toxic Release Inventory				
Water_Quality	Water_Quality	NPDES Major.csv	NPDES Major potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	NPDES Major.csv	Maybe
Water_Quality	Water_Quality	RCRA Active.csv	RCRA active potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	RCRA Active.csv	Maybe
Water_Quality	Water_Quality	RCRA Inactive.csv	RCRA inactive potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	RCRA Inactive.csv	Maybe
Water_Quality	Water_Quality	RCRA Large Quantity Generators (LQG).csv	RCRA Large Quantity Generators (LQG) potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	RCRA Large Quantity Generators (LQG).csv	Maybe
Water_Quality	Water_Quality	RCRA-All Sites.csv	RCRA (all sites) potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	RCRA-All Sites.csv	Maybe
Water_Quality	Water_Quality	Superfund.csv	Superfund potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	Superfund.csv	Maybe

Type	Folder	Title	Description	Source	Years (or last updated)	Location	SWAT Useability
Water_Quality	Water_Quality	Superfund_National Priorities List (NPL).csv	Superfund_National Priorities List (NPL) potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	Superfund_National Priorities List (NPL).csv	Maybe
Water_Quality	Water_Quality	Toxic Release Inventory (TRI).csv	TRI potential sources of contamination. Includes Brownfield, FIFRA and TSCA, Integrated Compliance Information System (ICIS), NPDES facilities, NPDES major, RCRA all sites, RCRA active, RCRA inactive, RCRA large quantity generators, Superfunds, Superfund National Priority List, and Toxic Release Inventory	U.S. EPA DWMAPS	2017	Toxic Release Inventory (TRI).csv	Maybe
Water_Quality	Water_Quality	dec_ms4.zip	This dataset is developed by the Department of Environmental Conservation (DEC), Division of Water to delineate the boundaries of the areas subject to SPDES General Permit for Phase II Stormwater Regulations. This dataset is subject to change as the Municipal Separate Storm Sewer Systems (MS4s) obtain a permit and identify the boundaries of their jurisdictions.	NYS GIS Clearinghouse - NYS Dept. of Environmental Conservation (DEC) - Stormwater Regulated MS4 Areas	2020	dec_ms4.zip	Yes
Water_Quality	Water_Quality	WaterWellProgram.zip	This file shows locations and attributes for water wells in New York State. This information has been collected by DEC since April 2000 as required by law.	NYS GIS Clearinghouse - NYS Dept. of Environmental Conservation (DEC) - Water Wells	2022	WaterWellProgram.zip	Yes
Water_Quality	Water_Quality	Wastewater_Treatment_Plants_Map.csv	The purpose of the State Pollutant Discharge Elimination System (SPDES) Program is to protect human health and the environment. The SPDES permit program in the New York State Department of Environmental Conservation's Division of Water regulates municipal, industrial, private, commercial and institutional wastewater treatment facilities that discharge to the groundwaters as well as surface waters of New York State. Service layer is updated as needed and was last updated August 2022.	NYS GIS Clearinghouse - NYS Dept. of Environmental Conservation (DEC) - State Pollutant Discharge Elimination System	2022	Wastewater Treatment Plants_Map.csv	Yes
Water_Quality	Water_Quality	Surface Water USGS Locations	Available active USGS surface water site data	Water Resources of the United States—National Water Information System (NWIS) Mapper (usgs.gov)	2023	Surface Water Data Locations.zip	Yes
Water_Quality	Water_Quality	Ground Water USGS Locations	Available active USGS ground water site data	Water Resources of the United States—National Water Information System (NWIS) Mapper (usgs.gov)	2023	Ground Water Data Locations.zip	Yes
Water_Quality	Water_Quality	CSLAP Lakes	Lakes that are participating in NYSDC CSLAP.	Citizens Statewide Lake Assessment Program (CSLAP) - NYS Dept. of Environmental Conservation	2022	CSLAP_Lakes.csv	Maybe
Water_Quality	Water_Quality	Hamilton County Soil and Water Conservation District Study Lakes	List and locations of lakes that are monitored by Hamilton County SWCD within the watershed.	Lake Monitoring - Hamilton County Soil and Water Conservation (hamiltoncountyswcd.org)	1993-2022	Hamilton County SWCD Lake Sites.csv	Maybe

Type	Folder	Title	Description	Source	Years (or last updated)	Location	SWAT Useability
Water_Quality	Water_Quality	NYSDEC RIBS Monitoring Sites	Locations of stream and lake monitoring sites of the NYSDEC RIBS program	DOW Monitoring Data Portal (arcgis.com)	2022	Lakes: RIBS Lakes Monitoring Sites.csv Streams: https://ramboll.sharpoint.com/:x:/r/sites/BlackRiverAdaptiveModeling/Shared%20Documents/General/ND/Data%20Directory/GIS/Water_Quality/RIBS%20Stream%20Monitoring%20Sites.csv?d=w37216473f6ac436a9c1aa4a8b5c62884&csf=1&web=1&e=bq4YBE	Maybe
Water_Quality	Culvert Assessments	Black River Culvert Assessments	Culvert assessments from the NAACC data center (data source suggested by Trout Unlimited). The NAACC is a network of individuals from agencies and organizations focused on improving aquatic connectivity across a thirteen-state region. The NAACC provides protocols for road-stream crossings (culverts and bridges) to assess and score crossings for fish and wildlife passability, as well as culvert condition and other data useful for evaluating risk of failure.	NAACC Data Center	2016-2021	Culvert Assessments	Maybe

Data Sources

Type	Folder	Title	Description	Source	Years (or last updated)	Location	Screening Level	SWAT Useability
Climate	Climate	NOAA NCEI Daily Summaries - Black River	GHCND weather station data for 21 total stations within the Black River watershed - precipitation and temperature (some have other parameters); 1970-present.	NOAA NCEI Climate Data Online https://www.ncdc.noaa.gov/cdo-web/	1888-2022 (dependent on climate station)	Climate (6 total files, 5 w/ data, 1 w/ locations)	Not screened (laboratory analysis not conducted)	Yes
Hydrology	Hydrology	Discharges - Black River and Tributaries	USGS StreamStats peak discharges for Black River and major tributaries	USGS StreamStats https://streamstats.usgs.gov/ss/	2017	USGS - Discharge and Nutrient Data	Not screened (laboratory analysis not conducted)	Yes
Water Quality	Hamilton County SWCD	Hamilton County SWCD Lake Monitoring	Hamilton County SWCD Lake Monitoring locations and data results for 2022.	Caitlin Stewart, Hamilton County SWCD	2022	Hamilton County SWCD	A	Maybe
Water Quality	City of Watertown	City of Watertown Raw Black River Measurements	Daily raw Black River measurements (turbidity, pH, alkalinity, color, temperature, UV-254) taken at the City of Watertown water treatment plant for 2020, 2021, and 2022.	Aaron Harvill, Chief Operator for the City of Watertown Water Treatment Plant	2020-2022	City of Watertown Raw Black River Measurements.xlsx	A	Maybe
Water Quality	Data Submissions	JCC SCI 199 Class Macroinvertebrate Data	Copy of macroinvertebrate data collected by the JCC SCI 199 class in 2022. Measurements include	Larry Danforth, JCC	2022	Copy of Comparing SCI199 to DEC data 7.15.2019.xlsx	D	No
Water Quality	Data Submissions	JCC SCI 199 Class Nutrient Data	Copy of nutrient data collected by the JCC SCI 199 class in 2022. Measurements include	Larry Danforth, JCC	2022	Copy of SCI 199 Data - 2022 (From JCC).xlsx	D	No
Water Quality	SPDES Discharge Data	NYSDEC Discharge Monitoring Reports (DMR)	NYSDEC discharge monitoring reports (DMRs) for various facilities in the Black River watershed.	Cassandra Davis, NYSDEC (NYSDEC, ICIS database)	2012-2022	DMR Analyze Report (4).xlsx	A	Yes
Water Quality	Data	Sewer Discharge Data	Historical sewage discharge data is retrieved from NY-Alert in batches. All data is submitted by the POTWs and POSSs. Data is estimated based on the existing systems, models, and personal knowledge of the sewer systems. Data quality is not checked by DEC.	NYSDEC https://www.dec.ny.gov/chemical/90315.html#Historical_Data	2020-2023	BlackRiver_2021sewagedischarges.xlsx	D	Maybe
Water Quality	Data	NYSDEC Annual Water Withdrawal Data	NYSDEC annual water withdrawal reports, reported by facilities that withdrawal 100,000 GPD or more. Dataset ranges from 2009-present. Averages, maximums, and permitted limits listed	NYSDEC https://data.ny.gov/Energy-Environment/Water-Withdrawals-by-Facility-Beginning-2009	2009-2022	Water Withdrawals by Facility_Beginning 2009.zip	D	Maybe
Water Quality	Streams_Chemistry	NYSDEC RIBS Monitoring Sites	Locations of stream and lake monitoring sites of the NYSDEC RIBS program	https://nysdec.maps.arcgis.com/apps/webappviewer/index.html?id=b72ae03f14508a0de97488e142ae1	2022		A	Maybe

Type	Folder	Title	Description	Source	Years (or last updated)	Location	Screening Level	SWAT Useability
Water Quality	USGS_SW_WQ_Pull	USGS Stream and Lake Monitoring Data	United States Geological Survey (USGS) has water-resources data collected at approximately 1.9 million sites in all 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa and the Commonwealth of the Northern Mariana Islands. The USGS investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing our water resources. Parameters pulled from this source include total phosphorus, total nitrogen, total suspended solids, flow, and surface elevations of available sites.	https://waterdata.usgs.gov/nwis?	1890-2023	USGS - Discharge and Nutrient Data	NA	Yes
Water Quality	City of Watertown	Black River WWTP Water Monitoring	Interns from the WWTP measured TSS, TS, TDS, BOD, TP, ammonia, TKN, potassium, low level mercury, and TOC at upstream, midstream, and downstream locations relative to the WWTP. Measurements taken 2018-2022.	Angel French, City of Watertown WWTP	2018-2022	Black River WWTP Data 2018-2022 (from Angel French).xlsx	A	Maybe
Agricultural Practices	Agricultural Practices	Black River SWCC Program Full Dataset Public Info as of 02.13.2023	NYS Soil and Water Conservation Committee, data from Agricultural Non-Point Source Pollution Abatement and Control (AgNPS), Agricultural Environmental Management (AEM), Climate Resilient Farming (CRF), and the CAFO Waste Storage and Transfer System Program (CAFO). These data are collected from SW forms and AEM Final Reports. This information is intended for internal District use. Prior to Districts sharing this information with partners or the general public, they should work with their Regional SWCC AEA to determine any disclosure or farmer privacy issues. If this information is used to respond to a FOIL request, the Districts should refer to their FOIL Policy and work with their County Attorney before release. Certain information in this database is considered confidential under the Personal Privacy Protection Law and AEM Law 151g (indicated by column heading notes and highlighted red in the glossary and yellow in the data tables).	Nichelle Swisher, Lewis County SWCD	2008-2022	Black River SWCC Program Full Dataset Public Info as of (02.13.2023) (from Nichelle Swisher).xlsx	Not screened (laboratory analysis not conducted)	Maybe

Appendix B

Data Screening and Usability Matrix

Dataset Name	QAPP	ELAP	Overall Quality Details	Formal Documentation	Analytical Methods	Data Review and Validation	Assessment DQIs	Data History	Mathematical Score	Lowest Level	Final Score	Comments
Hamilton County SWCD Lake Monitoring	Y	Y	A	A	A	A	A	A	24	A	A	
NOAA NCEI Daily Summaries (Climate Data)	-	-	-	-	-	-	-	-	NA	NA	NA	Data screening not performed because laboratory analysis not conducted. NOAA NCEI Climate Data documentation.pdf
City of Watertown Raw Black River Measurements	See Comments	Y	C	C	A	B	B	A	18	C	A	Collection and analysis is based on "The Standard Methods for Water and Wastewater." (https://www.standardmethods.org/) Data is collected and analyzed by City staff in their NELAP accredited lab. Other sampling that is not covered by an accreditation is sent to a third-party lab.
SUNY Jefferson SCI 199 Nutrient Data	N	N	C	D	C	D	C	C	10	D	D	Did not receive background documentation or clarification on shared raw data.
SUNY Jefferson SCI 199 Macroinvertebrate Data	N	N	C	D	C	D	C	C	10	D	D	Did not receive background documentation or clarification on shared raw data.
USGS Stream and Lake Gage Data	-	-	-	-	-	-	-	-	NA	NA	NA	Data screening not performed because laboratory analysis not conducted. FS-027-98 (usgs.gov) https://www.usgs.gov/mission-areas/water-resources/science/usgs-streamgaging-network#overview https://streamstats.usgs.gov/information-portal/
NYSDEC Discharge Monitoring Report (DMR)	See Comments	Y	A	A	A	A	B	A	23	B	A	Discharge Monitoring Report Manual (ny.gov)

Dataset Name	QAPP	ELAP	Overall Quality Details	Formal Documentation	Analytical Methods	Data Review and Validation	Assessment DQIs	Data History	Mathematical Score	Lowest Level	Final Score	Comments
Black River 2021 Sewer Discharge Data (NY-Alert)	N	N	D	D	D	D	D	A	9	D	D	The Sewage Pollution Right to Know Law (SPRTK) requires publicly owned treatment works (POTWs) and publicly owned sewer systems (POSSs) report sewage spills to the public within four hours of discovery. DEC does not issue alerts. These alerts are issued by the municipality who owns the sewer or treatment works where a sewage discharge takes place. DEC also does not make the decision on public health issues. DOH determines if there is a public health problem. DOH is notified at the time of the initial report. The reports are submitted by the notifiers creating the reports in a short time frame after discovery of the discharge and specific details may not be known. Data quality is not checked by DEC.
NYSDEC Water Withdrawals	N	-	D	D	D	D	D	A	9	D	D	https://www.dec.ny.gov/lands/86940.html ; Example reports: https://www.dec.ny.gov/data/IF/WWR/WWR0000380/
NPDES Facilities	Y	Y	A	A	A	A	A	A	24	A	A	https://www.epa.gov/compliance/compliance-inspection-manual-national-pollutant-discharge-elimination-system
NYSDEC RIBS Program	Y	Y	A	A	A	A	A	A	24	A	A	https://www.dec.ny.gov/docs/water_pdf/qappribs721.pdf
City of Watertown WWTP Black River Water Measurements	N	Y	B	B	A	A	A	B	22	B	A	

Appendix C

Black River Watershed Tributary Sampling Training Summary

Summary of Black River Watershed Tributary Sampling November 2023

Sampling Description

Tributary sampling was conducted on November 3rd and 21st (2023) in the Black River watershed to train County Soil and Water Conservation District (SWCD) staff on the methods to collect water quality samples and associated data (e.g., *in situ* parameters and stream discharge). The training was conducted by Upstate Freshwater Institute (UFI) researchers and supported by the *Black River Adaptive Modeling (BRAM) Project* funded by the New York State Department of Environmental Conservation (NYSDEC).

Over the course of two days, eight (8) sites were sampled (Figure 1). The sites sampled in November 2023 included locations that are planned for a robust monitoring program in the Black River watershed in 2024. Tributary water samples were collected via a stainless-steel bucket lowered from a roadway bridge (except for the Mill Creek which was sampled via in-stream grab samples). Samples were analyzed by UFI's analytical laboratory (a NYS Dept. of Health ELAP-certified laboratory²) for (1) total suspended solids (TSS), (2) total nitrogen (TN), and (3) total phosphorus (TP). A multi-probe sonde (YSI 6600) was used to collect *in situ* water quality parameters including temperature (°C), pH, conductivity ($\mu\text{S cm}^{-1}$), turbidity (NTU), and dissolved oxygen (mg L^{-1} ; % saturation).

Results are preliminary based on one sample at each location and additional sampling is recommended to better understand annual conditions and nutrient and sediment loading that occurs after high flow and heavy rain events.

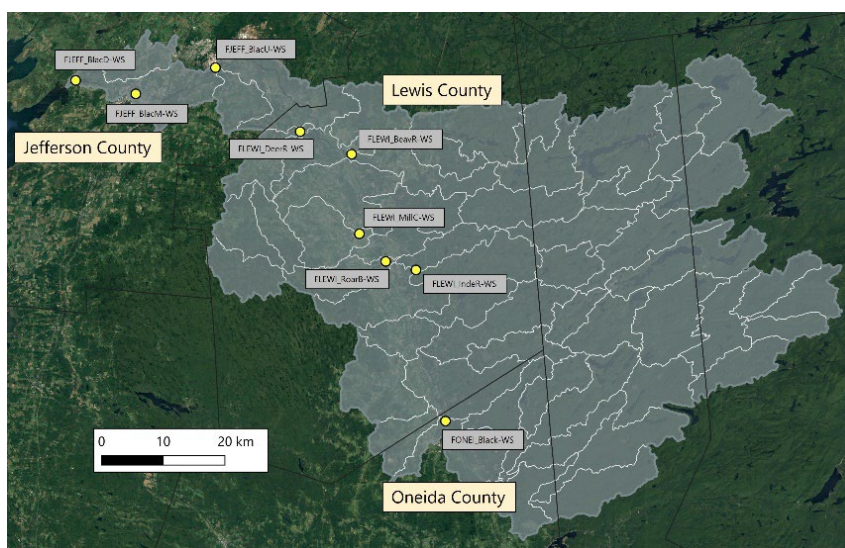


Figure 1. Map of sampling sites. Note that the downstream sampling location in the Black River was not sampled in November 2023 due to height of bridge.

² NY Laboratory ID No. 11462; EPA Laboratory Code NY01276

Total Suspended Solids (TSS) Preliminary Data

The average of TSS concentrations across the 8 sites was 3.3 mg L^{-1} (± 3.1) (Figure 2). Half of the sites sampled in November 2023 had TSS concentration below the limit of detection (1.0 mg L^{-1}). TSS concentrations ranged from 1.5 mg L^{-1} (Deer River) up to 8.0 mg L^{-1} (Independence River).

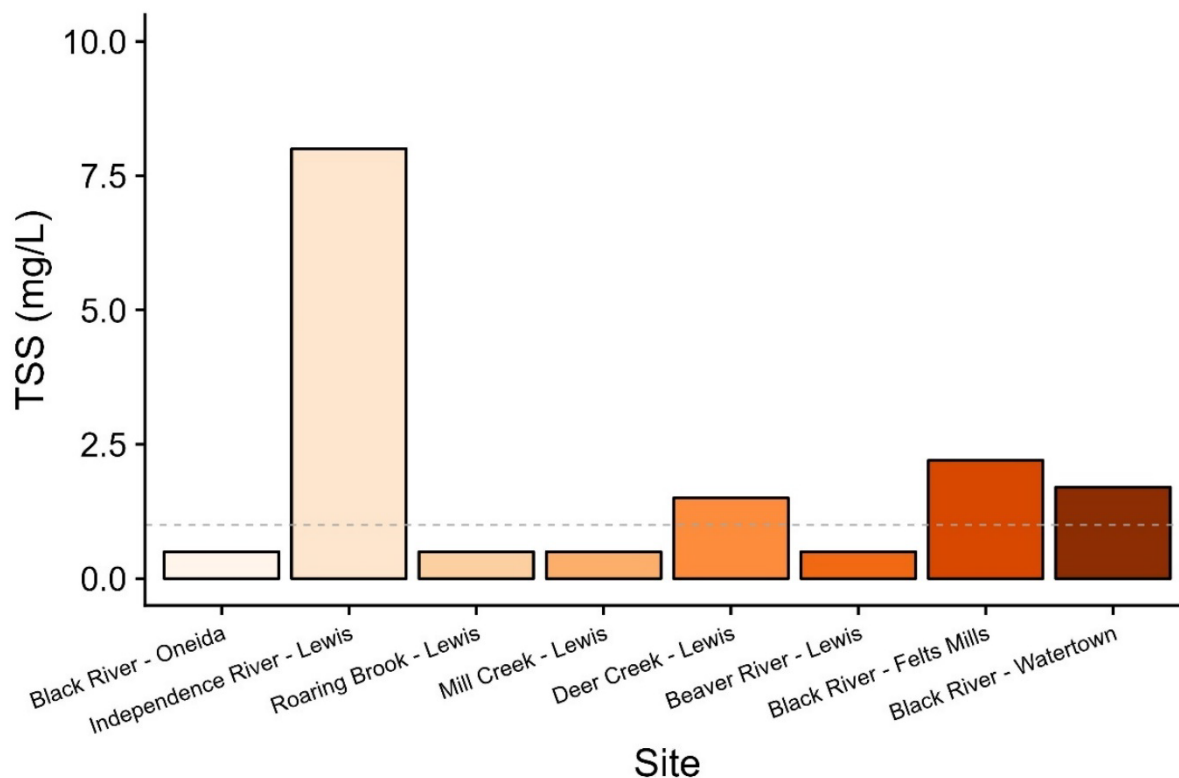


Figure 2. Total suspended solid (TSS, mg L^{-1}) concentrations from eight tributaries in the Black River watershed, sampled in November 2023. Sites are ordered from south to north along the x-axis. The grey dashed line represents the limit of detection (LOD) concentration.

Total Nitrogen (TN) Preliminary Data

The average of TN concentrations across the 8 sites was $568 \mu\text{g L}^{-1}$ (± 464) (Figure 3). All samples collected in November 2023 had detected concentrations of TN, and concentrations ranged from $225 \mu\text{g L}^{-1}$ (Black River, Oneida Co.) up to $1598 \mu\text{g L}^{-1}$ (Mill Creek).

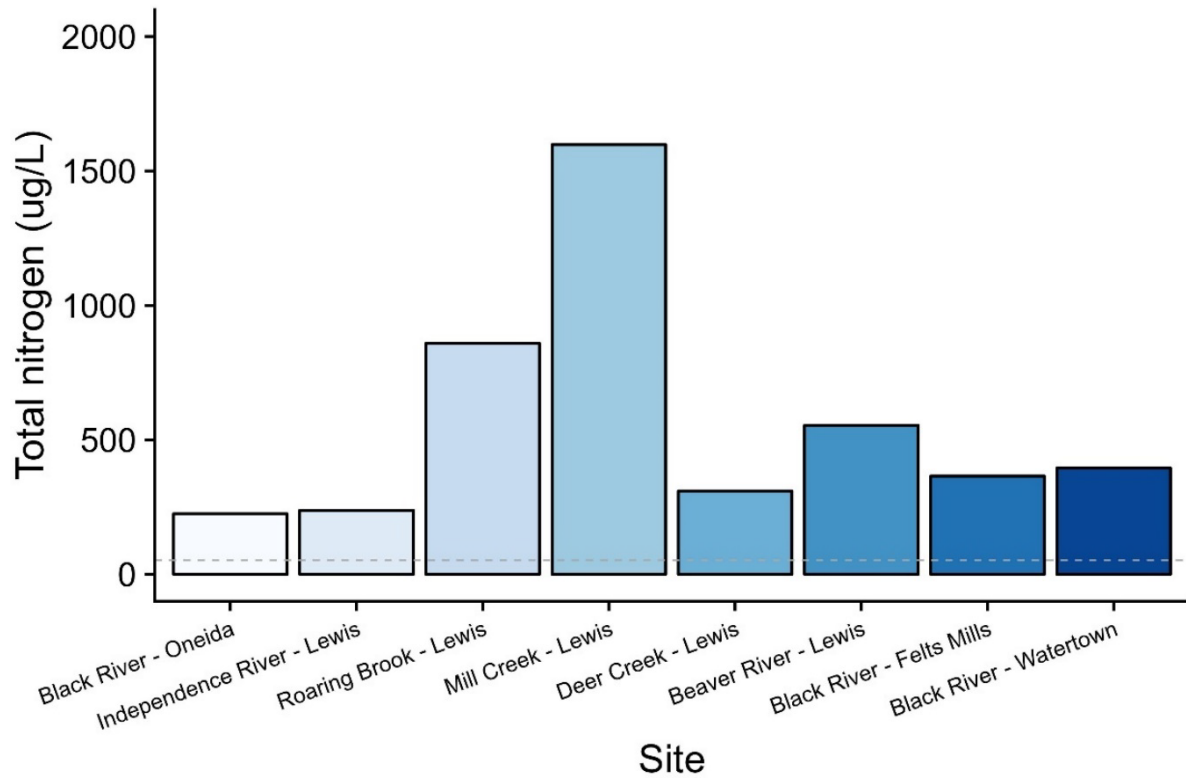


Figure 3. Total nitrogen (TN, $\mu\text{g L}^{-1}$) concentrations from eight tributaries in the Black River watershed, sampled in November 2023. Sites are ordered from south to north along the x-axis. The grey dashed line represents the limit of detection (LOD) concentration.

Total Phosphorus (TP) Preliminary Data

The average of TP concentrations across the 8 sites was $15.3 \mu\text{g L}^{-1}$ (± 6.7) (Figure 3). All samples collected in November 2023 had detected concentrations of TP, and concentrations ranged from $9.7 \mu\text{g L}^{-1}$ (Deer River) up to $26.6 \mu\text{g L}^{-1}$ (Mill Creek).

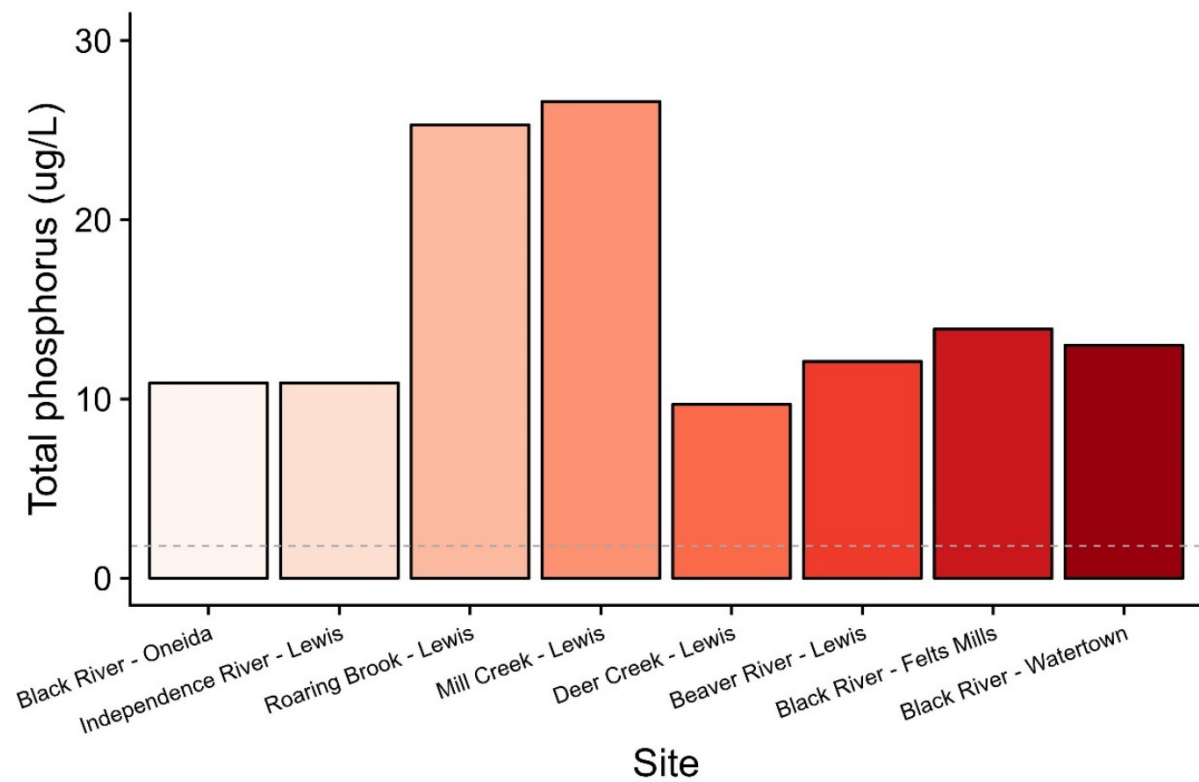


Figure 4. Total phosphorus (TP, $\mu\text{g L}^{-1}$) concentrations from eight tributaries in the Black River watershed, sampled in November 2023. Sites are ordered from south to north along the x-axis. The grey dashed line represents the limit of detection (LOD) concentration.