



# Black River Adaptive Modeling (BRAM) Phase I

Jasmine James, Ramboll  
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Black River Watershed Conference

*Bald Mountain. Photo by Emily Fell*



# Planning Committee

Thank you to the following organizations:

- Tug Hill Commission
- Hamilton County Soil & Water Conservation District
- Herkimer County Soil & Water Conservation District
- Jefferson County Soil & Water Conservation District
- Lewis County Soil & Water Conservation District
- Oneida County Soil & Water Conservation District

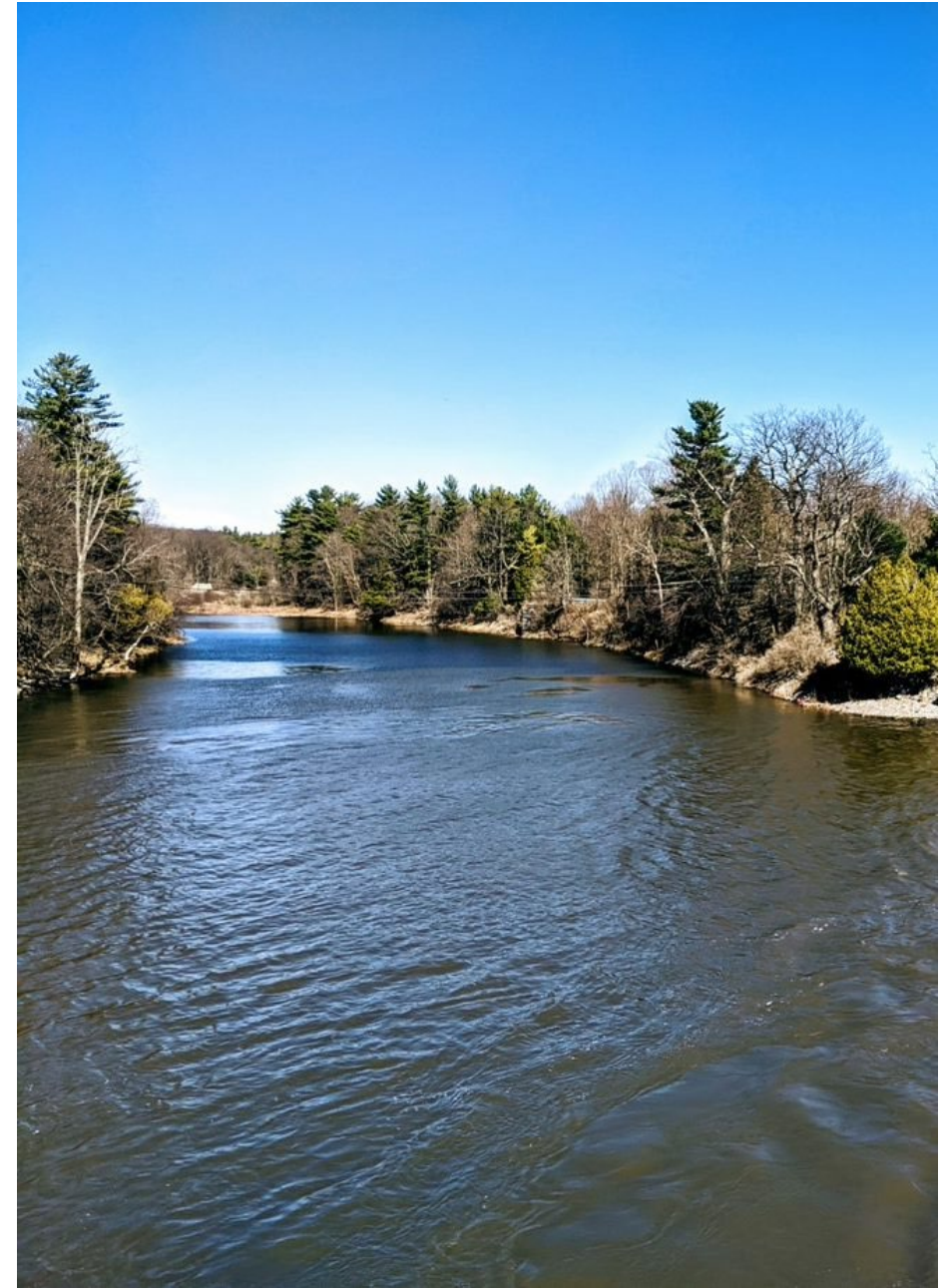


*Talcotville Falls.*

# Purpose

## Black River Adaptive Modeling (BRAM):

- Update the 2016 Black River Nine Element Watershed Management Plan: Reducing Phosphorus, Nitrogen, and Sediment Loading in Priority Subwatersheds, including new modeling at the HUC12 scale (2016 Plan conducted modeling at the HUC11 scale).
  - Compile available datasets
  - Receive input on new water quality concerns
  - Identify spatial and quantitative data gaps
  - Recommend additional water quality monitoring

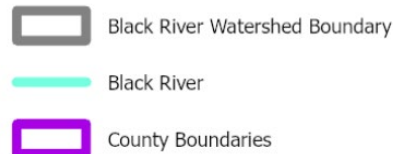
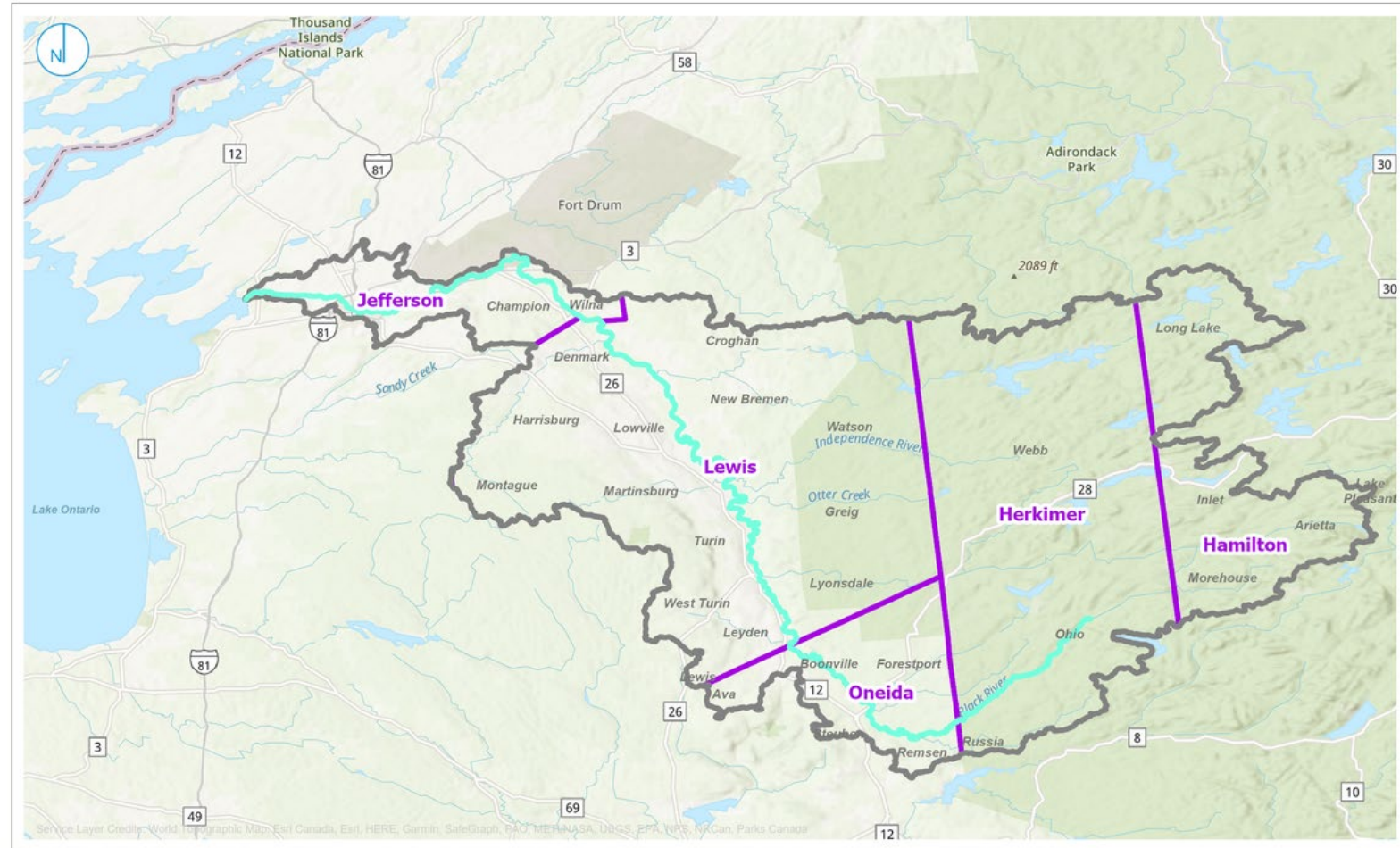


*Black River, Felts Mills*

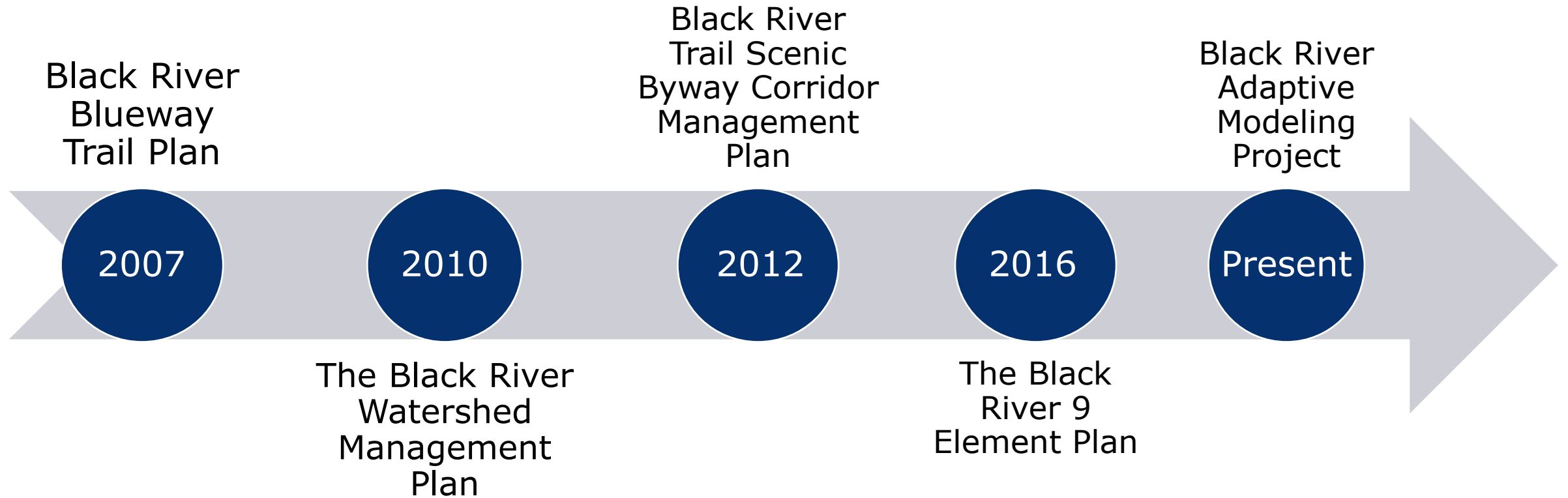


# Black River Watershed

- Over 1.2 million acres
- Includes parts of Jefferson, Lewis, Oneida, Herkimer, and Hamilton Counties
- Headwaters in the Western Adirondacks, water drains into Lake Ontario

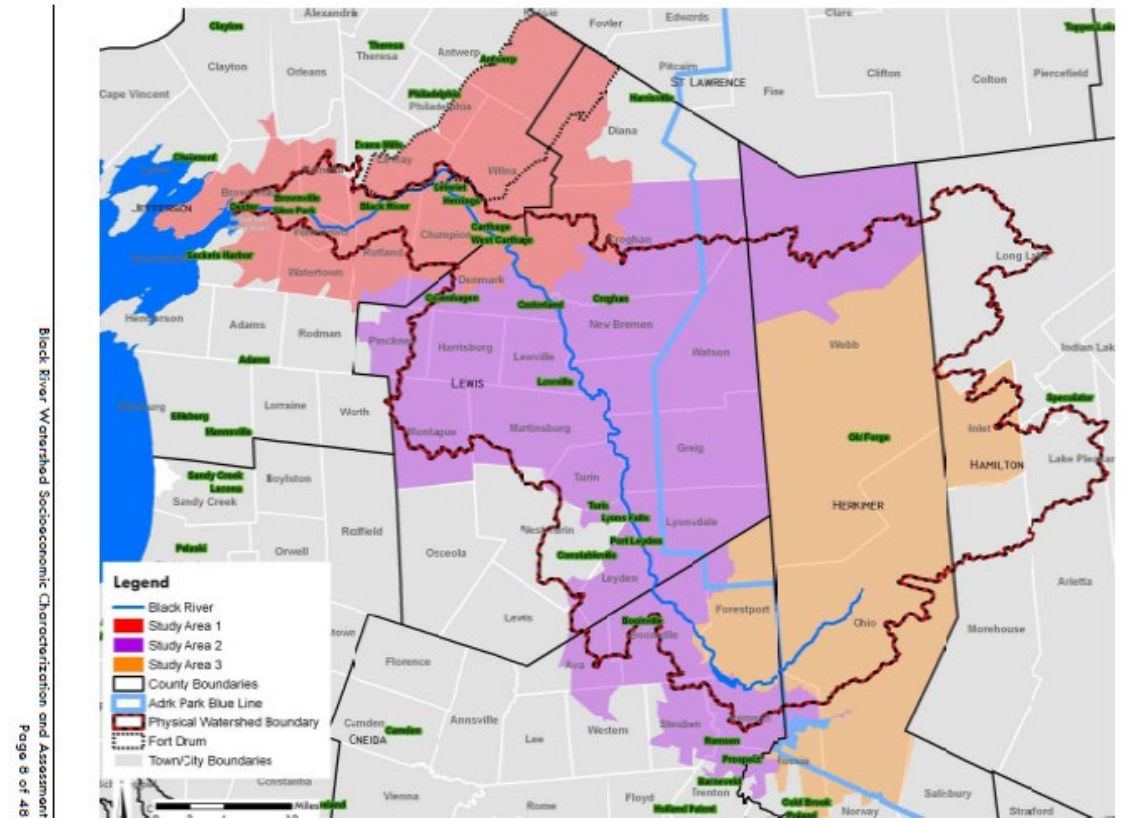


# Black River Initiative



# Additional Studies that Supported the 2010 Black River Watershed Management Plan

- Community Outreach (Bergmann Associates)
  - *Surveys and outreach to understand community concerns and opinions*
- Socio-Economic Analysis (Camoin Associates)
  - *Inform planning processes, highlight economic strengths*
- Groundwater Assessment (Bergmann Associates)
  - *Identify groundwater sources, recommendations for future protection and monitoring*



Map from socio-economic analysis displaying study areas.

# Threats and Impairments Identified in the 2010 Black River Watershed Management Plan

- Erosion and stream sedimentation
- Stormwater and flooding
- Nutrient inputs and eutrophication
- Hydrological change and stream channel modification
- Fires
- Acidification
- Contamination by pesticides and industrial wastes
- Invasive species
- Climate change

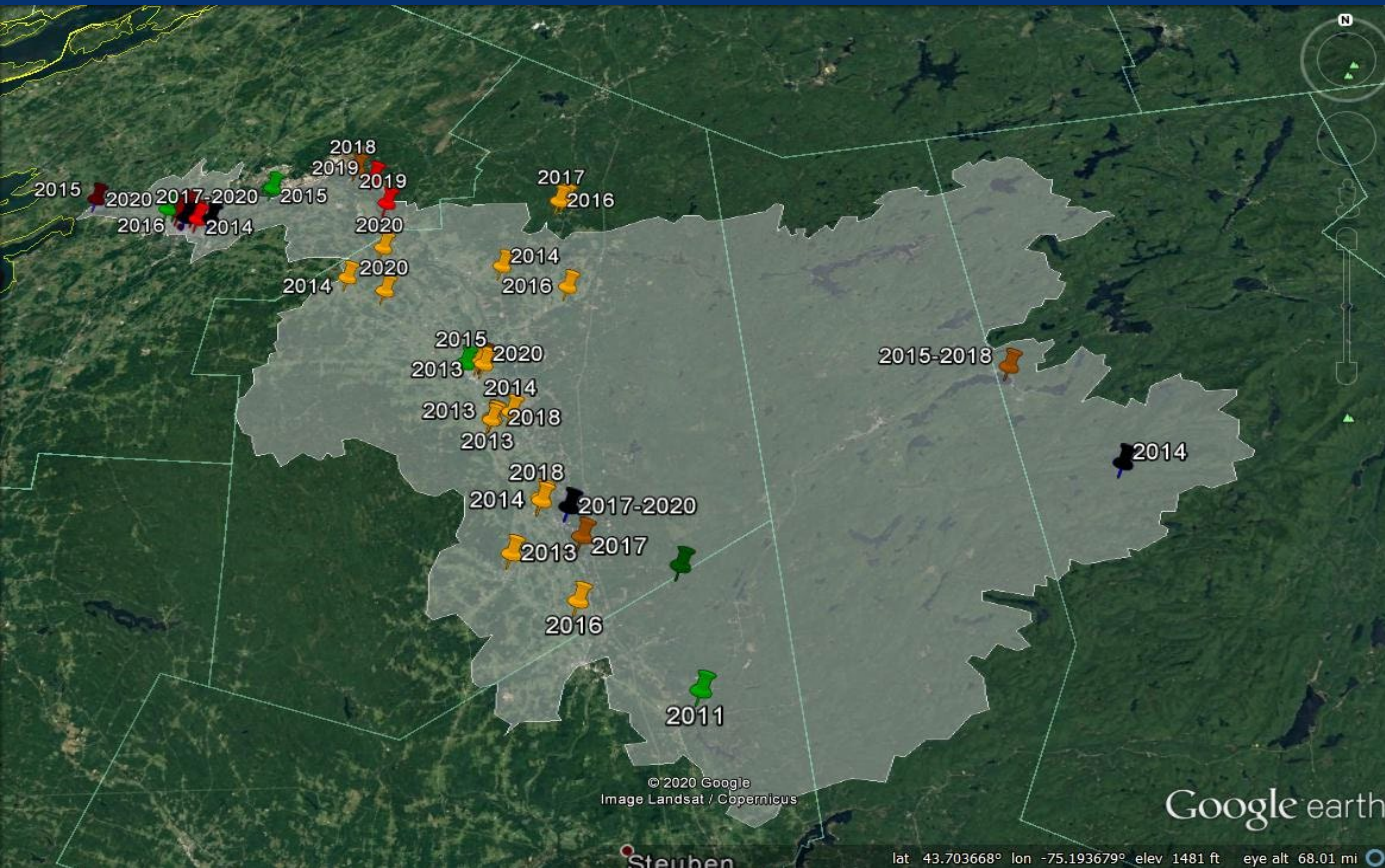
*List from the 2010 Black River Watershed Management Plan (BRWMP)*



*Black River, Watertown, NY*

# Black River Watershed Management Projects

- Since the Black River Initiative began, 72 actions (projects and initiatives), totaling \$35,812,470, have been completed or are underway (2020 Black River Initiative Progress Report)
- Locations of projects between 2010-2020 are pictured on the left

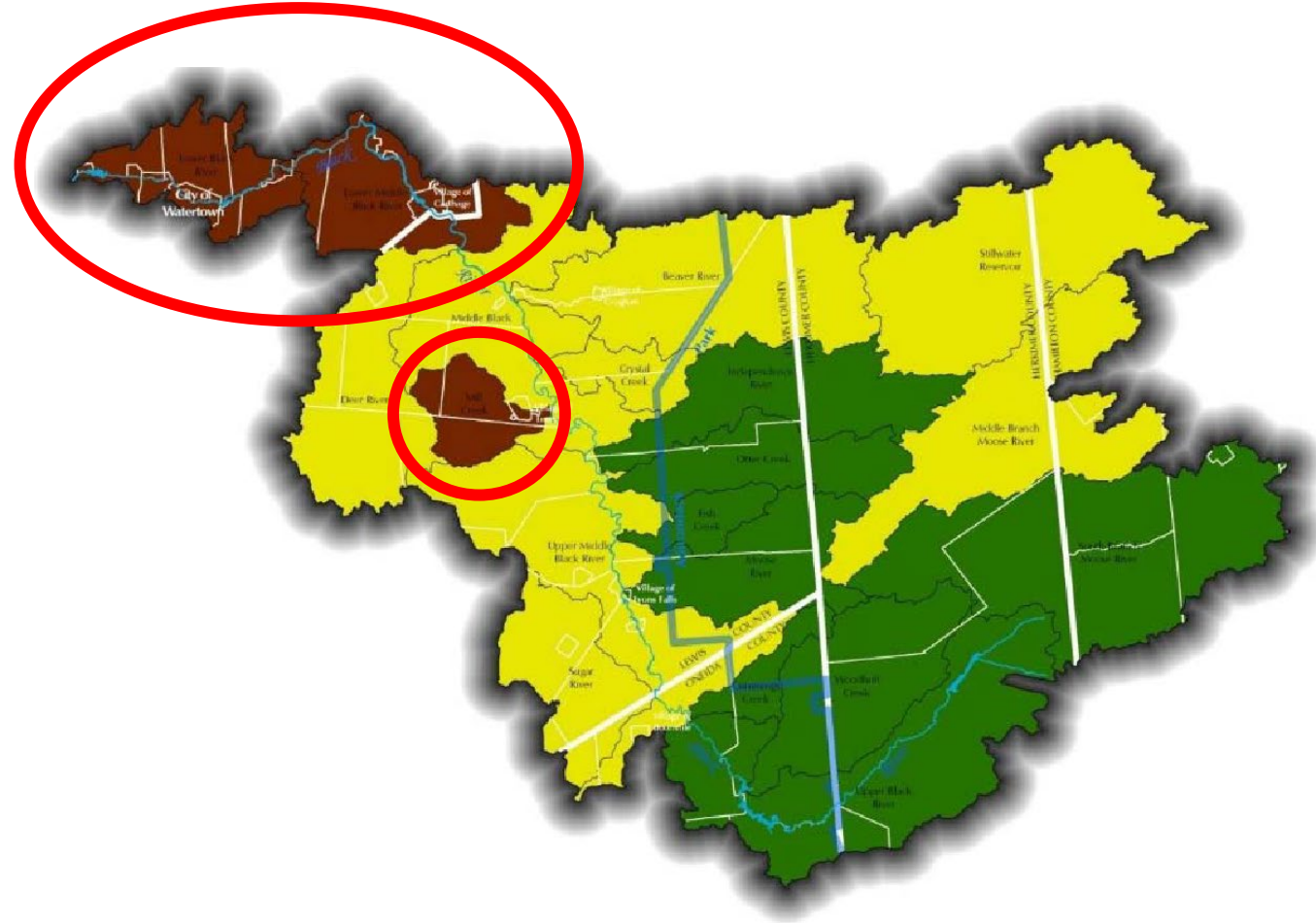


## Image key:

- Red = remediation
- Orange = agricultural best management practices (BMPs)
- Brown = wastewater treatment upgrades
- Green = restoration and green infrastructure
- Black = recreation, access, and community renewal

# 2016 Black River 9 Element (9E) Plan

- Developed to meet federal requirements for watershed plans and increase opportunities to receive federal funding
- Goal of the plan: reduce phosphorus, nitrogen, and sediment loading in the watershed
- Priority (HUC11) subwatersheds were identified (brown areas pictured to the right):
  - Mill Creek
  - Lower Black River
  - Lower Middle Black River



# Challenges with 2016 Black River 9E Plan Implementation

- HUC11 scale modeling was cataloged as legacy (no longer available to track watershed management implementation)
- Limited accuracy determining if projects were occurring within a priority subwatershed
- Tracking metrics such as acres/sq. ft of project, and number of trees planted
- Agricultural BMP locations are typically confidential but can be tracked at HUC12 scale

# Black River Adaptive Modeling (BRAM)

- **Phase I:** Engaged with water quality stakeholders, reviewed existing data, identified data needs, and scoped out water quality monitoring needed to support model.
- **Phase II (planned)\*:** Integrate additional monitoring and develop adaptive watershed model at the HUC12 scale to evaluate trends and address challenges to the 9E Plan implementation. This phase is not funded yet.

*\*Will be discussed further in Emily Fell's (NYSDEC) presentation*



Red lines delineate HUC12 subwatersheds

# BRAM Phase I Timeline



**November 2022 – January 2023**  
Background research and project kickoff



**December 2022 – February 2023**  
1. Secondary data compilation



**February 2023 – March 2023**  
2. Secondary data screening and usability



**April 24, 2023**  
Black River watershed field trip



**April 2023 – May 2023**  
3. Data gap evaluation and recommendations

# 1. Data Collection

Overview of Data Used for a Soil & Water Assessment Tool (SWAT) Model:

- Agricultural practices at the HUC12 level
- Watershed management practices
- Nutrient concentrations
- Sediment concentrations (total dissolved sediment and total suspended sediment)
- Topography/Digital Elevation Model (DEM)
- Land cover and land use
- Point sources (flow and nutrient concentration)
- Septic inventory and failure rate
- Soils
- Meteorological data
- Water flow and discharge (including stream gauge data)
- Other data submitted by stakeholders



*Moshier Reservoir. Webb, NY. Photo by Emily Fell*

## 2. Data Usability Assessment for Modeling

*Criteria*

1. Overall quality of and level of details in report(s)

2. Formal documentation of procedures

3. Analytical methods used and detection limits achieved

4. Data review, validation, and quality assurance

5. Assessment of data quality indicators (DQIs)

6. Data history and overall apparent data quality

*Scoring*

**Level A –**

Acceptable, unrestricted use in modeling (Quality Assurance Project Plan (QAPP) and Environmental Laboratory Accreditation Program (ELAP))

**Level B –**

Acceptable, may have some restrictions in modeling

**Level C –**

Limited use in modeling

**Level D –**

Not used in modeling, may be used for education, cross-checking the model, or as a reference

## 2. Data Usability Assessment for Modeling: Criteria

### 1. Overall quality of and level of detail in report(s)

- Description of study design
- Sufficient details

### 2. Formal documentation of procedures

- Quality Assurance Project Plan, chain-of-custody records, standard operating procedures (SOPs), laboratory documentation

### 3. Analytical methods used and detection limits achieved

- Standard methods, such as Environmental Protection Agency (EPA) or American Society for Testing and Materials (ASTM)

### 4. Data review, validation, and quality assurance

- Quality assurance and quality control procedures (e.g., blanks, duplicates)
- Laboratory data review and validation

### 5. Assessment of data quality indicators (DQIs)

- Data are complete, comparable, representative, and met requirements

### 6. Data history and overall apparent quality

- Dataset is recent (past 10 years), uses standard units, and is consistent

# 2. Data Usability Assessment for Modeling Results

Dataset Name	Criteria						
	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	Score
Hamilton County SWCD Lake Monitoring	A	A	A	A	A	A	Level A
City of Watertown Raw Black River Measurements	C	C	D	B	D	A	Level B
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 C
NYSDEC Water Withdrawals	D	D	D	D	D	A	Level C
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 <sup>17</sup>

- Criteria from Army Corps of Engineers (USACE), first used in evaluating the usability of data collected on the Housatonic River project

# Black River Watershed Field Trip

- Visited the watershed on April 24, 2023
- Observed the diversity of the Black River watershed (i.e., land uses, topography, climate)
- Received presentations from Trout Unlimited (culvert enhancement projects) and Hamilton County SWCD (lake monitoring and green infrastructure project)
- Interest in adding stream gages near dams and major tributaries to track water quality as water flows towards Lake Ontario



*Hawkinsville Dam, summer of 2022 (top) and  
spring 2023 (bottom)*

# 3. Data Gap Analysis

- Evaluated the availability of data meeting quality assurance (QA) standards needed for a watershed model
- Identified categories of missing data and spatial distribution gaps
- Summarize project findings, identify quality data gaps, and identify additional data needed to support the calibration of the watershed model in report

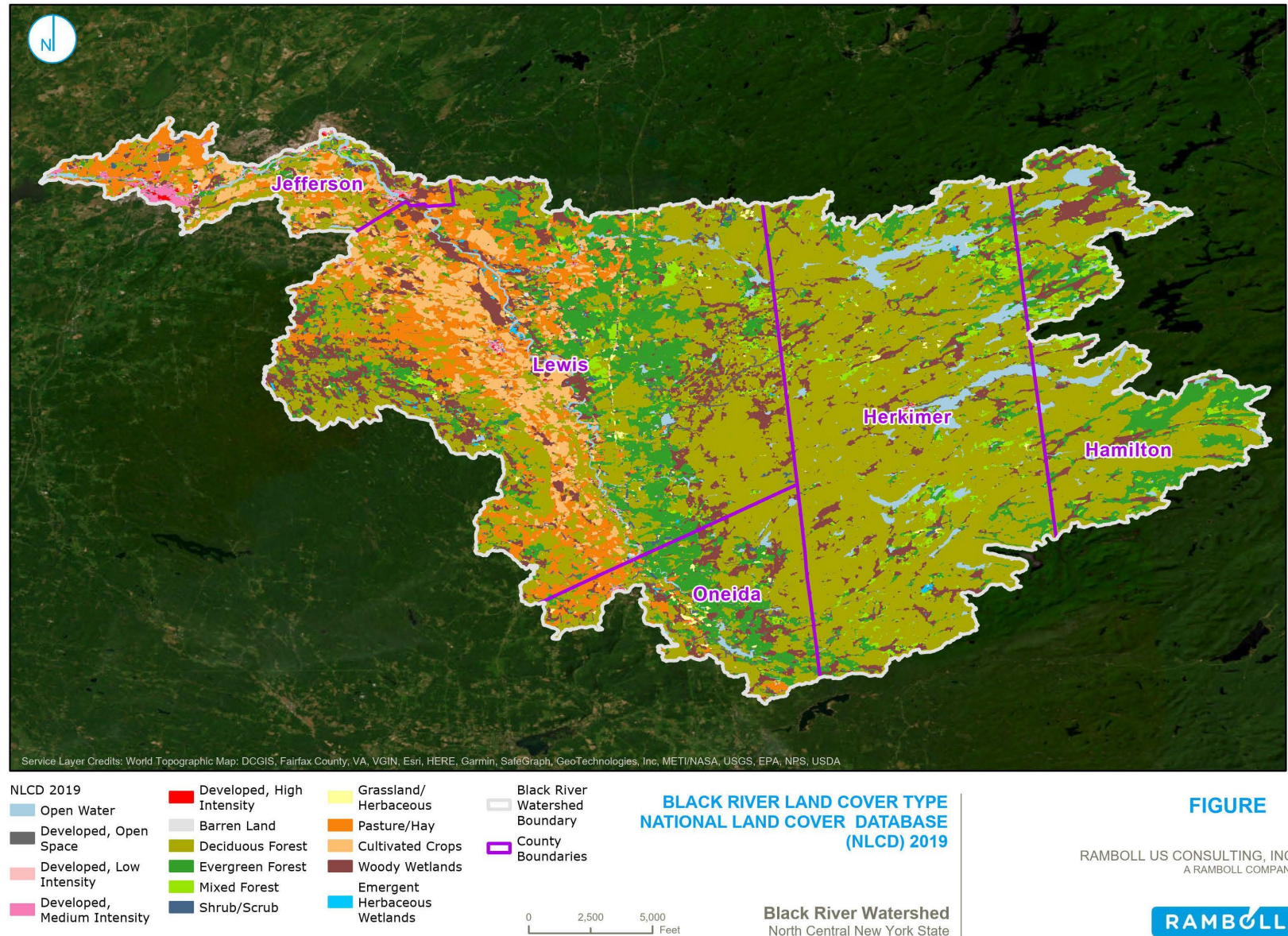


*Black River, Great Bend. Photo by Emily Fell*

# Findings and Data Gap Identification

## Finding:

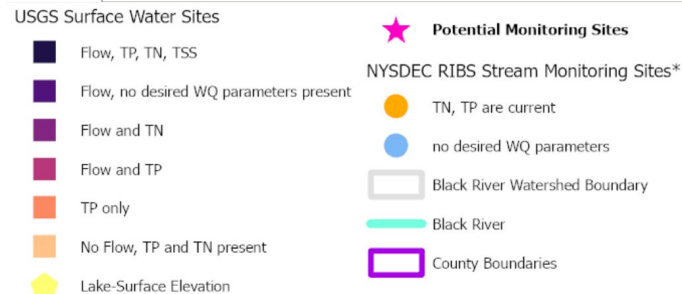
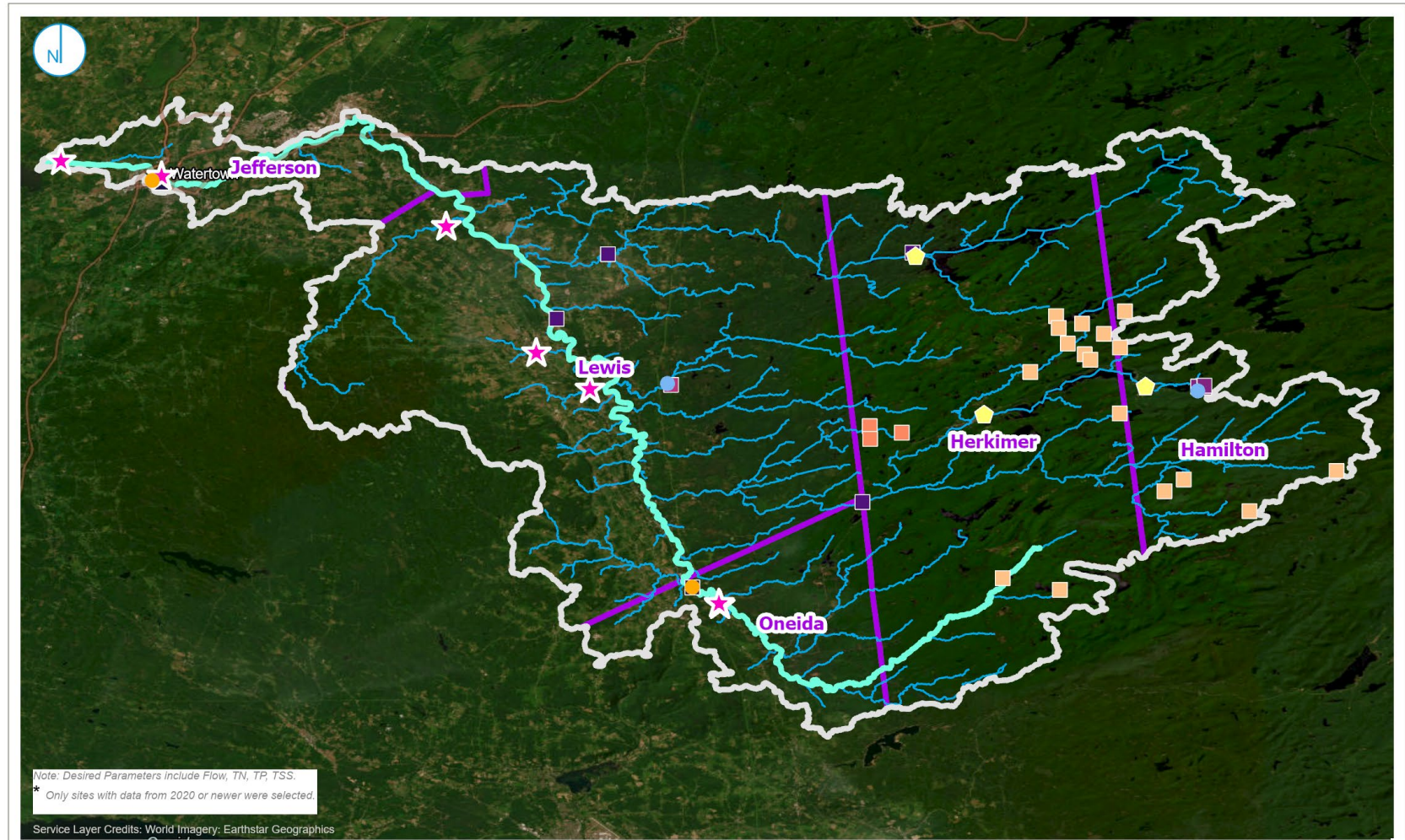
- The majority of anthropogenic (developed or agricultural) land is in the western portion of the watershed
- The Tug Hill Plateau, Adirondack Mountains, and valley in between these two regions have very different slopes, temperatures, and other characteristics
- Modeling will require several points of calibration and testing



# Findings and Data Gap Identification

## Gap:

- Additional stream monitoring locations in Jefferson and Lewis Counties
- Expanded monitoring at all locations to collect desired parameters
  - Desired parameters: flow, total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS)



## BLACK RIVER ADAPTIVE MODELING CURRENT STREAM MONITORING AND POTENTIAL STREAM MONITORING LOCATIONS



FIGURE 4

RAMBOLL US CONSULTING, INC.  
A RAMBOLL COMPANY



# Findings and Data Gap Identification

## *Gap:*

- Total suspended solids (TSS) monitoring
- Of the 34 USGS stream and lake monitoring sites, only 3 monitored for TSS. Although TSS is not required to create a basic SWAT model, the data are required in order to consider sediment as a pollutant of focus in the Nine Element Plan.

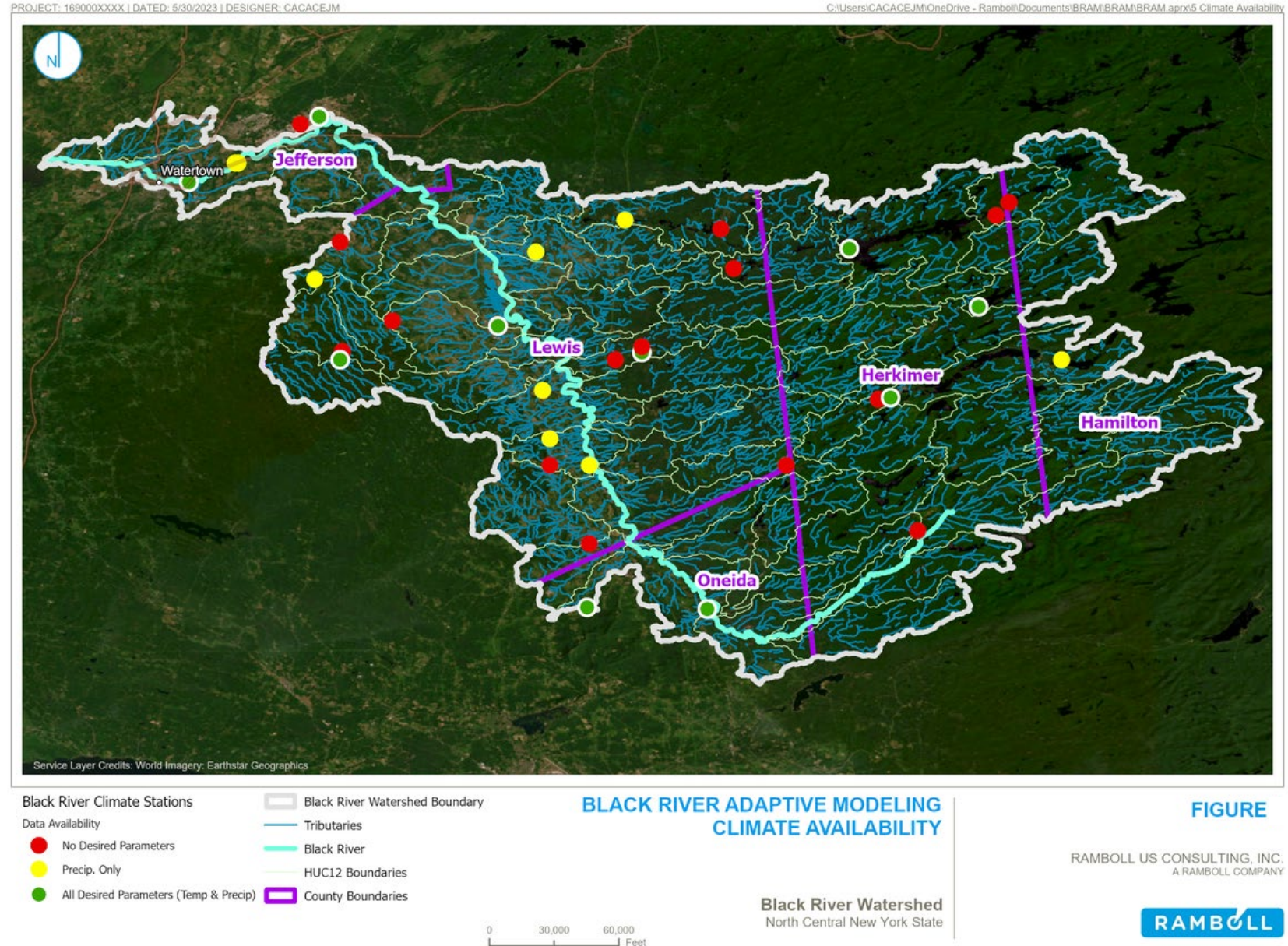


*Black River, Watertown, NY*

# Findings and Data Gap Identification

## Finding:

- Climate data are sufficient for future modeling
- 10 NOAA NCEI climate stations track the required parameters of maximum temperature, minimum temperature, and precipitation



# Thank you!

- Next Steps:
  - Additional water quality monitoring
  - Support BRAM Phase II efforts
- Questions?

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*Arrowhead Park, Inlet*