

FINAL



June 2020

St. Lawrence River Watershed Characterization Report

Prepared for Franklin County Soil & Water Conservation District

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ABBREVIATIONS

APA	Adirondack Park Agency
APIPP	Adirondack Park Invasive Plant Program
CAFO	Concentrated Animal Feeding Operation
CAIR	Clean Air Interstate Rule
CCE	Cornell Cooperative Extension
CEC	Contaminant of Emerging Concern
CSO	Combined sewer overflow
DANC	Development Authority of the North Country
FEMA	Federal Emergency Management Agency
FCSWCD	Franklin County Soil & Water Conservation District
GLAM	Great Lakes-St. Lawrence River Adaptive Management
HUC	Hydrologic Unit Code
IJC	International Joint Commission
LCLGRPB	Lake Champlain-Lake George Regional Planning Board
MGD	Million Gallons per Day
NASS	National Agricultural Statistics Service
NFHP	National Fish Habitat Partnership
NO _x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NYSDAM	New York State Department of Agriculture & Markets
NYSDEC	New York State Department of Environmental Conservation
NYNHP	New York Natural Heritage Program
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
NYPA	New York Power Authority
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
OPRHP	Office of Parks, Recreation, & Historic Preservation
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
PRISM	Partnership for Regional Invasive Species Management
PWL	Priority Waterbodies List
REDI	Resiliency & Economic Development Initiative
SLELO	St. Lawrence-Eastern Lake Ontario
SLRWP	St. Lawrence River Watershed Project, Inc.
SO ₂	Sulfur Dioxide
SRMT	St. Regis Mohawk Tribe
SPDES	State Pollution Discharge Elimination System
SUNY	State University of New York
SWCD	Soil and Water Conservation District

TMDL	Total Maximum Daily Load
USACOE	US Army Corp of Engineers
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFWS	US Fish & Wildlife Service
USGS	US Geological Survey
VOCs	Volatile Organic Carbons
WAC	Watershed Advisory Committee
WI	Waterbody Inventory
WRP	Watershed Revitalization Plan
WWTP	Wastewater Treatment Plant

1 Introduction

The St. Lawrence River watershed is the largest drainage basin in New York State, encompassing 5,600 square miles in northern New York (**Map 1**). In 2018, the St. Lawrence River Watershed Project (SLRWP) Inc. and the Franklin County Soil & Water Conservation District (FCSWCD) launched a watershed planning effort with funds from the New York State Department of State (NYSDOS) Local Waterfront Revitalization Program. This Watershed Characterization Report has been developed as a component of the St. Lawrence River Watershed Revitalization Plan (WRP), scheduled for completion in 2020.

The St. Lawrence River Watershed Revitalization Plan will address a series of questions:

1. *Where are we now?* That is, what is the current status of the natural, cultural, and political environment within the watershed? What are the assets, existing problems, and emerging threats and opportunities?
2. *Where are we going?* What processes and programs are in place that will affect the future of the watershed?
3. *Where do we want to be?* What is the community's vision for the future of the watershed? What desirable conditions or attributes of the watershed should be enhanced, and what undesirable conditions should be minimized or eliminated?
4. *How do we get there?* What strategic actions will enable the community to achieve the goals and vision? What specific practices and projects will help restore and protect the watershed and how can funds be leveraged?
5. *When will we get there?* When will the recommended projects be advanced, and how will the priority actions be decided?
6. *How do we measure progress?* What is the plan for tracking improvement and deciding what else needs to be done?

This Watershed Characterization Report documents current conditions and trends in the watershed, providing data and information needed to address the first two questions above. Water quality is linked to conditions throughout the watershed, including its landscape (geography, soils, hydrology, habitat, and climate), land use (settlement patterns, impervious surfaces, industry and agriculture centers, and waste management practices), and conditions that alter the natural state of the land. This characterization of the environmental conditions and human activities that affect the St. Lawrence River watershed will provide a basis for recommending long-term protection and restoration strategies for the watershed.

2 Overview of the Watershed

A watershed is the land that drains, or sheds, its water to a defined receiving water, such as a wetland, river, lake, coastal embayment, or ocean. The St. Lawrence River serves as the natural outlet for the Great Lakes to the Atlantic Ocean via the St. Lawrence River and Seaway. The St. Lawrence River ultimately receives runoff that originated across nearly 300,000 square miles; the watershed encompasses all the lands draining to the Great Lakes and flowing from Lake Ontario as well as the northern and western Adirondack Mountains. The river is part of the international boundary between the United States and Canada, and its shoreline abuts the Canadian provinces of Ontario and Quebec as well as northern New York.

The focus of this report is the portion of the St. Lawrence River watershed that lies within northern New York State. This study area encompasses 5,600 square miles within the state's borders and spans eight counties, including all of St. Lawrence County, most of Franklin County, much of northern Jefferson, Lewis, Herkimer, and Hamilton counties, and small areas of western Essex and Clinton Counties. In addition to 185 miles of St. Lawrence River shoreline, New York's St. Lawrence River watershed includes 12,030 miles of freshwater rivers and streams.

Land cover in the basin is comprised of densely forested woodlands with large peatland complexes in the southern portion of the basin along the slopes of the Adirondack Mountains; and more flat, agricultural plains along the St. Lawrence at the northern side of the basin. Developed and industrial areas include Massena, Malone, Ogdensburg, Canton, Gouverneur, Clayton, and Alexandria Bay.

Much of the southern and eastern portions of the watershed lie within the Adirondack Park, designated by the blue dotted line in Map 1. The Adirondack Park Agency oversees this area to "insure optimum overall conservation, protection, preservation, development and use of the unique scenic, aesthetic, wildlife, recreational, open space, historic, ecological and natural resources of the Adirondack Park" (APA Act, 2018).

2.1 Evolution and Current Configuration of the Basin

Melting ice, glacial debris, and changing glacial topography contributed to the formation of the St. Lawrence River basin. A quarter of a million years ago, a glacier advanced southward into the Adirondack region, creeping over hills and scraping up soil and rock from the land. Ice dams formed in river valleys due to the glacial debris, dotting the landscape with hundreds of lakes and ponds as the glacier began to melt and recede. Taking the path of least resistance, northwestern Adirondack waters drained into the St. Lawrence River, which developed approximately 10,000 years ago as a result of the rebounding continent from the Last Glacial Maximum, the Wisconsin Glaciation. The Wisconsin ice reached a thickness of more than 2 miles at its maximum extent. The glacier scoured the land depositing various thicknesses of till, significantly modifying the surface hydrology, slope, and terrain. During its final retreat, ice blocked the St. Lawrence valley causing water to flood the

Lake Ontario basin at its southeastern outlet creating Glacial Lake Iroquois, about 18 miles northeast of present-day Albany. As the 2 km of ice over the St. Lawrence Valley retreated, present day Lake Ontario drained into the St. Lawrence River on its course to the Atlantic Ocean. The eastern end of Lake Ontario and the St. Lawrence Valley continue their slow rebound (currently at a rate of 12 inches per century) from the weight of the massive ice sheet (Manninen and Gauthier, 1999). The gradual change in topography is altering the landscape and changing the slope of the river channel.

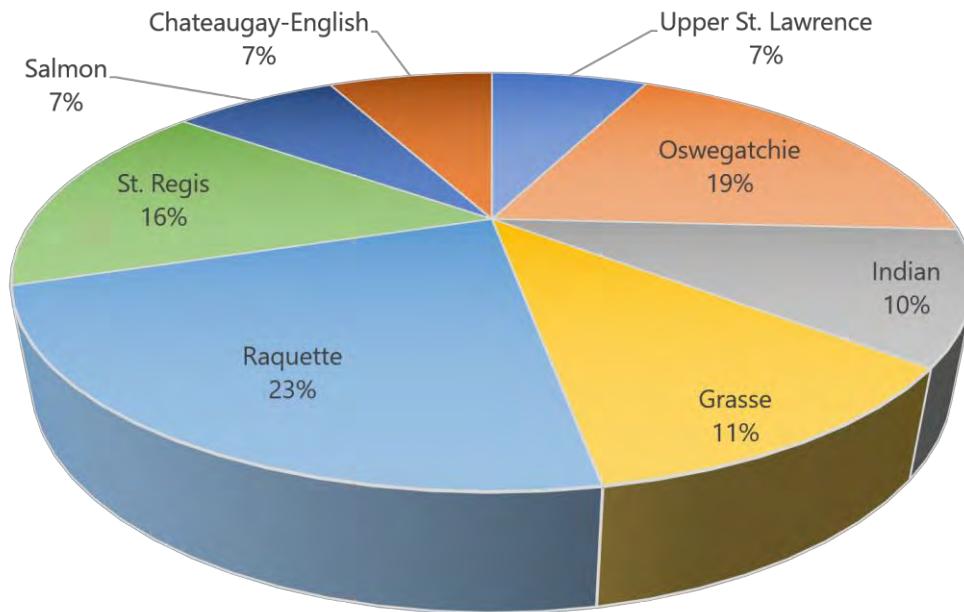
Today, New York's St. Lawrence River watershed extends from the northern and western slopes of the Adirondack Mountains at the southern end of the basin, to the plains along the St. Lawrence at the northern end of the basin. The river's headwaters are as far west as the northeast edge of Lake Ontario (cutting southeast between Watertown and Fort Drum) and as far east as Clinton and Essex Counties.

2.2 Subwatersheds

Watersheds are subdivided into smaller units that collectively contribute groundwater and surface water to larger watersheds or subbasins. Hydrologic units are used to create a baseline drainage boundary framework to account for all land and surface areas. Water basins in the United States are divided into hydrologic units identified by a unique hydrologic unit code (HUC) consisting of four to twelve digits based on six levels of classification: region (2-digit, HUC2), subregion (4-digit, or HUC4), accounting unit (6-digit, HUC6), cataloguing unit (8-digit, or HUC8), watershed (10-digit, or HUC10), and subwatershed (12-digit, or HUC12).

The St. Lawrence River is comprised of nine HUC8s, 43 HUC10 watersheds, and 180 HUC12 subwatersheds. In 2016, the US Geological Survey's (USGS) Watershed Boundary Dataset (WBD) retired the Upper St. Lawrence cataloguing unit (04150301) and subdivided it into the Headwaters St. Lawrence (04150309) and Raisin River-St. Lawrence River (04150310) (**Map 2**). However, much of the data cited and presented here was collected prior to this update and will be referenced as the Upper St. Lawrence subbasin (04150301). HUC8 codes were used to characterize and assess the areas within the St. Lawrence River watershed to better address the various environments, limitations, and needs of its respective area. **Figure 1** displays the percent of land area of the entire watershed contributed by each of the HUC8 watersheds. **Table 1** lists the HUC12 codes, waterbody names, and land areas, as well as the percent contribution of each HUC12 to their associated HUC8 subregion. Each individual HUC8 watershed and the contributing HUC12 subwatersheds are mapped. Progressing from east to west, **Map 3** displays the Upper St. Lawrence River; **Map 4** displays the Oswegatchie River; **Map 5** displays the Indian River; **Map 6** displays the Grasse River; **Map 7** displays the Raquette River; **Map 8** displays the St. Regis River; **Map 9** displays the Salmon River; and **Map 10** displays the Chateaugay-English River.

Figure 1
HUC8 Areas, St. Lawrence River Watershed



Source: 2011 CDL-NLCD Hybrid Land Cover dataset.

Table 1
Hydrologic Units and Area within the St. Lawrence River Watershed

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
Upper St. Lawrence (04150301)	041503010101	French Creek	28.1	7.2
	041503010102	Wheeler Creek-Frontal Saint Lawrence River	35.9	9.2
	041503010103	Mullet Creek	26.1	6.7
	041503010104	Cranberry Creek-Frontal Saint Lawrence River	35.2	9.0
	041503010105	Crooked Creek-Cranberry Creek-Frontal Saint Lawrence River	20.1	5.1
	041503010106	Chippewa Creek	38.6	9.9
	041503010107	City of Morristown-Frontal Saint Lawrence River	31.1	7.9
	041503010201	Tibbits Creek	17.7	4.5
	041503010202	Whitehouse Bay-Frontal Saint Lawrence River	29.0	7.4

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
	041503010203	Little Sucker Brook-Sucker Brook	46.2	11.8
	041503010204	Brandy Brook	36.3	9.3
	041503010205	Coles Creek-Frontal Saint Lawrence River	22.1	5.6
	041503010301	Dodge Creek-Frontal Saint Lawrence River	23.2	5.9
	041503010302	Raquette Creek-Frontal Saint Lawrence River	2.3	0.6
		SUBTOTAL- Upper St. Lawrence	391.9	
Oswegatchie (04150302)	041503020101	Robinson River-Oswegatchie River	48.3	4.6
	041503020102	Buck Brook-Oswegatchie River	26.5	2.5
	041503020103	Cranberry Lake-Oswegatchie River	67.6	6.4
	041503020201	Tamarack Creek	14.5	1.4
	041503020202	Upper Little River	31.9	3.0
	041503020203	Lower Little River	27.5	2.6
	041503020301	Sand Lake Outlet-Middle Branch Oswegatchie River	26.2	2.5
	041503020302	Wolf Creek-Middle Branch Oswegatchie River	48.7	4.6
	041503020303	Fish Creek	17.4	1.7
	041503020304	Browns Creek-Middle Branch Oswegatchie River	23.3	2.2
	041503020401	Headwaters West Branch Oswegatchie River	25.8	2.5
	041503020402	Blanchard Creek-West Branch Oswegatchie River	41.2	3.9
	041503020501	Jenny Creek	17.2	1.6
	041503020502	Big Creek	35.3	3.4
	041503020503	Meadow Brook-West Branch Oswegatchie River	21.2	2.0
	041503020504	West Branch Oswegatchie River	37.5	3.6
	041503020601	Peavine Creek-Oswegatchie River	46.7	4.5
	041503020602	Stammer Creek	21.5	2.0
	041503020603	Welch Creek-Oswegatchie River	30.5	2.9
	041503020604	Pork Creek-Oswegatchie River	16.2	1.5
	041503020701	Sawyer Creek	31.5	3.0
	041503020702	Hawkins Creek-Matoon Creek	32.3	3.1
	041503020801	Turnpike Creek-Oswegatchie River	29.0	2.8

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
	041503020802	Malterna Creek-Oswegatchie River	33.7	3.2
	041503020803	Boland Creek	33.9	3.2
	041503020804	Vrooman Creek-Oswegatchie River	45.0	4.3
	041503020901	Anderson Creek-Oswegatchie River	31.1	3.0
	041503020902	Indian Creek	38.6	3.7
	041503020903	Beaver Creek	47.3	4.5
	041503020904	Barter Creek-Oswegatchie River	29.8	2.8
	041503021001	Town of Flackville-Lisbon Creek	23.9	2.3
	041503021002	Village of Heuvelton-Oswegatchie River	17.9	1.7
	041503021003	Oswegatchie River	30.8	2.9
		SUBTOTAL- Oswegatchie	1050.1	
Indian (04150303)	041503030101	Weatherhead Creek-Indian River	37.9	6.7
	041503030102	Bonaparte Creek	23.0	4.1
	041503030103	Blanchard Creek-Indian River	34.0	6.0
	041503030201	Rockwell Creek-Indian River	51.3	9.1
	041503030202	West Branch Black Creek	23.4	4.2
	041503030203	Buck Creek-Black Creek	22.8	4.1
	041503030204	Beaver Meadows Creek-Black Creek	16.1	2.9
	041503030205	Hunter Creek-Indian River	21.6	3.8
	041503030301	West Creek	31.8	5.7
	041503030302	Otter Creek	24.4	4.3
	041503030303	Trout Brook-Indian River	28.9	5.1
	041503030401	Soapstone Creek-Indian River	19.7	3.5
	041503030402	Muskellunge Lake-Indian River	23.9	4.2
	041503030403	Bostwick Creek-Indian River	30.9	5.5
	041503030501	Jewett Creek	19.1	3.4
	041503030502	Butterfield Lake-Black Creek	17.9	3.2
	041503030503	Birch Creek	24.8	4.4
	041503030504	Fish Creek	36.1	6.4
	041503030505	Black Creek-Black Lake	74.9	13.3
		SUBTOTAL-Indian	562.5	
Grasse (04150304)	041503040101	Dead Creek	24.4	3.9
	041503040102	Massawepie Lake-South Branch Grasse River	52.7	8.3

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
	041503040201	Pleasant Lake Stream-Middle Branch Grasse River	31.9	5.0
	041503040202	South Branch Grasse River	62.6	9.9
	041503040203	North Branch Grasse River	61.2	9.7
	041503040204	Deerskin Creek-Middle Branch Grasse River	40.3	6.4
	041503040301	Grannis Brook	35.3	5.6
	041503040302	Van Rensselaer Creek-Little River	46.7	7.4
	041503040303	Tracy Brook-Little River	17.7	2.8
	041503040401	Tanner Creek	38.1	6.0
	041503040402	Elm Creek	41.1	6.5
	041503040403	Plumb Brook-Grasse River	60.9	9.6
	041503040404	Nettle Creek	16.4	2.6
	041503040405	Line Creek	17.6	2.8
	041503040406	Harrison Creek-Grasse River	29.1	4.6
	041503040501	Town of Madrid-Grasse River	27.8	4.4
	041503040502	McConnell Creek-Grasse River	29.2	4.6
		SUBTOTAL-Grasse	633.0	
Raquette (04150305)	041503050101	South Inlet	32.6	2.6
	041503050102	Marion River	33.3	2.6
	041503050103	Raquette Lake	61.8	4.9
	041503050104	Moose Pond	26.5	2.1
	041503050105	Forked Lake-Raquette River	37.6	3.0
	041503050201	Upper Cold River	40.2	3.2
	041503050202	Ermine Brook-Moose Creek	15.3	1.2
	041503050203	Lower Cold River	30.1	2.4
	041503050301	Salmon River	21.8	1.7
	041503050302	Big Brook	40.4	3.2
	041503050303	Raquette River-Long Lake	53.6	4.3
	041503050401	Moose Creek	19.0	1.5
	041503050402	Stony Creek	31.5	2.5
	041503050403	Palmer Brook-Raquette River	17.6	1.4
	041503050404	Follensby Pond-Raquette River	38.3	3.0
	041503050405	Bog Stream	19.9	1.6
	041503050406	Round Lake Stream	56.1	4.5
	041503050407	Bog River	56.9	4.5

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
	041503050408	Wolf Pond	20.6	1.6
	041503050409	Jenkins Brook-Tupper Lake	58.5	4.6
	041503050501	Dead Creek	22.1	1.8
	041503050502	Mountain Brook-Raquette River	35.1	2.8
	041503050503	Willis Brook-Jordan River	19.9	1.6
	041503050504	Potter Brook-Jordan River	28.0	2.2
	041503050505	Ellis Brook-Raquette River	33.8	2.7
	041503050506	Joe Indian Inlet	21.3	1.7
	041503050507	Cold Brook-Raquette River	33.7	2.7
	041503050601	Cold Brook	20.2	1.6
	041503050602	Dead Creek-Raquette River	37.3	3.0
	041503050603	Parkhurst Brook	17.3	1.4
	041503050604	Stafford Brook-Raquette River	47.1	3.7
	041503050701	Upper Trout Brook	30.0	2.4
	041503050702	Lower Trout Brook	36.8	2.9
	041503050703	Village of Potsdam-Raquette River	34.4	2.7
	041503050704	Plum Brook	43.3	3.4
	041503050705	Squeak Brook	38.1	3.0
	041503050706	Hutchins Creek-Raquette River	49.8	4.0
		SUBTOTAL-Raquette	1259.6	
St. Regis (04150306)	041503060101	Hays Brook	16.1	1.9
	041503060102	Osgood River	28.2	3.3
	041503060103	Pleasant Brook-East Branch Saint Regis River	55.7	6.5
	041503060201	Windfall Brook-West Branch Saint Regis River	52.7	6.1
	041503060202	Long Pond Outlet	42.7	5.0
	041503060203	Black Brook-West Branch Saint Regis River	24.3	2.8
	041503060204	Stony Brook	26.4	3.1
	041503060205	Alder Meadow Brook-West Branch Saint Regis River	53.5	6.2
	041503060206	Dan Wright Brook-Trout Brook	43.9	5.1
	041503060207	Tucker Brook-West Branch Saint Regis River	26.2	3.0
	041503060301	Mile Brook-Deer River	37.1	4.3
	041503060302	Trout Brook	37.3	4.3

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
	041503060303	Kingston Brook-Deer River	58.3	6.8
	041503060304	Lawrence Brook	35.2	4.1
	041503060305	Redwater Brook-Deer River	29.0	3.4
	041503060401	Headwaters Saint Regis River	35.0	4.1
	041503060402	Quebec Brook-Saint Regis River	32.8	3.8
	041503060403	Goose Pond Brook-Saint Regis River	55.1	6.4
	041503060404	Lake Ozonia Outlet	29.0	3.4
	041503060405	Long Pond-Saint Regis River	19.8	2.3
	041503060406	Hopkinton Brook	20.5	2.4
	041503060407	Miller Brook-Saint Regis River	38.1	4.4
	041503060408	Bell Brook-Saint Regis River	30.6	3.5
	041503060409	Town of Hogansburg-Saint Regis River	35.5	4.1
		SUBTOTAL-St. Regis	863.2	
Salmon (04150307)	041503070101	Hatch Brook	39.9	9.8
	041503070102	Ingraham Stream-Salmon River	62.4	15.4
	041503070103	Duane Stream	21.9	5.4
	041503070104	Winslow Brook-Salmon River	36.2	8.9
	041503070201	Headwaters Little Salmon River	15.4	3.8
	041503070202	East Branch Little Salmon River	16.6	4.1
	041503070203	Develin Brook-Little Salmon River	24.1	5.9
	041503070204	Farrington Brook	24.0	5.9
	041503070205	Town of Bombay-Little Salmon River	20.2	5.0
	041503070301	Branch Brook	19.1	4.7
	041503070302	Plum Brook-Salmon River	30.3	7.5
	041503070303	East Branch Deer Creek	24.7	6.1
	041503070304	West Branch Deer Creek	33.4	8.2
	041503070305	Pike Creek	28.0	6.9
	041503070306	Town of Fort Covington-Salmon River	9.4	2.3
		SUBTOTAL-Salmon	405.6	
Chateaugay- English (04150308)	041503080101	Middle Kiln Brook	30.1	7.3
	041503080102	Separator Brook	15.0	3.6
	041503080103	Mountain Pond Stream-Upper Chateaugay Lake	36.1	8.8
	041503080104	Bailey Brook-Chateaugay River	37.2	9.0
	041503080201	Marble River	33.3	8.1

HUC8	HUC12	Name HUC12 Watershed	Area (square miles)	% of HUC8
	041503080202	Hinchinbrook Brook	19.9	4.8
	041503080203	Collins Brook	8.3	2.0
	041503080204	Allen Brook-Chateaugay River	15.4	3.7
	041503080205	Beaver Pond Brook-Chateaugay River	19.2	4.7
	041503080301	Collins Brook-Trout River	57.6	14.0
	041503080302	Little Trout River	40.0	9.7
	041503080303	Briggs Creek	14.7	3.6
	041503080304	Town of Trout River-Trout River	8.9	2.2
	041503080401	Crystal Creek	14.5	3.5
	041503080402	Taylor Brook-English River	26.8	6.5
	041503080403	Allen Brook	5.5	1.3
	041503080404	Kellas Creek-English River	9.9	2.4
	041503080406	Ruisseau Norton	2.7	0.7
	041503080501	Ruisseau Noir	11.2	2.7
	041503080502	Riviere aux Outardes Est	3.2	0.8
	041503080503	Riviere aux Outardes	2.0	0.5
		SUBTOTAL- Chateaugay-English	411.6	
		GRAND TOTAL- St. Lawrence River Watershed Study Area	5,577.7	

SOURCE: 2011 CDL-NLCD Hybrid Land Cover dataset.

2.3 Settlement and Development in the Watershed

The St. Lawrence River basin is home to the Mohawks of the Iroquois Confederation, who call the river *Kaniatarowanenneh*, meaning “big waterway.” Original Mohawk territory extended from Schoharie Creek upriver to East Canada Creek. Today, the St. Regis Mohawk Reservation at Akwesasne covers 19,000 acres on the southern side of US-Canada border in Franklin and St. Lawrence Counties at the confluence of the St. Regis, St. Lawrence, and Raquette rivers. Their territory extends from Massena to Malone and across the St. Lawrence River from Cornwall, Ontario. As of 2016, there are approximately 15,900 members in the Saint Regis Mohawk Tribe (SRMT) (Saint Regis Mohawk Tribe, 2016). The SRMT is the only Mohawk community officially recognized by the United States; the Tribe administers its own environmental, social, policing, economic, health, and educational programs, policies, laws, and regulations. Today, Mohawk people have integrated historical culture, practices, and knowledge from centuries-old ways of living into their everyday lives. Traditional ecological knowledge, a term to describe Indigenous knowledge that has been passed down through generations to explain their place in the natural world, is important to the development and understanding of SRMT environmental management. Due to the Tribe’s historical reliance on natural resources, it is imperative that the environment remains healthy and safe for

continued cultural practices. This knowledge and appreciation for the St. Lawrence River and its connecting water systems is an important element in local and regional management decisions.

The St. Lawrence River valley became a popular settlement location driven by its access to Lake Ontario and its tributaries which provided fishing and hunting opportunities, as well as efficient travel for trade, diplomatic, and military purposes. Settlers of European descent began to flock to upstate New York after the War of 1812, drawn by the “curative” properties of sulfur mineral springs located on the Raquette River, which became the basis of the local economy. During the late 19th century, the Irish and French Canadians built settlements southeast of Massena and along the Franklin and St. Lawrence County border, respectively. Wealth in this region was primarily derived from mining, farming, and logging. Lead, iron, tremolite, zinc, feldspar, talc, and marble were mined from the land, leaving disturbed ground cover, open pits, and ruins. Today, marble, zinc, and tremolite mining is still integral to the towns of Fowler, Pierrepont, and Ogdensburg.

In 1902, the Massena Power Canal was constructed, allowing for an abundant hydroelectric energy supply in the area, which in turn drew more industry to the region (e.g., Pittsburgh Reduction Company, an aluminum producer). In the late 1950s, FDR’s Power Project brought additional low-cost electricity to the area followed by new industries in Massena, such as Reynolds Metals Company and General Motors.

The St. Lawrence Seaway opened in April 1959, allowing transatlantic trade and access for ocean vessels as well as commercial and recreational boaters to the Great Lakes. The Seaway System has been integral not only to local economies but to the US economy as a whole, generating more than \$4.3 billion in personal income, \$3.4 billion in transportation-related business revenue, and \$1.3 billion in federal, state, and local taxes (IJC 2014). In addition to commercial goods, dominant commodities shipped along the St. Lawrence Seaway include iron ore for the steel industry, coal for power generation, and limestone for construction and steel industries.

The waters of the St. Lawrence River watershed have various designated use dependent on their water quality. Some waters are used as a source of drinking water, while others are primarily for recreation and aquatic life. The watershed’s mix of abundant surface water, rugged peaks, rolling hills, expansive wetlands, and flat plains makes it a major destination for scenic viewing, hiking, fishing, kayaking, boating, snowmobiling and other recreational pursuits. Fifty percent of lakes have been identified as having poor water quality (NYSDEC 2016a). This is in part due to atmospheric deposition of pollutants (acid and mercury) originating outside the basin. In addition, the growth of agriculture and industry in the region since the 19th century has also had a lasting adverse impact on water quality in the watershed. In the late 1900s and early 2000s, The Great Lakes Area of Concern at Massena/Akwesasne and Superfund sites were established at Grasse River in Massena, NY (Alcoa, Inc.), the St. Lawrence River in Massena, NY (General Motors), and at Sealand Restoration, Inc. (disposal facility) in Lisbon, NY, where industrial activity had contaminated sediments and

groundwater with polychlorinated biphenyls (PCBs), volatile organic carbons (VOCs), and polycyclic aromatic hydrocarbons (PAHs). Owners of the facilities have taken responsibility for the contamination and are collaborating with Federal and State organizations to remediate legacy pollutants and restore impaired habitats.

Today, citizens of the St. Lawrence River watershed are proactively working toward reducing pollution and revitalizing their community by partnering with organizations and agencies to protect and restore valuable water resources. Taking action to improve and protect water quality will allow communities and economies to thrive and enjoy a sustainable future for years to come.

2.4 Existing Plans and Initiatives Related to Water Resources in the Study Area

Appendix A provides an overview of the institutional framework for local laws, programs, and practices affecting water quality in the watershed, as well as an assessment of the ability of local laws and programs to implement best management practices that would protect water quality.

Several federal and state regulatory and advisory programs are already in place to advance watershed planning within the St. Lawrence River watershed. Examples include:

- Great Lakes Focus
 - » Lake Ontario Lakewide Action and Management Plan (2018-2022)
 - » Great Lakes St. Lawrence Seaway Study (2007)
 - » New York's Great Lakes Basin: Interim Action Agenda (Ongoing effort)
 - » Great Lakes Water Quality Agreement (1972, 1983, 1987, 2012)
 - » Great Lakes Restoration Initiative (2010) and Action Plans (2010, 2014, 2019)
 - » Healthy Fishing Communities Project: Great Lakes Biomonitoring
 - » Resiliency & Economic Development Initiative (2019)
- NY Statewide Plans of Interest
 - » New York State Riparian Opportunity Assessment (January 2018)
 - » New York State Invasive Species Comprehensive Management Plan (Nov 2018)
 - » New York State Wildlife Action Plan (September 2015)
 - » New York State Hazard Mitigation Plan (2018)
- IJC Climate-Related Plans and Guidance
 - » Lake Ontario – St. Lawrence River Plan (2014)
 - » Climate Change Guidance Framework for IJC Boards, A Highlights Report (2018)
- Akwesasne Climate Change Adaptation Plan (2013)
- Subwatershed Research
 - » Watershed Protection of the St. Lawrence – Raquette River Watershed with Special Consideration to Large Wetlands and Large Landownership; Part One: The St. Regis River Basin

- » St. Regis Chain Limnology and Water Quality Report (2017)
- » Blue Mountain Lake Watershed Monitoring Program (2016)
- » Salmon River Watershed Management Plan, Phase I (2016)
- » Adirondack Lake Assessment Program (ALAP)
- Local Watershed Plans and Initiatives
 - » Town and Village of Alexandria Bay LWRP (Draft, 2019)
 - » Town of Cape Vincent (1988, Update in Progress)
 - » Town and Village of Clayton (July 2013)
 - » Town of Essex (2003)
 - » Town and Village of Malone (2012)
 - » Town and Village of Morristown LWRP (1991)
 - » City of Ogdensburg LWRP (1987)
 - » Town and Village of Waddington LWRP (1991)
 - » Canton-Grasse River Waterfront Revitalization Plan (March 2018)
 - » Tupper Lake Local Waterfront Revitalization Strategy
 - » Tupper Lake LWRP (In Progress)
 - » Grasse River Blueway Trail Plan (Draft, 2018)
 - » Town of Indian Lake – Waterfront Access Strategy (Awarded 2018)
 - » Massena Brownfield Opportunity Area Revitalization Plan (2017)
 - » Village of Massena Local Waterfront Revitalization Plan (In Progress)
- Adirondack Forest Preserve Unit Management Plans
 - » St. Lawrence Foothills (2015)
 - » Cranberry Lake Wild Forest (1984)
 - » Debar Mountain Wild Forest (2017)

The monitoring programs and watershed management plans provide key data and insights to inform the analysis of water quality and the environmental setting. The local watershed management plans, although specific to their locality, also address similar critical issues facing the St. Lawrence River watershed.

In response to an extended pattern of flooding along the shores of Lake Ontario and the St. Lawrence River, in 2019 Governor Andrew Cuomo commissioned the Resiliency & Economic Development Initiative (REDI) to address the immediate and long-term resiliency needs of these areas while also enhancing economic development opportunities and health of the lake. This multiagency task force is charged with developing a plan to harden infrastructure in flood prone regions along Lake Ontario's waterfront while strengthening the region's local economies, which are heavily dependent on summer tourism. The Commission pledged \$300 million toward projects.

The REDI region encompassed eight counties along shorelines of Lake Ontario and the St. Lawrence River including Jefferson and St. Lawrence counties. Most of the river's shoreline lies within these two counties. While each region has a unique strategic plan and set of goals, there are common themes that relate directly to the priorities and approach of the watershed planning process currently underway:

- commitment to a regional approach to identifying challenges and finding solutions;
- recognition of the need to invest in infrastructure;
- an embrace of smart growth concepts;
- reclamation of waterfront assets for community and economic development;
- recognition of the need to strengthen the effectiveness of government and civic institutions in order to improve the quality of life for all.

In October 2019, Governor Cuomo announced that St. Lawrence and Jefferson Counties would be allotted \$50 million for 38 projects to advance REDI. The REDI Commission allocated \$20 million for homeowner assistance, \$30 million to improve the resiliency of businesses, and \$15 million toward a regional dredging effort to maintain navigation channels in harbors and bays along Lake Ontario and the St. Lawrence River. The remaining balance of \$235 million was allocated across the other six shoreline counties within the REDI region (Oswego, Cayuga, Wayne, Monroe, Niagara, and Orleans) towards local and regional projects that target at-risk assets such as critical water and wastewater infrastructure, public health and safety, and marinas and harbors. Selected projects emphasize incorporating nature-based features and green infrastructure. Projects selected by the REDI commission can be found at <https://www.ny.gov/lake-ontario-flooding/regional-projects-selected-redi-commission#jefferson-and-st-lawrence-counties>.

3 Environmental Setting

3.1 Water Resources

Water resources within the St. Lawrence River watershed support multiple human uses, including recreation, shipping, transportation, infrastructure, tourism, agriculture, and hydroelectric power generation. In addition, the watershed supports many critical ecosystem functions including habitat, carbon sequestration, and moderating the hydrologic cycle.



Fishing in Franklin County
Photo source: saratogaphotographer.com

3.1.1 Surface Water

Nineteen percent (19%) of the area in New York's St. Lawrence River watershed is surface water (**Map 11**). In addition to 185 miles of St. Lawrence River shoreline, this includes 12,030 miles of freshwater rivers and streams. Major tributaries include the Oswegatchie River (3,590 miles), Raquette River (2,016 miles), St. Regis River (1,734), Grasse River (1,607 miles), and Indian River (1,222 miles), which drain the northwestern Adirondack Mountains and together comprise 89% of total stream and river miles in the watershed. There are 376 significant freshwater lakes, ponds, and reservoirs covering 104,125 acres, the largest being Black Lake (7,754 acres), Cranberry Lake (6,795 acres), Raquette Lake (5,194 acres), Tupper Lake (4,858 acres), and Long Lake (4,094 acres), which together account for 33% of lake acres in the watershed.

Many of the streams originate as cold headwaters in the hills of the northern Adirondack region (Oswegatchie and Raquette Rivers) and flow to the St. Lawrence River across broad flat plains of lacustrine sands, clays, and peat deposits. Waterfalls and rapids are typical features of the major tributaries as these rivers pass through the mountains along steep gradients. In many places, the potential energy of the water flow is captured by operation of hydroelectric dams.

Fifty percent of lakes in the watershed are assessed as having poor water quality (NYSDEC 2016a), 18% as good or satisfactory, and 32% lack sufficient data for assessment (NYSDEC 2018). Of the river miles, 60% remain largely unassessed; of those rivers that have been assessed, 36% are classified as exhibiting good or satisfactory water quality and 5% as exhibiting poor water quality. Details of existing water quality conditions are presented in Section 5.

3.1.2 Groundwater

The water stored underground in the cracks and spaces in soil, sand, and rock constitutes a large unseen reservoir of water. In addition to human use, groundwater helps maintain flows in streams and wetlands during dry periods, supporting significant ecosystem functions. The Chateaugay Transboundary Aquifer, a semi-confined aquifer, is located along the St. Lawrence Lowlands and the Adirondack Mountains. This system is composed mainly of a sedimentary rock overlain by till and clay. Aquifer recharge occurs primarily in a north-northeast direction with a storage capacity of 37.5 km³ in the U.S. and 1,250 km³ in Canada.

Groundwater is an important source of drinking water, especially for the rural populations typical of the St. Lawrence River Basin. Primary aquifers are illustrated in **Map 11**. The 305(b) Ambient Groundwater Quality Monitoring project is an ongoing cooperation between USGS and NYSDEC DOW to characterize naturally occurring, or background, conditions, and identify long-term trends in groundwater quality. Two or three of the 14 major hydrologic basins of NYS are evaluated each year. The St. Lawrence River Basin was most recently evaluated in 2010 and 2015 (Nystrom, 2012; Scott, Nystrom, & Reddy, 2019).

Recent results indicate that groundwater in the St. Lawrence River Basin is generally of good quality, although some constituents sometimes approached or exceeded primary, secondary, or proposed drinking-water standards. Groundwater is typically hard and neutral to slightly basic. Bicarbonate, sulfate, and calcium are the major ions and exhibit the highest median concentrations; the dominant nutrient is nitrate. Trace elements strontium, iron, barium, and boron are present at the highest median concentrations. Radon-222 was detected in concentrations exceeding drinking-water standards in 14 of 21 samples (Scott, Nystrom, & Reddy, 2019), samples with the greatest radon activities originated from bedrock wells. Five of twenty samples exceeded NYS drinking-water standards for bacteria (Nystrom, 2012). Trace levels of six herbicides and one pesticide were detected in over 50% of sampled wells (Nystrom, 2012).

3.1.3 Wetlands

Wetlands are sensitive, productive ecosystems that provide important ecosystem functions including flood storage, filtration, and shoreline erosion protection as well as providing habitat for fish and wildlife. Hydrology varies seasonally and episodically in wetlands due to periodic inundation and saturation of soils. These unique areas support distinctive vegetation adapted to absorb the forces of flooding and erosion. Freshwater Wetlands are protected under Article 24 of the Environmental Conservation Law of NYS. NYSDEC maps and regulates all freshwater wetlands greater than 12.4 acres and requires permits for certain activities within 100 ft of their boundary.



Indian Creek Nature Center, Rensselaer Falls. Photo Source: <https://indiancreeknaturecenter.us/>

Wetlands are delineated in **Map 12**. The St. Regis watershed has 84,000 acres classified as wetlands representing 15% of the total land area. Other areas with significant wetlands include the Oswegatchie (81,000 acres, 12%), and the Raquette (71,000 acres, 9%). Wetlands are threatened by encroachment for residential use, pollution, eutrophication, and alterations in hydrology that can convert them to uplands. Water level management and its effects on wetland soil characteristics plays an important role in contaminant bioavailability and transport. A recent study by Brahmstedt *et al.* (2019) suggests that new water level management plans of the Great Lakes-St. Lawrence River could result in greater transformation and bioavailability of methylmercury in wetland soils of the Upper St. Lawrence River watershed.

3.1.4 Precipitation Patterns and Flooding

The St. Lawrence River watershed is characterized by long, frigid winters and short, relatively cool summers. Precipitation averages around 35 inches per year in the valley and lowlands and around 45 inches per year in the uplands (National Climatic Data Center, data from 1981-2010, Arguez *et al.*, 2010) (**Map 13**), largely dependent on elevation (**Map 14**). This rate is among the highest annual precipitation rates in New York State. The most precipitation occurs at the southeastern edges of the Raquette subbasin and southern edge of the Oswegatchie subbasin, with the lowest precipitation rates concentrated on areas adjacent to the St. Lawrence River. At the subwatershed level, the mean

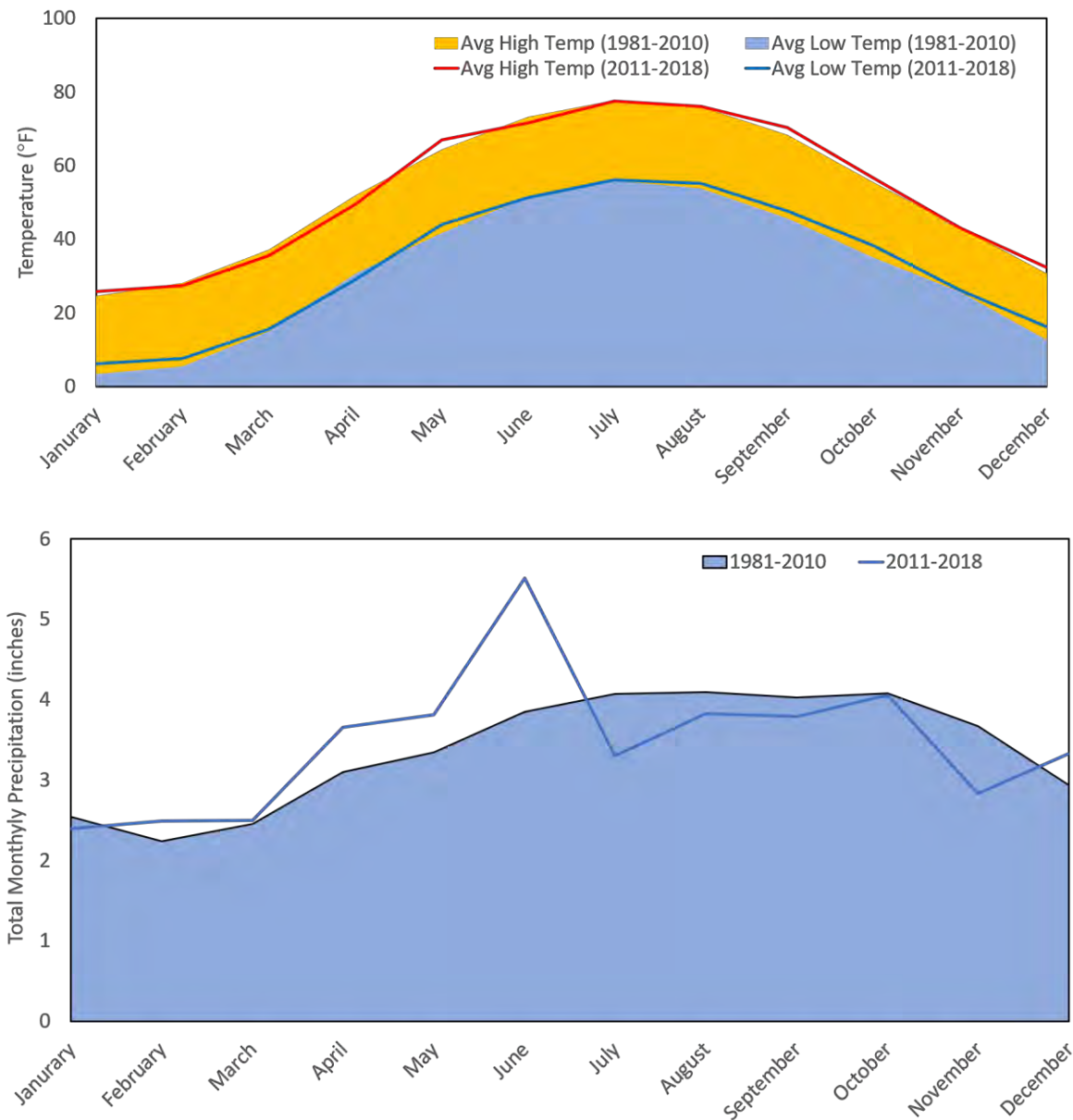
annual precipitation varies from a low of 37.6 inches in the Upper St. Lawrence to 43.9 inches in the Raquette (US EPA, Average Annual Precipitation 1981–2010). The National Oceanic and Atmospheric Administration (NOAA) calculates climate ‘normals’ by averaging over a recent 30-year period. The most recent averages are reported for the period from 1981–2010. NOAA operates seven climate monitoring stations throughout NY portion of the St. Lawrence watershed to continuously measure temperature and precipitation. Annual and seasonal normals collected by these stations are listed in **Table 2**. The watershed has a fairly consistent distribution of precipitation throughout the year, although most areas experience slightly higher precipitation rates (approximately 3.5–4.5 inches/month) in autumn and lower rates in the winter (approximately 2–3 inches/month) according to NOAA climatic normals from 1981–2010 (Arguez *et al.* 2010). Snowfall averages increase with elevation; highlands see upward of 100 inches of snowfall annually. It is typical for snowpack to persist in the Adirondacks well into March. The additional snowpack can be rapidly melted by warm spring rains, contributing to the potential for flooding and episodes of significant runoff.

Table 2
Climate Normals, 1981-2010

Climate Monitoring Station	Elevation	Average Temperature (°F)		Precipitation (inches)	
		Winter	Summer	Annual Average	Annual Average Snowfall
Wanakena Ranger School	460.2	19.8	66	44.18	114.2
Malone, NY	268.2	17.2	65.4	38.86	95.3
Canton 4SE, NY	136.6	19.4	66.6	37.34	79.6
Colton 2 N, NY	176.8			42.45	
Gouverneur 3 NW, NY	128	18.2	65.6	37.61	85.2
Tupper Lake Sunmount, NY	512.1	17.1	63.2	44.82	
Massena International Airport, NY	65.2	18.1	66.6	34.96	69.4

SOURCE: Annual/Seasonal Normals, 1981–2010, NOAA Climatic Data

Figure 2
Climate Patterns, Past and Present



Source: Annual/Seasonal Normals, 1981-2010, NOAA Climatic Data; U.S. Climate Data, 2011-2018, usclimatedata.com

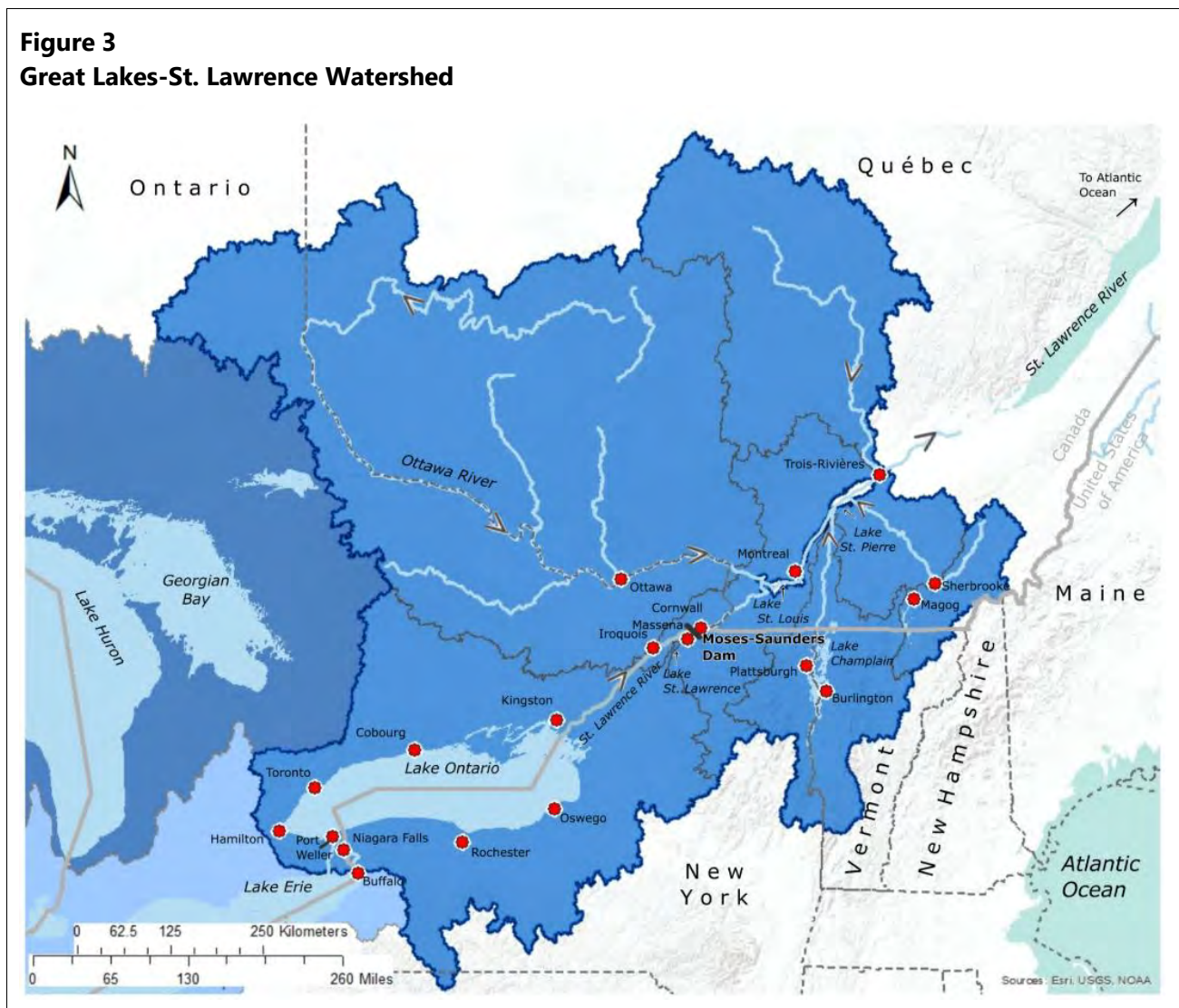
Note: Data averaged from Malone, Tupper Lake, and Gouverneur NOAA climatic stations based on available monthly data.

Figure 2 compares monthly temperature and precipitation averages from monthly averages from years 1981-2010 (filled in area) and 2011-2018 (lines). The most recent years following the last 30-year climate normal assessments (1981-2010) have similar temperature patterns, with little variation in average high and low monthly temperatures. In contrast, precipitation differences between 1981-2010 and 2011-2018 precipitation totals are evident; most notably in increased rainfall during spring and early summer. The 4th National Climate Assessment projects that precipitation in the Northeast

will increase 5-20%, with much of that increased precipitation delivered through heavy rain events. In addition, the frequency, intensity, and duration of heat waves is expected to increase making the northeast more susceptible to drought (Melillo *et al.*, 2014).

The uptick in spring precipitation and resultant snowmelt has affected flooding within the St. Lawrence River watershed, which has become more devastating in recent years. Flooding occurs when intense or continuous rainfall exceeds the soil's absorptive capacity and channel capacity of local rivers and streams. Flooding along the St. Lawrence River is difficult to address as the Great Lakes-St. Lawrence Watershed receives inflow from a vast area that includes multiple jurisdictions and encompasses transboundary waters (**Figure 3**). Flooding and water-level management are discussed further in **Section 7.2**.

Figure 3
Great Lakes-St. Lawrence Watershed



Source: IJC, International Lake Ontario-St. Lawrence River Board (2019), <https://ijc.org/en/loslr/b>.

Floodplains are mapped as low elevation areas adjacent to streams, rivers, and lakes that are prone to periodic flooding. In natural areas, floodplains typically support diverse a diverse assemblage of upland and wetland biota and provide groundwater recharge. Flood Insurance Rate Maps were sourced from the Federal Emergency Management Agency (FEMA) to determine the locations of floodplains within the watershed (**Map 15**). However, floodplain maps are not available across much of the St. Lawrence River watershed. Other factors such as slopes, soil types, and hydrologic characteristics must be used to delineate areas at risk of flooding.

3.2 Topography and Geology

In general, topography can be described as mountainous terrain in the southwestern area with lowland, agricultural plains lying inland from the St. Lawrence River within the eastern and northern region of the watershed. Defining ridgelines of the western Adirondack mountains have the highest elevation, exceeding 4,000 ft above mean sea level, with the highest elevations found along the southeastern edge of the basin the Adirondacks. The lowest elevations are found in the northern St. Lawrence River valley.

The surficial material throughout the basin was deposited during the Last Glacial Maximum, approximately 26,500 years ago (**Map 16**). Till and kame deposits within the Adirondack region is sand-rich and of metamorphic origin. It has poorly sorted, variable texture, from boulders to silt; permeability varies with thickness and compaction of the material due to deposition from a melting ice sheet. The Upper St. Lawrence, Indian, and western portion of the Oswegatchie subbasins are dominated by lacustrine silt and clay deposits that are generally calcareous and of low permeability. Surficial deposits within the northern central and western areas of the watershed primarily consist of till, marine and lacustrine silt and clay, and sands; these materials are generally of intermediate permeability.

Bedrock geology of the St. Lawrence River watershed predominantly consists of carbonate, sandstone, crystalline and metamorphosed rocks (**Map 17**). A large band of carbonates extends from the west to east along the St. Lawrence River shoreline adjacent to a thinner band of sandstone. The plains of the Upper St. Lawrence, Indian, and Oswegatchie subbasins are a conglomerate of glacial/alluvial deposits, carbonates, crystalline and sandstone. Crystalline rocks are the most dominant bedrock within the Adirondack region with some glacial deposits, metamorphosed clastic and crystalline, and shale and carbonate bedrock spreading throughout the range.

3.3 Soils

Soils are involved in many critical functions affecting the environment and water quality; they provide habitat to plants, animals, fungi, and microbes that contribute to nutrient and carbon cycling, filter water seeping into aquifers, and moderate the supply of essential nutrients for agricultural production. Soils differ spatially based on parent material, climate, organisms present, topography,

and age. Chemical, physical, and biological properties of soil directly affect contaminant fate and transport as well as erosion potential; these factors have a major influence on water quality.

The Natural Resource Conservation Service (NRCS) classifies soils into four hydrologic soil groups (A, B, C, D) based on the soil's runoff potential. Runoff potential generally increases from Group A to D. Group A soils are typically sand, loamy sand, or sandy loam soils with high infiltration rates. Group B soils are usually silt loam or loam soils with a fine to moderately coarse texture; these soils exhibit a moderate infiltration rate when thoroughly wetted. Sandy clay loams are representative of Group C soils, which have a low infiltration rate and a moderately fine to fine structure. Group D soils are typically clay loam, silty clay loam, sandy clay, silty clay, or clay having a high runoff potential and very low infiltration rates due to high swelling potential. The hydrologic soil groups throughout the basin are shown in **Map 18**.

The western areas of the watershed along the St. Lawrence River, including the Upper St. Lawrence, Indian, and Oswegatchie subbasins, are dominated by Groups C and D soils with high runoff potential and low infiltration rates. Land areas dominated by these soil types are at greater risk of flooding. Other Group C and D soils lie along the St. Lawrence River across the northern portions of the Raisin, Raquette, St. Regis, and Salmon River subbasins. The mountainous regions within the mid-southern area of the watershed are characterized by more variable hydrologic soil classes likely due to changing topography and abundant water resources in this area.

The potential for soil erosion by runoff and raindrop impact is measured by the soil erodibility k-factor. The NRCS developed this factor to estimate soil losses based on a soil's physical and chemical characteristics; values range from 0.02-0.69. A higher k-value represents greater susceptibility of the soil to rill and sheet erosion by rainfall. Typically, soils with higher permeability are less susceptible to erosion and are classified with a lower k-value. The erosion potential for the St. Lawrence River watershed is shown in **Map 19**, with erosion potential increasing as colors darken to deeper red. The watershed has an average k-factor of 0.29 with the highest average k-factor of the subbasins in the Upper St. Lawrence. However, areas with the highest k-factor locally lie within the mountainous areas of the Adirondack State Park with steep slopes and high annual precipitation.

3.4 Habitat

Habitat condition is directly affected to landscape position, vegetative cover, and land use, as well as hydrologic and biogeochemical processes. The St. Lawrence River watershed is within the most rural area of New York State. The diverse vegetation, unique geology, and numerous waterbodies within the St. Lawrence River watershed provide habitat to terrestrial, wetland, and aquatic assemblages. The landcover map, **Map 20**, illustrates the diversity of habitats throughout the watershed. A habitat condition index was developed by the National Fish Habitat Partnership (NFHP, 2015 National Assessment) to score habitats on their likelihood of aquatic habitat degradation with a score range

of 1 for high likelihood of aquatic habitat degradation, to 5 for low likelihood of aquatic habitat degradation. This score is dependent on land use, population density, roads, dams, mines, and point-source pollution sites. The habitat condition index for the entire watershed was calculated as 4.4, suggesting that there is a low likelihood of aquatic habitat degradation.

The St. Lawrence River is home to a wide variety of warm water fish species including small- and largemouth bass, northern pike, walleye, yellow perch, bullhead, and various panfish. Streams, rivers, and lakes of the Adirondack region support both warm- and cold-water fisheries due to their diverse habitats from deep, clear waters to rushing rapids and swirling pools. Species such as Lake, Brown, Brook, and Rainbow Trout, large- and smallmouth bass, land-locked salmon, walleye, perch, northern pike, and chain pickerel can be found in these waters.



Northern Harrier
Photo Source: National Audubon Society

NY's State Wildlife Action Plan (2015) identifies endangered, threatened, and species of conservation need within the region. Some important species include the endangered blundings turtle, threatened northern harrier, threatened pugnose shiner, and northern pike. The New York Natural Heritage Program (NYNHP) aims to facilitate conservation and biodiversity by providing information and expertise on rare species and natural ecosystems within NYS. The Upper St.

Lawrence has the highest total count of at-risk species at 53, followed by the Raquette River at 48. The majority of these counts are characterized as flowering plant species; the second highest at-risk group is birds. A full list of rare, threatened, and endangered species of the St. Lawrence River watershed can be found at [New York Nature Explorer](#) (NYSDEC 2014). Invasive species are discussed in **Section 6.2**.

3.4.1 Ecological Zones

A wide range of terrestrial habitats such as forests in the Adirondack region, wetlands, and agricultural lands provide refuge for important bird, reptile, amphibian and mammal populations. These regional differences have been characterized into distinct ecological zones. Each zone, mapped in **Map 21**, represents an assemblage of interacting plant and animal populations that share a common environment. A description of the major zones follows.

Central Adirondacks. Most of this zone is within the southern half of the Raquette River subwatershed. It is characterized by boreal heath barrens, or shrubland that occurs at the outwash plains of the Adirondacks. Soils are sandy, dry, and poor in nutrients and may become seasonally flooded due to a discontinuous subsurface layer of podzolized soil that restricts infiltration rate. The area is characterized by various coniferous communities at higher elevations and mixed forests at lower elevations. A large proportion of this area is within the Forest Preserve and managed by the Adirondack Park Agency.

Champlain Transition. This zone is confined to the Chateaugay-English subbasin at its eastern end along the St. Lawrence River within Clinton County. It is characterized by a mix of perched bogs of acidic, shallow peat, heath shrubland with well-drained, sandy soils, and open canopy woodlands with very shallow acidic soils over sandstone bedrock. Jack pine and pitch pine are the dominant tree species in this zone.

Eastern Ontario Plains. This zone extends from the southwestern portions of the Upper St. Lawrence and Indian subwatersheds approximately to the St. Lawrence County line. This area consists of low elevation plains with shallow loam soils over limestone or dolostone bedrock. The natural biome supports wetlands, grasslands and shrub communities; these have now been largely replaced by agricultural pastures supporting the dairy industry. This area also exhibits alvar communities, a globally rare group of prairie-like plants found on thin mineral soils over limestone.

St. Lawrence Plains. The Upper St. Lawrence, Oswegatchie, and northern tips of the Raquette, St. Regis, and Salmon River subwatersheds fall within the St. Lawrence Plains ecozone. This area is characterized by riverside meadows with gently sloping cobble shores, sparse or patchy vegetation dominated by scrub oak or heath shrubs, and small wetland areas rich in organic matter or clay. Water levels and soil saturation fluctuate seasonally and ice from the St. Lawrence River scours the meadow, cutting back woody plants along its shoreline. The area has a cool microclimate. The forested areas are dominated by pitch pine, chestnut and red oak, red maple, American elm, and green and white ash. Grazing and other agricultural practices have altered the ecological zone.

Western Adirondack Foothills. The Western Adirondack Foothills is the dominant ecological zone of the St. Lawrence River watershed. The band extends from the southwestern edge of the Oswegatchie and stretches diagonally to the southern half of the Chateaugay-English subwatershed, traversing the bulk of the Grasse, the narrow, middle stretch of the Raquette, the southern half of the St. Regis, and the central Salmon River subwatersheds. Sandy, low fertility soils derived from glacial outwash deposits cover the foothills. The area contains many seasonally fluctuating, groundwater-fed ponds and associated wetlands typical of pine barrens. Peatlands and bogs occur along the gentle slopes of the foothills. The landscape is covered with extensive hardwood forests and supports similar communities to those found at the higher elevations of the Adirondacks.

3.4.2 Significant Habitats and Protected Areas

NYSDEC is responsible for approximately 4.5 million acres of public land, including 2.6 million acres in the Adirondack Park. After growing concerns regarding clear cutting of trees, the Adirondack Park was established and recognized in 1892 as a constitutionally protected Forever Wild area. In 1971, the Adirondack Park Agency was created to develop long-range public and private land use plans for the area. State lands fall under four classifications that determine management actions; forest preserve, state forests, wildlife management areas, and conservation easements. The Adirondack Park has 2.6 million acres in forest preserve, 15,000 acres in state forests, 4,000 acres in wildlife management areas, and 780,000 acres under conservation easement.

The Great Lakes and St. Lawrence River host many Significant Coastal Fish and Wildlife Habitats (SCFWH). SCFWHs are areas critical to the populations of fish and wildlife; they contain a unique combination of environmental and biological conditions which fish and wildlife need for survival either seasonally or year-round. Areas typically include coastal wetlands, breeding grounds, nursery areas, migratory routes, and areas of high human use of the fish and wildlife resource (Ozard, 1984). SCFWHs in the St. Lawrence River watershed are catalogued at the NYSDOS site;

<https://www.dos.ny.gov/opd/programs/consistency/scfwhabitats.html#greatlakes>.

New York State and NYNHP are working to protect select areas that are more vulnerable to ecological degradation and poor management. As a result, some areas are designated Critical Environmental Areas (CEA) or are managed by the NYNHP to enhance community resiliency and ecological integrity through restoration and protection. The Great South Woods of the Wilderness located in Colton was designated a CEA in 2003 because of its mature forests and its cultural, recreational, and educational value. CEAs are designated if they provide a significant benefit to public health, represent a natural setting or habitat, serve important agricultural, social, cultural, or historic values, or are inherently sensitive to ecological, geological, or hydrological changes.

The National Audubon Society's mission is to protect birds and the habitats they need to survive. To accomplish this, Important Bird Areas (IBA) that are critical habitats to the success of bird populations have been identified, monitored, and protected. Important Bird Areas must meet one of three criteria: an area where birds gather in large numbers at one time; a habitat for at-risk species; or an area that supports diverse habitat and bird species. The Upper St. Lawrence/Thousand Islands, Adirondack Forest Tract, Moose River Plains/Blue Ridge Area, Adirondack Loon Complex, Brasher Falls and Bombay Forests, Indian River/Black Lakes, Perch River Complex, Spring Pond Bog, Massawepsee Mire, Fort Drum, Lisbon Grasslands, and Lower St. Lawrence River areas are designated IBAs. More information on these areas can be found at the National Audubon Society website; <https://www.audubon.org/important-bird-areas/state/new-york>.

Modeled after the National Audubon Society's IBA Program, New York State's Bird Conservation Area (BCA) Program was established in 1997 to safeguard and enhance bird populations and their habitats on state lands and waters. An area of 8,700 acres in St. Lawrence County in the Towns of

Canton and DeKalb was identified as a BCA. The area is a large complex of open water surrounded by marsh, shrub, swamp, and upland forests

3.5 Land Cover

Both land cover and land use can impact water quality in a watershed. Land cover refers to how much of a region is covered by forests, wetlands, agriculture, open water, and other natural features. Land use refers to how the landscape is utilized by humans, such as for farming, conservation, residential, or commercial purposes. Land cover can function as a buffer against environmental impacts; for example, wetlands provide a buffer against flooding, woodlands buffer waterbodies from runoff, and vegetation can stabilize steep slopes prone to erosion. Land use information helps determine which types of pollutants may be present and how much could potentially be released.

Land cover within the S. Lawrence River watershed (refer to Map 20 and Table 3) is dominated by forested woodlands, encompassing roughly 59% of the total area. The Raquette River subbasin has the most acreage dedicated to forests at 619,000 acres comprising 77% of the area. The region lost about 14,000 acres of its forests from 2001 to 2011 while areas classified as wetlands increased by 350 acres during this period. Agriculture occupies about 17% (616,000 acres) of the watersheds' landscape with the remainder in wetlands (14%), open water (3%), urban development (3%), shrub/scrub (2%), and grasslands (1%).



Farming in St. Lawrence County
Photo Source: northcountrypublicradio.org

Table 3
Land Cover, St. Lawrence River Watershed

HUC8	Forest (acres)	Scrubland (acres)	Grassland (acres)	Wetlands (acres)	Urban (acres)	Agriculture (acres)
Upper St. Lawrence	89166	7145	4758	37537	18116	86806
Oswegatchie	446827	10064	4245	81473	12560	93025
Indian	177609	11313	7714	53231	15768	77481
Grasse	260231	6824	2590	48455	12460	65046
Raquette	619203	17890	3712	70860	13269	27824
St. Regis	389709	16222	3104	83969	7628	34845
Salmon	145666	4884	2194	35512	8212	59140
Chateaugay-English	140762	7355	2443	52096	5158	51759
Watershed	2108346	84789	36167	496538	110193	616731
	% Forest	% Scrubland	% Grassland	% Wetlands	% Urban	% Agriculture
Upper St. Lawrence	36	3	2	15	7	35
Oswegatchie	66	1	1	12	2	14
Indian	49	3	2	15	4	22
Grasse	64	2	1	12	3	16
Raquette	77	2	0	9	2	3
St. Regis	71	3	1	15	1	6
Salmon	56	2	1	14	3	23
Chateaugay-English	53	3	1	20	2	20
Watershed	59	2	1	14	3	17

SOURCE: 2011 CDL-NLCD Hybrid Land Cover dataset.

The riparian zone of a landscape influences the water quality within, and downstream from, surrounding waterbodies. Identifying riparian zones in need of improvement and maintenance will enhance retention of excess nutrients and sediments and perform other critical hydrologic, geomorphic, and biological functions that improve a watershed's health. NYS Riparian Opportunity Assessment identifies riparian areas needing improvement at the subwatershed and catchment level using indicators of ecological health and stress. In general, the region has ample natural riparian cover with a higher density in the mountainous areas of the Adirondacks and approximately 50-85% riparian cover on the agricultural plains. Low cover areas are concentrated in the Indian and Oswegatchie River watersheds. Wheeler Creek (Upper St. Lawrence River watershed), encompassing urban areas such as Cape Vincent and Clayton along the St. Lawrence River shoreline, has the least natural riparian cover.

Agriculture is a leading industry and use of land in the area, as the northern skirt of the St. Lawrence River water basin is host to rich soils and flat plains suitable for farming (see Maps 14 and 18).

Agricultural districts are outlined in **Map 22**. According to the 2017 Census of Agriculture from the USDA National Agricultural Statistics Service (NASS), land dedicated to farming has decreased by approximately 7% since 2012 within the watershed. In 2017, 620,714 acres were dedicated to farming, hosting 2,344 farms, a decrease of 144 farms since the 2012 census. In 2017, cropland, pasture/grazing land, and woodlands occupied 333,350, 14,523, and 163,308 acres, respectively. Approximately 18,000 acres of cropland were idle or used for cover crops or soil-improvement but not harvested and not pastured or grazed. No-till practices are used on 191 farms occupying 21,377 acres (up from 173 farms holding 13,032 acres in 2012), and reduced tillage is practiced on 182 farms covering 33,508 acres (up from the 92 farms covering 15,543 acres). Manure is spread across 104,000 acres in the watershed, and 129,000 acres are treated with commercial fertilizers, lime, or soil conditioners. **Table 4** lists the harvested crops and livestock and poultry counts for the watershed. Agriculture census data can also be found for each county within the watershed.

Table 4
Crops and Livestock, St. Lawrence River Watershed

Selected Crop	Farms	Acres	% Harvested Cropland	Change in # of Farms since 2012	Change in Farmed Acres since 2012
Corn	398	74178	26.49	-54	-2615
Soybeans	62	8284	2.96	-11	1054
Small grains (wheat, oats, barley, rye)	117	4109	1.47	-10	625
Vegetables	170	1128	0.40	-33	-473
Orchards	91	296	0.11	-18	-265
Nursery, greenhouse, floriculture, and sod	71	77	0.03	-18	-68
All other crops	1710	191949	68.55	-93	-11897
Total	2619	280021	100	-237	-13639
Livestock/Poultry	Farms (2017)	Acres (2017)	% of Livestock Acres	Change in Farms since 2012	Change in Farmed Acres since 2012
Cattle and calves	1173	135567	55.64	-142	-1137
Hogs and pigs	148	1045	0.43	-42	-964
Sheep and lambs	120	3369	1.38	5	-1685
Horses and ponies	622	3753	1.54	-43	-728
Goats	125	1153	0.47	-12	151
Chickens	441	98758	40.53	-8	76936
Total	2629	243645	100	-242	72573

SOURCE: 2017 Agriculture Census, USDA, National Agricultural Statistics Service.

The Upper St. Lawrence is the most agriculturally intensive subbasin, dedicating 35% of its land to agricultural activities (87,000 acres). The Oswegatchie and Indian subbasins farm an additional 93,000 and 77,000 acres each, constituting 14% and 22% of their total area, respectively. The Oswegatchie and Indian subbasins have the highest count of surface water segments listed as impaired due to nutrients and requiring a TMDL under Section 303(d) of the Clean Water Act (CWA). The counts include state-assigned pollutants/causes identified as nutrients, organic enrichment/oxygen depletion, algal growth, or noxious aquatic plants. These IDs are associated with excess nutrients and sediment transport via agricultural runoff. From 2001 to 2011, the St. Lawrence River watershed increased its agricultural lands by 1,100 acres; approximately 70% were in hydrologically connected zones that are comprised of wet areas with high runoff potential, causing concern for future impairment of adjacent waterbodies.

Only 3% of the St. Lawrence watershed area is classified as urban; this region is among the least populated areas of NYS. With the low population density, impervious cover occupies a low 0.7% of the area (**Map 23**). The highest percentage of impervious surfaces (2%) is within the Upper St. Lawrence subbasin.



Dairy farm in the St. Lawrence River watershed.

Photo Source: Empire State Development; <https://esd.ny.gov/industries/agribusiness>

4 Community Characteristics

4.1 Municipalities and Population

In all, one Native American territory (Saint Regis Mohawk Indian Territory), one city (Ogdensburg), 22 villages, and 76 towns are wholly or partially within New York's St. Lawrence River watershed (**Table 5**). **Map 24** displays municipalities within the watershed and delineates major population centers. Population density within the St. Lawrence River watershed is displayed in **Map 25**. The total watershed population in 2010 was 196,503, the most populous areas were Potsdam (16,075), Malone (14,799), Fort Drum (12,955), and Massena (12,245) (US Census Bureau 2010). The Upper St. Lawrence subbasin has the highest population density (approximately 37 individuals/km²), and the Raquette subbasin is home to the largest population of 37,413 (WSIO Indicator Data, EPA EnviroAtlas "Dasymetric Population for the Conterminous United States", February 2015). The upcoming 2020 census will provide valuable information on population trends in this region of northern NY.

Table 5
Municipalities within the St. Lawrence River Watershed

Civil Boundary Type	Primary HUC8	Name	Population*	County
Tribal	St. Regis (04150306)	St. Regis Mohawk Tribe	3,398	Franklin
City	Upper St. Lawrence (04150301)	Ogdensburg	11,128	St. Lawrence
Village	Upper St. Lawrence (04150301)	Cape Vincent	726	Jefferson
		Clayton	1978	Jefferson
		Alexandria Bay	1,078	Jefferson
		Morristown	395	St. Lawrence
		Waddington	972	St. Lawrence
	Oswegatchie (04150302)	Antwerp	686	Jefferson
		Harrisville	612	Lewis
		Gouverneur	3,949	St. Lawrence
		Richville	323	St. Lawrence
		Rensselaer Falls	332	St. Lawrence
		Huevelton	714	St. Lawrence
	Indian (04150303)	Philadelphia	1,252	Jefferson
		Evans Mills	621	Jefferson
		Theresa	863	Jefferson
		Hammond	280	St. Lawrence
	Grasse (04150304)	Canton	6,314	St. Lawrence
		Massena	10,936	St. Lawrence

Civil Boundary Type	Primary HUC8	Name	Population*	County
	Raquette (04150305)	Speculator	324	Hamilton
		Tupper Lake	3,667	Franklin
		Norwood	1,657	St. Lawrence
		Potsdam	9,428	St. Lawrence
	Salmon (04150307)	Brushton	474	Franklin
		Malone	5,911	Franklin
	Chateaugay-English (04150308)	Chateaugay	833	Franklin
		Burke	211	Franklin
Town	Upper St. Lawrence (04150301)	Cape Vincent	2,777	Jefferson
		Orleans	2,789	Jefferson
		Alexandria	4,061	Jefferson
		Hammond	1,191	St. Lawrence
		Morristown	1,974	St. Lawrence
		Clayton	5,153	Jefferson
		Lisbon	4,102	St. Lawrence
		Waddington	2,266	St. Lawrence
	Oswegatchie (04150302)	Fine	1,512	St. Lawrence
		Clifton	751	St. Lawrence
		Pitcairn	846	St. Lawrence
		Edwards	1,156	St. Lawrence
		Fowler	2,202	St. Lawrence
		Gouverneur	7,085	St. Lawrence
		De Kalb	2,434	St. Lawrence
		Oswegatchie	4,397	St. Lawrence
	Indian (04150303)	Theresa	2,905	Jefferson
		Antwerp	1,846	Jefferson
		Philadelphia	1,947	Jefferson
		Le Ray	21,782	Jefferson
		Wilna	6,427	Jefferson
		Croghan	3,093	Lewis
		Diana	1,709	Lewis
		Rossie	877	St. Lawrence
		Macomb	906	St. Lawrence
		De Peyster	998	St. Lawrence
	Grasse (04150304)	Colton	1,451	St. Lawrence
		Hermon	1,108	St. Lawrence
		Canton	10,995	St. Lawrence

Civil Boundary Type	Primary HUC8	Name	Population*	County
		Russell	1,856	St. Lawrence
		Clare	105	St. Lawrence
		Pierrepont	2,589	St. Lawrence
		Madrid	1,735	St. Lawrence
		Louisville	3,145	St. Lawrence
	Raquette (04150305)	Webb	1,807	Herkimer
		Lake Pleasant	724	Hamilton
		Long Lake	711	Hamilton
		Arietta	304	Hamilton
		Inlet	333	Hamilton
		Indian Lake	1,342	Hamilton
		Newcomb	436	Essex
		North Elba	8,957	Essex
		Harrietstown	5,709	Franklin
		Tupper Lake	5,971	Franklin
		Piercefield	310	St. Lawrence
		Parishville	2,153	St. Lawrence
		Potsdam	16,041	St. Lawrence
		Norfolk	4,668	St. Lawrence
		Massena	12,883	St. Lawrence
	St. Regis (04150306)	Santa Clara	345	Franklin
		Hopkinton	1,077	St. Lawrence
		Waverly	1,022	Franklin
		Brighton	1,435	Franklin
		Duane	174	Franklin
		Brandon	577	Franklin
		Dickinson	823	Franklin
		Lawrence	1,826	St. Lawrence
		Moir	2,934	Franklin
		Brasher	2,512	St. Lawrence
		Stockholm	3,665	St. Lawrence
	Salmon (04150307)	Franklin	1,140	Franklin
		Malone	14,545	Franklin
		Bangor	2,224	Franklin
		Bombay	1,357	Franklin
		Fort Covington	1,676	Franklin
		Westville	1,819	Franklin

Civil Boundary Type	Primary HUC8	Name	Population*	County
	Chateaugay-English (04150308)	Bellmont	1,434	Franklin
		Dannemora	4,898	Clinton
		Ellenburg	1,743	Clinton
		Constable	1,566	Franklin
		Burke	1,465	Franklin
		Chateaugay	2,155	Franklin
		Clinton	737	Clinton
		Mooers	3,592	Clinton

SOURCE: New York State Civil Boundaries, NYS GIS Clearing House (June 2019).

Note: In some cases, only a portion of villages and towns lie within the watershed, so populations shown in the table cannot be summed to give the watershed population.

4.2 Regulatory and Programmatic Environment

The St. Lawrence River watershed is affected by regulations, plans, and programs at the federal, state, regional, county, and local level, as well as by collaborations involving nonprofit organizations and academic institutions, designed to help protect and maintain water quality and aquatic habitat. The Project Team worked with a consultant (Rootz) to compile and review the local laws of the watershed municipalities and evaluate their effectiveness in protecting water quality and habitat from point- and nonpoint-source pollution.

4.2.1 Approach to Reviewing Local Laws, Plans, and Programs

The inventory and assessment of municipal measures to protect water resources in the St. Lawrence River watershed were based on a modified version of the process outlined by the Genesee/Finger Lakes Regional Planning Council (2006). Due to the extensive size of the watershed, a rigorous assessment of individual municipalities was not feasible, and therefore the regulatory environment was assessed at the County level. Existing local laws and tools that guide land use were identified by municipal nonpoint assessment forms completed by County Department of Planning and/or SWCD professional staff. The review of existing documents included:

- Comprehensive Plans/Land Use Plans/Rural Development Plans/Waterfront Revitalization Plans;
- Zoning, Site Plan Review and Subdivision Regulations; and
- Water Quality Protection Programs/Measures
- Waterbody/Shore Protection
- Floodplain Protection
- Waste Management
- Wastewater/On-site Septic

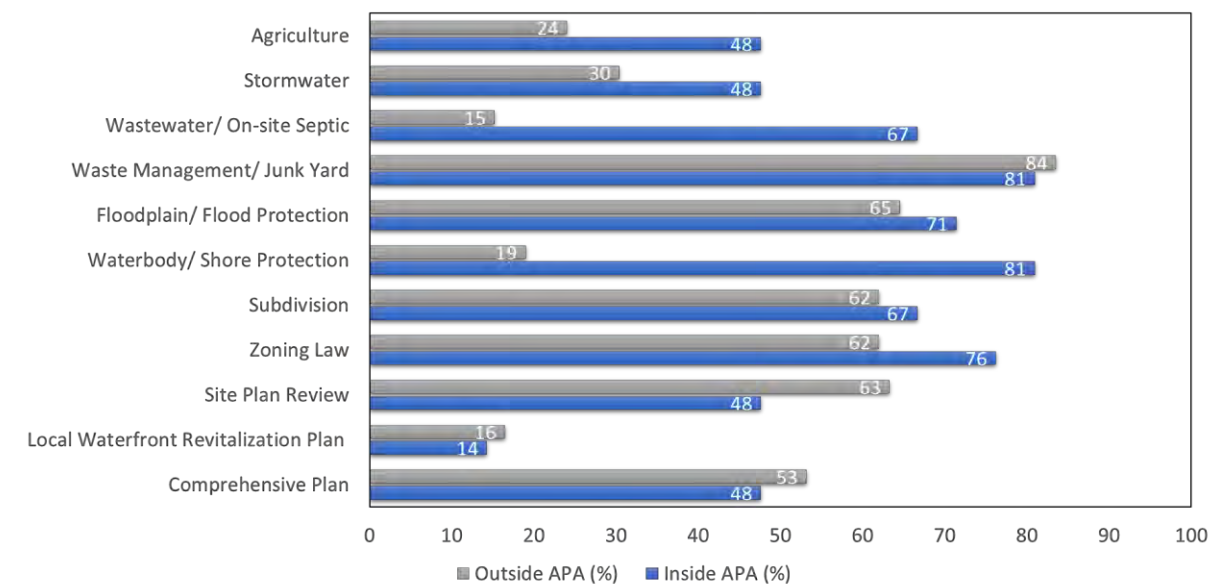
- Stormwater
- Agriculture

The resulting product is in **Appendix A: St. Lawrence River Watershed Local Laws and Programs Affecting Water Quality**. This document evaluates the current regulatory environment with respect to water quality and identifies improvements to local codes that would address water quality impacts from developmental activities more effectively. The St. Lawrence River Watershed Revitalization Plan will improve coordination amongst municipalities, organizations, and agencies to advance our shared understanding of the watershed and build upon the identified regulatory and programmatic gaps in local laws and programs to recommend laws and practices that could enhance sustainable land use and natural resource protection and future livelihood of the watershed.

4.2.2 Gap Assessment as Related to the Desired State

Within the St. Lawrence River watershed, multiple municipalities with several regulatory entities exist, which results in significant variation in regulatory tools and laws that address watershed resource protection. Some municipalities have greater resources available to them, regarding staffing, resources, and regulatory tools, while others are more vulnerable offering few local laws to manage water quality challenges. This variation is, in part, influenced by location within the Adirondack Park boundary. The APA is an important regulatory body, encompassing 44% of the watershed, and is responsible for maintaining protection of the forest preserve and regulating development on privately owned lands. This involves shoreline restrictions, tree removal, and protection of river systems and adjoining land.

Figure 4
Local Laws Assessment



Note: Percentage based on percentage of municipalities adopting practice/plan.

Based on the results of the evaluation, most municipalities do not adequately address the comprehensive protection and preservation of water quality in their regulatory programs. Due to the influence of the Adirondack Park on land use regulation and practices, it was useful to evaluate the adoption of local regulations or plans that influence water quality inside and outside the boundaries of the Adirondack State Park, shown in **Figure 4**. The largest discrepancies between inside and outside the park are with regards to on-site septic/wastewater and waterbody/shoreline regulation and practices. At the time of local law assessment inventory, only 32%, 26%, and 29% of municipalities utilize land use planning tools and regulations to target waterbody/shoreline protection, on-site septic systems, and agriculture, throughout the watershed, respectively. On the contrary, waste and junkyard management (83%) and floodplain protection measures (66%) are most consistently addressed within the watershed.

4.3 Water Use

Waters of the St. Lawrence River Watershed are diversely utilized by its community, providing navigation and commercial shipping channels, recreation, drinking water supplies, energy, and habitat.

4.3.1 Water Withdrawals

Water withdrawals in the St. Lawrence River watershed is divided among four predominant sectors: thermoelectric (59%, 25 million gallons per day MGD), domestic (42%, 14 MGD), industrial (7%, 3 MGD), and agricultural (<1%, 0.013 MGD) (USEPA, Watershed Index Online, 2019; USEPA EnviroAtlas,

2015). **Map 26** shows the locations of water withdrawals throughout the watershed and the sector associated with the withdrawal. NYS has the highest thermoelectric power water withdrawals in the northeastern United States (USGS 2015). Water for thermoelectric power is used to cool power-producing equipment. **Map 27** depicts hydroelectric, thermoelectric, solar, and biomass energy generation plants within the watershed.

4.3.2 Drinking Water Sources

The St. Lawrence River provides drinking water to approximately four million people in the United States and Canada; in New York State, the river serves as public water supply for the City of Ogdensburg, Town of Louisville, and Villages of Massena, Clayton, and Alexandria Bay. The Oswegatchie River serves 3,949 residents in the town of Gouverneur. The Raquette River provides municipal water for the Village of Potsdam with 1,624 water service connections. Canton primarily uses groundwater drawn from the Upland System which consists of a million-gallon reservoir, caisson, and groundwater extraction wells. Malone supplies groundwater drawn from two drilled wells to approximately 13,000 individuals via 2,819 village and town service connections. The Village of Tupper Lake is drilling wells to replace Tupper Lake as their primary source of drinking water.

Table 6 identifies waterbodies and municipalities served, if any, within the description column.

Groundwater aquifers are the main source of drinking water in the region. Groundwater availability is dependent on climatic and hydrogeologic factors. When pumped, changes in water levels of confined aquifers are manifested rapidly; in contrast, the effects of pumping unconfined or semi-confined aquifer systems are slowly made evident. Sand and gravel deposits generally produce the highest yields in the St. Lawrence study area, the sandstone and carbonate aquifers along the northern edge of the basin produce more moderate yields. The crystalline bedrock in the Adirondacks generally produces the lowest yields of the aquifers in the basin. Public water works utilize groundwater and surface water to serve 65% (128,897 individuals, 2014 SWDIS data) and 44% (86,011 individuals, 2014 SWDIS data) of the watershed's population, respectively. Rural residents obtain potable water from deep wells drilled into bedrock. The NYSDEC Water Well Program mapped 973 water wells within the St. Lawrence River watershed, as depicted in the Water Wells map from the NYS GIS Clearinghouse (NYSDEC Division of Water 2016). Note that this data set encompasses only about 20% of private wells in NYS with records beginning post-2000.

Municipal water supplies from major aquifers, lakes and reservoirs, and wellheads are depicted in **Map 26**. The purple/maroon dots on **Map 26** refer to withdrawals for public water via publicly owned water utilities. The mapped water wells, shown as X's, are designated community water systems—those that either serve at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents, such as local town and village water districts. A comprehensive list of Public Water Systems by county is maintained by the NYS Department of Health (NYSDOH, 2018).

The NYSDEC Water Quality Standards Program classifies surface waters for their best use, including water supply. Class A and AA waters are waterbodies classified as suitable for drinking and culinary purposes, as well as primary and secondary contact recreation and fishing. **Table 6** summarizes Class A and AA surface waters of the St. Lawrence River watershed. Class A waters are drinking waters that require filtration and some treatment, and class AA waters are drinking waters with minimal treatment needed and no filtration. A full list of assigned classifications to fresh surface waters within the St. Lawrence River watershed can be found in the New York Codes, Rules, and Regulations, Division of Water (6 CRR-NY 910.6).¹

Table 6
Class A and AA Waterbodies

HUC8	Name	Description	Class	Standards
Upper St. Lawrence (04150301)	St. Lawrence River	The portion of river confined between the United States shore line and a line starting at Tibbetts Point Lighthouse, running directly north to the International Boundary Line, thence downstream along the International Boundary Line, terminating at the point of landfall of the International Boundary Line on St. Regis Point approximately 0.5 mile west of St. Regis Hamlet. For classification purposes, this includes all arms and bays in this included section and also includes all streams on islands in this section of the river, except the bay area described in item no. 1b below.	A	A
Oswegatchie (04150302)	Oswegatchie River	From 0.4 mile upstream from N.Y.C. railroad bridge over stream at Gouverneur to bridge over stream at Talcville.	A	A
	Oswegatchie River	From dam at Newton Falls to dam at Cranberry Lake.	A	A(T)
	Oswegatchie River (Cranberry Lake)	From Cranberry Lake outlet to footbridge at Wanakena. Cross reference item 1589. Parts not in forest preserve.	A	A(T)
	South Creek	From Village of Harrisville water supply dam at 0.35 mile upstream from mouth to trib. 5.	A	A(T)
	Cranberry Lake	Parts not in forest preserve.	A	A(T)
	Sylvia Lake		AA	AA
	Star Lake	Star Lake water supply.	AA	AA(T)

¹ NYSDEC intends to reclassify some surface waters within the St. Lawrence River basin: "The Division of Water expects to propose upgrades to the classifications of certain surface waters in 6 NYCRR Part 910 (St. Lawrence River drainage basin). These reclassifications are necessary to meet federal Clean Water Act (CWA) goals for water quality and, if adopted, would result in higher classifications (and thus more stringent water quality standards) for some waters in this drainage basin. Numerous Class D surface waters, which only provide protection for fish survival, would be proposed to be upgraded to higher classifications (Class C or higher)" (NYSDEC 2019a).

HUC8	Name	Description	Class	Standards
Indian (04150303)	Indian River	From old N.Y.S. Route 26 bridge over stream at Antwerp to trib. 42.	A	A
	Indian River Carthage Reservoir	From outlet of P 50 (Carthage Reservoir) to source of Indian River.	A	A(T)
	West Creek	From U.S. Route 11 bridge over stream to source. Evans Mills water supply.	A	A(T)
	Subtrib. of Black Creek	Military Reservation Reservoir.	A	A
Grasse River (04150304)	Grass River	From dam at Madrid to bridge at Morley.	A	A
	Grass River	From trib. 22 to Route 68 bridge at Canton.	A	A
	Little River	From trib. 16 to source.	AA	AA
	Tribs. of Little River and subtribs.	Trib. of Canton water supply.	AA	AA
	Van Rensselaer Creek	From mouth to 0.5 mile above trib. 5.	AA	AA(T)
	Van Rensselaer Creek	From 0.5 mile above trib. 5 to source.	AA	AA
	Dean Brook and tribs. and subtribs.	Trib. of Canton water supply.	AA	AA(T)
	Trib. of Dean Brook	Trib. of Canton water supply.	AA	AA
	Trib. of Van Rensselaer Creek and subtribs.	Trib. of Canton water supply.	AA	AA
	Taylor Creek	From mouth to trib. 3.	AA	AA(T)
	Taylor Creek tribs. and subtribs.	From trib. 3 to source.	AA	AA
	Trib. of Van Rensselaer Creek	Trib. of Canton water supply.	AA	AA
Raquette River (04150305)	Raquette River	From N.Y.S. Route 3 bridge over stream at Piercefield to railroad bridge at Raquette Pond (P 89 outlet).	A	A
	Eagle Crag Lake		A	A(T)
	Subtribs. of Dead Creek. Mt. Arab Lake		A	A
	Piercefield Flow	Used as water source by Hamlet of Piercefield.	A	A
	Tupper Lake	Water supply for Village of Tupper Lake.	A	A
	Blue Mountain Lake		A	A(T)
	Raquette River	From dams at Village of Potsdam north of U.S. Route 11 to bridge over stream at Hannawa Falls.	AA	AA

HUC8	Name	Description	Class	Standards
	Clear Pond	St. Regis Falls water supply.	AA	AA
	Black Pond Black Pond Outlet	St. Regis Falls water supply.	AA	AA
	Trib. of Dead Creek	From mouth to 0.25 mile above trib. 1. Used as water supply by Conifer.	AA	AA(T)
	Trib. of Dead Creek	From 0.25 mile above trib. 1 to source. Used as water supply by Conifer.	AA	AA
	Subtrib. of Dead Creek	Used as water supply by Conifer.	AA	AA
	Subtrib. of Dead Creek	Used as water supply by Conifer.	AA	AA
	Trib. of Tupper Lake and subtrib.	From P 110 outlet to source P 110 is water supply for Village of Tupper Lake.	AA	AA
	Little Simon Pond	Water supply for Village of Tupper Lake.	AA	AA(T)
	Trib. of Shaw Pond	Parts not in forest preserve. Used as auxiliary water supply for Town of Long Lake.	AA	AA(T)
	Trib. of Long Lake	Used as emergency water supply by Town of Long Lake.	AA	AA
	Lake Eaton	Future potential water supply for Long Lake. Parts not bordering forest preserve.	AA	AA(T)
	Raquette Lake	Used as water supply. Parts not bordering forest preserve.	AA	AA
St. Regis River (04150306)	Trib. of Trout Brook	Philadelphia Reservoir.	A	A
	Osgood Pond	Parts not in forest preserve.	AA	AA
	(Spitfire Lake) Subtrib. of Lower St. Regis Lake (Upper St. Regis Lake)		AA	AA
Salmon River (04150307)	Roaring Brook and tribs. and subtribs.	From mouth to source including Fishpole Pond (P 28a)	AA	AA(T)
	Tribs. of Roaring Brook		AA	AA
	Trib. of Salmon River and subtrib.		AA	AA
Chateaugay- English (04150308)	Separator Brook	From dam at Lion Mountain water supply to source.	AA	AA
	Standish Brook	From Standish Water Supply Dam to source.	AA	AA(T)
	Tribs. of Standish Brook and subtribs.		AA	AA

SOURCE: 6 CRR-NY 910.6

Although public utilities treat water used for human consumption, protecting source water from contamination can greatly reduce treatment costs and the risk to public health. NYSDOH manages a Drinking Water Protection Program dedicated to providing safe, quality drinking water. Under this program, NYSDOH (along with other agencies including county health departments and SWCDs) assists private homeowners with testing private water supplies to ensure that they meet public health standards. NYSDOH requires public utilities and water purveyors to test their water quality and inform consumers through an Annual Water Quality Report. These reports include information about the water system, source water, contaminant levels in finished water, and any violations of the national primary drinking water regulations. Typically, these reports can be found on the municipality's public utilities website or acquired by contacting managers or the utility or its respective local health department. NYSDOH operates a Source Water Assessment Program (SWAP) that provides water utilities with information to help them identify potential sources of contamination and implement management measures to prevent, reduce, or eliminate risks to the drinking water supply. Source water assessments have identified 503,000 acres in the watershed as Source Water Protection Areas, defined as areas with increased susceptibility to contamination (EPA Safe Drinking Water Information Systems, SDWIS, 2014 geospatial data).

4.3.3 Commercial Shipping – The St. Lawrence Seaway

The St. Lawrence River has been altered to facilitate transportation. Modifications began in 1680 when Dollier de Casson of the Sulpician Seminary in Montreal built a 1.5 m (5 ft) deep canal to bypass the Lachine Rapids between Lake St. Louis and Montreal. Today it is known as the Great Lakes - St. Lawrence Seaway, a deep draft waterway extending 2,340 miles from the Atlantic Ocean to the Great Lakes. The system serves mariners, farmers, and factory workers by moving a diverse array of commodities. The dominant commodities include iron ore for the steel industry, coal for power generation, limestone, grain for overseas markets, and cements, salt and stone aggregates for agriculture and industry.

The first joint U.S.-Canadian Deep Waterways Commission was formed in 1895 to investigate the feasibility of a Seaway, followed by establishment of the International Joint Commission (IJC) in 1909 and the signing of the Great Lakes – St. Lawrence Deep Waterway Treaty in 1932. Delayed by two world wars and other factors, the project began in 1954 when the St. Lawrence Seaway Authority mandated acquisition of lands for construction, operation, and maintenance of a deep draft waterway between the port of Montreal and Lake Erie, along with international bridges that cross it. The Seaway was completed in 1959 allowing navigation and access to global markets from the Great Lakes region. In 1993 and again in 2004, the Seaway's draft was increased by 3 inches from its original 26 feet, enabling ships to carry more cargo per voyage.

In 2017, the Montreal/Lake Ontario section of the seaway established a new record, remaining open from March 20 to January 11, a total of 298 days. The possibility of winter navigation and shipping

on the Seaway are of great concern to shoreline communities. The U.S. Army Corps of Engineers conducted a study investigating the extension of the navigational season identifying probable impacts:

- erosion of shorelines and structural damage due to pressure waves induced by ship passage;
- damage to wetlands, benthic communities, and aquatic vegetation from high velocity water currents and ice scouring;
- re-suspension of sediments in spawning areas resulting in decreased egg and larvae vitality;
- degradation of water quality from resuspended sediment in the water column;
- decreased habitat connectivity, restricting normal migration patterns of native animals and fish; and
- potential loss of winter recreational activities such as ice fishing in small harbor areas due to unstable ice conditions resulting from ship passage.

4.4 Public Access and Recreation

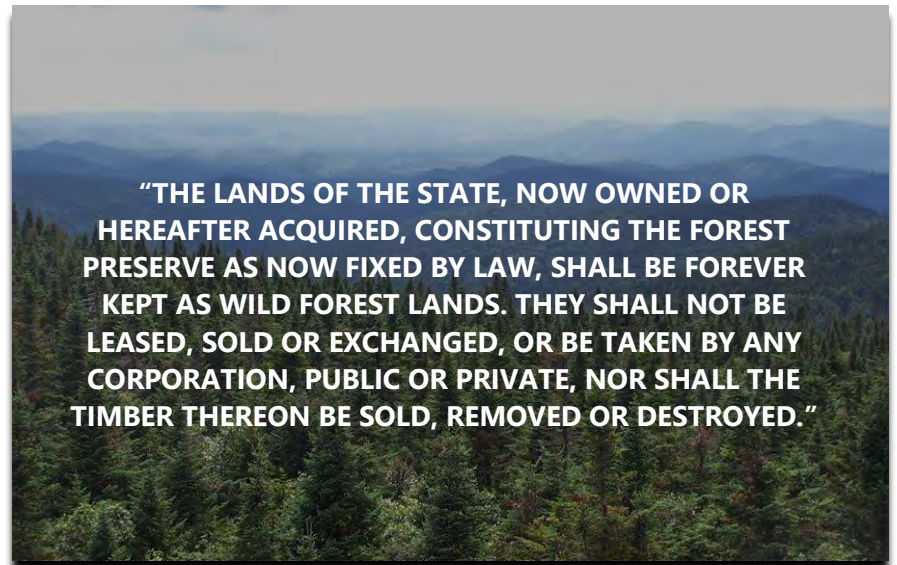
Residents of, and visitors to, the St. Lawrence River watershed have diverse opportunities to enjoy water-related recreational activities including boating, swimming, hunting, fishing, and nature observation. Public lands within the Adirondack Park are managed by the Adirondack Park Agency, which is part of NYSDEC. **Map 28** depicts NYSDEC recreational public access points supporting activities such as boating, camping, canoeing, fishing, hiking, and nature observation. A full list of NYS recreational areas is available at <https://www.dec.ny.gov/outdoor/>. In addition, many counties, cities, towns, and villages also offer boat launches for recreational access. Late spring and summer months are typically when recreational demand is along the St. Lawrence is at its peak.

Most of the shoreline along the St. Lawrence is privately owned with a few state parks managed by the Office of Parks, Recreation, and Historic Preservation (OPRHP). Surface water access to the St. Lawrence River is mostly provided by privately owned sites such as recreational clubs, marinas, restaurants, motels, and residential properties. However, demand for improving and enhancing opportunities for public access to swimming, fishing, and boating has increased throughout the watershed. Recreational freshwater fishing demand is highest for the Raquette (81,600 fishing day trips/year), Oswegatchie (69,300 fishing day trips/year), and St. Regis (55,900 fishing day trips/year) subbasins.

A recent study by the Trust for Public Lands researched the economic benefits of open space, conserved lands, public access and trails within the Thousand Islands region of Jefferson and St. Lawrence Counties. The study found that these amenities attract visitors and tourists, generating \$164 million in labor income and 6,100 jobs each year, as well as \$25.8 million in local taxes and \$21.0 million in state taxes annually (The Trust for Public Land, 2018, <https://tilandtrust.org/about-tilt/value-land-conservation>).

4.5 Protected Lands

In response to growing concerns regarding clear cutting of trees, NYS established the Adirondack Park in 1892 as a constitutionally protected Forever Wild area. Approximately 44% of the St. Lawrence River watershed lies within the Adirondack Park boundary. The Adirondack Park is a six-million-acre patchwork of public and private lands in northeastern New York. It cuts northeast from the southwestern corner of the Oswegatchie subbasin up to the middle of the Chateaugay-English subbasin. A significant proportion of this land is part of the Adirondack Forest Preserve, afforded constitutional protections under Article 14 of the 1894 NYS Constitution, that prevent the removal of timber and guides management and land use within the park. These lands are rich in both recreational opportunity and ecological significance.



Article 14 of the 1984 New York Constitution
Photo Source: Stephen Williams, The Daily Gazette

In 1971, the Adirondack Park Agency was created to oversee regulation that envelops the long-range public and private land use plans for the area. State lands fall under four classifications that determine management actions; forest preserve, state forests, wildlife management areas, and conservation easements. Public lands managed by NYSDEC and their classifications are shown in **Map 28**. The NYNHP has created the New York Protected Areas Database (<https://www.nypad.org/>) that collects and shares spatial information on lands protected, designated, or functioning as open space, natural areas, conservation lands, or recreational areas. In addition, the USGS maintains a Protected Areas Database and publicly available interactive map at <https://maps.usgs.gov/padus/>. It is important to note that these interactive mapping tools use the word “protected” somewhat loosely; lands can be public or private, open or closed to public use, permanently protected from development, or subject to future changes in management.

4.6 Infrastructure

4.6.1 Dams

Dams serve many purposes within the St. Lawrence River watershed including recreation, flood control and storm management, navigation, water supply, and hydroelectric power generation. There

is a total of 190 dams in the St. Lawrence River watershed with the most being in the Raquette and Oswegatchie subbasins (**Map 29**). **Table 7** lists the number of dams within each HUC8 of the St. Lawrence River watershed.

The Federal Energy and Regulatory Commission works with dam owners, local municipalities, and regulatory agencies to provide licensing for dams throughout the watershed. NYSDEC's DOW operates a NYS Dam Inventory which assigns a hazard classification to each dam structure based on the height of the dam, maximum capacity, physical characteristics, and downstream land use. A dam would be considered a high hazard dam (Class C) when in the case that it was to fail, loss of life and significant damage to homes, commercial buildings, public utilities, highways and roads would be expected to occur. Moderate hazard dams (Class B) would result in some damage to homes, buildings, infrastructure, and public utilities in the circumstance of a dam failure. Low hazard (Class A) dams would be expected to only damage isolated buildings, vacant lands, or rural roads in the event of failure. **Table 8** lists the 21 high hazard dams, designated Class C by NYSDEC and their respective subwatershed.

Table 7
New York State Dam Classifications, St. Lawrence River Watershed

HUC8	Low Hazard (A)	Moderate Hazard (B)	High Hazard (C)	Total Dams
Upper St. Lawrence	0	0	4	4
Oswegatchie	21	10	6	37
Indian	24	2	0	26
Grasse	12	0	0	12
Raquette	44	6	10	60
St. Regis	23	1	1	25
Salmon	13	3	0	16
Chateaugay-English	8	2	0	10
St. Lawrence River Watershed	145	24	21	190

SOURCE: NYS Dam Inventory, <http://www.dec.ny.gov/maps/nysdams.kmz>.

Table 8
High Hazard (Class C) Dams in the St. Lawrence River Watershed

Dam Name	Length (ft)	Height (ft)	Max Discharge (cubic ft/s)	Max Storage (acre-ft)	Basin
Long Sault Dam	2960	132	873000	2000000	Upper St. Lawrence
Robert Moses/Robert H Saunders Dam	3200	167	873000	2000000	Upper St. Lawrence
Massena Intake Dam	4000	75	0	5000	Upper St. Lawrence
Iroquois Dam	1980	72	310000	50	Upper St. Lawrence

Dam Name	Length (ft)	Height (ft)	Max Discharge (cubic ft/s)	Max Storage (acre-ft)	Basin
Cranberry Lake Dam	360	24	14220	57400	Oswegatchie
Newton Falls Dam	640	40	1331	16000	Oswegatchie
Flat Rock Dam	680	80	10500	5020	Oswegatchie
Ogdensburg Water-Power Company Dam	400	19	26600	4175	Oswegatchie
Browns Falls Dam	870	70	8900	3593	Oswegatchie
Eel Weir Dam	1020	30	52120	810	Oswegatchie
Carry Falls Dam	623	66	31800	117595	Raquette
Blake Falls Dam	1593	70	50000	37800	Raquette
Rainbow Falls Dam	2420	91	62800	25800	Raquette
Higley Falls Power Dam	435	50	16540	13960	Raquette
South Colton Dam	877	50	50300	4500	Raquette
Norwood Dam	910	30	17800	4080	Raquette
Five Falls Dam	1655	60	45400	3090	Raquette
Colton Dam	465	27	31770	2310	Raquette
Norfolk Dam	500	29	22030	108	Raquette
East Norfolk Dam	423	20	16530	94	Raquette
Allen Falls Development Dam	766	40	25400	1780	St. Regis

SOURCE: NYS Dam Inventory, <http://www.dec.ny.gov/maps/nysdams.kmz>.

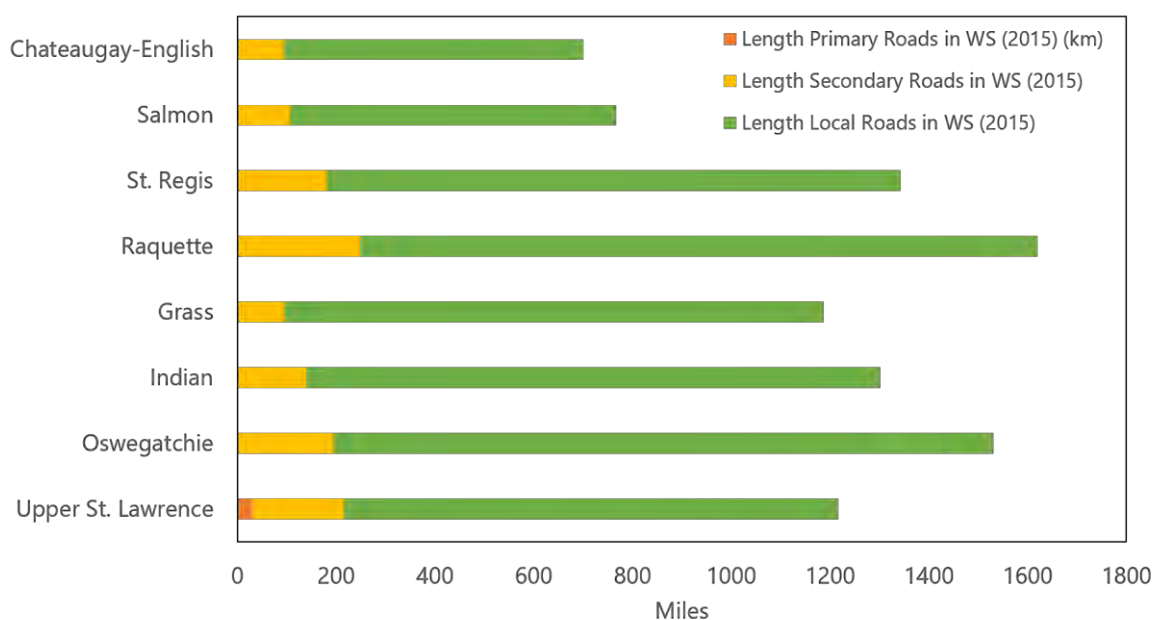
Dams serve as a major component of the watersheds' energy supply. Hydroelectric plants are reliable, cost-effective and support less-flexible sources of renewable energy. The Robert Moses-Robert H. Saunders Power dam first generated power in 1958 as part of the St. Lawrence-FDR project. It has 32 turbine-generators divided equally by the international border between the New York Power Authority (NYPA) and Canada's Ontario Hydro. The NYPA's 16 generating units can produce 800,000 kilowatts of electricity, more than enough energy to light a city the size of Washington, D.C. The Long Sault and Iroquois dams were also built as part of the St. Lawrence-FDR project.

4.6.2 Roads, Highways, and Railways

Roads, highways, and railways are shown on **Map 29**. The primary east-west highways are State Routes 11 and 37, which run parallel to the St. Lawrence River, and Highway 30, which runs north to south through Malone. The watershed includes over 450 miles of railways with track CSXT crossing through Gouverneur to Massena and track ADCX traversing through the Adirondacks passing through Tupper Lake.

Roads, highways, and related infrastructure such as parking lots contribute to the amount of impervious area in a watershed. The St. Lawrence River watershed contains a small amount of impervious cover at 0.67%, covering a total area of approximately 24,000 acres (see Map 23). The greatest concentration of impervious cover lies within the Upper St. Lawrence and Indian River subbasins due to developed centers of Ogdensburg and Le Ray/Fort Drum. **Figure 6** illustrates the length of road miles in each watershed, categorized by primary, secondary, and local roads.

Figure 5
Road Miles in Watershed



Source: WSIO Indicator Data, 2018.

Notes: Primary roads refer to divided highways within the interstate highway system or under state management and are distinguished by the presence of interchanges and ramps for entrance/exit. Secondary roads are main arteries with one or more lanes of traffic in each direction that may be divided, and are usually in the US Highway, State Highway or County Highway system. Local roads are paved non-arterial street, road, or byway that usually has a single lane of traffic in each direction and may be privately or publicly maintained.

4.7 Industries and Employment

The watershed developed centered around manufacturing and aluminum smelting along the St. Lawrence River with agricultural and forestry-related industries set more in-land. With time, a significant shift in the primary economic center of the watershed has occurred. With economical centers shifting to incorporate areas such as Canton and Potsdam, which host three of the five hospitals in the watershed and four colleges/universities. Colleges and Universities, including St. Lawrence University, SUNY Potsdam, SUNY Canton, Clarkson University, Paul Smith's College, and

SUNY ESF Ranger school, are important employers and economic drivers within these communities. Agriculture utilizes much of the land in the St. Lawrence River watershed and continues to be a prominent contributing economy although it has experienced a 6% decrease in amount of farm and farmland from 2012 to 2017 (US Agricultural Census, 2017).

Significant industries within the counties of the St. Lawrence River watershed include manufacturing, educational services, health care, leisure and hospitality, public administration/government, transportation, and utilities (NYSDOL, 2015). The public sector employs nearly 20,000 people with an average annual wage of \$53,300, making it the largest employment sector of the North Country. The educational services sector, carrying 19,000 jobs and an average annual wage of \$43,400 in 2015, lost hundreds of jobs between 2009 and 2014 due to declines in primary and secondary schools. The hospitality sector employs the third most workers of any sector in the North Country economy with more than 11,400 workers and average annual wages of \$14,500. The North Country region has an average annual unemployment rate of 5.3%, ranging from 4-7.5% throughout the year due to seasonal employment (NYSDOL, 2018).

5 Existing Water Quality Conditions

The NYSDEC Division of Water conducts regular, periodic assessments of waterbodies in the state to fulfill certain requirements of the Federal Clean Water Act (CWA). Waters are assessed according to their designated best use such as drinking water, recreation, and aquatic life, as defined by 6 CRR-NY 910.6.

- Class A, AA indicate a best usage for a source of drinking water, swimming, contact recreation, and fishing
- Class B indicates a best usage for swimming, contact recreation, and fishing
- Class C indicates a best usage for fishing and non-contact activities
- Class D indicates a best usage of fishing, but these waters will not support fish propagation

Waters with AA, A, B, and C classifications may also have “T” or “TS” classifications or standards, meaning that they support trout (T) populations or trout spawning (TS).

These assessments are compiled in an inventory database called the Waterbody Inventory/Priority Waterbodies List (WI/PWL). For waters classified as impaired, the Clean Water Act also requires states to consider a strategy, such as the development of a Total Maximum Daily Load (TMDL), to reduce the input of specific pollutant(s) restricting waterbody use. Impaired waterbodies are listed on the Section 303(d) list.

5.1 Waterbody Inventory and Priority Waterbodies

The Division of Water’s WI/PWL database compiles current water quality information, characterizes known or suspected water quality problems, and tracks progress toward their resolution. The documents can be found at <https://www.dec.ny.gov/chemical/36735.html>. The NYSDEC’s Rotating Integrated Basin Studies (RIBS), which sample water quality and macroinvertebrates in various regions on a five-year rotating basis, is a primary source of information. NYSDEC engages volunteers in water quality monitoring through citizen science programs, including the Citizen Statewide Lake Assessment Program (CSLAP) and the Water Assessments by Volunteer Evaluators (WAVE) program, which helps to provide additional water quality information and screening to determine where additional assessments are needed. According to NYSDEC staff, the WI/PWL assessments for the St. Lawrence River watershed reflect data collected through the 2014 NYSDEC sampling season, although the date of last assessment varies by waterbody.

The PWL identifies seven assessment classifications:

- *Impaired*: Waterbodies with well documented water quality problems that result in precluded or impaired uses

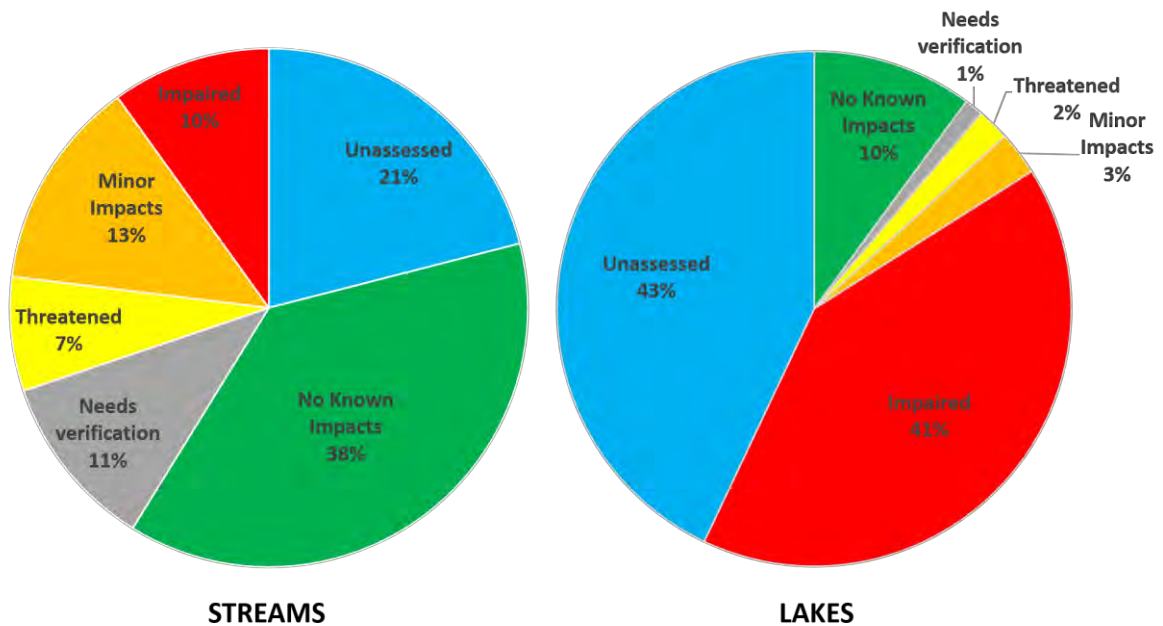
- *Minor impacts:* Waterbodies where less severe water quality impacts are apparent but uses are still considered fully supported
- *Needs verification:* Segments that are thought to have water quality problems or impact but for which there is not sufficient of definitive documentation
- *Threatened:* Waterbodies for which uses are not restricted and no water quality problems currently exist, but where specific land use or other changes in the surrounding watershed are known or strongly suspected of threatening water quality
- *Threatened (possible):* Waterbodies for which uses are not restricted and no water quality problems currently exist, but where waterbody classification, distinct uses, or other considerations make the water more susceptible to threats and additional protection efforts are warranted
- *No known impact:* Segments where monitoring data and information indicate that there are no use restrictions or other water quality impacts/issues
- *Unassessed:* Segments where there is no available water quality information to assess the support of designated uses

An overview of the PWL status for waterbodies in the St. Lawrence River watershed is presented in **Figure 6**. The WI/PWL assessed 52% (6,212 miles) of the total 12,030 miles of streams and rivers within the St. Lawrence River drainage basin. About 38% of the assessed stream miles are characterized as impaired, minorly impacted, or threatened. Thirteen (13%, 781 miles) of assessed stream miles were classified as impaired, signifying that the waters do not fully support their designated uses.

The 2016 WI/PWL assessed 57% of total lake acres within the watershed. Eighty percent (80%, 47,654 lake acres) of assessed (59,386) lake acres within the St. Lawrence River watershed were found to be impaired, minorly impacted, or threatened. About 72% of lake acres were found to be impaired and not supporting their designated use.

WI/PWL characterizations of lakes and streams in specific subwatersheds are shown in **Table 9** and **Map 30**.

Figure 6
WI/PWL Status of St. Lawrence River Watershed Waterbodies



SOURCE: NYSDEC, WI/PWL 2016

Table 9
Priority Waterbodies Assessment of St. Lawrence River Streams and Lakes

Streams (miles)						
HUC8	Impaired	Minor Impacts	Threatened	No Known Impacts	Unassessed	Assessed Impacted (%)
Upper St. Lawrence	254	204	--	--	166	100
Oswegatchie	298	181	265	157	1266	57
Indian	56	182	--	115	683	50
Grasse	30	175	--	707	548	19
Raquette	142	48	--	539	1677	26
St. Regis	--	58	--	841	722	5
Salmon	--	102	264	218	332	63
Chateaugay-English	--	84	32	398	423	22
Watershed	781	1034	560	2974	5818	38
Lakes (acres)						
HUC8	Impaired	Minor Impacts	Threatened	No Known Impacts	Unassessed	Assessed Impacted (%)
Upper St. Lawrence	--	--	--	--	1736	--
Oswegatchie	8581	--	--	638	8457	92

Indian	8487	2263	474	292	4998	97
Grasse	56	--	--	1294	2248	4
Raquette	21157	225	--	6220	21167	76
St. Regis	1782	356	1656	850	4568	82
Salmon	54	--	--	667	1174	4
Chateaugay-English	2564	--	--	543	390	83
Watershed	42681	2843	2129	10505	44739	80

SOURCE: NYSDEC WI/PWL 2016a

5.2 Section 303(d) List

Forty-three waterbodies in the St. Lawrence River watershed are classified as impaired and are therefore included on the Final NYS 2016 303(d) list. These waterbodies are listed in **Table 10**, which also indicates the specific pollutants causing impairment and their sources. Data reported in this document is from NYS's Final 2016 Section 303(d) List (NYSDEC 2016b).

The St. Lawrence River drainage basin lists four waterbodies under Section 303(d) Part 1, classifying them as waters with impairment requiring development of a total maximum daily load allocation. A TMDL quantifies the maximum amount of a pollutant that a waterbody can receive and maintain its designated uses and defines the magnitude of source reductions. Waterbodies in need of a TMDL include the Lower Raquette River and minor tributaries (pathogens from onsite waste treatment systems), Black Lake Outlet - Black Lake (phosphorus from agricultural runoff), Fish Creek and minor tributaries (phosphorus from on-site waste treatment systems), and Little River and tributaries (priority organics from industrial waste disposal).

Twenty-six waterbodies in the watershed are listed under Section 303(d) Part 2a, which means they are impaired by atmospheric deposition, or acid rain. In 2006, NYSDEC completed TMDLs for 143 acid-impaired lakes within the New York's Forest Preserve, the majority of which were listed as impaired on the inaugural 303(d) list in 1998. The Forest Preserve has expanded in recent years, and the current TMDL is focused on the remaining acid-affected lakes.

Thirteen of the St. Lawrence River drainage basin's waterbodies are listed under Part 2b, meaning they are subject to fish consumption advisories due to contamination with dioxin, pesticides, PCBs, and mercury. Note that Stark Fall Reservoir (0903-0073) and Willis Pond (0903-0105) have been added to the Draft 2018 303(d) List under Part 2b. A TMDL was developed to target mercury pollution in the Northeast Region in 2007.

In addition to the classifications shown in Table 10, Appendix A of Section 303(d) lists thirty-four waterbodies in the watershed that are classified as smaller lakes impaired by atmospheric deposition of acid rain.

Table 10
NYS 303(d) Listed Waterbodies in the St. Lawrence River Watershed

HUC8	Waterbody Name	Type	Class	Cause/Pollutant	Source
Part 1—Requiring TMDL Development					
Raquette	Raquette River, Lower, and minor tribs (0903-0059)	River	B	Pathogens	Onsite WTS
Indian	Black Lake Outlet, Black Lake (0906-0001)	Lake	B	Nutrients (P)	Agriculture
	Fish Creek and minor tribs (0906-0026)	River	C	Nutrients (P)	Onsite WTS
Oswegatchie	Little River and tribs (0905-0090)	River	C(T)	Priority Organics	Industry/Landfill
Part 2a—Impaired due to atmospheric deposition					
Grasse	Len, Wolf, Beaver Ponds (0904-0002)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
Salmon	Wolf Pond (0902-0006)	Lake	B	Acid/Base (pH)	Atmospheric Deposition
	Catamount Pond (0902-0092)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
St. Regis	Lower, Upper Twin Ponds, more (0902-0045)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Duck Pond, Benz Pond (0902-0021)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Diamond Lake (0902-0011)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
Raquette	Rock Pond (0903-0001)	Lake	B(T)	Acid/Base (pH)	Atmospheric Deposition
	High Pond (0903-0001)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Little Pine Pond (0903-0028)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Spruce Crouse, Spring, Graves Ponds (0903-0041)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Halfmoon Pond (0903-0032)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	South Pond (0903-0005)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Salmon Pond (0903-0004)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Pilgrim Pond (0903-0043)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Haymarsh Ponds, Lone Pond (0903-0017)	Lake	D	Acid/Base (pH)	Atmospheric Deposition

HUC8	Waterbody Name	Type	Class	Cause/Pollutant	Source
	Lost Pond (0903-0057)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
Oswegatchie	W. Br. Oswegatchie (0905-0003)	River	FP	Acid/Base (pH)	Atmospheric Deposition
	Dry Timber Lake	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Gregg Lake, Green, Twin, Loon Hollow Ponds (0905-0035)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Muskrat Pond (0905-0062)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Bear Pond, Diana Pond (0905-0062)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Lower, Middle, Upper South Pond (0905-0012)	Lake	D	Acid/Base (pH)	Atmospheric Deposition
	Desert, Jakes, Buck, Hog Ponds (0905-0038)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Crystal Lake (0905-0030)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Minor Lake Trib to Upper Oswegatchie (0905-0005)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
	Gull Lake (0905-0072)	Lake	C(T)	Acid/Base (pH)	Atmospheric Deposition
Part 2b—Impaired with respect to fish consumption					
Upper St. Lawrence	St Lawrence River (0901-0001)	River	A	Dioxin	Contaminated Sediment
				Mirex	Contaminated Sediment
				PCBs	Contaminated Sediment
	St Lawrence River (0901-0002)	River	A	Dioxin	Contaminated Sediment
				Mirex	Contaminated Sediment
				PCBs	Contaminated Sediment
	St Lawrence River (0901-0015)	River	A	Dioxin	Contaminated Sediment
				Mirex	Contaminated Sediment
				PCBs	Contaminated Sediment
	St Lawrence River (0901-0004)	River	A	Dioxin	Contaminated Sediment

HUC8	Waterbody Name	Type	Class	Cause/Pollutant	Source
				Mirex	Contaminated Sediment
				PCBs	Industr, Contam Sed
	Massena Power Canal (0904-0012)	River	D	PCBs	Industr, Contam Sed
Grasse	Grasse River (0904-0009)	River	B	PCBs	Industr, Contam Sed

SOURCE: NYS 303(d) list (2016)

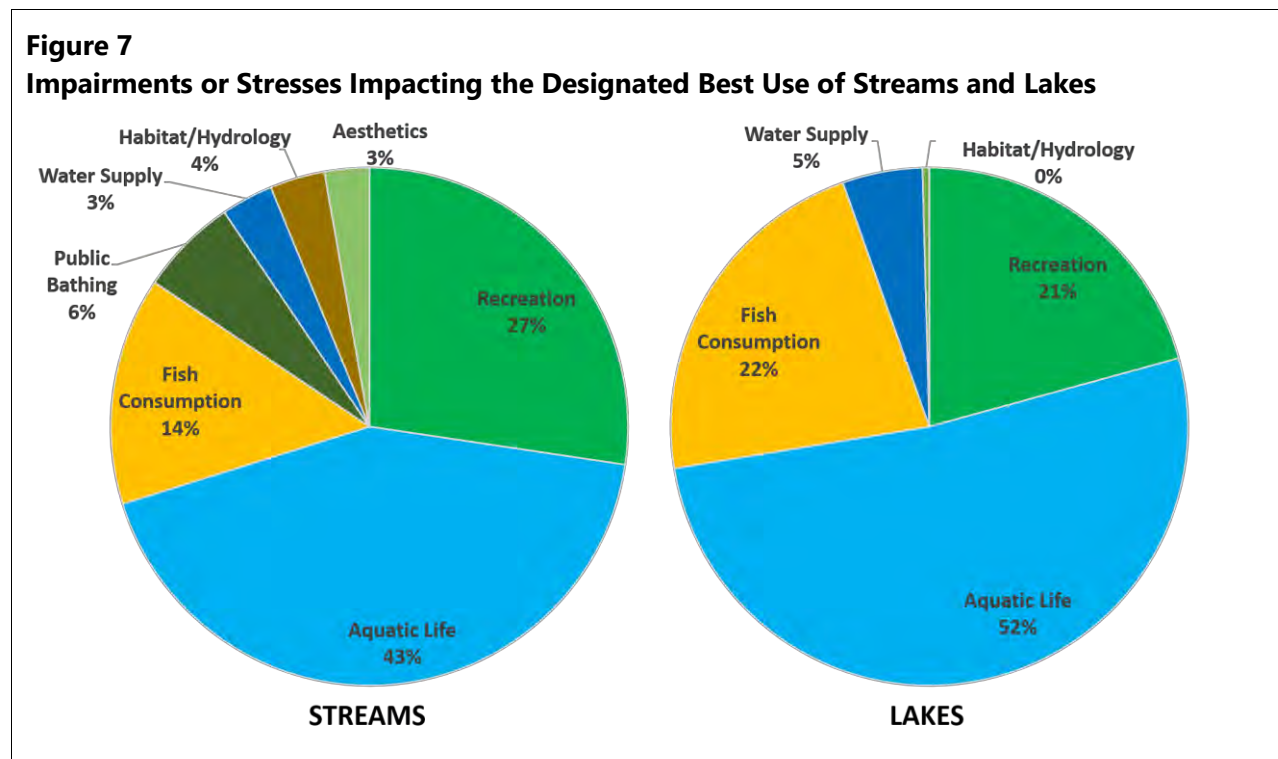
6 Waterbody Impairments and Potential Sources of Pollution

This section begins with an overview of known impairments and stresses to waterbodies in the St. Lawrence River watershed, and then summarizes potential sources of pollution that may contribute to those impairments and stresses.

6.1 Impairments to Designated Best Use

NYSDEC assesses impacts to waterbodies based on their designated best use and characterizes them as impaired or stressed if their best use is not being met, as was discussed in section 5. Waters of the St. Lawrence River watershed are best used for fishing, recreation, swimming, and potable water.

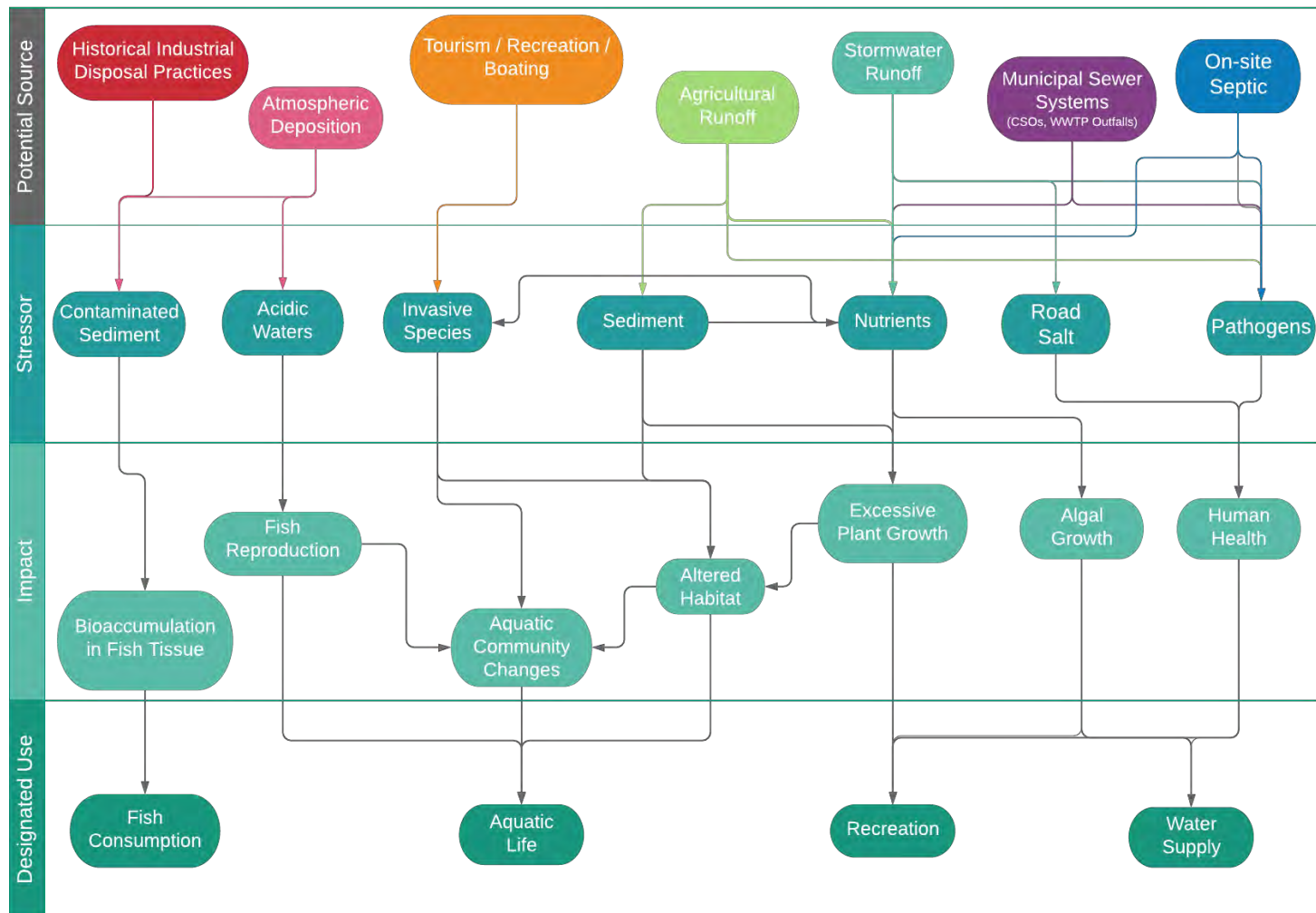
Figure 7 summarizes the percentage of streams and lakes in the watershed that do not meet their designated best use (including waterbodies found to be impaired, displaying minor impacts, threatened, and/or needing verification).



SOURCE: NYSDEC, WI/PWL (2016)

Aquatic life is “stressed” in 43% and 52% of impacted streams and lakes, respectively. The mountain and wilderness areas are host to cold-water fisheries, while lakes and streams in the open and wooded lowlands support warmwater fisheries. Fish consumption is affected in 14% of streams and 22% of lakes in the watershed. Use of 33% of streams and 21% of lakes are impacted in ways that affect recreation and swimming. A conceptual model linking sources, stressors, and their impact on a designated use of a waterbody in the St. Lawrence River watershed are shown in **Figure 8**.

Figure 8
Conceptual Model - Linking Sources, Stressors, Impacts, and Designated Use in the St. Lawrence River Watershed



6.1.1 Fish Consumption Advisories

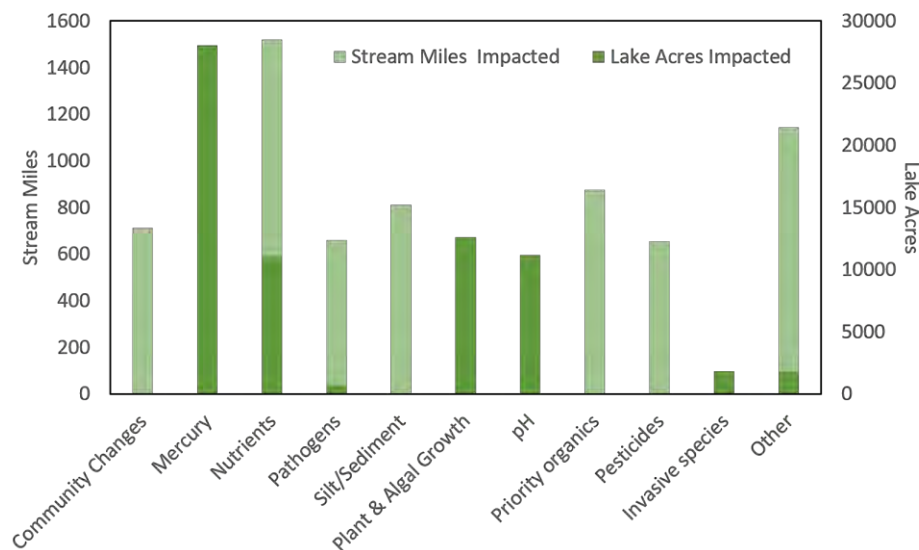
NYS has issued blanket and regional advisories for all waters in the St. Lawrence Valley and Adirondack region concerning consumption of specific species. The NYSDOH provides advisories for individual waterbodies and sportfish species and maintains a web site noting current status at https://www.health.ny.gov/environmental/outdoors/fish/health_advisories/.

6.2 Impacts and Stressors Preventing Waterbodies from Meeting Their Designated Uses

The St. Lawrence River watershed has experienced numerous ecological impacts associated with the stresses brought on by such human activities as industry, commercial and recreational navigation, agriculture, and development. **Figure 9** characterizes the most frequently cited pollutants and stressors affecting water quality according to the 2016 NYSDEC WI/PWL and 303(d) List.

Pollutants and sources affecting water quality in the basin differ in streams and lakes. Nutrients (25% of assessed stream miles, 1,500 miles), priority organics such as PCBs, dioxins and PAHs (14%, 875 miles), and sediment (13%, 810 miles) are the most common pollutants of streams. Lakes in the watershed are primarily impacted by mercury (47%, 28,000 acres), excessive algal and plant growth (21%, 12,600 acres), and acidic waters (19%, 11,200 acres). Other threats to water quality in the watershed include community composition changes and invasive species, silt/sediment transport, salinization, and pathogens.

Figure 9
Pollutants and Stressors of Waterbodies



SOURCE: NYS WI/PWL & 303(d) List, (2016)

The subsections below discuss causes for impairment in lakes and streams that are not meeting their designated best uses of fish consumption, aquatic life, recreation, and water supply.

6.2.1 Mercury

Impaired Use: Fish Consumption

Approximately 47% of assessed lake acres in the watershed are threatened, stressed, or impaired due to mercury found in sediments, waters, and fish. Fish consumption advisories have been issued due to elevated levels of mercury in certain fish species and sediments of the St. Lawrence River watershed. In the aquatic environment, microbial processes can metabolize mercury into its organic form, methylmercury. Acidic lake conditions have been shown to enhance this transformation. Methylmercury is a potent neurotoxin that bioaccumulates in fish and aquatic organisms. Human exposure to mercury is largely through consumption of contaminated fish, where developing fetuses and young children are the most sensitive populations.

6.2.2 Contaminated Sediment

Impaired Use: Fish Consumption

As a result of historical industrial practices and improper waste disposal, stream bottom sediments in portions of the St. Lawrence River watershed have been contaminated by priority organics (14% of assessed streams, 876 miles) and pesticides (11%, 656 miles). The Upper St. Lawrence subbasin at the St. Lawrence River and Massena Power Canal, the Oswegatchie subbasin at Little River and tributaries, and the Grasse River at the mouth of the Power Canal within the Grasse River subbasin are on the 2016 state and federal list of impaired waters due to sediment contamination by organic chemicals. The pollutants are dioxins, PCBs, and Mirex (an organochlorine insecticide); all are known to be bioaccumulative and carcinogenic. Benthic organisms exposed to contaminated sediment can accumulate these compounds through oral and dermal exposure. These compounds biomagnify to increased concentrations along the food chain, making some species of fish unsuitable for human consumption.

6.2.3 Acidic Waters

Impaired Use: Aquatic Life

Acidic waters are the third leading pollutant of lakes of the St. Lawrence River watershed, affecting 19% (11,167 lake acres) of assessed lake acres and an additional 400 stream miles (WI/PWL, 2016). Acidified waters have many ecological effects, especially on aquatic life. These waters leach nutrients and metals (e.g., calcium, aluminum) from soil clay minerals, which then flow across the surface as runoff water into streams and lakes or sink into the soil. Aluminum is toxic to vegetation at high levels and impairs a plant's ability to take up water and withstand environmental stressors, while the loss of soil nutrients can stunt plant growth and productivity. Leached aluminum can interfere with

ion regulation in aquatic animals and can accumulate on the surface of fish gills, leading to respiratory dysfunction. In addition, low pH and increased aluminum levels have been shown to cause chronic stress to fish, resulting in lower body weight and size that makes them less capable of competing for food and habitat. Fish reproduction is adversely impacted by acidic waters; calcium levels in female fish become lower to the point where egg production or pass is not viable, or larvae development is abnormal. Aquatic community composition changes and biodiversity decreases as lakes and streams become more acidic and viable only for fish and plant species that can tolerate lower pH levels. Even fish species that are more tolerant of acidic waters may suffer population impacts due to decreased food supply.

NYSDEC has conducted a liming program of acidic waters since 1959 with the purpose of restoring or protecting fish communities. These efforts, in addition to reductions resulting from implementation of the Clean Air Act, have contributed to the trend of increasing pH across several lakes. Analysis of historical data reveals that 25% of lakes included in the Adirondack Lake Assessment Program (ALAP) with long-term data have exhibited an increasing trend in pH (Laxson *et al.*, 2018).

6.2.4 Invasive Species

Impaired Uses: Aquatic Life, Recreation

Native aquatic species in the St. Lawrence River watershed are vulnerable to the presence of invasive species—nonnative organisms, such as rooted, aquatic plants, algae, animals, bacteria, viruses, and insects, that can harm humans or the environment. Invasive species pose a threat to aquatic habitat, nutrient cycling, and a lake or stream's capacity to fully support its designated uses. **Table 11** lists known invasive species and "watch" or "prevention" species referenced by the Partnerships for Regional Invasive Species Management (PRISMs), which coordinate invasive species management and monitoring efforts. Although the 2016 WI/PWL (2016) listed only three St. Lawrence River watershed waterbodies as impacted by invasive species (1,767 acres, 3%), research by the St. Lawrence-Eastern Lake Ontario (SLELO) Partnership, and Adirondack Park Invasive Plant Program (APIPP), and the Adirondack Watershed Institute has documented the widespread scale of invasives.

Typically, invasives grow and reproduce quickly and spread aggressively due to a lack of predators in the invaded environment. Their presence can quickly alter community dynamics, decrease biodiversity, and threaten native wildlife. The viability and proliferation of invasive species is dependent on the type of habitat invaded and associated stressors of that ecosystem. As an invasive population increases in size, it demands greater resources for management and inflicts grater impacts. Therefore, rapid identification of invasive species is critical to successful management and minimizing impacts.

Two especially significant aquatic invasive species have been the target of management efforts in the watershed, Eurasian milfoil and variable leaf milfoil. These submerged plants compete aggressively with native plants, growing in dense mats that shade out native plants and tend to reduce the levels of dissolved oxygen below. The thick growth also interferes with fishing, swimming, and recreational access. Plant fragments often are transported from lake to lake on boat trailers of fishing gear, starting new populations. The plants can grow in a variety of environments and sediment types, contributing to its widespread distribution. The Adirondack Park Agency and many lake associations are actively working to reduce its presence, but once established it is very difficult to eliminate. Terrestrial invasive species, such as Japanese Knotweed, and forest pests, such as the Emerald Ash Borer, Asian Longhorned Beetle and Hemlock Woolly Adelgid, can impact water quality by threatening riparian health and cold-water stream habitat. APIPP maintains an interactive Invasive Species Distribution Map documenting the distribution and management status of target aquatic and terrestrial invasive species within the Adirondack region (<http://adkinvasives.com/Invasive-Web-Map/index.html>). NYNHP also operates an invasive species database and mapping tool, iMapInvasives, <https://www.nyimainvasives.org/>.

Additional impacts related to invasive species are discussed in **Section 6.2.6** in the context of aquatic plants (macrophytes) and adverse impacts on recreation.

Table 11
Invasive Species Targeted for Prevention, Early Detection, and Control

Species	Scientific Name	PRISM
Target/General Invasive Species		
Asian Clam	<i>Corbicula fluminea</i>	APIPP
Autumn Olive	<i>Elaeagnus umbellata</i>	APIPP
Bale & Pale Swallow-wort	<i>Cyanthum spp.</i>	SLELO
Buckthorns	<i>Rhamnus cathartica, Frangula alnus</i>	APIPP
Bush Honeysuckles	<i>Lonicera spp.</i>	APIPP
Chinese Mystery Snail	<i>Cipangopaludina chinensis</i>	APIPP
Common Reed Grass	<i>Phragmites australis</i>	APIPP
Cup Plant	<i>Silphium perfoliatum</i>	APIPP
Curly-leaf Pondweed	<i>Potamogeton crispus</i>	APIPP
Emerald Ash Borer	<i>Agrilus planipennis</i>	APIPP, SLELO
Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>	APIPP, SLELO
European Frog-bit	<i>Hydrocharis morsus-ranae</i>	APIPP, SLELO
Fishhook Waterflea	<i>Cercopais pengoi</i>	APIPP
Garlic Mustard	<i>Alliaria petiolata</i>	APIPP
Giant Hogweed	<i>Heracleum mantegazzianum</i>	APIPP, SLELO
Glossy Buckthorn	<i>Frangula alnus</i>	SLELO
Hemimysis	<i>Hemimysis anomala</i>	SLELO

Species	Scientific Name	PRISM
Hemlock Woolly Adelgid	<i>Adelges tsugae</i>	APIPP
Japanese Barberry	<i>Berberis thunbergii</i>	APIPP
Japanese Honeysuckle	<i>Lonicera japonica</i>	SLELO
Japanese Knotweed	<i>Polygonum cuspidatum</i>	SLELO
Japanese Stilt Grass	<i>Microstegium vimineum</i>	SLELO
Knotweeds	<i>Reynoutria spp.</i>	APIPP
Leafy Spurge	<i>Euphorbia esula L.</i>	SLELO
Leek Moth	<i>Acrolepiopsis assectella</i>	SLELO
Lesser Celandine	<i>Ficaria verna</i>	APIPP
Multiflora Rose	<i>Rosa multiflora</i>	APIPP
Norway Maple	<i>Acer platanoides</i>	APIPP
Oriental Bittersweet	<i>Celastrus orbiculatus</i>	APIPP
Phragmites	<i>Phragmites australis</i>	SLELO
Purple Loosestrife	<i>Lythrum salicaria</i>	APIPP, SLELO
Quagga Mussel	<i>Dreissena rostriformis bugensis</i>	SLELO
Round Goby	<i>Neogobius melanostomus</i>	SLELO
Scotch Broom	<i>Cytisus scoparius</i>	APIPP
Sirex (European) Woodwasp	<i>Sirex noctilio</i>	APIPP, SLELO
Spiny Waterflea	<i>Bythotrephes longimanus</i>	APIPP, SLELO
Spotted Knapweed	<i>Centaurea maculosa</i>	SLELO
Spring Viraemia		SLELO
Swallow-worts	<i>Cynanchum louiseae</i>	APIPP
Tree of Heaven	<i>Ailanthus altissima</i>	APIPP
Variable-leaf Watermilfoil	<i>Myriophyllum heterophyllum</i>	APIPP
Viral Hemorrhagic Septicemia		SLELO
Water Chestnut	<i>Trapa natans</i>	APIPP, SLELO
White Nose Syndrome		SLELO
Wild Chervil	<i>Anthriscus sylvestris</i>	SLELO
Winged Burning Bush	<i>Euonymus alatus</i>	APIPP
Yellow Iris	<i>Iris pseudacorus</i>	APIPP
Zebra Mussel	<i>Dreissena polymorpha</i>	APIPP
Prevention Watch-List Species		
Asian Longhorned Beetle	<i>Anoplophora glabripennis</i>	APIPP, SLELO
Asian Carp	<i>Cyprinus carpio</i>	SLELO
Asian Clam	<i>Corbicula fluminea</i>	SLELO
Asian Jumping Worm	<i>Amyntas spp.</i>	SLELO
Eurasian Boar	<i>Sus scrofa</i>	APIPP
Fanwort	<i>Cabomba caroliniana</i>	SLELO
Feral Swine	<i>Sus scrofa Linnaeus</i>	SLELO
Hemlock Woolly Adelgid	<i>Adelges tsugae</i>	SLELO
Hydrilla	<i>Hydrilla verticillata</i>	APIPP, SLELO

Species	Scientific Name	PRISM
Japanese Angelica Tree	<i>Aralia elata</i>	APIPP
Japanese Stiltgrass	<i>Microstegium vimineum</i>	APIPP
Kudzu (Vine)	<i>Pueraria lobata</i>	SLELO
Mile-A-Minute	<i>Polygonum perfoliatum</i>	APIPP, SLELO
New Zealand Mud Snail	<i>Potamopyrgus antipodarum</i>	SLELO
Porcelain Berry	<i>Ampelopsis brevipedunculata</i>	APIPP, SLELO
Quagga Mussel	<i>Dreissena rostriformis bugensis</i>	APIPP
Rock Snot (didymo)	<i>Didymosphenia geminata</i>	SLELO
Rusty Crayfish	<i>Orconectes rusticus</i>	APIPP/SLELO
Slender False Brome	<i>Brachypodium sylvaticum</i>	APIPP
Tench	<i>Tinca tinca</i>	SLELO
Water Soldier	<i>Stratiotes aloides</i>	SLELO
Wineberry	<i>Rubus phoenicolasius</i>	APIPP

SOURCE: SLELO and APIPP PRISMS, retrieved December 6, 2019.

Note: Bold rows refer to species on SLELO's General Invasive Species List.

6.2.5 Nutrients

Impaired Uses: Aquatic Life, Recreation

Although nutrients are required to support healthy ecosystems, excessive nutrients can harm water supplies, recreational uses, and aquatic life. Nutrient contamination of surface waters, primarily attributed to nitrogen and phosphorus, has been a longstanding issue that is not unique to the St. Lawrence River watershed. The WI/PWL cited nutrients as the primary pollutant of streams in the St. Lawrence River watershed, affecting 1,520 miles (24% of the assessed 6,212 miles). Nutrients affect the fourth greatest amount of assessed lake area (11,074 lake acres, 19%) in the watershed.

In freshwater systems, phosphorus is typically the limiting element on growth and productivity. Excessive levels of nutrients stimulate the growth of algae and aquatic plants, which upon dieback are decomposed by bacteria that consume oxygen on the water floor. This can result in hypoxia (low oxygen conditions), which is detrimental to aquatic life and habitat. Other impacts related to excessive plant and algal growth are discussed below.

6.2.6 Excessive Plant and Algal Growth

Impaired Uses: Aquatic Life, Recreation, Water Supply

Twenty-one percent of lakes (12,630 acres) and an additional 156 miles of streams in the watershed are impacted by excessive plant and algal growth. Excessive plant growth diminishes the recreational value of the waterbody by inhibiting swimming and boating, which in turn impacts local economies that are largely dependent on tourism and recreation. Excessive plant growth can also decrease habitat for fish and spawning beds. Often, the excessive growth is due to the introduction of invasive species that form dense beds on the lakebed and outcompete native species for habitat. In

particular, invasives such as Eurasian milfoil and curly leaf pondweed can inhabit various sediments, depths, and light conditions, altering conditions that were previously good conditions for spawning habitat.

Algae is a fundamental component of any aquatic food web, as it produces oxygen, provides food for many organisms, and removes nutrients from the water column. However, when a significant influx of nutrients occurs, algae can grow excessively, creating an unpleasant and unaesthetic atmosphere for swimmers and recreationists. Algal growth can contribute to taste and odor issues and clog intake pipes impacting drinking water sources. Large mats of algal growth block sunlight necessary for aquatic plants below the surface, altering habitat and reducing oxygen levels. In the dieback season, algae fall to the water floor where it is microbially decomposed in a process that reduces dissolved oxygen levels. Reduced oxygen levels significantly affect organisms in the benthic zone and cause changes in community dynamics and potential migration of organisms to areas with more suitable conditions.

Some algal species can produce toxins. Harmful algal blooms (HABs) are kept in check partly by native nontoxic algae that readily take up excess nutrients from the water column. However, HABs can proliferate in suitable environmental conditions, which include excess nutrients, increased precipitation, sufficient sunlight, low-flow conditions, warm temperature, and calm waters (low wind). Lake dynamics such as native algal species and presence of invasive species contribute to their presence. Lake associations and organizations such as the Adirondack Watershed Institute are actively involved in training the public and lake residents on how to identify and report HABs in the watershed. NYSDEC encourages lake users to “know it, avoid it, and report it” when a suspected HAB is observed and operates a NYHABS online notification and reporting system for HABs.

6.2.7 Sedimentation

Impaired Use: Aquatic Life, Recreation

Sedimentation affects 13% (812 miles) of assessed stream miles in the St. Lawrence River watershed (WI/PWL, 2016). Sedimentation occurs when loose sand, clay, silt, and other soil particles enter and fill catch and flood basins, structures that are important for mitigating flooding and increasing volumetric capacity during times of increased precipitation and snowmelt. When these structures are instead filled with excess sediment, their functionality is inhibited.

Sediment deposits in rivers can alter the natural flow of water and reduce water depth, affecting recreational use and navigation. In addition, soft sediment deposits can increase turbidity and make swimming undesirable. Aquatic life is also affected by the transport of sediment and associated nutrients; turbid conditions can prevent fish from finding prey, and sediment can clog fish gills, lowering growth rates and reducing resistance to disease.

6.2.8 Salt

Impaired Use: Aquatic Life, Water Supply

Salts from de-icing and residential water softeners can enter lakes and streams, and groundwater that supply drinking water. Just one teaspoon of salt can permanently pollute five gallons of water. Once in the water, treatment becomes difficult and expensive. The St. Lawrence River watershed has a growing salt contamination problem that threatens drinking water supplies and aquatic life. Lakes in watersheds with paved roads have a median sodium concentration four times greater than those in watersheds without paved roads (Kelting, Laxson, and Yerger 2012). Dissolved salts can leach into aquifers and ground water when exposed to rain, snow, and wind. Road salt that enters roadside soils can also displace other cations within the soil, leaching them from the soil for offsite transport and depleting soil fertility. This cation loss from soils demonstrates a flux that may have a significant impact on soil and waterbody biogeochemistry and ecosystem health by reducing water retaining capacity and increasing erosion potential. Deicing compounds are known to be nontoxic at lower concentrations, but at higher concentrations they can place stress on fish and insect community structure, diversity, and productivity. Ultimately, salt intolerant species are outcompeted by salt-tolerant species, which often include invasive species. In addition, chloride corrodes road surfaces, bridges, and other elements of infrastructure, increasing maintenance and repair costs.

The Adirondack Watershed Institute at Paul Smith's College collected data showing that wells in the Adirondacks were contaminated by road salt at unhealthy levels. Two-thirds (2/3) of the wells tested downslope from state roads contained concentrations of sodium beyond the federally recommended health limit of 20 parts per million (ppm). The natural salinity of water in the Adirondacks is 0.3-0.5 ppm. Sodium has been strongly linked with hypertension, a condition that affects 12–30% of the population. Chloride levels exceeded 250 ppm, the recommended NYSDOH guideline for chloride, in nearly one-third of the 157 wells downslope of state roads. Some wells contained around 1,000 ppm of chloride, a level deemed not potable or drinkable (Virtanen, 2019).

6.2.9 Pathogens

Impaired Use: Water Supply

Pathogens affect 11% of assessed stream miles (661 miles) and 1% of lake acres (727 lake acres) (WI/PWL, 2016). Swimming in and drinking contaminated waters can make people ill, resulting in beach closures and an unsafe drinking water source. EPA has developed criteria to protect people from bacteria and their associated toxins in water bodies.

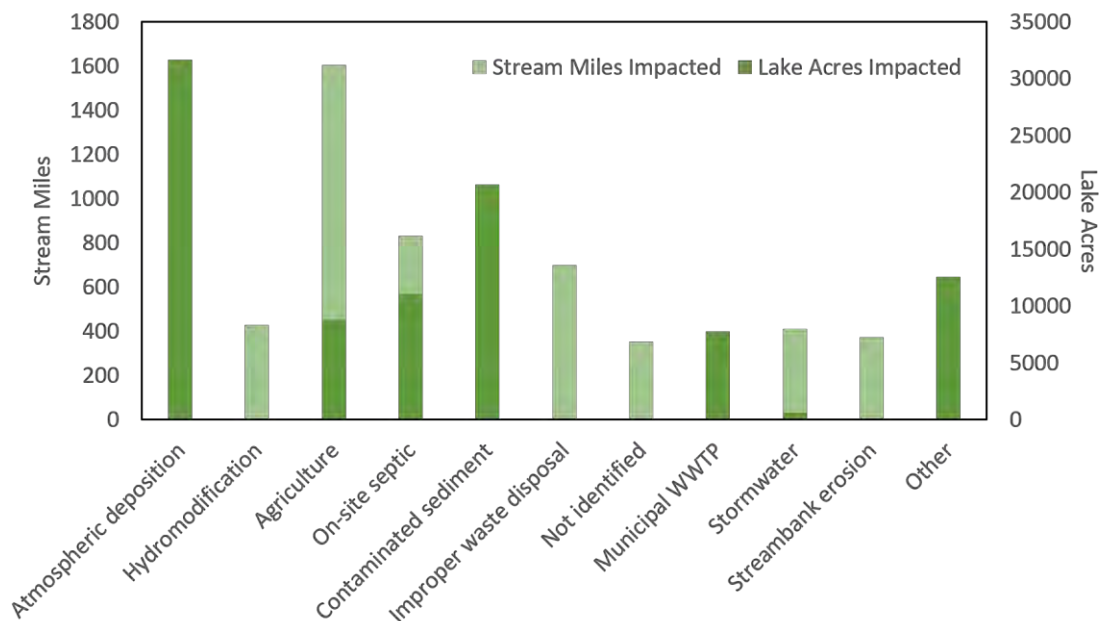
6.3 Potential Sources of Stressors

Lakes and streams in the St. Lawrence River watershed are affected by a combination of local and regional sources of pollution, which presents a challenge for those developing strategies to combat stresses and impairments to waterbodies. These sources include atmospheric deposition of

pollutants originating outside the basin (regional), as well as local point and nonpoint sources related to industry, agriculture, hydromodification, municipal infrastructure, development, and commercial and recreational navigation. Point sources refer to discharges that originate from a single, identifiable source such as a pipe or outfall from a sewage treatment plant, whereas nonpoint sources represent diffuse combinations of pollutants from a large area, such as stormwater runoff that accumulates contaminants from several sources and then flows into streams.

Figure 10 shows the potential pollutant sources affecting the St. Lawrence River watershed and the magnitude of their impact. **Maps 31** and **32** display pollution sources within the St. Lawrence River watershed, such as sites permitted under the National Pollution Discharge Elimination System (NPDES), Superfund, Brownfield, and Environmental Restoration sites, landfills, sites undergoing voluntary cleanup programs, and mines. Regional sources contributing to pollution, nonpoint local sources, and local point sources affecting the St. Lawrence River watershed are discussed in the subsections that follow.

Figure 10
Potential Sources of Pollutants and Stressors



SOURCE: NYS WI/PWL & 303(d) List, (2016)

6.3.1 Regional Nonpoint Sources

Atmospheric deposition of acid rain and mercury is the primary source of lake pollutants in the watershed, affecting 53% (31,680 lake acres) and 400 miles of streams. Atmospheric deposition is the process by which pollutants in the form of particulates, aerosols, and gases are transported by wind currents and released through precipitation to the earth's surface. For the St. Lawrence River watershed, the pollutants released through this process are inorganic acids (known as acid rain) and mercury. These pollutants represent historical sources that still affect the system due to the recycling of contaminants in the environment and the atmosphere; they are addressed by federal and state regulations, including the Clean Air Act and Clean Water Act.



Coal-fired plant in Monroe, Michigan
Photo source: crainsdetroit.com

6.3.1.1 Acid Rain

Acid rain is formed when sulfur dioxide (SO_2) and nitrogen oxides (NO_x) combine with moisture in the atmosphere to produce sulfuric and nitric acids. Sulfur dioxide and nitrogen oxides are largely produced through the combustion of fossil fuels and emitted by motor vehicles, power plants, and industries. Higher elevation areas of the St. Lawrence River watershed, including the Adirondacks, are highly susceptible to the impacts of acid rain due to their thin soils, which are largely devoid of limestone (calcium carbonate). This severely limits the soil's buffering capacity to counteract the impacts of acid rain, making lakes more vulnerable to its effects. Acid rain has affected 19% of lake acres (11,167 acres) in the watershed.

Federal and state programs including the Clean Air Act (1990), Clean Air Interstate Rule (CAIR), and NYS Acid Deposition Control Act have reduced emissions of nitrogen oxide and sulfur dioxide. Environmental improvements in the region have been documented recently in response to these air pollutant control strategies (Waller, 2012).

6.3.1.2 Atmospheric Deposition of Mercury

Mercury is emitted into the air through human activities such as mining and fossil fuel combustion and through natural processes such as volcanic eruptions. It is then deposited via atmospheric deposition onto land and water, where microbial processes can metabolize it into an organic form, methylmercury. Approximately 47% of the St. Lawrence River watershed lake acres are threatened, stressed, or impaired due to mercury found in sediments, waters, and fish. New York State has issued blanket and regional advisories for all waters in the Adirondack region concerning consumption of

specific species. The advisories include additional limits on fish consumption for women of child-bearing age and all children.

6.3.1.3 *Recreation and Commercial Transport*

Aquatic invasive species typically enter waterbodies via transport by boats and recreational users. The St. Lawrence River watershed is particularly susceptible to aquatic invaders due to international commerce from Eurasia across the Atlantic. Invasive plants and animals in ballast water enter the watershed through the St. Lawrence Seaway and rivers flowing from the Great Lakes. In addition, recreational boating, particularly in the Adirondack's region, can hasten the spread of invasive species. The NYSDEC coordinates efforts to combat invasive species through its Partnerships for Regional Invasive Species Management (PRISM).

6.3.2 Local Nonpoint Sources

6.3.2.1 *Runoff from Agricultural Areas*



Water flows off a farm following a storm.
Photo Source: Tim McCabe/NRCS

Agricultural activities and associated runoff contribute nutrients, sediments, and pesticides to receiving waters, which can have adverse effects on aquatic life and water quality. Twenty six percent (26%) of assessed stream miles (1,604 miles) and 15% of assessed lake acres (8,800 acres) in the watershed are threatened, stressed, or impaired due to agricultural activities (WI/PWL, 2016). There are 2,344 farms in the watershed

occupying 620,000 acres of land, and agricultural districts (**Map 22**) are concentrated primarily in the northern skirt of the basin, which is host to flat plains and rich soils (**Maps 14** and **18**). **Table 4** lists the farmed crops and livestock of the St. Lawrence River watershed and the associated amount of land used for the activity.

The Oswegatchie and Indian subbasins dedicate 14% and 22% of their total area, respectively, to agriculture and have the highest count of surface water segments listed as impaired due to nutrients. The counts include state-assigned pollutants/causes identified as nutrients, organic

enrichment/oxygen depletion, algal growth, or noxious aquatic plants. These IDs are associated with excess nutrients and sediment transport via agricultural runoff.

Fifteen percent (15%) of croplands and pasture in the watershed are contiguous to water, and 3% are on hydric soils. The Upper St. Lawrence has the highest percentage of agriculture contiguous to water at 31%. 70% of newly converted agricultural lands (1,100 acres) from 2001-2012 are within hydrologically connected zones, land that is comprised of wet areas with high runoff potential.

Impacts to local waterways can result from poor agricultural management, such as improper manure application on fields, intense cultivation of lands with little riparian buffer, and unrestricted access of livestock to streams. The St. Lawrence River watershed fertilizes 104,254 acres of farmland via manure application (USDA-NASS, 2018). An average of approximately 380 and 390 kg N/ha/year of manure and synthetic nitrogen, respectively, are applied to lands for fertilization purposes (WSIO Indicator Data, 2018).

6.3.2.2 *On-Site Water Treatment Systems (Septics)*

On-site septic systems are considered to threaten, stress, or impair 19% (11,100 acres) of lake acres and 13% (830 miles) of stream miles in the NY portion of the St. Lawrence River basin. Pathogens associated with sewage effluent can impair the use of a waterbody for contact recreation and as a source of potable water. Nutrients in wastewater can exacerbate algal growth, threatening aquatic life, recreation, and swimming access. The NYS Department of Health has established minimum standards for domestic septic systems. Other agencies, including the APA or local health departments may establish more stringent standards. Local municipalities can adopt local laws related to maintenance and inspection of septic systems that consider distance to waterways or critical environmental areas.

Historically, the St. Lawrence River watershed and the broader Adirondack region hosted many seasonal visitors from late spring to fall. Recent years have seen a rise in conversion of lakefront properties from seasonal cottages into year-round residences. If homes fail to upgrade their septic systems to accommodate this transition, they risk sewage effluents reaching nearby waterbodies. Depending on the age of the septic system, its distance from waterways, and the biogeochemical properties of the leach field (e.g., mineral composition and bulk density of soils, slope, depth to groundwater), even a well-maintained system may contribute nutrients to nearby waters and increase the risk of eutrophication.

6.3.2.3 Road Deicing

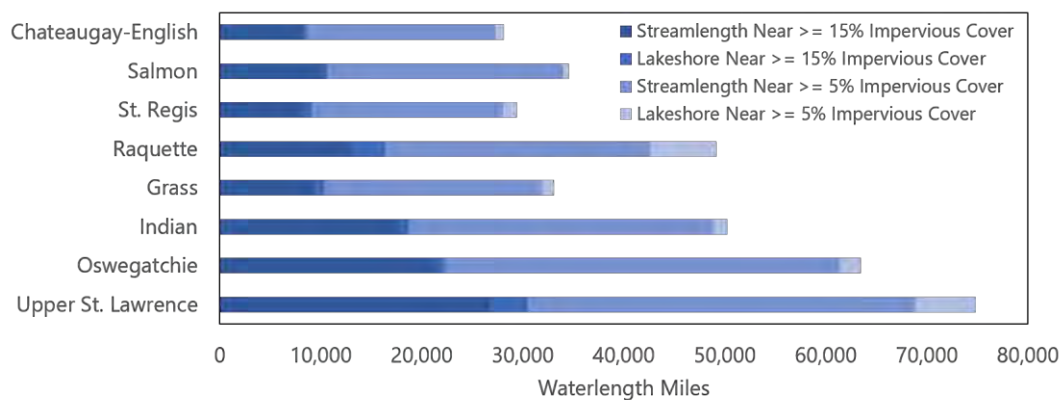
Deicing compounds are effective and necessary for maintaining safe travel conditions for motorists throughout the winter months. The NYSDOT relies on sodium chloride (salt) as the primary de-icing chemical due to its low cost and availability. About 50% of salt applied to roads runs off to surface waters; the remainder accumulates in soils and eventually reaches groundwater (Kelting & Laxson 2017). Road salt runoff tends to be a problem in areas with increased impervious surfaces. **Figure 11** shows the stream and lakeshore length in each HUC12 within 30 meters of areas with greater than or equal to 15% and 5% impervious surfaces.



Road-deicing.

Photo Source: Paul Smith's College, Adirondack Watershed Institute, Road Salt Research

Figure 11
Waterbodies Near Impervious Cover



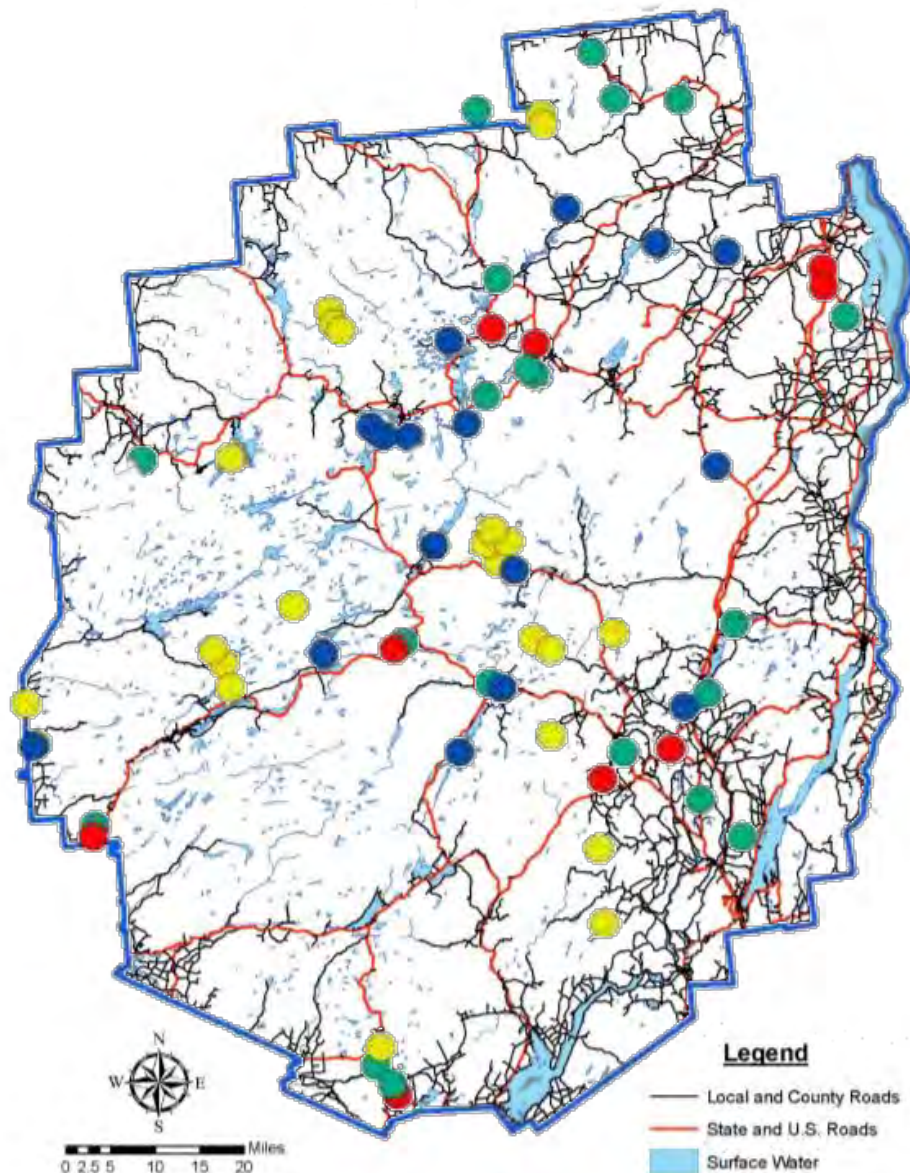
Source: WSIO Indicator Data, 2018; Based on analysis of the proximity of impervious cover to water features done by EPA using NLCD 2011 Percent Developed Imperviousness dataset (October 2014 version) and NHDPlus2 NHD Snapshot (June 2014).

The Upper St. Lawrence watershed has the greatest percentage of waters near impervious surface, primarily due to developed areas around Ogdensburg, Waddington, Alexandria Bay, Clayton, and Cape Vincent along the St. Lawrence River. The Oswegatchie, Indian, and Raquette watersheds have between 12-20 thousand miles of waterbody length within 30 m of areas with 15% impervious cover.

Studies found a high correlation between road density and sodium and chloride concentrations, pointing to road salt as the primary source of salt loadings to lakes (Kelting, Laxson, & Yerger 2012). This same study found that roads maintained following NYSDOT deicing protocols (state roads) are the greatest contributors to salinization of lakes in the Adirondack Park. **Figure 12** illustrates the proximity of road networks to waterbodies of the Adirondack Park. About 208,000 metric tons of road salt (NaCl) is applied to roads in the Adirondack Park every year, this equals an average application rate of 23 tons per lane kilometer of state roads (Laxson *et al.*, 2019). In addition, coarse texture glacial till and soils of granitic origin have high infiltration rates and low retention within the soil matrix, contributing to the rapid and increased migration of salts to aquifers and groundwater.

Salted roads are hydrologically connected to 77% of the surface water in the Adirondack Park (Regalado and Kelting, 2015). Roughly 72% of lakes assessed as part of the Adirondack Lake Assessment Program (ALAP) by the Adirondack Watershed Institute are influenced by road salt, with many of those lakes containing anywhere from 10-170 times the background concentration of chloride of 0.3-0.5 mg L⁻¹ (Laxson *et al.*, 2019).

Figure 12
Surface Water and Road Network in the Adirondack Park



SOURCE: Laxson *et al.*, 2018 for the road salt condition status of lakes. Laxson & Kelting, 2010 for the proximity of Adirondack Lakes to roads. Colored dots indicate road salt influence; blue, low influence (1-5 ppm chloride); green, moderate influence (5-20 ppm chloride); red, high influence (20-50 ppm chloride); and yellow, not significant (less than 1 ppm chloride).

The storage of deicing compounds is currently unregulated, and many municipalities have inadequate storage facilities, leaving deicing compounds exposed to the elements and increasing the potential for offsite transport. NYS updated its guidelines for snow and ice control in 2006 with revisions in 2012 (NYSDOT, 2012). The guidelines are maintained and updated by the Cornell Local Roads Program (CLRP) and form the basis for operator training conducted by the CLRP for NYSDOT.

These guidelines incorporate documents from the American Association of State Highway and Transportation Officials.

6.3.2.4 *Hydromodification*

Hydromodification is the alteration of the natural flow of water through a landscape that results from changes in land cover or channel modification. Road and streambank erosion, shoreline erosion, development, and the building of dams are examples of hydromodification. Seven percent (7%) of assessed stream miles in the St. Lawrence River watershed are impacted by hydromodification (WI/PWL, 2016).

Streambank and shoreline erosion. Sediment carried by rivers and streams draining large watersheds is primarily attributed to bank and channel erosion. When a stream is straightened or widened, whether via human manipulation or fast-flowing waters, its banks and shoreline can erode as the stream reestablishes a stable size and pattern. Vegetation removal and land use changes can contribute to more erosion. As sediments are released downstream, they can potentially settle in low-flow areas, altering stream flow and filling in areas that previously mitigated flooding. Banks and shorelines that are unvegetated, high sloped, and experience large flow rates during times of increased precipitation are more susceptible to erosion. The NY Riparian Opportunity Assessment assesses erosion potential and provides the data in a publicly available map at <https://www.arcgis.com/home/webmap/viewer.html?webmap=a914e62f4ffc497ea05cbeaf203fb819>. The heat map highlights HUC12s that receive runoff waters from steep, upslope areas that have a greater risk for erosion adjacent to the stream bank. McConnell Creek (Grasse River watershed) and Vrooman Creek (Oswegatchie River watershed) are ranked most vulnerable to erosion, with slopes of the Adirondacks also displaying some vulnerability.

Dams. Dams can alter hydrology, surface water quality, and aquatic habitat in the stream or river where they are located. There are 190 dams in the St. Lawrence River Watershed, shown on **Map 29**. Dams trap sediment and inhibit its transport downstream, altering both upstream and downstream habitat. Disrupting water flow and sediment transport by changing the quantity and timing of water flow affects the ecological web of a river system. For example, increased flow conditions are an important environmental cue for initiating the salmon run of Chinook salmon in the Salmon River. In recreational reservoirs impounded by dams, sedimentation is cited as a nuisance for swimmers and lakeshore residents, who experience difficulty navigating due to buildup of sediment and increased plant growth.

In some cases, a dam wall can block fish migrations or separate spawning habitats from rearing habitats. Barriers to stream connectivity have been mapped by the Northeast Aquatic Connectivity Project (<https://maps.freshwaternetwork.org/northeast/#>), depicting barriers such as road crossings and dams. In 2016, the Saint Regis Mohawk Tribe (SRMT) oversaw the removal of the Hogsburg

Dam at the mouth of the St. Lawrence River. The removal resulted in the connection of 441 km (274 miles) of river and stream migration routes to upstream spawning and nursery habitat, benefiting Walleye, Muskellunge, Atlantic Salmon, Lake Sturgeon, American Eel, and other species. This project marked the first removal of a hydropower dam in NYS. The North Atlantic Aquatic Connectivity Collaborative developed protocols for assessing road stream crossings for the Northeast, and maintains a map illustrating prioritized areas by HUC12 (found at TNC HUC12 Prioritization Tool under the Tools Tab at <http://streamcontinuity.org/>). However, it is important to note, barriers such as dams can play a beneficial role in preventing Sea Lamprey from accessing thousands of miles of additional spawning habitat and preventing the spread of other invasive species including Round Goby. The Great Lakes Fishery Commission has developed a Sea Lamprey control map that assesses barriers importance in preventing Sea Lamprey introductions (<http://data.glfc.org/>).

Development. Development, of urban and rural areas, or “back-country sprawl,” is an emerging threat to aquatic ecosystems and water quality in the St. Lawrence River watershed. New development brings new roads, driveways, power and water lines, leach fields, invasive species, and other disruptions to the natural hydrography of the landscape. Culverts at road stream crossings can obstruct the passage of fish through tributaries, reducing aquatic habitat connectivity. Development also increases

impervious surfaces in the watershed that can disrupt the natural flow of water. Studies have shown that water quality can be harmed when as little as 2% of a watershed is converted from natural vegetation to artificial hard surfaces (Adirondack Council, 2008).



Town of Clayton, NY
Photo Source: townofclayton.com

The Massena Power Canal was constructed in the early 1900s to provide hydroelectric power to the local community and Alcoa Inc., an aluminum smelting facility. The Canal connects the St. Lawrence Seaway to the lower Grasse River. The Grasse River was widened and deepened to accommodate the additional source of streamflow from the Canal and St. Lawrence Seaway. The river was altered to have steep banks that extend from shallow areas along the shorelines to a relatively deep and flat river bottom, spanning about 400 to 600 feet wide. The Power Canal was closed in 1958 upon completion of the Moses-Saunders Power Dam and Eisenhower locks system. In addition to widening the river and altering flows, the closing of the Massena Power Canal significantly reduced

the volume of water transported through the Grasse River channel, resulting in low flow conditions throughout the river. Even under spring flows, velocities are still relatively low and difficult to measure with conventional equipment. The low flow velocities offer favorable conditions for the settling of solids entering from upstream, with one to three centimeters of solids deposited in the river bottom each year.

6.3.3 Point Sources

The Clean Water Act regulates point sources that discharge pollutants into a waterbody by requiring the discharger to have a National Pollutant Discharge Elimination Systems (NPDES) permit. The permit identifies the pollutant(s) of concern, the discharge allowance, and monitoring and reporting requirements. This system protects water quality by ensuring that the state's water standards are met and specifying acceptable levels of a pollutant, or pollutant indicator, in a discharge. NPDES sites in the St. Lawrence River watershed include publicly owned treatment works (39), combined sewer overflows (33), municipal separate storm sewer systems (2), stormwater constructs (8), industrial wastewater discharges (56), and concentrated animal feeding operations (72). NYSDEC's Info Locator map provides information about permitted facilities including links to permits. **Map 31** locates sources of pollution such as landfills, publicly owned treatment works, and industrial wastewater discharges.

6.3.3.1 Publicly Owned Treatment Works

Publicly owned treatment works (POTWs) are tasked with collecting municipal wastewater and treating it to meet discharge requirements before the effluent can be released into adjacent waters. Wastewater can contain pathogens, metals, suspended solids, residual chlorine, and trace contaminants that can threaten drinking water and recreational activity. Wastewater treatment plants (WWTPs) are cited as the suspected source of pollutants of 13% (3,130 lake acres) of assessed lake acres and 6% (410 miles) of assessed streams (WI/PWL, 2016). Sewage pollution discharge information is publicly accessible under the Sewage Pollution Right to Know Law (2013). **Map 33** illustrates boundaries of the St. Lawrence County public sewer district, Franklin County public sewer district and villages within St. Lawrence and Franklin Counties that have public sewer (DANC GIS sewerage areas within Jefferson, St. Lawrence, and Franklin counties of the St. Lawrence River watershed. This information was compiled by the Development Authority of the North Country (DANC). **Table 12** lists POTWs within the St. Lawrence River watershed.

The Clean Water Act, passed in 1972, provided funding to support the construction and upgrade of wastewater treatment facilities, which led to a significant improvement in water quality. However, funding for maintaining and upgrading these systems has been greatly reduced, which coincides with the end of these systems' 30- to 40-year design lives. Many sewage treatment systems in small towns and villages are aging, inadequate, or operating beyond their capacity.

Table 12
Publicly Owned Treatment Works Permitted under NPDES

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
Upper St. Lawrence	041503010102	Clayton (V) STP	NY0027545 NYL027545	
	041503010104	Alexandria Bay WWTP	NY0022501	St. Lawrence River
		Orleans/Alexandria Joint WWTP	NY0258059	St. Lawrence River
		Thousand Island Park STP	NY0030686	
		Us Coast Property At Wellesley Island	NY0022284	St. Lawrence River
	041503010107	Morristown (V) WWTF	NY0206997	
	041503010202	Ogdensburg Secondary WWTP	NY0029831	St. Lawrence River
		Waddington (V) WWTF	NY0030180	
	041503010203	Lisbon STF	NY0257559	St. Lawrence River
Oswegatchie	041503020102	Fine - T Wanakena Sewer District	NY0034533	
	041503020604	Edwards (V) WWTP	NY0023809	Oswegatchie River
	041503020802	*Gouverneur (V) WWTF	NY0020117 NYR00E780	Oswegatchie River
	041503020902	Dekalb Junction STP	NY0034762	Gulf Creek
	041503020904	Rensselaer Falls WWTP	NY0257613	Oswegatchie River
	041503021002	Heuvelton (V) WPCP	NY0027146	Oswegatchie River
Indian	041503030205	Antwerp (V) WWTP	NY0235890	Indian River
	041503030301	Evans Mills (V) WWTP	NY0024660	
	041503030303	Philadelphia (V) WWTP	NY0033022	Indian River
	041503030401	Theresa (V) WWTP	NY0207004	Indian River
	041503030501	Redwood SD	NY0215911	
	041503030505	Hammond (V) STP	NY0033561	
Grasse	041503040402	Hermon (V) WWTP	NY0257532	Elm Creek
	041503040404	*Canton (V) WWTP	NY0236586 NYR00E591	Grasse River
	041503040501	Madrid WPCP	NY0024635	Grasse River
	041503040502	*Massena (V) WWTP	NY0031194 NYR00E618	Grasse River
Raquette	041503050409	Tupper Lake (V) WPCP	NY0029939	Raquette River
	041503050604	Colton STP	NY0022012	Raquette River
	041503050703	Norfolk (T) SD#1	NY0023604	Raquette River
	041503050703	Norwood (V) WWTP	NY0021369	Raquette River
		Potsdam (V) WPCP	NY0020818	Raquette River

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
			NYR00E695	
	041503050703	Potsdam Sewer District #1 STP	NY0023337	Raquette River
St. Regis	041503060303	N. Lawrence & Nicholville STP	NY0110116	Saint Regis River
	041503060405	St Regis Falls WWTP	NY0255858	Saint Regis River
	041503060408	Brasher Falls SD#1 STP	NY0030732	
Salmon	041503070302	Malone (V) WWTP	NY0030376	Salmon River
	041503070306	High Street WWTP	NY0027863	Salmon River
Chateaugay-English	041503080102	Lyon Mountain SD WWTP	NY0239577	Separator Brook
	041503080104	Brainardsville SD#1 WWTP	NY0255726	
	041503080201	Chateaugay (V) STP	NY0024830	

SOURCE: Enforcement and Compliance History Online (ECHO), USEPA

NOTE: Bold rows are "major" permit types; Asterisks (*) denote facilities that receive industrial stormwater.

6.3.3.2 Stormwater Collection Systems

Stormwater runoff is generated when water from rain and snowmelt events flows over land or impervious surfaces and does not seep into the ground. If runoff is not captured or treated, it can



Stormwater Collection

Photo Source: Capitol Region Watershed District

accumulate and transport nutrients, chemicals, sediment, and other pollutants that adversely affect water quality in receiving waters. Urban and developed areas with a higher concentration of impervious surfaces are more vulnerable to the impacts of stormwater runoff. Stormwater impacts seven percent of assessed streams (410 miles) and one percent of assessed lakes (634 acres) in the St. Lawrence River watershed (WI/PWL, 2016). The CWA regulates combined sewer overflows (CSOs), municipal separate storm sewer systems (MS4s), industrial facilities, and construction sites to prevent and monitor discharges of pollutants in stormwater runoff.

Combined Sewer Overflows. Combined sewer systems collect water from domestic sewers and wastewater, industrial wastewater, and stormwater runoff. These systems are designed with relief points to mitigate periods of high flow. A CSO occurs when stormwater runoff from precipitation or snowmelt exceeds the sewer's capacity and excess waters are discharged directly to its receiving waterbody through the built-in relief points. CSO discharges may contain mixtures of domestic sewage, high levels of suspended solids, toxic chemicals, floatable material, and other pollutants. In

the event of an overflow, receiving waterbodies may be hazardous for human and animal health and have significant water quality impacts such as bacterial contamination, algae growth, and reduced oxygen levels in the water. As permittees, municipalities are required to comply with long-term control plans that present mechanisms to reduce the frequency and volume of CSO discharges. Popular methods include separating stormwater and sewer lines, expanding wastewater treatment capacity, creating retention basins to hold overflow during storm events, and using green infrastructure to reduce stormwater flows.

There are 33 permitted CSOs in the St. Lawrence River watershed (**Table 13**). CSOs are concentrated in the City of Ogdensburg, and Villages of Massena, Clayton, Tupper Lake, Gouverneur, and Potsdam. The highest number of CSOs exist within the City of Ogdensburg, with 17 overflows monitored and owned by the City of Ogdensburg WWTP. The Village of Massena monitors ten CSOs operated by the Massena WWTP. The NYSDEC website presents a [mapping tool](#) showing the locations of CSOs within the state.

Table 13
Permitted CSOs

HUC8	HUC12	Receiving Waterbody	Permit ID	Facility Owner	Operating CSOs
Grasse	041503040502	Grasse River	NY0031194	Village of Massena, WWTP	5
Raquette	041503050706	Raquette River	NY0031194	Village of Massena, WWTP	5
	041503050409	Raquette Pond	NY0029939	Village of Tupper Lake, WPCP	2
	041503050703	Raquette River	NY0020818	Village of Potsdam, WPCP	1
Oswegatchie	041503020802	Oswegatchie River	NY0020117	Village of Gouverneur, WWTF	1
	041503021003	Oswegatchie River	NY0029831	City of Ogdensburg, WWTP	10
Upper St. Lawrence	041503010202	St. Lawrence River	NY0029831	City of Ogdensburg, WWTP	7
	041503010102	St. Lawrence River	NY0027545	Village of Clayton, STP	2

SOURCE: [CSO Outfalls Google Earth Map](#), NYSDEC; Enforcement and Compliance History Online (ECHO), USEPA.

Municipal Separate Storm Sewer Systems. The St. Lawrence River watershed hosts two MS4s, serving areas within the Indian River subwatershed at Fort Drum and the adjacent town, LeRay (**Table 14**). These systems utilize a collection of structures, including retention basins, ditches, roadside inlets, and underground pipes, to gather stormwater from flooded areas and discharge it into local

streams and rivers without treatment. Many rural developments use similar stormwater management structures, but only communities that the US Census Bureau classifies as “urbanized areas” (based on population density) are required to become part of the MS4 program and retain a permit. Urbanized areas contain more impervious surfaces and development that leads to increased stormwater runoff. In conjunction with retaining an NPDES permit for these systems, communities are required to develop a stormwater management plan and six minimum control measures.

Table 14
Permitted MS4s

HUC8	HUC12	Receiving Waterbody	Permit ID	Facility Name	Operating MS4s
Indian	041503030301	West Creek	NYR20A556	Fort Drum	Base-wide, Fort Drum
			NYR20A557	LeRay	Town-wide, Evan Mills

SOURCE: Enforcement and Compliance History Online (ECHO), USEPA.

Jefferson County established a Stormwater Coalition in 2014 in order to comply with federal stormwater regulations and improve water quality in a cost-effective manner (<https://jcnystormwater.com/coalition/>). Public participation is a key element of the MS4 Permit requiring that certain documents be made available to the public including an annual report and stormwater management program goals and implementation documents.

Industrial Wastewater and Stormwater. Industrial wastewater may contain pollutants at levels that have adverse impacts on water quality. Effluents may contain components that interfere with POTWs that receive their wastewater. Industry and construction are often exposed to the weather, where runoff from rainfall or snowmelt can potentially transport pollutants to stormwater catchments or adjacent waterbodies. The NPDES permitting program establishes discharge limits and conditions for industrial sources with specific standards relevant to the type of industrial activity. Relevant subjects to regulation in the St. Lawrence watershed subject include sand and gravel storage sites, mines, manufacturing and solid waste management facilities. **Table 15** lists industrial facilities subject to the NPDES permitting system.

Table 15
Industrial Wastewater and Stormwater Sites Permitted under NPDES

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
Upper St. Lawrence	041503010101	French Creek Marina	NYR00A10F	St. Lawrence River
	041503010102	Northern Marine Inc	NYR00A494	St. Lawrence River
	041503010106	Stout's Ready Mix Ltd.	NYR00F161	Chippewa Creek

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
	041503010107	Acco Brands USA LLC	NYR00E721	St. Lawrence River
	041503010201	Acco Brands	NYR00G008	
		Maxam Us, LLC	NYR00F749	
		Ogdensburg Distribution And Manufacturing Facility	NYR00F496	
		Ogdensburg Power Plant	NYR00D126	
	041503010202	Port of Ogdensburg	NYR00A860	St. Lawrence River
Oswegatchie	041503020503	Viking Cives Inc USA	NYR00B403	West Branch Oswegatchie River
	041503020702	Bestway of New York	NYR00F489	
	041503020801	Gouverneur Division, #1 Mill And #2 Mine	NYR00A595	
		Gouverneur Division, #3 Mill	NYR00A894	
	041503020802	Cargill Feed and Nutrition Gouverneur	NYR00C212	Oswegatchie River
		Cives Steel Company	NYR00B413	
		Dunn Paper - Natural Dam Inc	NYR00F629	Oswegatchie River
	041503020804	Seavey Road Quarry	NYR00B614	Oswegatchie River
	041503020902	Stiles Used Auto Parts	NYR00G028	
		Losurdo Foods Inc	NYR00D375	Oswegatchie River
		Sunopta Aseptic Inc	NYR00E518	Oswegatchie River
	041503021003	Ogdensburg International Airport	NYR00A859	
Indian	041503030102	Gouverneur Division, #4 Mine	NYR00B205	Clark Creek
	041503030301	Building 2084 - Jp-8 Storage Tanks	NYR00F375	Black River
		Building 21510 Central Vehicle Wash Facility	NYR00F376	Black River
		Fort Drum Military Installation	NYR00E835	
Grasse	041503040303	Poulin Grain Inc	NYR00F610	Tracy Brook
	041503040406	Canton Usarc	NYR00C438	Grasse River
		St Lawrence County Manufacturing & Properties LLC	NYR00A798	Grasse River
		Witherbee And Whalen Inc	NYR00B829	Grasse River
	041503040502	Massena Energy Facility	NYR00E893	Robinson Creek
Raquette	041503050603	UPS-Potsdam	NYR00C046	Plum Brook
	041503050604	Potsdam Quarry And Concrete	NYR00F954	Stafford Brook
		Waste-Stream Inc	NYR00D032	Stafford Brook
	041503050703	Knapps Station Facility	NYR00B231	
		Norwood Facility	NYR00B658	Raquette River
	041503050704	Potters Industries, LLC	NYR00D568	Raquette River
	041503050706	Massena Ready Mix Plant	NYR00G151	
		Massena Terminal Railroad Company	NYR00D761	Raquette River
Salmon	041503070204	Malone Quarry	NYR00F957	Farrington Brook

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
	041503070302	Malone Ready Mix Plant	NYR00G126	
		Westville Facility	NYR00B660	Salmon River
	041503070303	Malone Distribution Warehouse	NYR00G146	
Chateaugay-English	041503080102	Wi Ore Sand	NYR00F865	
	041503080103	Lyon Mountain Convenience Sta	NYR00E340	Separator Brook
	041503080201	McAdam Plant Chateaugay	NYR00D497	Marble River
	041503080202	Clinton Quarry	NYR00F955	
	041503080203	Grasslands	NYR00D031	
	041503080301	Waste Stream Management Transfer Station	NYR00D595	
	041503080303	County of Franklin Solid Waste Management Authority	NYR00D523	
	041503080406	Mooers Transfer Station	NYR00D597	English River
	041503080501	Churubusco Convenience Station	NYR00E548	Hinchinbrook Brook

SOURCE: Enforcement and Compliance History Online (ECHO), USEPA.

6.3.3.3 Concentrated Animal Feeding Operations

Animal feeding operations and their associated manure and wastewater contribute nutrients, pathogens, organic matter, hormones, and antibiotics to the environment. Agricultural animal feeding operations are defined by the following conditions:

- Animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and
- Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility

Animal feeding operations that meet the regulatory definition of a *concentrated* animal feeding operation (CAFO) are considered point sources, as defined by the [CWA \[Section 502\(14\)\]](#) and regulated under the NPDES permitting program. CAFOs are classified by the type and number of animals they contain, and the way they discharge waste into a waterbody. A CAFO is defined as a “large” when 1,000 or more head cattle are present (including heifers, steers, bulls, and cow/calf pairs). A “medium” CAFO” has 300-999 head and meets one of the criteria below:

- Pollutants are discharged into waters through a manmade ditch, flushing system, or other similar manmade device, or
- Pollutants are discharged directly into waters that originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation (122.23(b)(2)).

“Small” CAFOs—those with fewer than 300 animal units—are designated CAFOs on a case by case basis, depending on factors such as size, manure production, location relative to waters, slope, vegetation, rainfall, and other factors that affect the likelihood and frequency of discharge to waters.

There are 69 CAFOs permitted under the NPDES program in the St. Lawrence River watershed (**Table 16**). CAFOs with effective coverage under the general permit also submit CAFO-specific nutrient management plans, which provide information on production and land application areas, best management practices, an implementation schedule, and an emergency action plan. These plans and permits are essential to reducing the risk of nutrient and pathogen transport to surface and groundwaters from agricultural activities.

Table 16
CAFOs Permitted under NPDES

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
Upper St. Lawrence	041503010102	Bourcy Farm Property	NYA001542	
		Wood Farms LLC	NYA000351	
	041503010106	Pitcher Farms	NYA000579	
	041503010107	Beamish Farm	NYA000547	
	041503010202	Woodcrest Dairy LLC	NYA000561	
	041503010203	Five Mile Farms	NYA000071	
		Flack Farms	NYA000628	
		Harvest Dairy Farm	NYA000267	
		Keystone Dairy	NYA001385	Squaw Creek
		Lisbon Centre Farms, LLC	NYA000565	
	041503010204	Brandy Brook Haven Farms, LLC	NYA001374	Brandy Brook
		Brandy View Farms	NYA000615	Brandy Brook
		Ceda-Meadow Farm	NYA000448	
	041503010205	Fobare Lake Farm	NYA001380	Coles Creek
		River-Breeze Farm	NYA000083	Grasse River
		Corscadden Family Farm	NYA000207	
Oswegatchie	041503020902	McClean Farms	NYA001432	Line Creek

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
	041503020903	Martin Farm	NYA000076	Merrill Creek
	041503020904	Kelly Farm	NYA000573	Beaver Creek
		Rainbow Acres	NYA001386	
	041503021002	Chambers Farms LLC	NYA000013	Oswegatchie River
	041503021003	Bruce Nichols	NYA000569	
		Fishel Farms LLC	NYA000498	
		Royal-J-Acres LLC	NYA000090	
		Virgil Valley Farms	NYA000480	
		Pominvilles Farm	NYA001556	Indian River
Indian	041503030303	Leuze Farms	NYA000354	Indian River
		Thompson Farm Property	NYA001538	
	041503030504	Dori B S Farm	NYA000461	
		Shady Brook Farm	NYA001578	Mud Lake Outlet
	041503030505	White Acre Farms	NYA000560	
Grasse	041503040401	Gebarten Acres	NYA001325	
	041503040402	Gotham Family Farm, LLC	NYA000162	
	041503040404	Greenwood Dairy Farm, LLC	NYA000067	Nettle Creek
		Lloyd T. Smith & Sons	NYA001394	Grasse River
	041503040406	Jordan Farms	NYA000206	Grasse River
		Kingston Brothers Farm	NYA000515	Grasse River
		Teriele Family Dairy, LLC	NYA000428	
	041503040501	Mapleview Dairy LLC	NYA000059	
		Paradise Valley Farm	NYA000020	Grasse River
Raquette	041503050603	Snell Farm	NYA001369	
	041503050604	Adon Farms	NYA000092	
		Chambers Dairy	NYA001424	
St. Regis	041503060302	Durant Farms	NYA000581	Allen Brook
		Dutch Pride Farm	NYA001357	
		New Beginnings	NYA000073	
		Roberts Dairy Farm LLC	NYA001329	

HUC8	HUC12	Facility Name	NPDES ID	Receiving Waterbody
	041503060303	Stauffer Farms	NYA000489	Deer River
	041503060305	Tri Oak Lea Farm	NYA001519	
	041503060406	Norco Farms	NYA000068	Hopkinton Brook
	041503060407	Adirondack Heifer Management, Inc.	NYA000082	
Salmon	041503070203	Jimali Holsteins	NYA001320	
	041503070302	A. Miller	NYA001431	
		Dan's Dairy LLC	NYA001458	Salmon River
	041503070303	Carsada Farms	NYA001292	East Branch Deer Creek
		Clearview Dairy	NYA001355	
		Ellsworth Farms	NYA001339	
		Monica Farms	NYA001321	East Branch Deer Creek
		Papas Dairy, LLC	NYA001315	
		White's Dairy Farm LLC	NYA001316	West Branch Deer Creek
	041503070305	Brockway Hilltop Farm	NYA001289	Pike Creek
Chateaugay-English	041503080201	Brior Farm	NYA001537	Marble River
	041503080203	Trainer Farm, LLC	NYA001310	
	041503080204	Sunset Lake Farm #2 LLC	NYA00C010	Allen Brook
		Swanston Farms, Inc.	NYA001313	Allen Brook
	041503080205	Shipman Farm LLC	NYA001452	Flynn Brook
	041503080303	Metcalf Farms	NYA001317	
	041503080402	Lamberton Farms	NYA000542	English River

SOURCE: Enforcement and Compliance History Online (ECHO), USEPA

6.3.3.4 Legacy Industrial Waste Disposal Practices

The St. Lawrence River watershed has been affected by industrial production and improper waste disposal practices that resulted in contamination of sediments and waterways. The Massena area in northeastern St. Lawrence County, once an industrial powerhouse, is now addressing pollution resulting from past waste management practices. Priority organics (PAHs, PCBs) and pesticides have contaminated 875 stream miles (14% of assessed miles), and 700 miles are suspected to be contaminated due to improper industrial waste disposal practices. The threat to human health from consumption of contaminated fish resulted in designation of the St. Lawrence River at Massena/Akewesasne as a Great Lakes Area of Concern (<https://www.epa.gov/great-lakes-aocs/st->

[lawrence-river-area-concern-massenaakwesasne](#)), inclusion on the National Priority List, and implementation of Federal and State Superfund restoration activities at the sites (**Figure 13**).

The boundaries of the Area of Concern (AOC) are mapped in **Figure 14**. The area includes waters of the St. Lawrence River upstream of the Canadian boundary to the Massena public water supply intake, the Grasse River from its mouth upstream to the breached dam in the village of Massena, the Raquette River from its mouth upstream to the NYS Route 420 bridge, and the St. Regis River from its mouth upstream to the dam at Hogansburg. Remediation and restoration actions are outlined in the Remedial Action Plan (RAP). RAPs are developed in three stages.

- Stage 1: identifies specific problems, called Beneficial Use Impairments, and sources of pollution. The Massena Stage I RAP was completed in November 1990.
- Stage 2: proposes restoration actions and implementation plan. The Stage II RAP was completed in August 1991.
- Stage 3: provides documentation that all Beneficial Use Impairments in an AOC have been addressed and that the AOC is ready to be delisted. Stage III remains in progress. Currently, water, sediment, and biota within St. Lawrence River AOC are being tested to evaluate whether the Massena area cleanup efforts have improved the local ecosystem to a point where specific Beneficial Use Impairments have been restored. NYSDEC and the SRMT recently collaborated on an assessment of fish tissue contamination from fish sampled from waters in proximity to the AOC on the St. Lawrence River and its adjoining tributaries. The report provided data necessary to update fish advisories and examine impairments. Fish sampled inside the AOC were found to have significantly more contamination than fish sampled outside the AOC, with the greatest risk to fish consumers driven by PCB concentrations (Skinner, David, & Ritcher, 2018).

Currently, water, sediment, and biota within St. Lawrence River AOC are being tested to evaluate whether the Massena area cleanup efforts have improved the local ecosystem to a point where specific Beneficial Use Impairments have been restored. NYSDEC and the SRMT recently collaborated on an assessment of fish tissue contamination from fish sampled from waters in proximity to the AOC on the St. Lawrence River and its adjoining tributaries. The report provided data necessary to update fish advisories and examine impairments. Fish sampled inside the AOC were found to have significantly more contamination than fish sampled outside the AOC, with the greatest risk to fish consumers driven by PCB concentrations (Skinner, David, & Ritcher, 2018). Remedial Action Plans and other relevant information are available at the St. Lawrence River at Massena/Akwesasne Area of Concern website maintained by NYSDEC <https://www.dec.ny.gov/lands/98794.html>

Figure 13
St. Lawrence River Area of Concern at Massena/Akwesasne



NOTES:

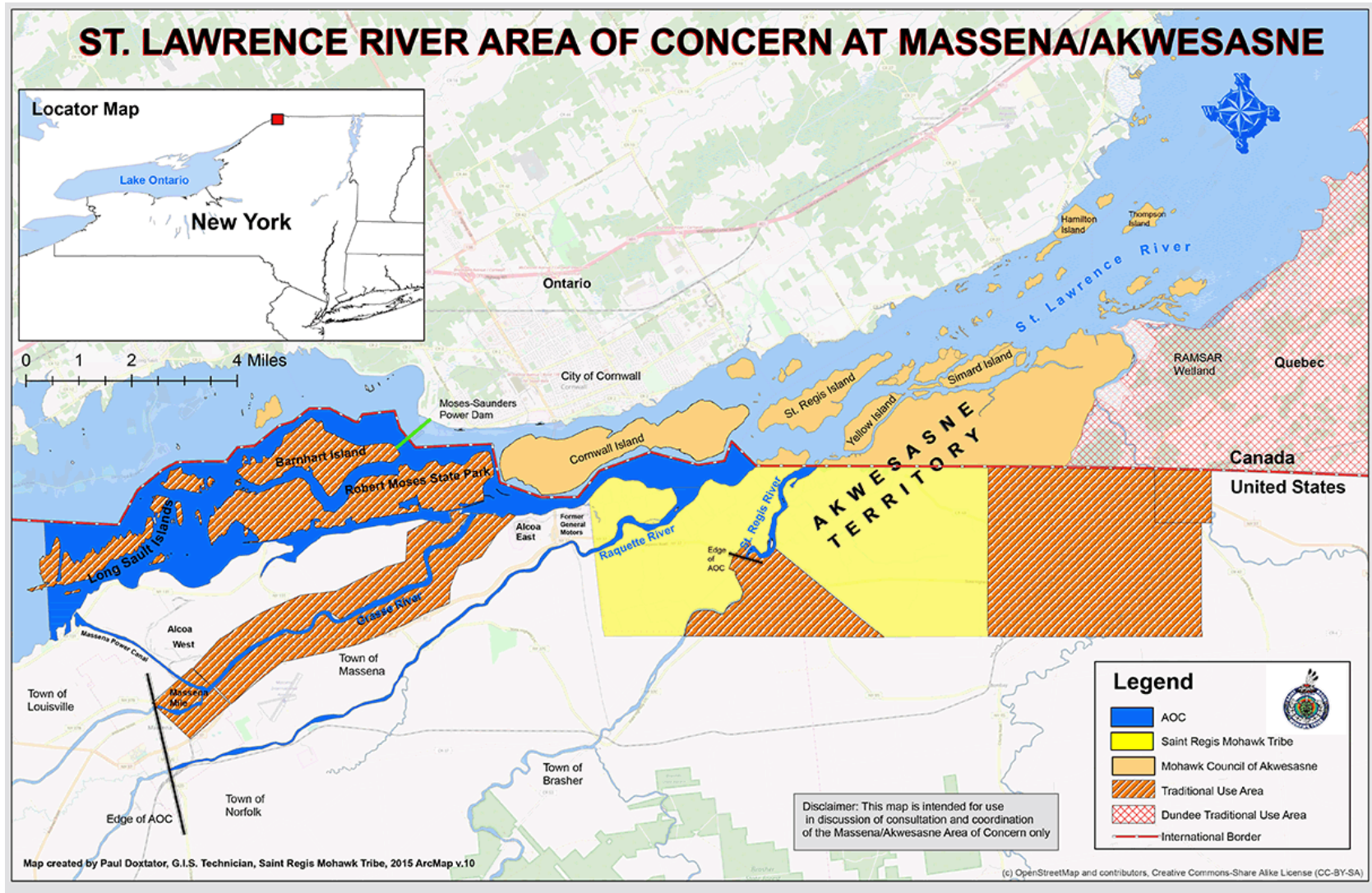
1. ARCONIC MASSENA WEST FACILITY BOUNDARY PROVIDED BY ARCONIC IN FIGURE 1-1 VICINITY MAP - VILLAGE OF MASSENA, MASSENA WEST & MASSENA EAST UPDATED 2015 AUG 17.
2. EXTENT OF GRASSE RIVER SUPERFUND SITE REMEDIATION AREA REMEDIATION DEFINED IN THE RECORD OF DECISION (USEPA, APRIL 2013).
3. GENERAL MOTORS PROPERTY AND THE REYNOLDS METALS PROPERTY BOUNDARIES WERE OBTAINED FROM THE ST. LAWRENCE COUNTY WEB MAP PORTAL.
4. REYNOLDS METALS SITE REMEDIATION AREA DEFINED IN THE EXPLANATION OF SIGNIFICANT DIFFERENCES (USEPA, DECEMBER 2008).
5. GENERAL MOTORS SUPERFUND SITE REMEDIATION AREAS PROVIDED IN EXPLANATION OF SIGNIFICANT DIFFERENCES, GENERAL MOTORS CORPORATION - CENTRAL FOUNDRY DIVISION SUPERFUND SITE, MASSENA, NEW YORK, 04/26/2000.
6. MOHAWK NATION TERRITORY AT AKWESASNE BOUNDARY OBTAINED FROM THE NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES GIS PROGRAM OFFICE (GPO). RESERVATION ON US SIDE UNDER JURISDICTION OF THE SAINT REGIS MOHAWK TRIBE.



**MASSENA-AREA FEDERAL
 SUPERFUND SITES**

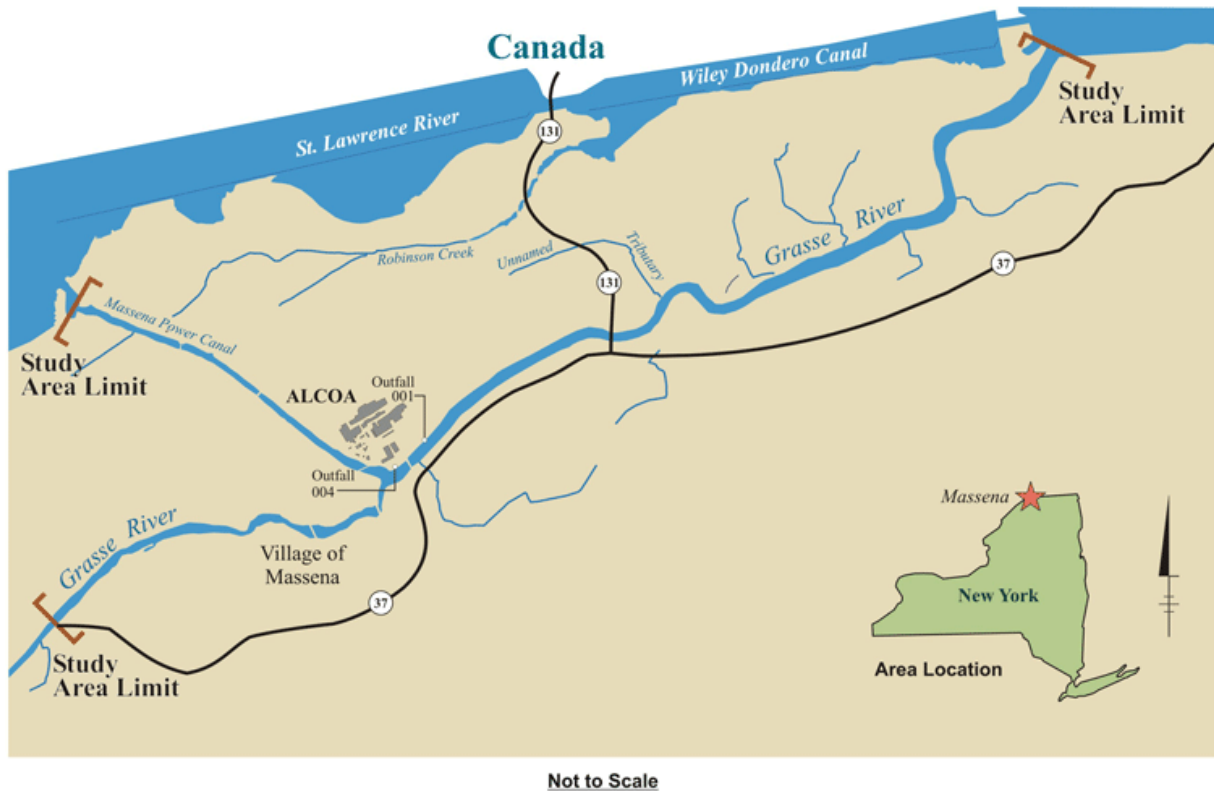
SOURCE: USEPA, Site Area Map, 2017.

Figure 14
St. Lawrence River Area of Concern Boundary Map



SOURCE: USEPA, St. Lawrence River AOC Boundary Map, Great Lakes AOCs, 2015.

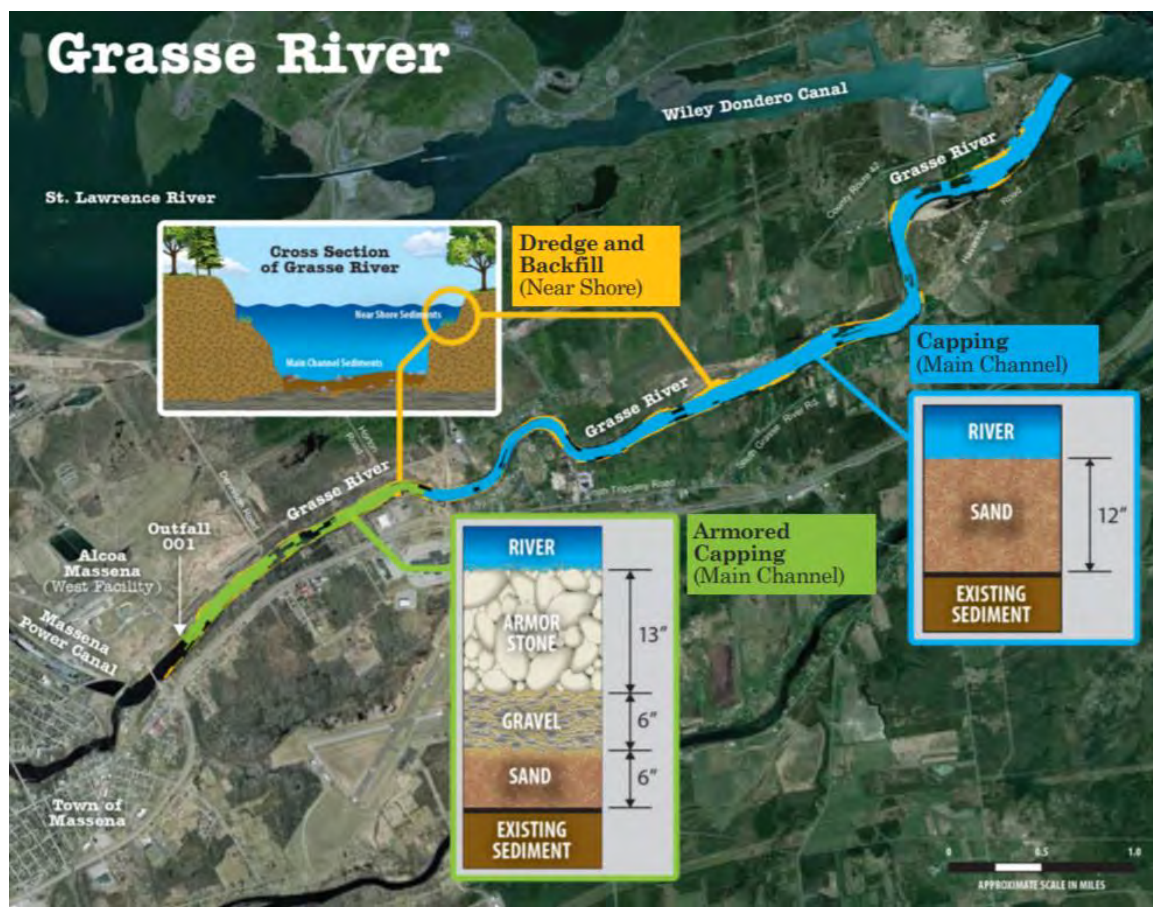
Figure 15
Grasse River Project Study Area



SOURCE: [Grasse River Project, http://www.thegrassriver.com/about.html](http://www.thegrassriver.com/about.html)

Grasse River Superfund Site In 1990, the NYSDOH advised the public to not eat any fish from the mouth of the Grasse River to the Massena Power Canal. From 1995 to 2001, Alcoa completed some dredging and capping of the contaminated site, but a severe ice jam event in the Grasse River damaged a portion of the capping, so subsequent monitoring and remediation is needed. In 2013, the USEPA issued a record of decision (ROD) which selected a final cleanup plan for the Grasse River Superfund site. As shown in **Figure 16**, the cleanup consists of some near-shore dredging, capping and armored capping in a 7.2 mile stretch of the lower Grasse River and the St. Lawrence River (USEPA, 2013). The plan also requires monitoring of fish, water and habitat, along with long-term monitoring of the capped areas to ensure that the caps remain intact. In November 2016, Alcoa separated into two companies – Alcoa Corp. and Arconic. Upon separation, Arconic assumed responsibility for the Grasse River remediation project. Arconic continues to work with the EPA, NYSDOC, and the SRMT to implement the EPA Record of Decision for the Grasse River remediation project. More information and updates can be found at the Grasse River Project website, <http://www.thegrassriver.com/>.

Figure 16
Grasse River Project Remediation Strategy



SOURCE: Grasse River Project, <http://www.thegrassriver.com/>

Reynolds Metals Superfund Site, (EPA ID: NYD091972554). The Reynolds Metals Company operated a 1,600-acre facility on the St. Lawrence River, approximately eight miles east of the village of Massena. The facility is now owned and operated by Alcoa Corp. Industrial wastes contaminated with PCBs and PAHs were discharged into river through four permitted outfalls. The USEPA issued a Unilateral Administrative Order ordering investigation and cleanup of the site to address contamination of river sediments. An excavation program was implemented in 2001 which removed 20,200 pounds of PCBs from the St. Lawrence riverbed (USEPA, 1993). Dredging and capping of remaining contamination was completed in 2009 with ongoing cap and erosion monitoring. The Superfund program conducts assessments every five years to evaluate the continued effectiveness of remediation. The last site assessment occurred in 2016 and USEPA concluded that the remedial measures remain protective of human health and the environment.

General Motors, Central Foundry Division Superfund Site, (EPA ID: NYD091972554). In 1984, a 270-acre site in Massena was added to the Superfund National Priorities List. General Motors

produced aluminum cylinder heads and operated as an aluminum die-casting plant from 1959 to 2009. This site lies between the St. Lawrence River to the north, the SRMT to the east, and the Raquette River to the south. Various industrial wastes were deposited on-site resulting in contamination of two disposal areas, an industrial landfill, and four industrial lagoons. PCB contamination of groundwater, on-site and off-site soils, and sediment in the St. Lawrence and Raquette Rivers, Turtle Cove, and Turtle Creek have been documented. Cleanup work is carried out by the current owner of the site, RACER Trust, which was created through the GM bankruptcy in 2011, and overseen by the EPA, SRMT Environmental Division, and NYSDEC. In 1987, the industrial landfill was capped to prevent migration of contaminants. Dredging and excavation of contaminated materials, followed by on-site treatment and disposal of residual contamination, and groundwater extraction and treatment were selected remediation strategies outlined in the USEPA's 1992 ROD (USEPA, 1992). This site is still undergoing cleanup, including construction of a groundwater collection and treatment system and dredging of a ten million-gallon lagoon. Cleanup work is expected to be completed in 2020.

J&L Steel/Benson Mine (NYSDEC Site Code: E645029). The former J&L site is in the northwestern corner of the Adirondack Park along the border of the Towns of Clifton and Fine. The 54-acre site mined iron ore from 1889 through the late 1970s. The US Defense Plant Corporation built a processing plant on site to expand US production capabilities of military equipment. In the 1950s, this site was the largest open pit magnetite mine in the world, employing up to 1,000 people.

Processing operations led to soil and groundwater contamination by substances including friable asbestos, polychlorinated biphenyls (PCBs), metals, and petroleum. In 1988, NYSDEC was notified of an oil spill in the Little River, a tributary to the Oswegatchie River adjacent to the mine. A polyvinyl curtain measuring 1,000 ft. by 15 ft. was installed to separate the contamination area from the Little River. The curtain has lost its effectiveness allowing oil to seep into the river. Cleanup funded by the Oil Pollution Act of 1990/Oil Spill Liability Trust Fund began in 2013.

St. Lawrence County applied to NYSDEC's Environmental Restoration Program (ERP) to complete site investigations and define remedial measures. The oil plume was found to extend over large portions of the lowlands south of the Little River and portions of the adjacent uplands. Eight PCB hot spots were identified, and sediment along the bank of the Little River was found to be saturated with petroleum, noting periodic releases of petroleum to a depth of at least eight feet. A Record of Decision (ROD) was issued in 2013 to remediate areas affected by the oil spill and PCBs under the NYSDEC's State Superfund Program

(https://www.dec.ny.gov/docs/remediation_hudson_pdf/e645029rod.pdf).

6.4 Sensitive Areas

The St. Lawrence River watershed encompasses many sensitive areas, including lakes and streams, steep slopes, wetlands and hydric soils, floodplains, and primary aquifers (**Map 34**). These areas provide multiple essential ecosystem services. For example, wetlands provide a buffer against flooding; woodlands and natural land cover of riparian areas buffer waterbodies from runoff; and intact vegetation stabilizes steep slopes prone to erosion. The St. Lawrence River watershed includes a large area within the Adirondack region exhibiting slopes greater than or equal to 15%; these are associated with a high risk of soil erosion. The plains of the northern region traversing the St. Lawrence River shoreline are dominated by emergent and forested wetlands, which are threatened by encroaching agricultural practices and changing land use patterns.

7 Emerging Issues

In addition to the previously mentioned stressors, climate change and water-level management are significant issues. Solutions to these problems require knowledge and a collaborative effort that transcends watershed boundaries. An ecosystem-based management approach, formalizing watershed planning as a continual process that engages stakeholders, is a viable path to solving such long-term, complex challenges.

7.1 Climate Change

Seasonal differences in Northeast temperatures have decreased in recent years as winters have warmed three times faster than summers (Giroux *et al.*, 2018). The 4th National Climate Assessment for the Northeast and Great Lakes Regions predicts a 20% increase in precipitation delivered in heavy rainfall events, an increase in drought events, reduced ice over on the Great Lakes, and increased invasive species threats and vulnerability (Dupigny-Giroux *et al.*, 2018). A decrease in early winter snowfall and earlier snowmelt will lead to a shorter snow season. Winters are seeing a shift in the proportion of precipitation falling as rain or snow, with fewer days without temperatures below freezing resulting in decreased snow depth, fewer days without snow on the ground, and multiple snowmelt events each year. Changes in seasonal precipitation and frequency have been noted in recent years, with increases in heavy rainfall events in the spring and fall, and periods of low precipitation and drought during the summer months.

Climate change affects the severity of numerous water quality issues. Water resources are influenced by factors such as temperature, amount and duration of snowfall and snow cover, rainfall, and evaporation. Climate change has the potential to shrink water supplies for human desired uses and degrade the quality of remaining supplies. Warmer weather and more variable precipitation complicate efforts to manage both the natural and built environments. Heavy rains create hazardous runoff conditions and increase vulnerability to flooding. Higher temperatures, changing precipitation and wind patterns, and increased nutrient-rich runoff exacerbate the risk of eutrophication. Changing precipitation patterns and a warming climate also threaten fish populations by decreasing the levels of dissolved oxygen, increasing water temperature and turbidity, and altering water flow. As these impacts are not due to local or point sources, adaptation strategies should incorporate resiliency and “smart growth” principles to help mitigate stress on waterbodies and prepare for the future.

The winter recreation industry is an important economic resource for rural areas and the Adirondacks and is strongly influenced by weather and climate, making it particularly vulnerable to climate change. Agriculture, a leading industry in the watershed, is expected to benefit from a changing climate over the next half-century due to greater productivity and a longer growing season. However, excess moisture is already a leading cause of crop loss in the Northeast (Dupigny-Giroux *et*

al., 2018) and intense precipitation can increase soil compaction and reduce the number of workable field days.

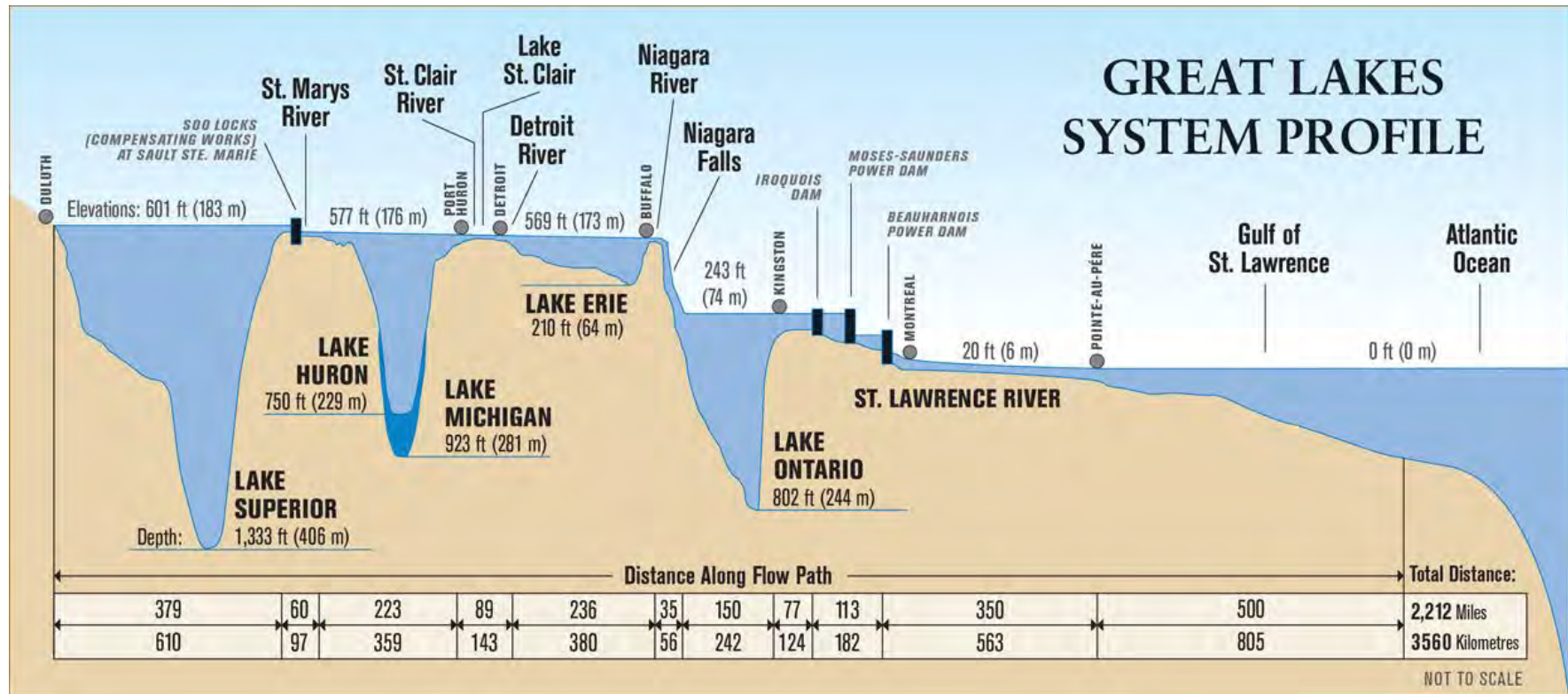
7.2 Floodplain and Water-Level Management

Many communities along the St. Lawrence River watershed and shoreline of Lake Ontario experienced extreme high water and flooding conditions in 2017 and 2019. Historically high rainfall across the Great Lakes Basin caused high water levels in upstream lakes and rivers, which flowed into Lake Ontario and out the St. Lawrence River. Water levels in the St. Lawrence River are primarily affected by Lake Ontario outflow. The Moses-Saunders and Long Sault Dams are the primary means of regulating Lake Ontario outflow. According to the IJC, changing the outflow by 323 cubic meters per second (m^3/s) for one week will change the level of Lake Ontario by only 1 cm; in contrast, this change in outflow modifies the St. Lawrence River level by 16 cm (IJC, 2014). If Lake Ontario's outflow rate is too low, shoreline communities will flood. At the same time, too little water released to the river will threaten river navigation and increase the risk of ship groundings. Large releases may reduce the risk of flooding Lake Ontario shoreline areas but increase river flooding. Managing this water system and balancing the risks to human uses along with the natural and built environment is complex and difficult. **Figure 17** illustrates the Great Lakes system profile, including depths and widths of waterbodies and important water-level control sites.



Docks are submerged along the flooded St. Lawrence River
Photo Source: wwnytv.com

Figure 17
Great Lakes System Profile



Source: The Great Lakes Basin, map/poster, NOAA-Great Lakes Environmental Research Laboratory, Coastwatch

Widespread and record-setting precipitation in 2017 and 2019 brought significant water volumes and flooding to both Lake Ontario and the St. Lawrence River, affecting residents, business owners, and municipalities. Impacts from the flooding affect local economies due to expensive remediation and infrastructure repairs, decreased tourism, and damage to residential and business properties. Rapid runoff resulting from increased precipitation is expected to affect sediment and contaminant transport, impairing waterways and eroding shorelines. Alterations in flow patterns and consequential sedimentation of low-flow areas can decrease fish spawning and egg viability, biodiversity, and habitat. Adaptation strategies to flooding should focus on projects that contribute to the resiliency of shorelines and infrastructure to high volumes of water. These should involve infrastructure that enhances natural hydrologic processes (soil infiltration, groundwater recharge, evaporation) and slows the movement of water instead of rapidly conveying it to waterbodies.

The International Joint Commission (IJC) was established to resolve issues between the US and Canada under the 1909 Boundary Waters Treaty. As a committee within the IJC, the Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee undertakes monitoring, modeling, and assessment needed to support ongoing evaluation of the regulation of water levels and flows. In addition, IJC's International Lake Ontario-St. Lawrence River Board works alongside GLAM to ensure that outflows from Lake Ontario meet the requirements of the IJC order and communicate with the public about water levels and flow regulation. The International Lake Ontario-St. Lawrence River Board implemented Plan 2014 which sets the flow rate of the Moses-Saunders Dam, effective in January 2017. Plan 2014 generally works to:

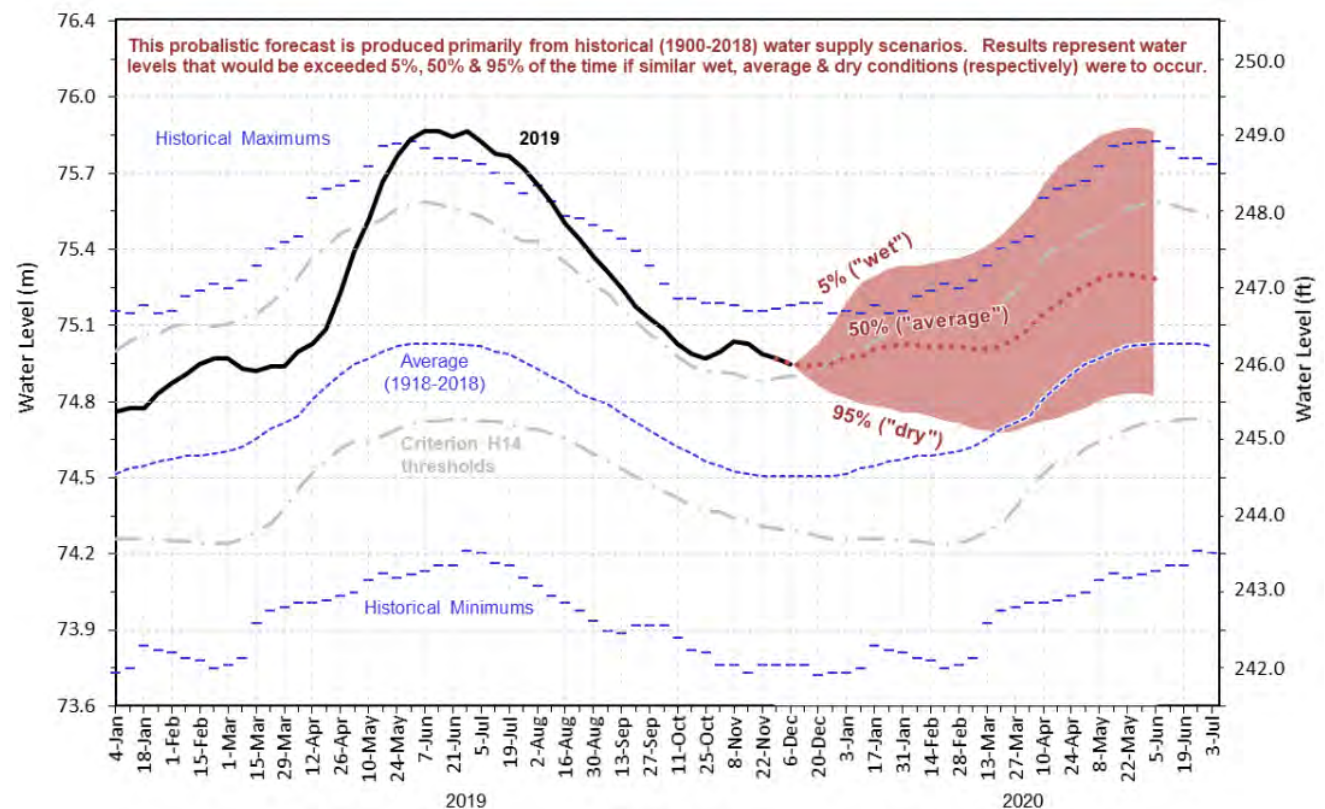
- increase Lake Ontario outflows as water levels rise,
- reduce flows when the Ottawa River peaks,
- increase flows when downstream conditions improve, and
- prevent peak levels on both Lake Ontario and St. Lawrence River.

Major flooding has occurred in recent years (2017 and 2019) resulting in millions of dollars in damages. From January to June 2017, inflows to Lake Ontario were above average but did not set records. From January to March, inflows from Lake Erie combined with heavy rainfall and snowmelt caused Lake Ontario to rise 60 cm (2 ft), twice the normal rise for this time of year. In addition, unusual weather caused the St. Lawrence River to experience five freeze/thaw cycles during January to March. When ice is forming, the flow of water must be reduced to prevent ice jams that can potentially block the flow of water and cause localized flooding. April and May 2017 were two of the wettest months on record with historic precipitation records. Record flows from the Ottawa River, the outflow from Lake Ontario were adjusted nearly every day in an attempt to balance water flows. St. Lawrence County, in partnership with the City of Ogdensburg, and the Town and Village of Morristown is conducting an assessment of ecosystem vulnerability to determine how resiliency measure can be incorporated into local planning. Ongoing efforts and programs such as REDI aim to

help communities adapt to this new pattern of flooding in the area through hardening key infrastructure and smart growth principles. Resiliency guidelines and resources to reduce the risk of future damage and minimize habitat impacts have been compiled by NYSDEC at <https://www.dec.ny.gov/lands/117819.html>, FEMA's Community Rating System also offers planning support and incentives to communities who work to mitigate their risks to flooding under increased precipitation.

The IJC maintains historic records on lake levels, flows, and precipitation and provides forecasts for upcoming years at <https://ijc.org/en/loslrb/watershed/forecasts>. **Figure 18** shows the most recent weekly forecast of Lake Ontario through June 2020. The forecast illustrates the projected range of water levels and flows that are expected to occur under potentially wet, average, and dry conditions. It is important to note that actual future water levels and flows are dependent on precipitation, weather, and existing water supplies.

Figure 18
Lake Ontario Water Level Forecast



Source: IJC, International Lake Ontario-St. Lawrence River Board (Dec 2019)

7.3 Contaminants of Emerging Concern (CECs)

Historically, chemical pollution and toxicity has been focused on “priority” pollutants that are persistent in the environment and commonly used in industry. However, a new a diverse group of chemicals known collectively as “emerging contaminants” or “contaminants of emerging concern” (CECs) are gaining attention. Captured under the umbrella of CECs are compounds such as pharmaceuticals, personal care products, pesticides, herbicides, endocrine disruptors, flame retardants, and microplastics. With advanced analytical instrumentation and technology, CECs have been detected in trace amounts in surface waters and wastewater treatment effluents (Glassmeyer *et al.*, 2017).

These compounds and their bioactive metabolites are continually released into the aquatic environment as complex mixtures primarily through sewage treatment systems and wet weather runoff. This group of chemicals is unique in that many of these compounds were designed to be biologically active at trace levels and therefore can elicit a biological response at environmentally relevant levels. Although biochemical actions and mechanisms of many of these compounds in humans is known, the known pathways of actions are not always the only mechanisms at work. Understanding of the complex biochemical signaling pathways and their targets is limited making possible effects on nontarget organisms largely unknown (Daughton and Ternes, 1999). Knowledge of the effects of these compounds in the aquatic and terrestrial environment is lacking, especially with respect to low-dose, cumulative, and multi-generational exposure of complex mixtures. This is particularly troublesome for aquatic organisms who are captive to continual life-cycle, multigenerational exposure. Cumulative exposure over time can potentially manifest into changes that are not observed with current toxicity-directed screening methods.

8 Data Gaps

This watershed characterization process uses available data to evaluate current metrics of watershed health and define effective strategies for restoration and protection. Ultimately, this information and analysis will inform the revitalization plan and help define milestones to assess progress in response to recommended actions. Several important data gaps are noted:

- Only 48% of stream miles and 43% of lake acres have been assessed for water quality, meaning that nearly 50% of the waters within the watershed were not characterized or monitored for impairment. Of the assessed waters, 38% of stream miles and 80% of lake acres were found to be threatened, stressed, or impaired. Given that high percentage, it is likely that many of the unassessed waters are also impacted.
- The North Country of New York State is largely unmapped by FEMA for identification of high-risk flood areas. Consequently, parameters such as slope, soil type, storage capacity, and incoming flow were used to evaluate which areas are more vulnerable to flooding.
- Citizen science is a major source of data for detecting invasive species and cyanobacterial blooms and assessing water quality and benthic macroinvertebrate communities. While citizen data are essential for stakeholder engagement and expanding capacity of resource management agencies, selective sampling can introduce bias if there are major disparities in sampling frequency and spatial coverage.
- The land use characterization does not include a detailed analysis of local codes for each municipality, due to the complexity and level of effort required to collect these data across such a large study area. However, since 44% of the watershed is within the Adirondack Park and a substantial percentage of the remainder is currently in agricultural use, analysis of local land use laws affecting nonpoint sources of pollution are less significant in this rural area. Moreover, the characterization demonstrates that water quality impairments are primarily the result of regional (atmospheric) sources and/or legacy contaminants; neither source is subject to local control. Despite this finding, improvements to local codes for water resource management is an important recommendation for long-term protection as this rural area undergoes development.

Despite these data gaps, the findings of the Characterization Report support development of recommended actions and priorities.

9 References

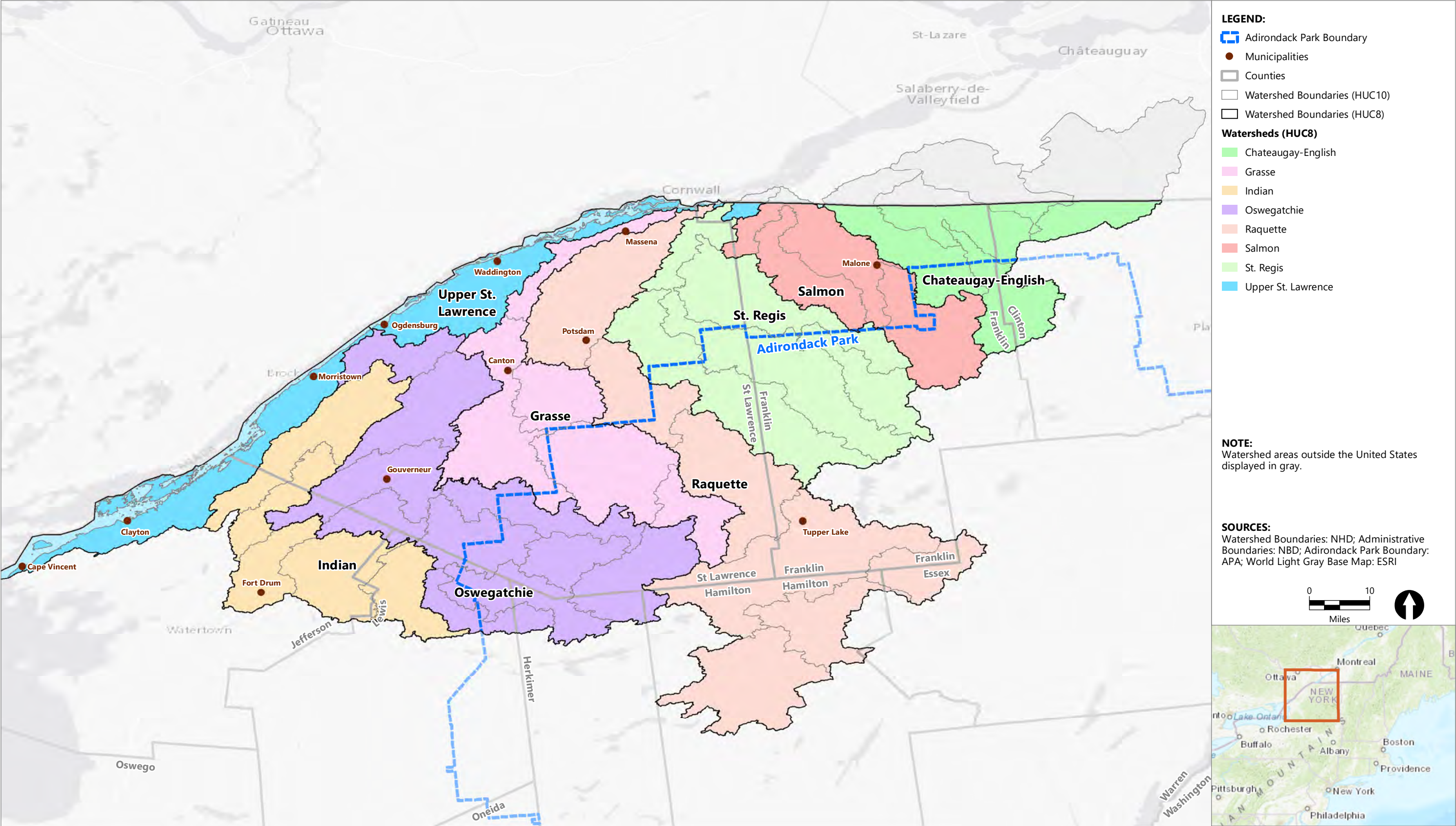
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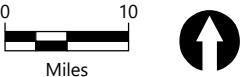
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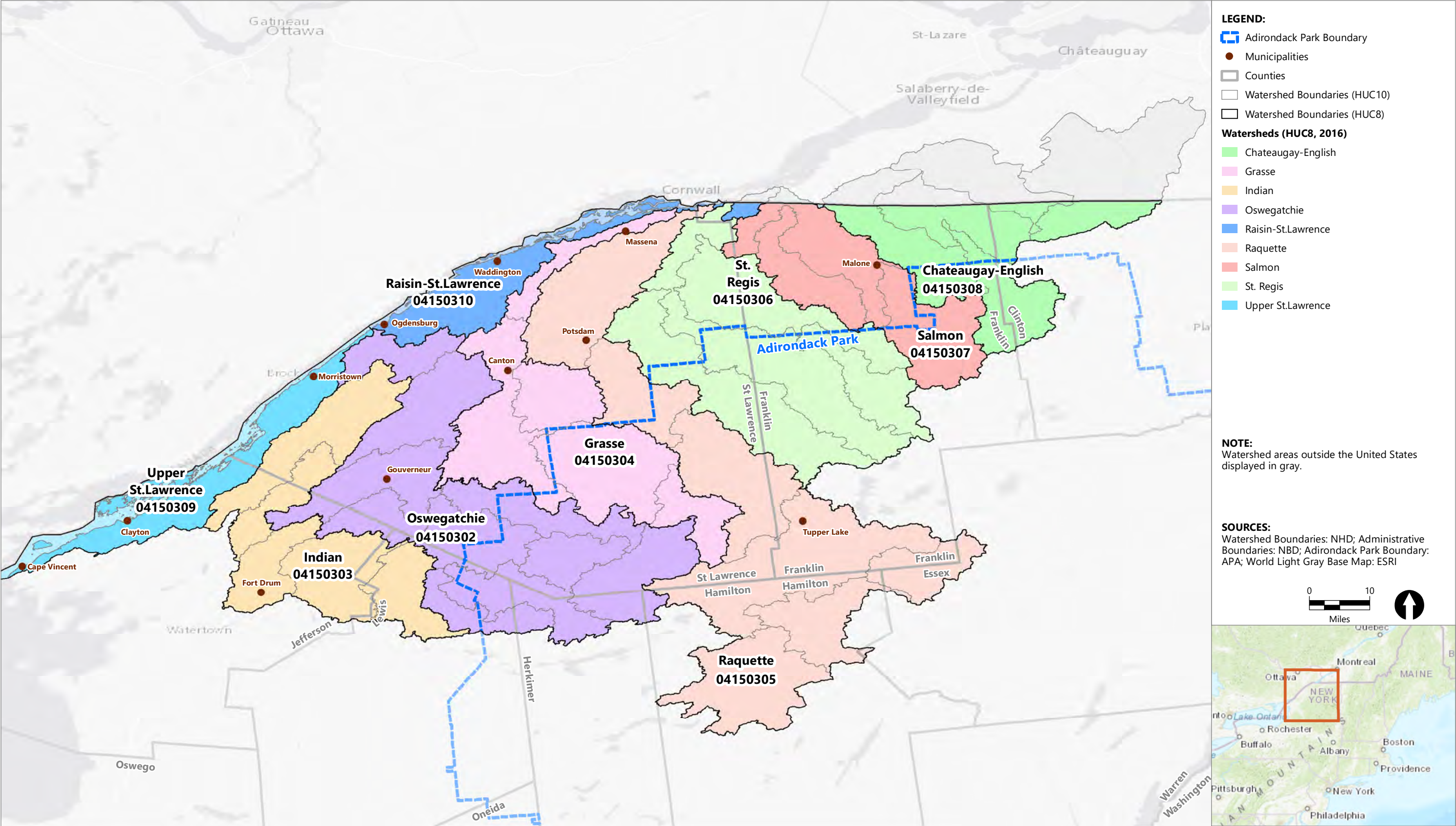
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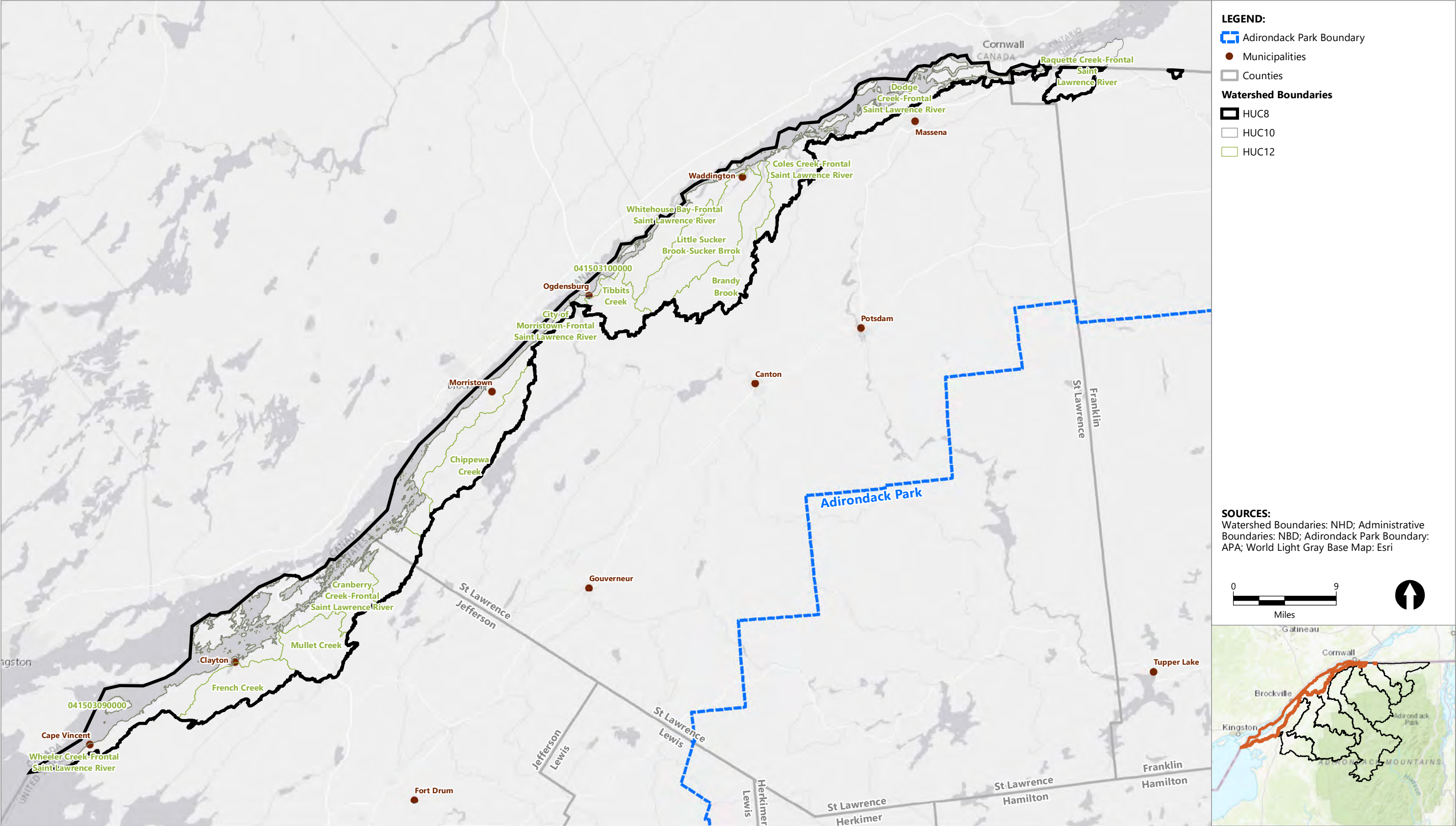
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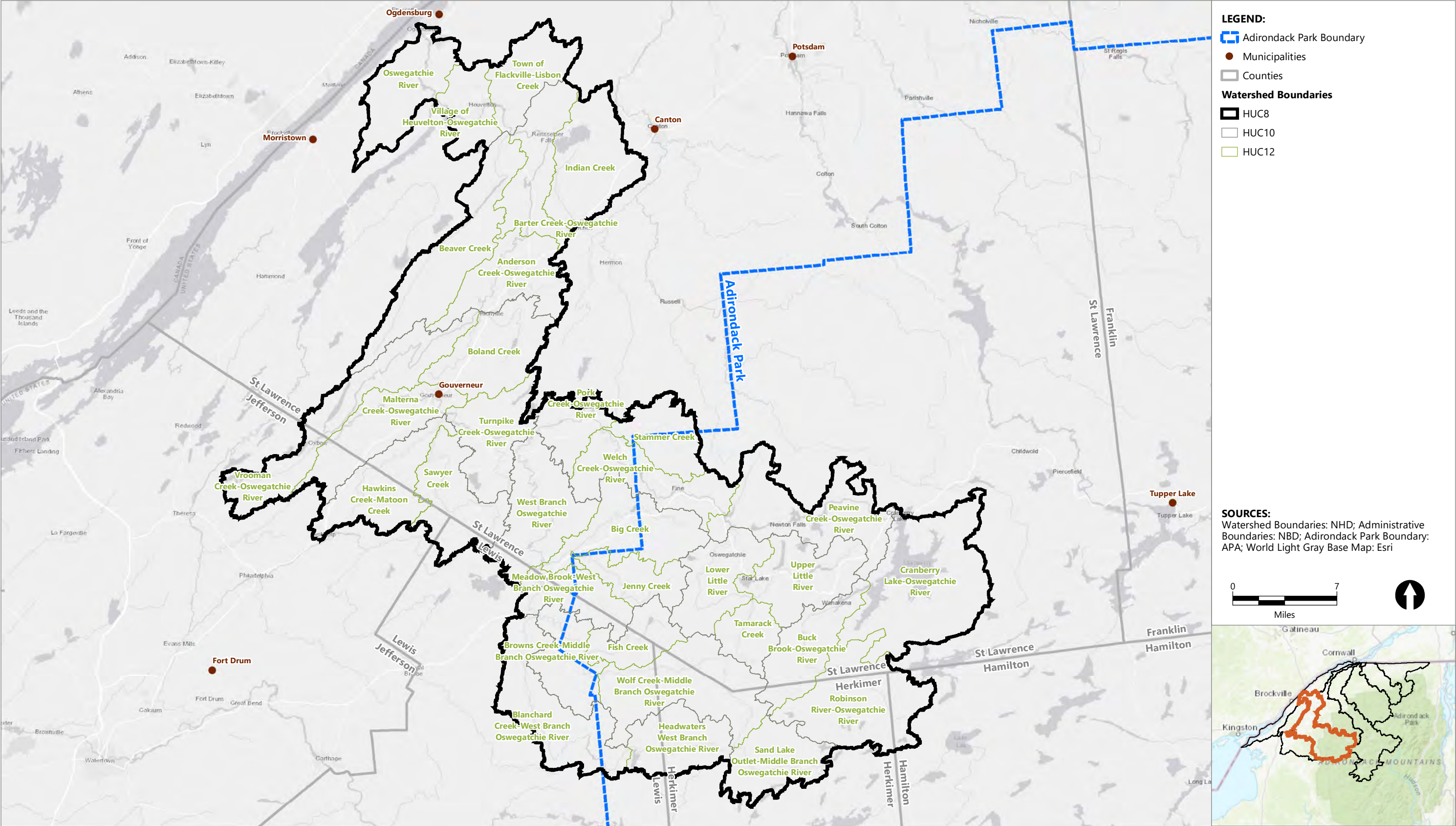
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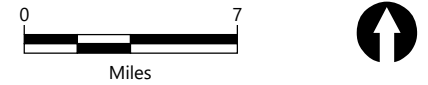
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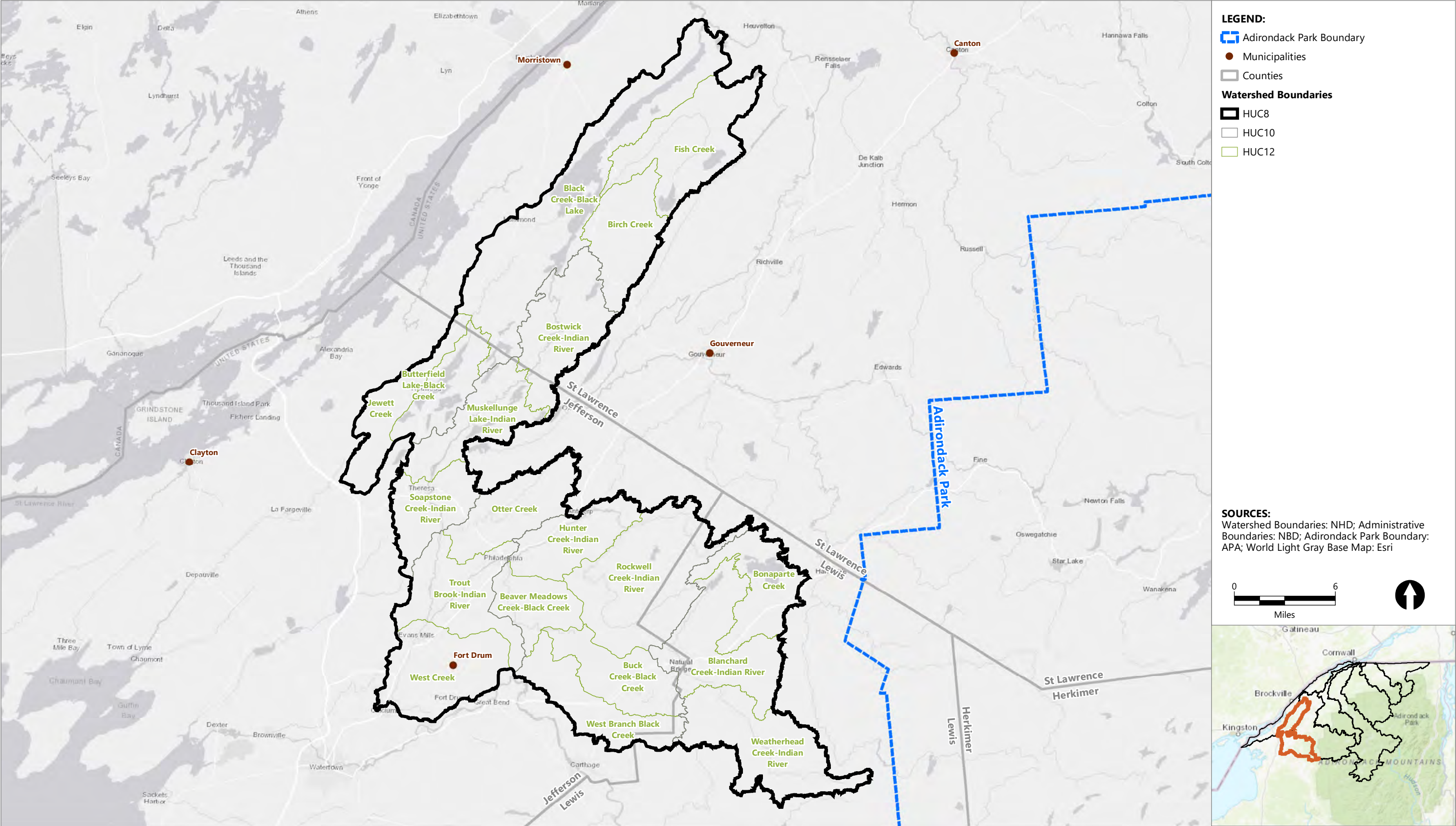
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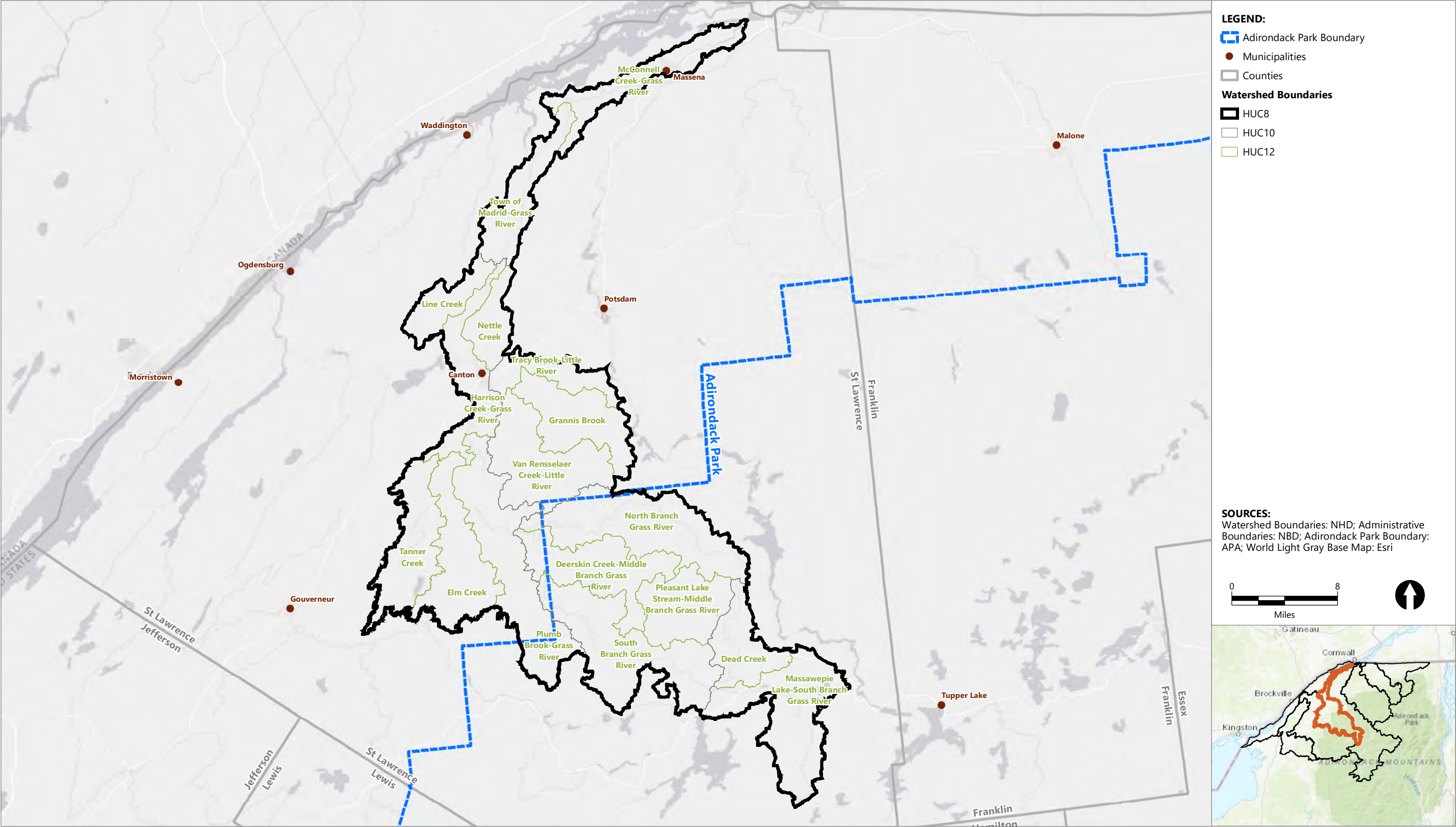
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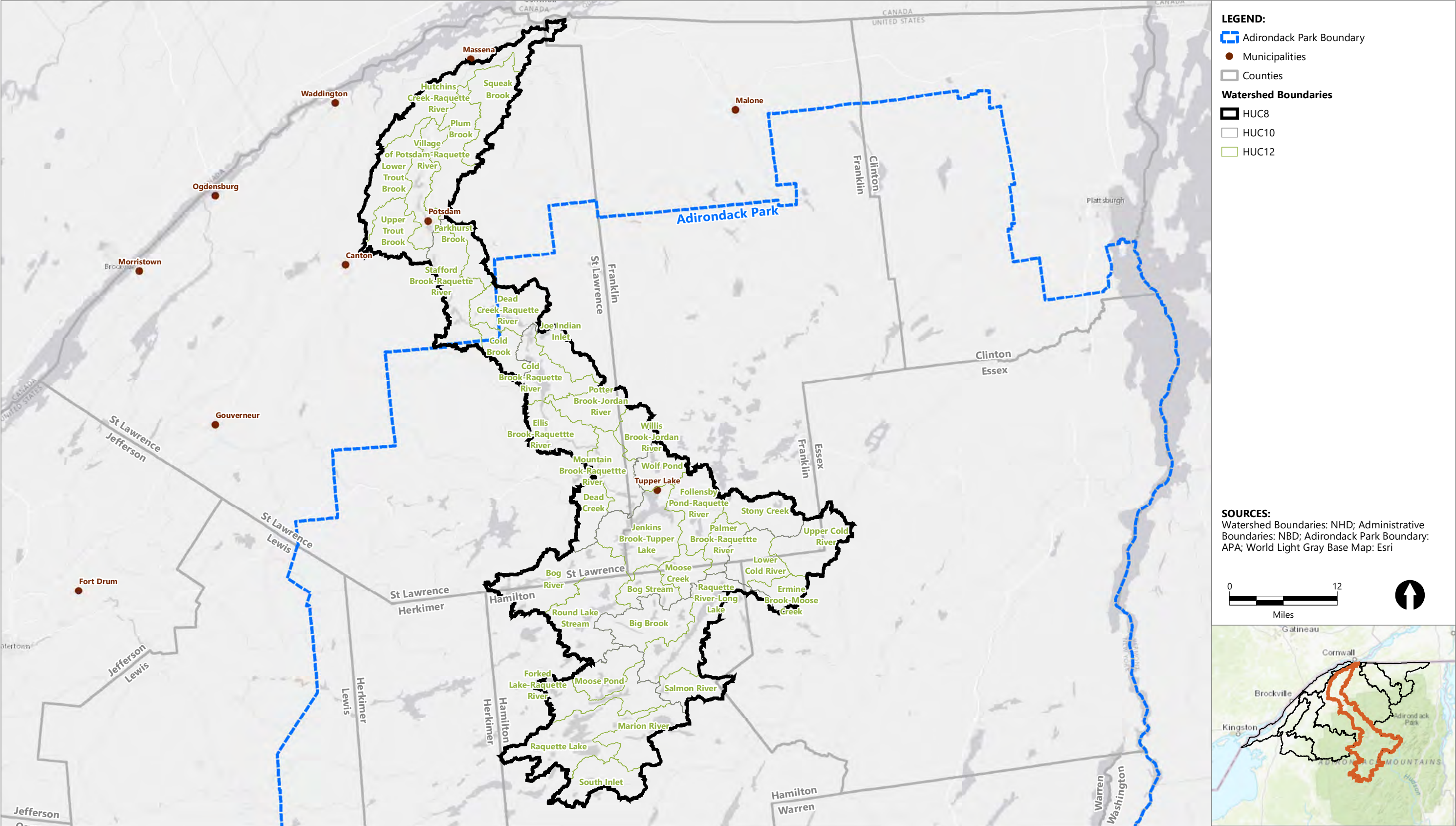
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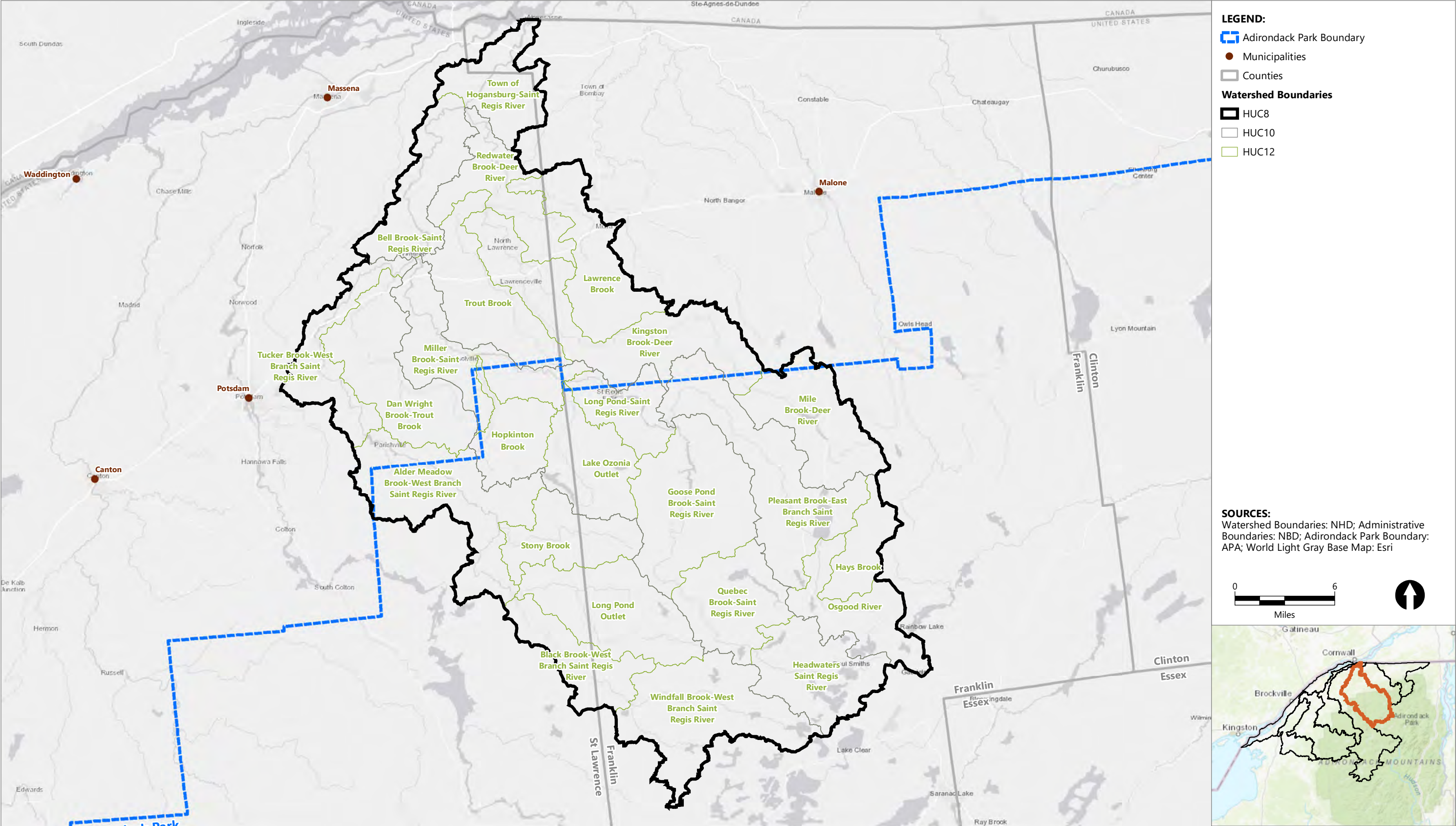
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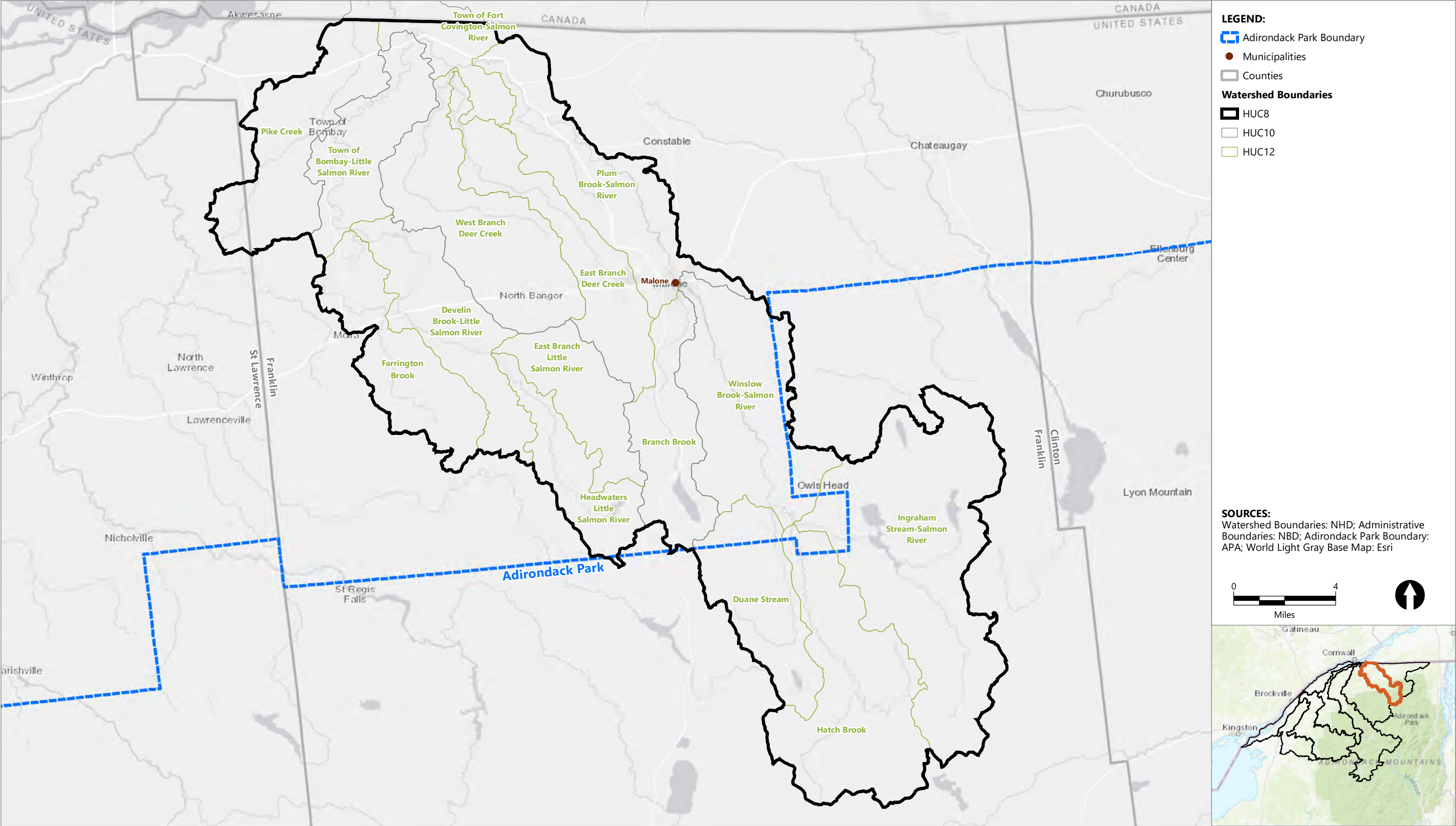
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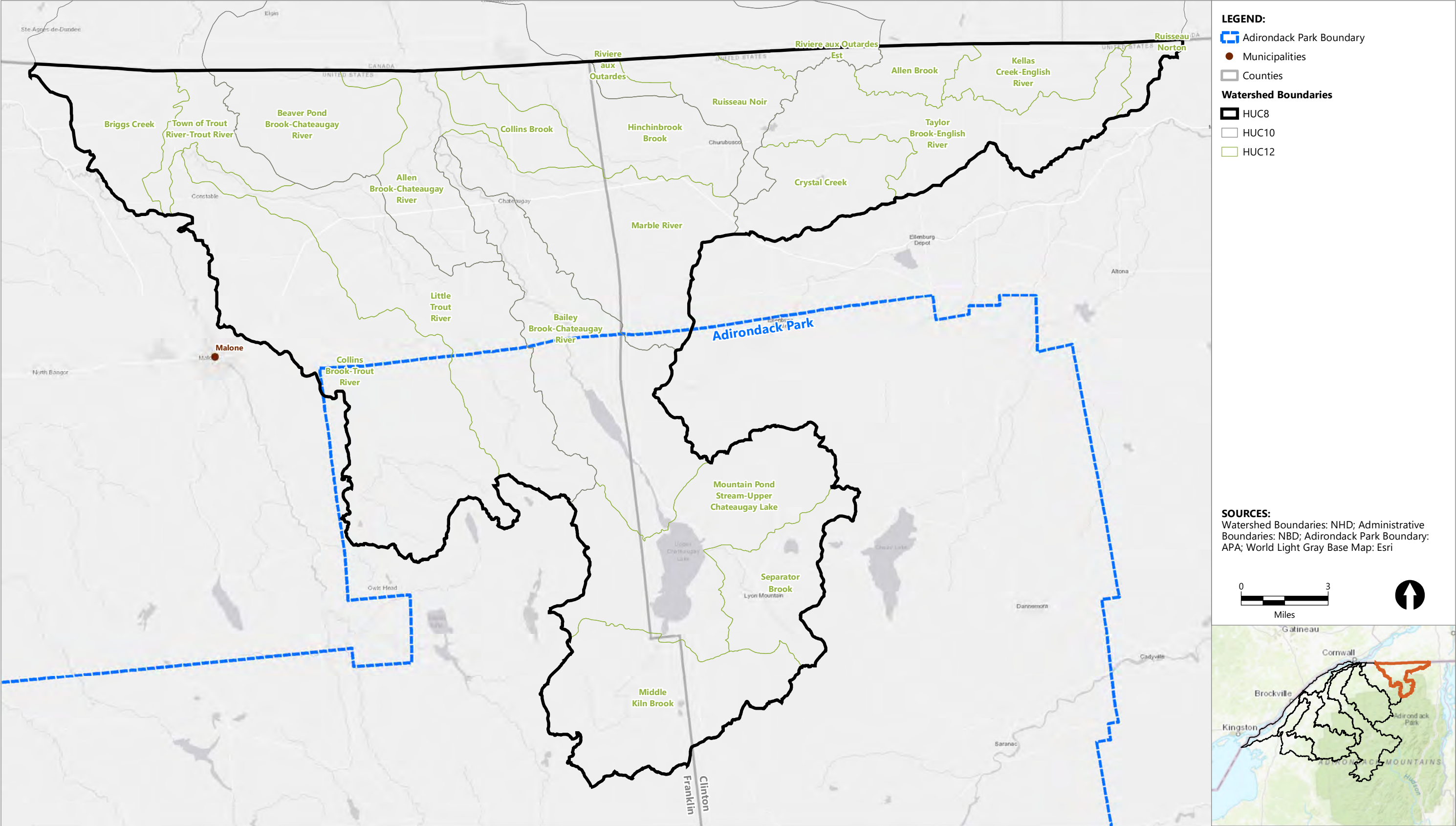
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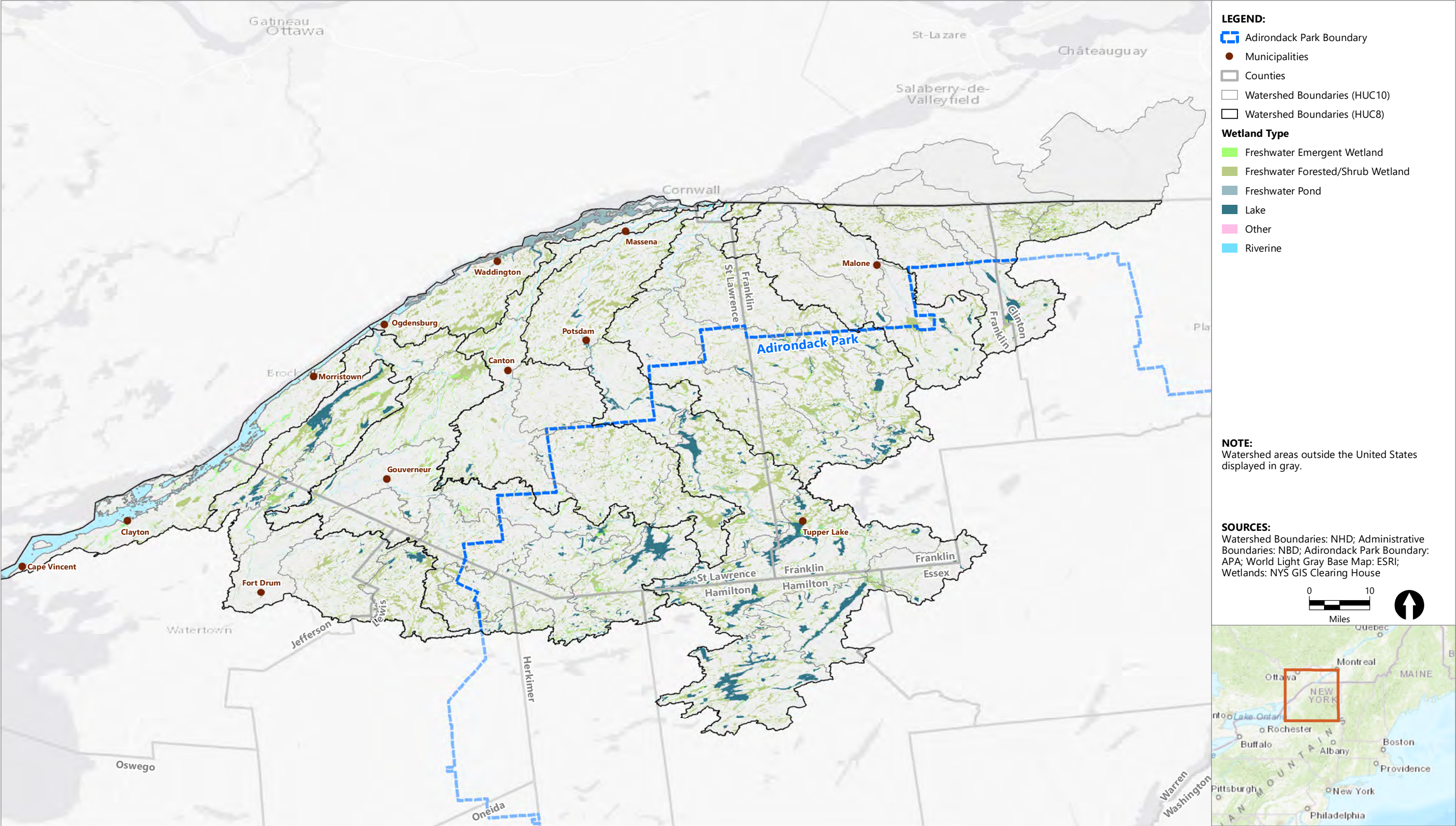
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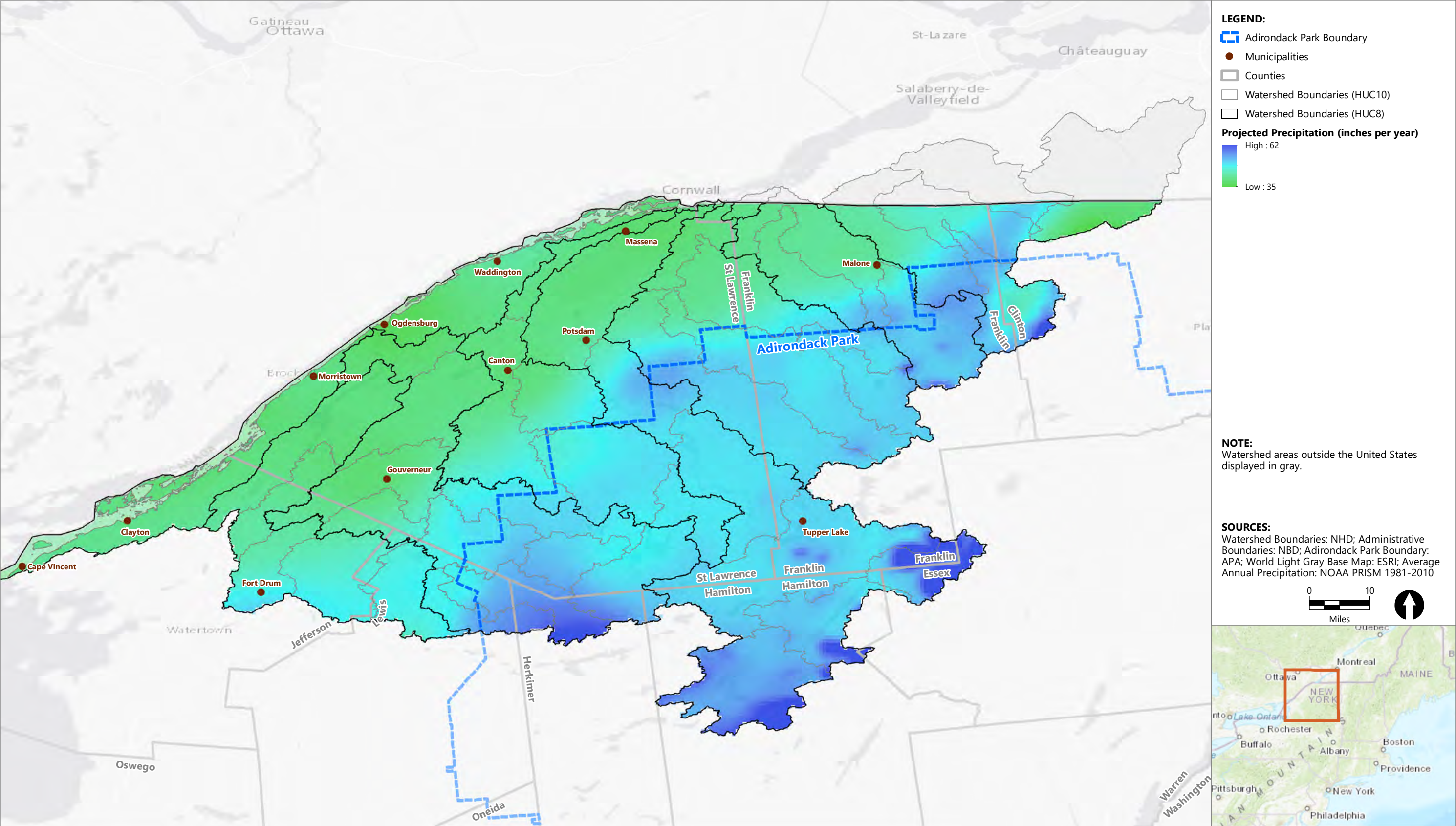
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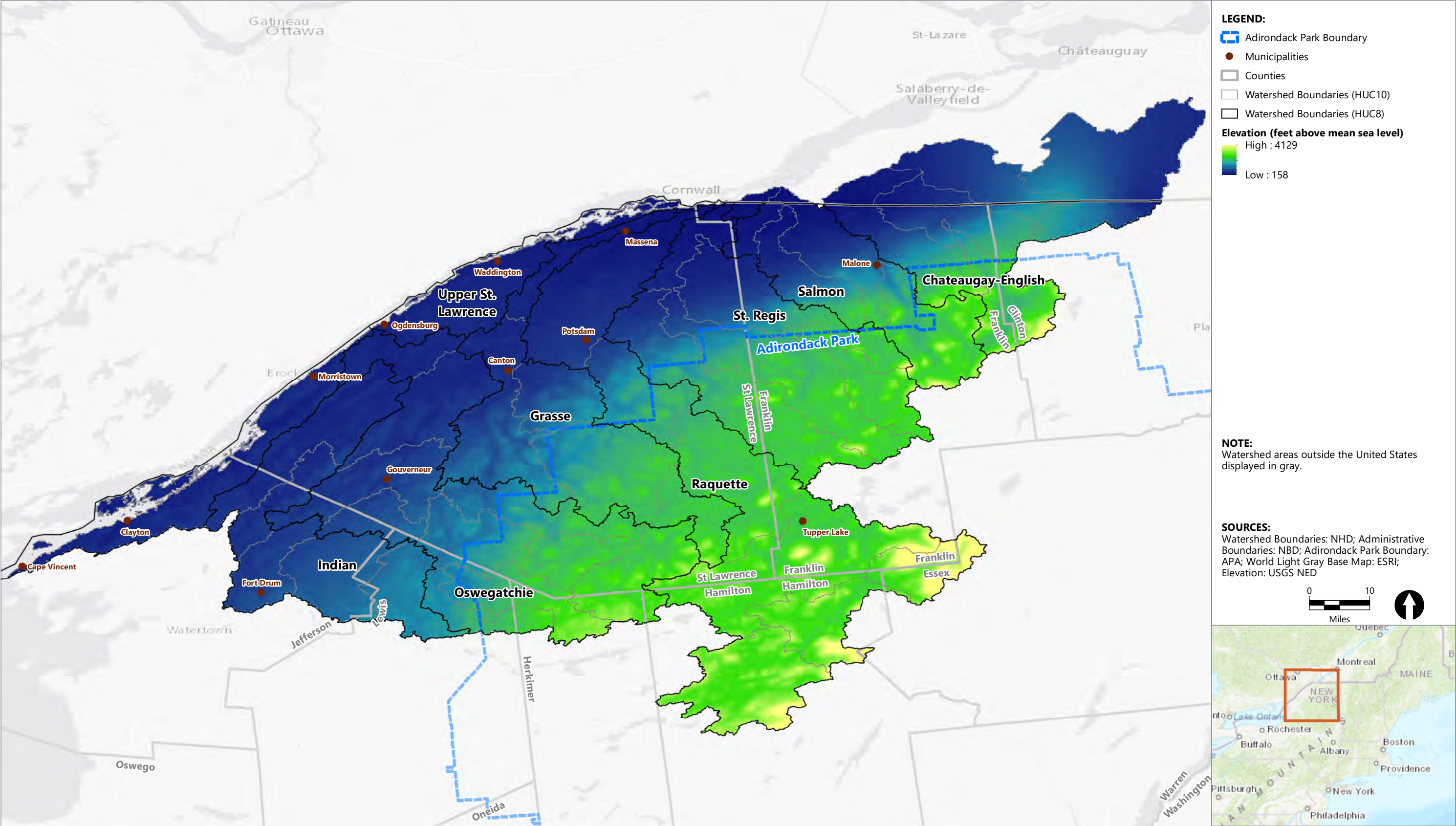


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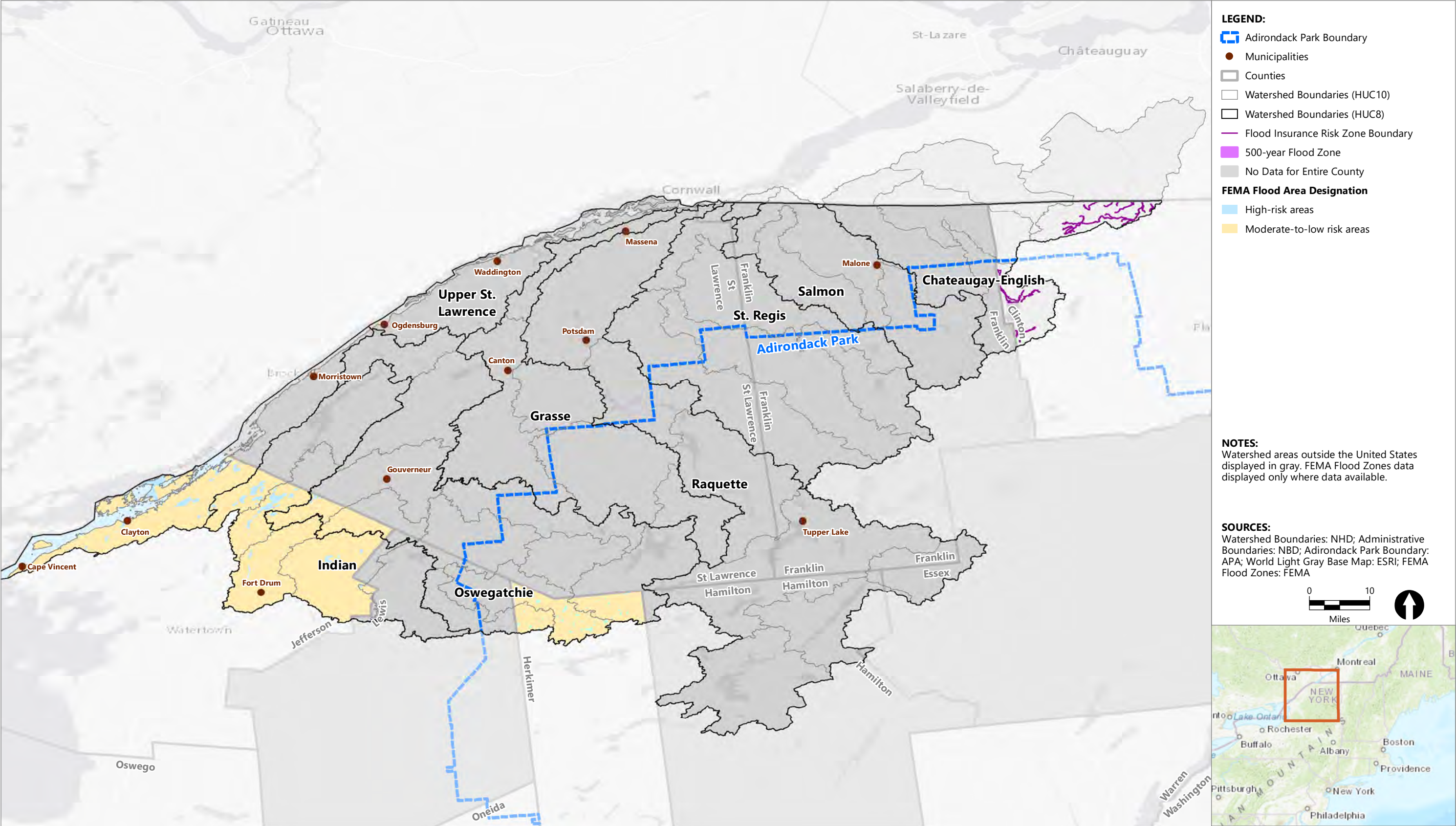


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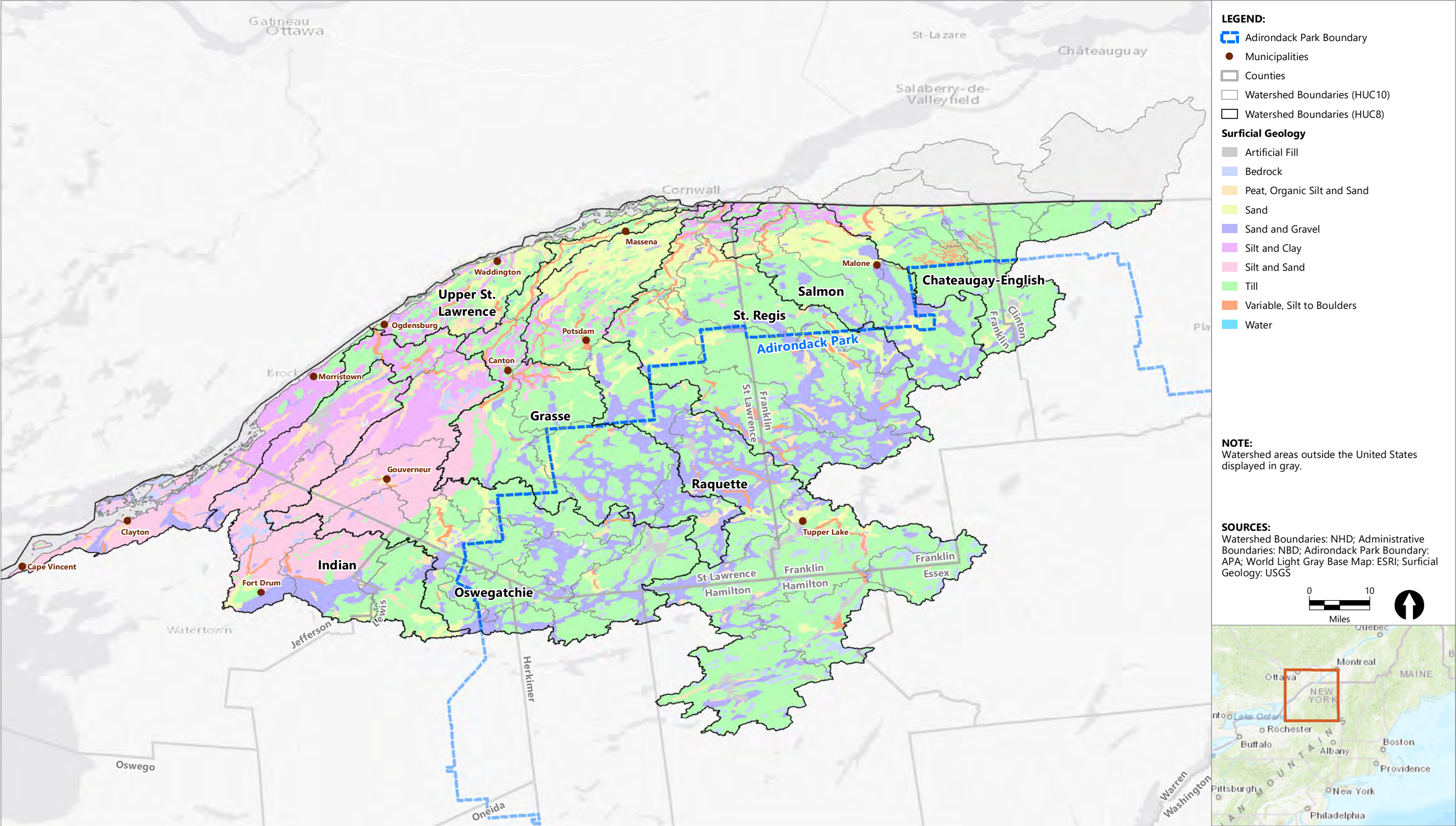




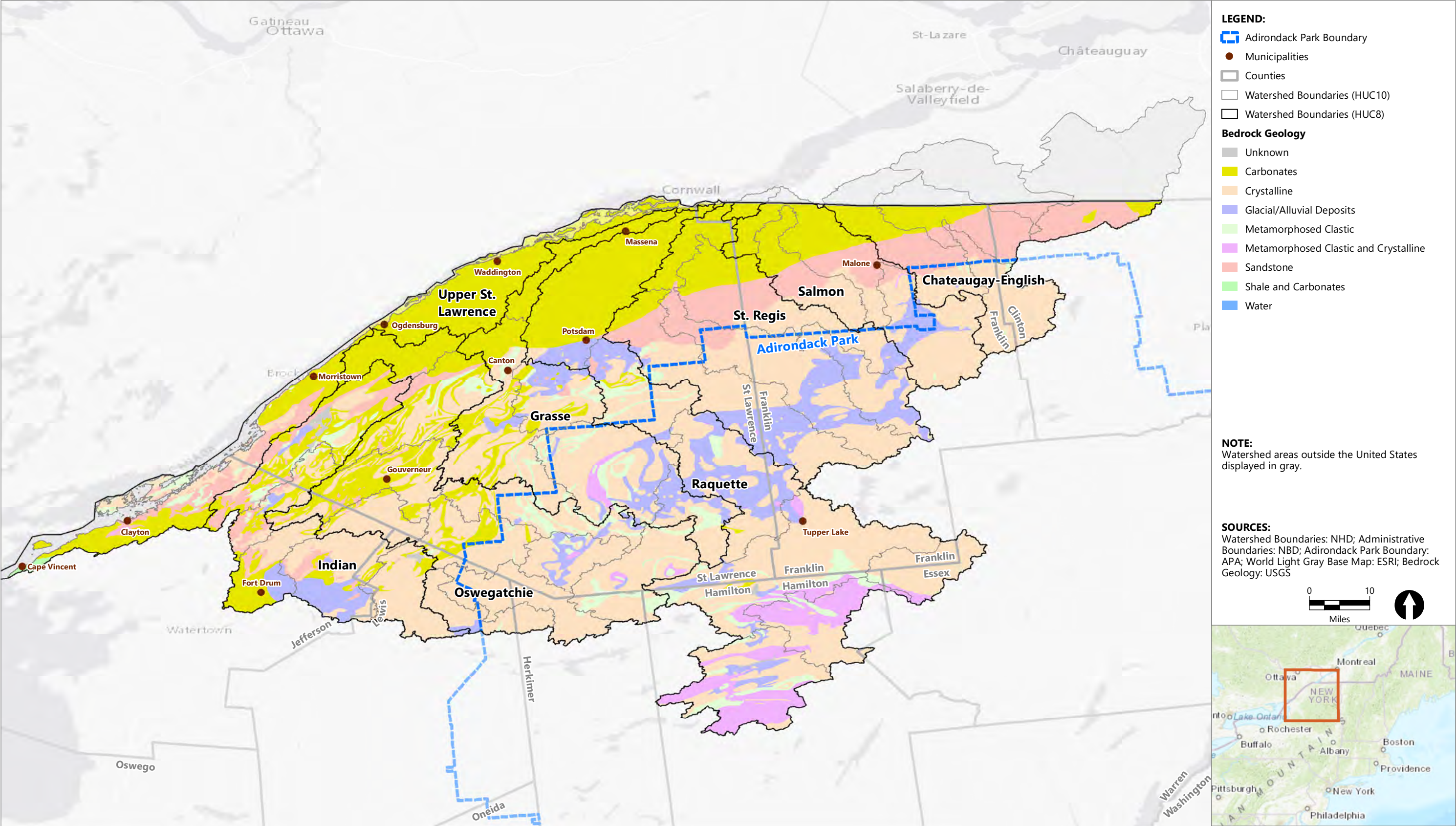
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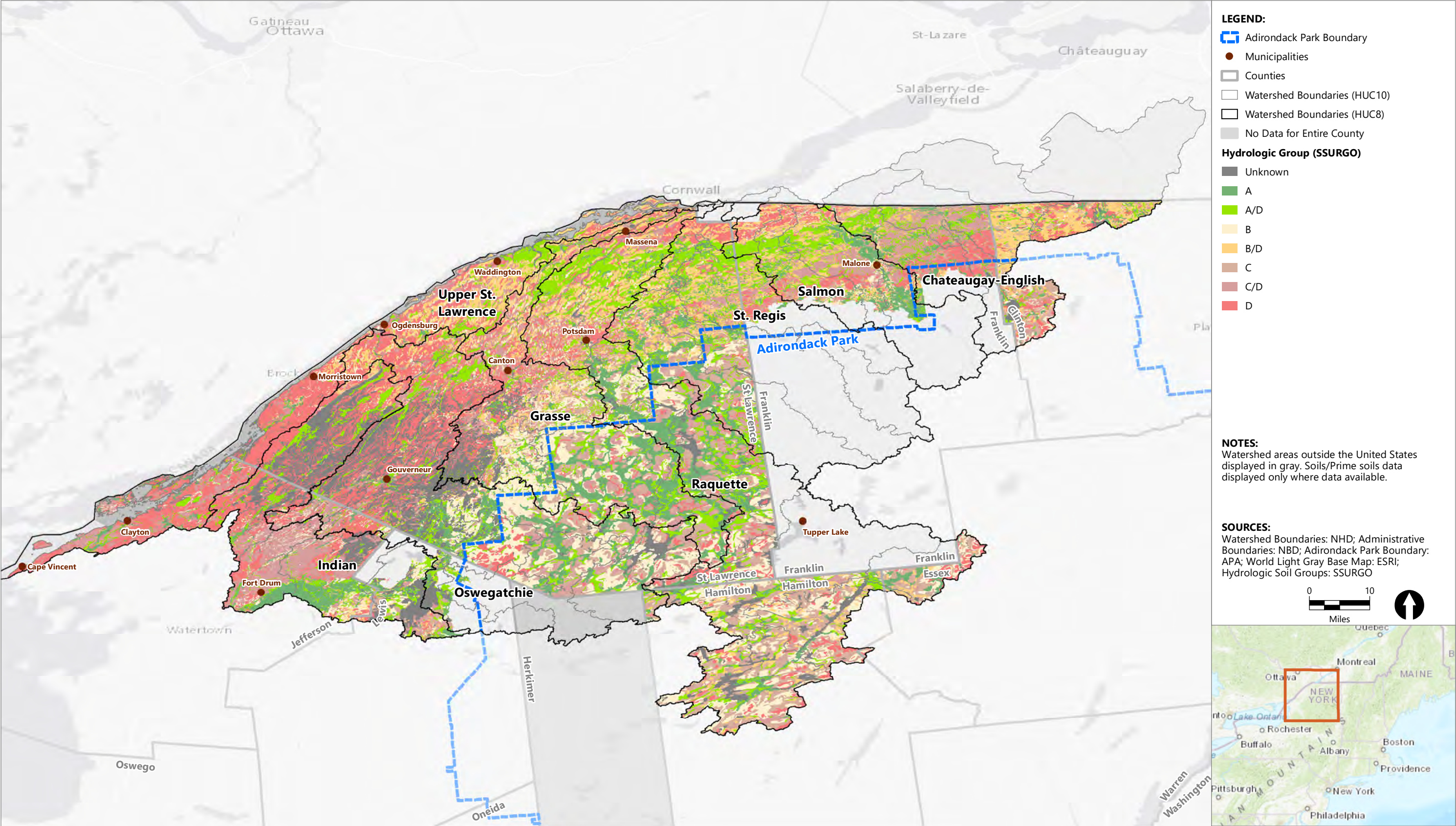
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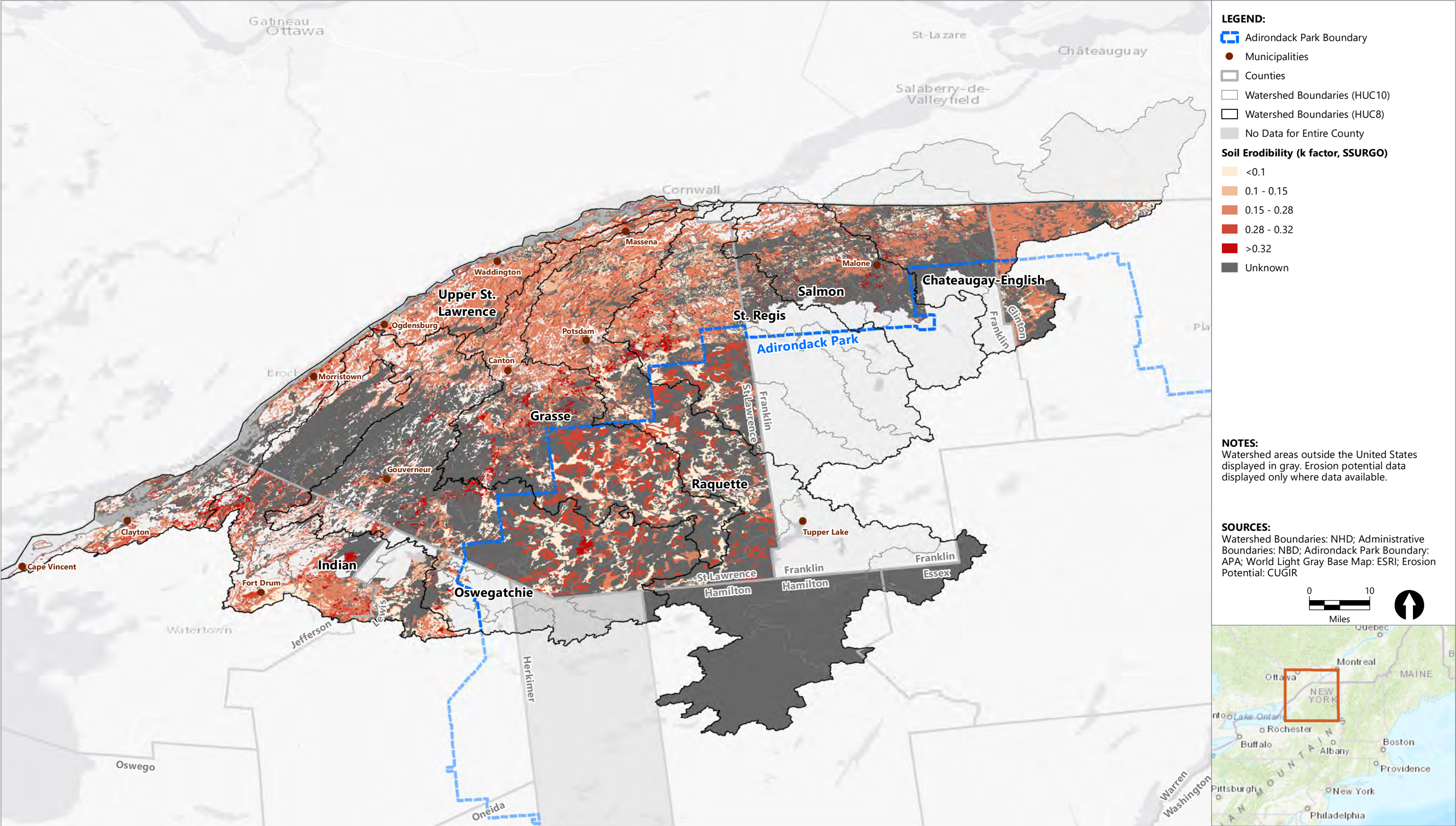
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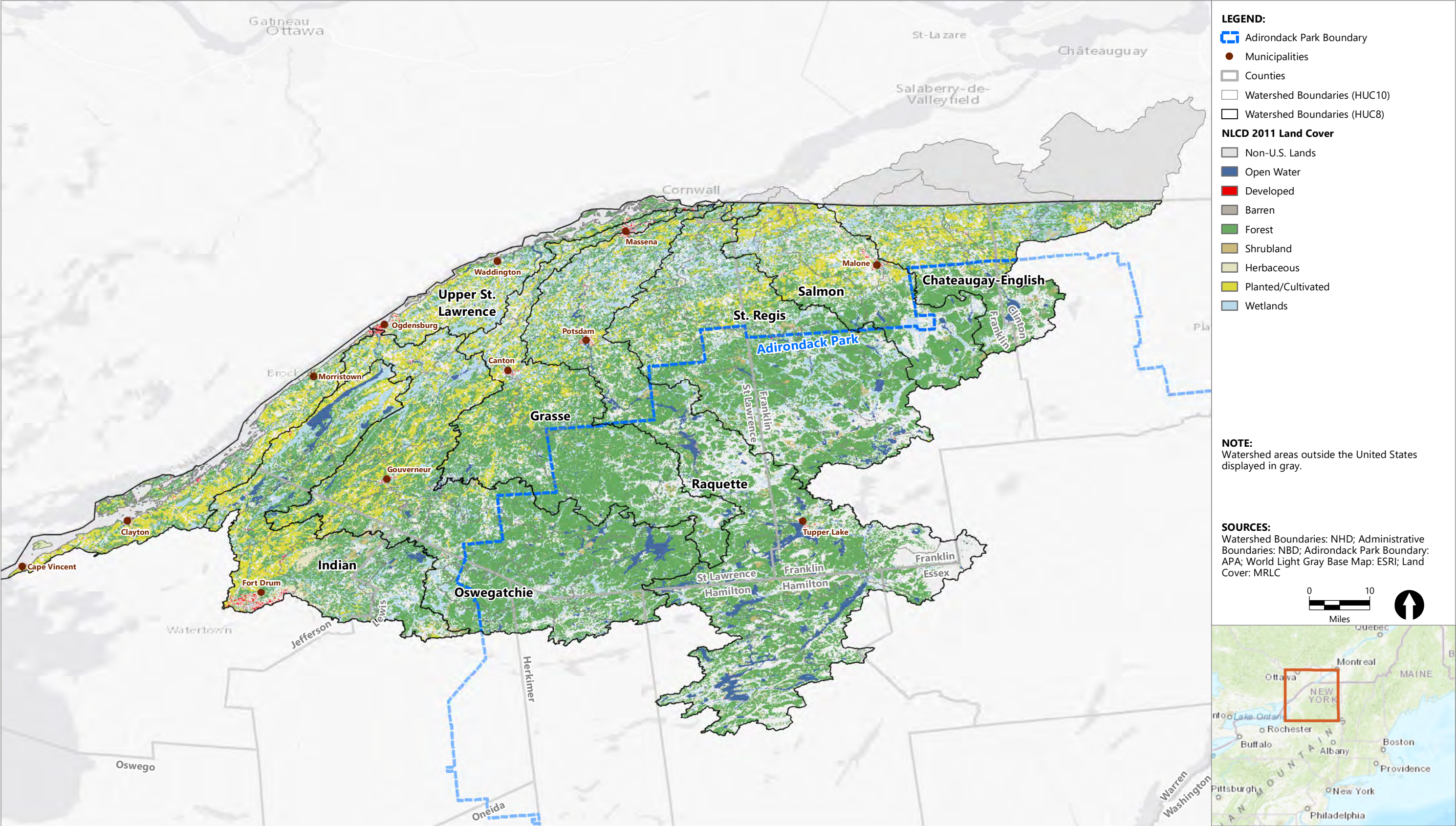
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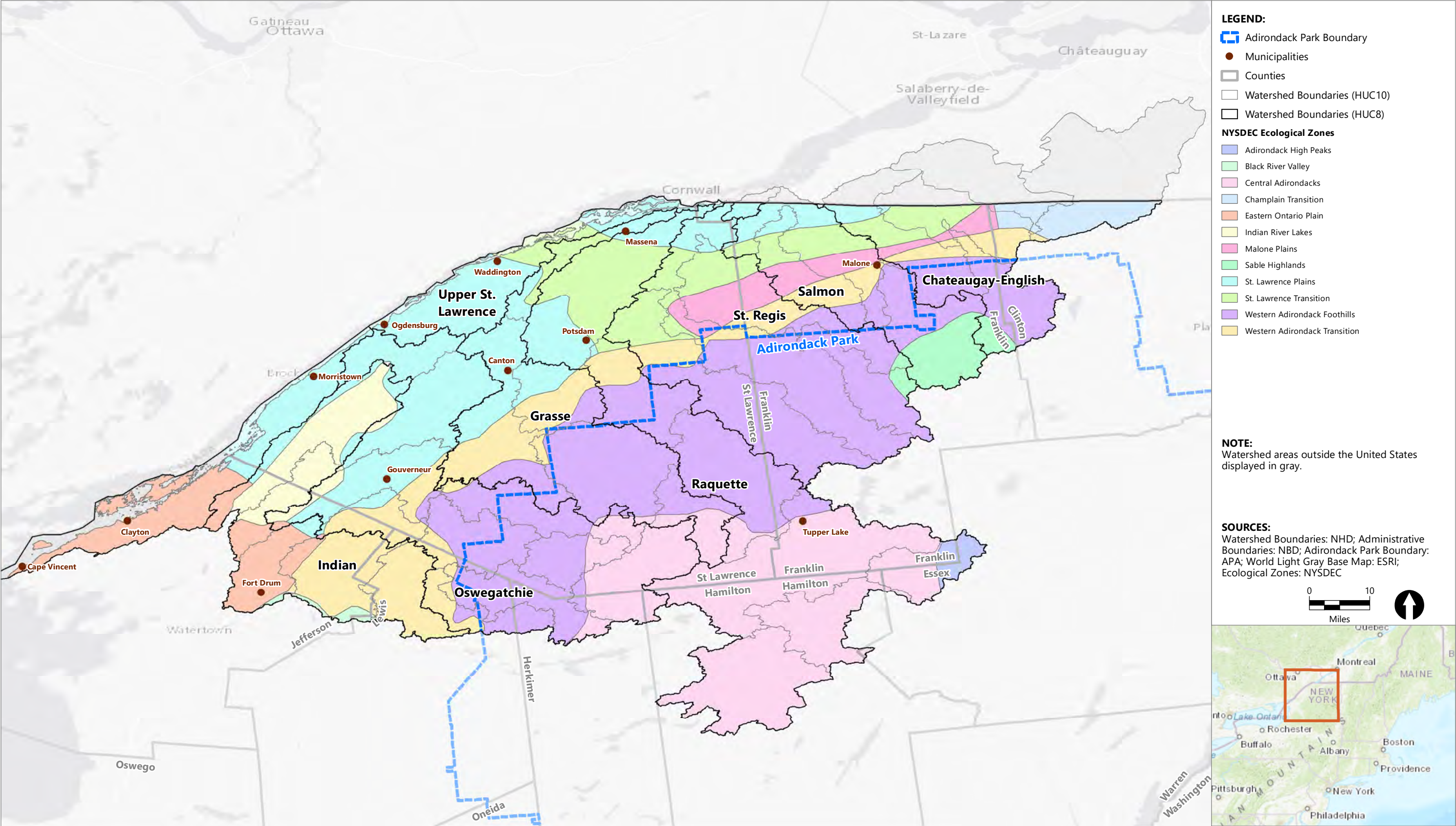


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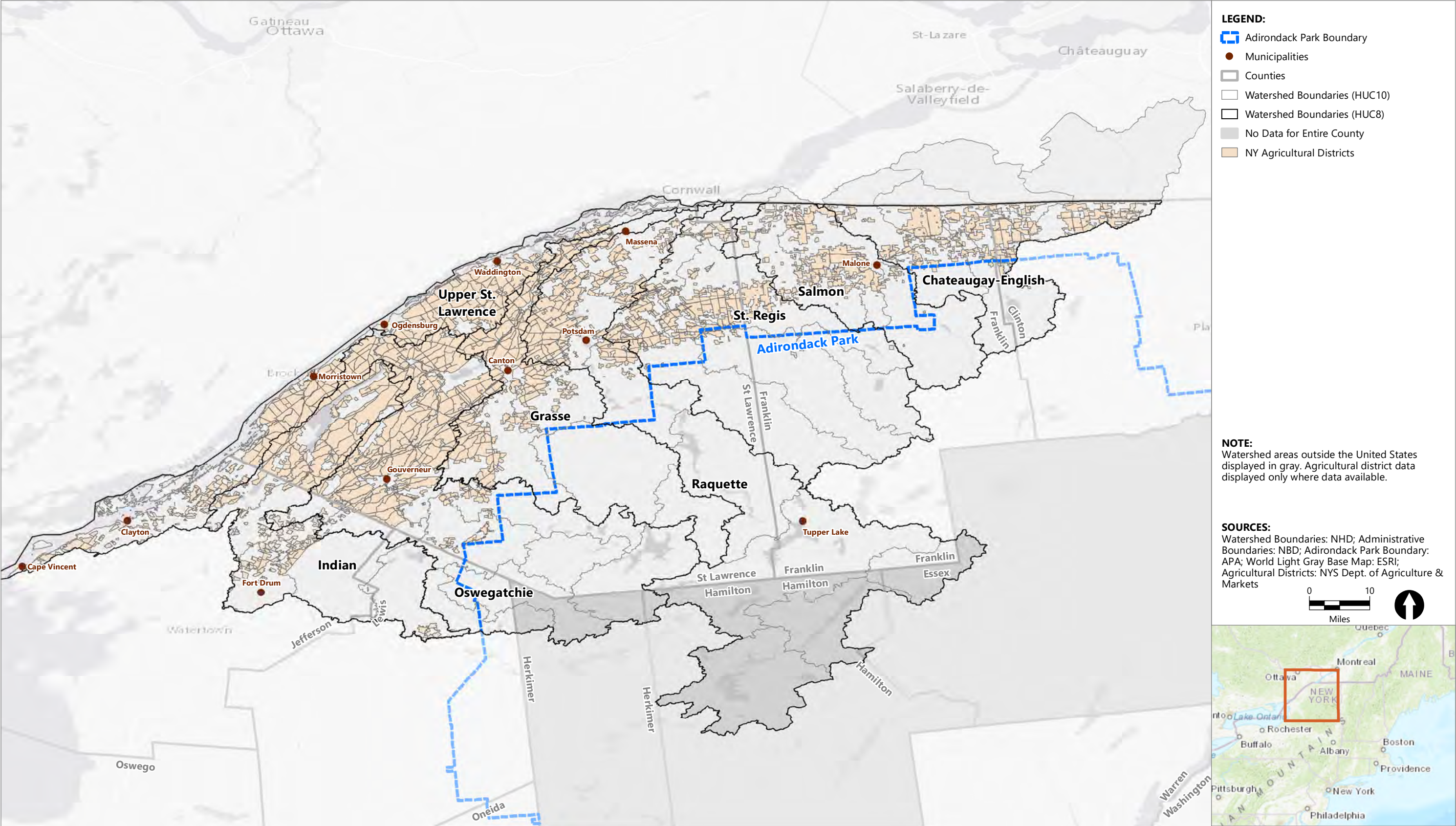


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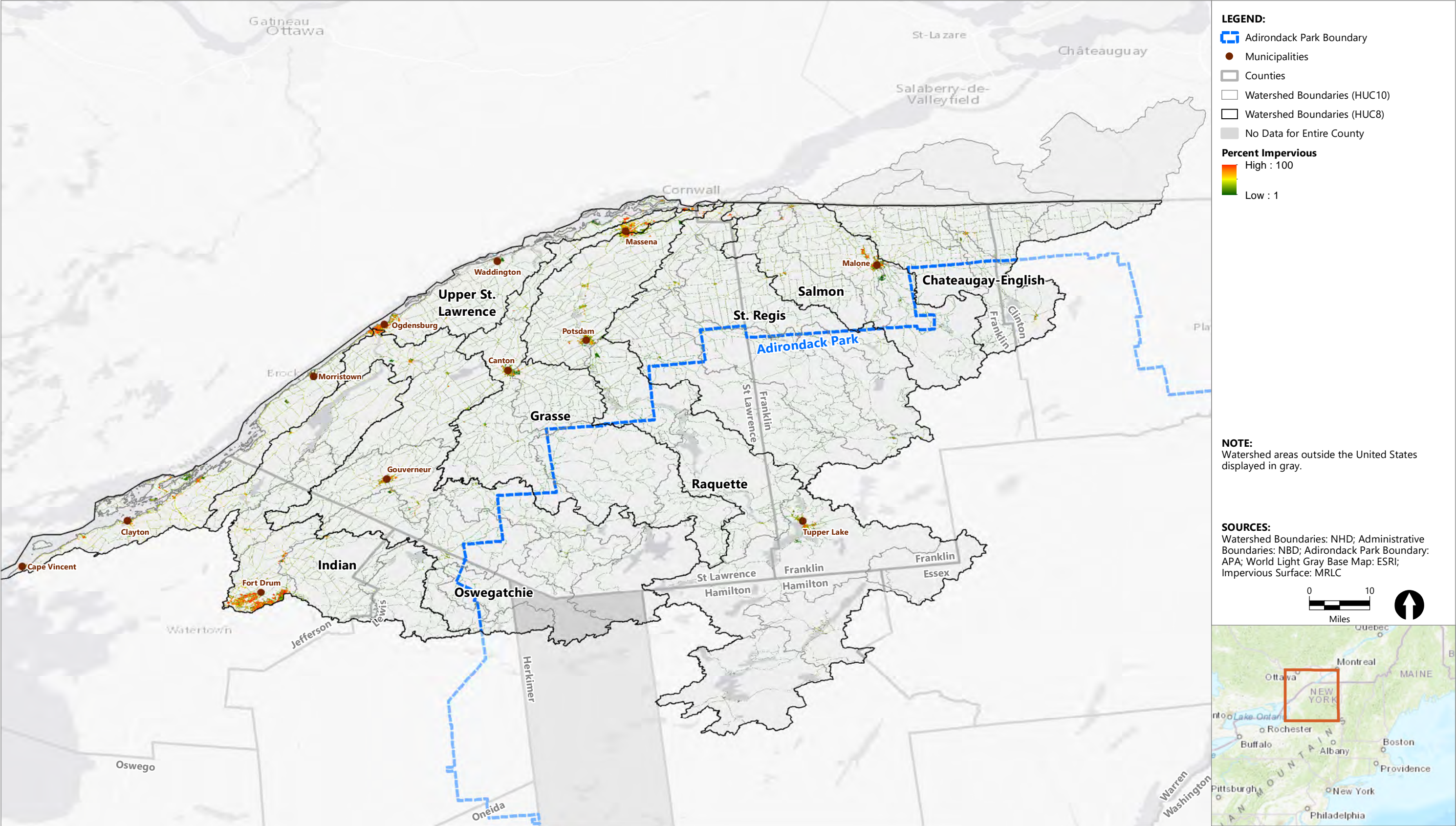




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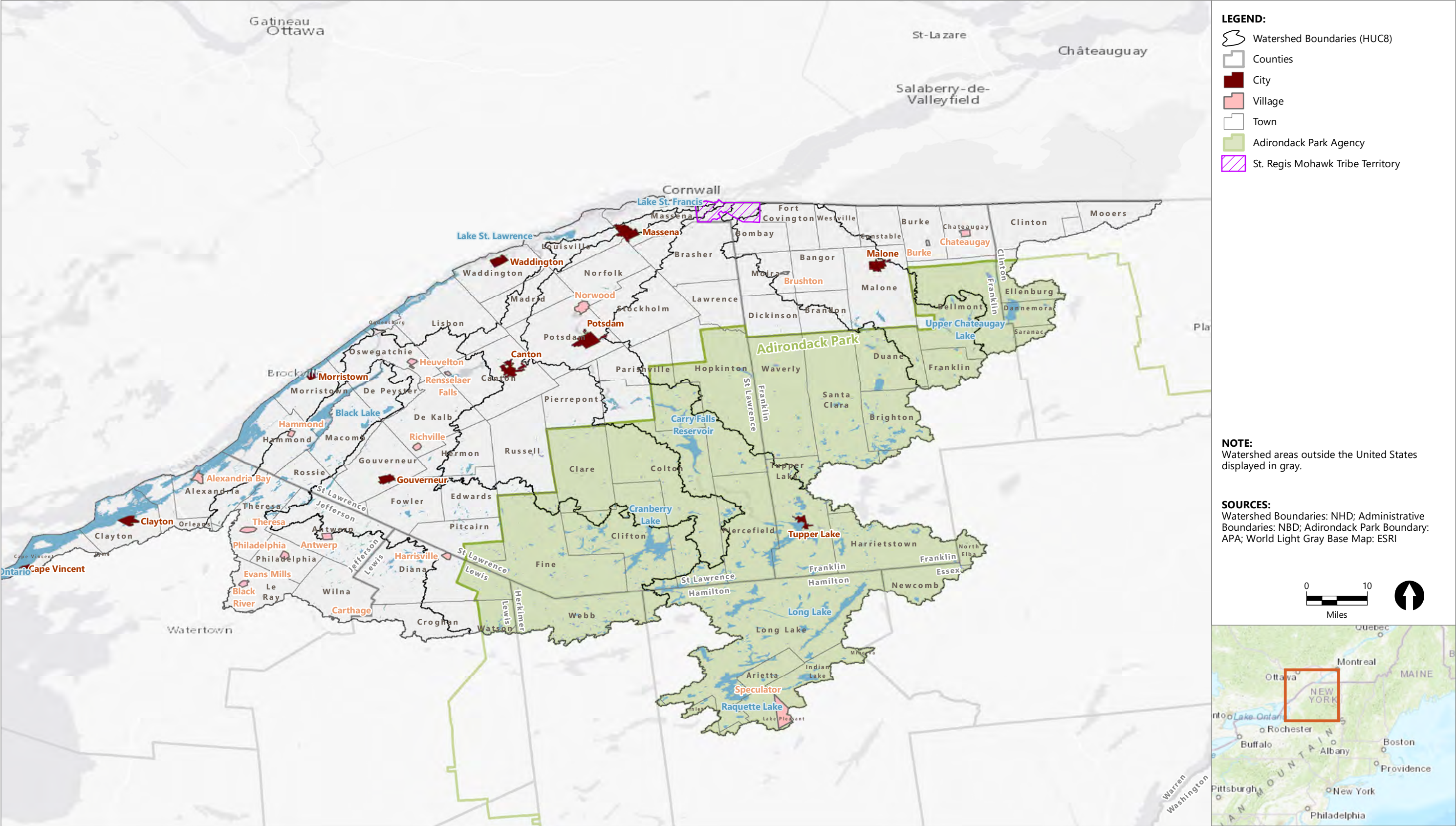


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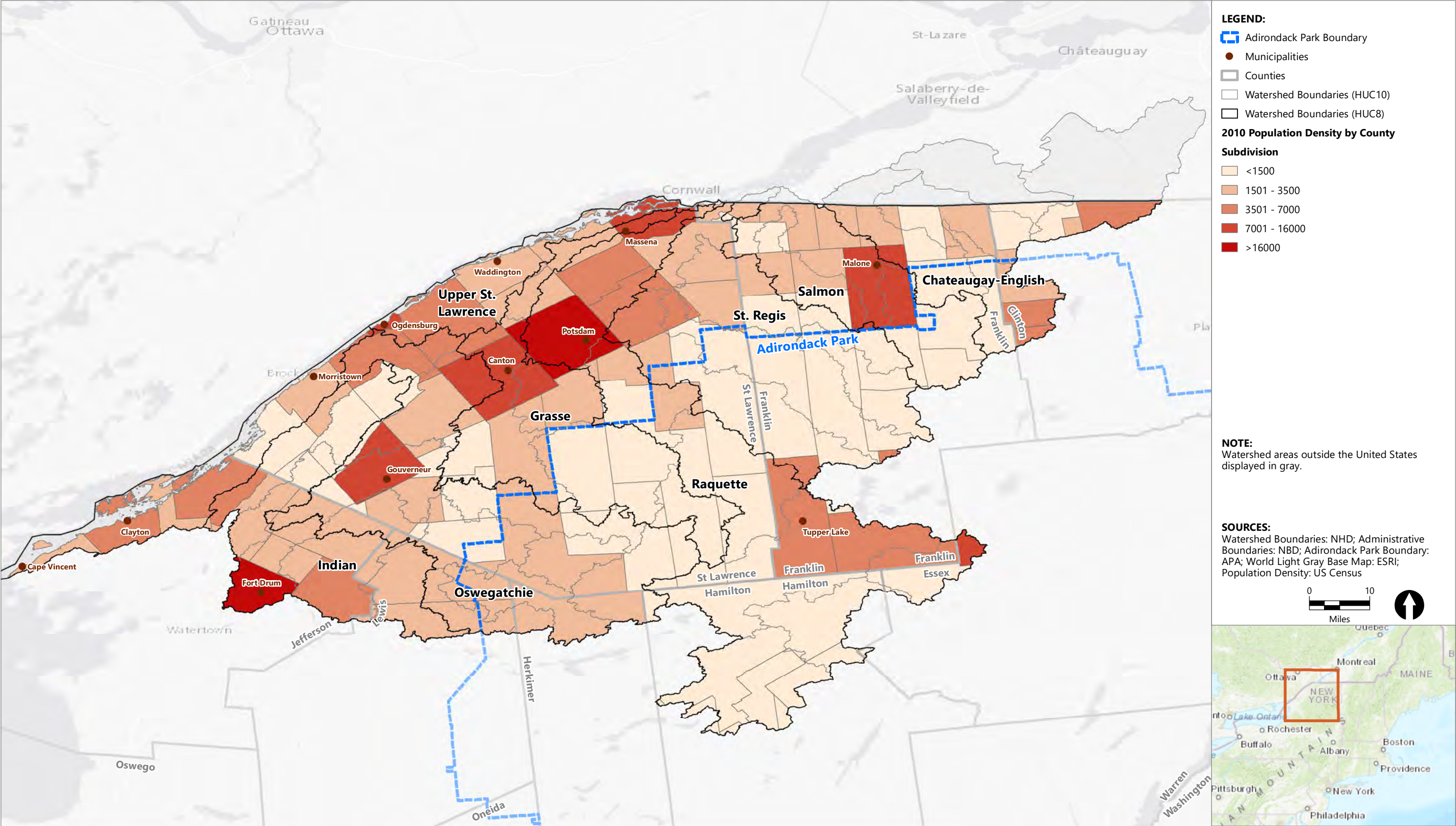
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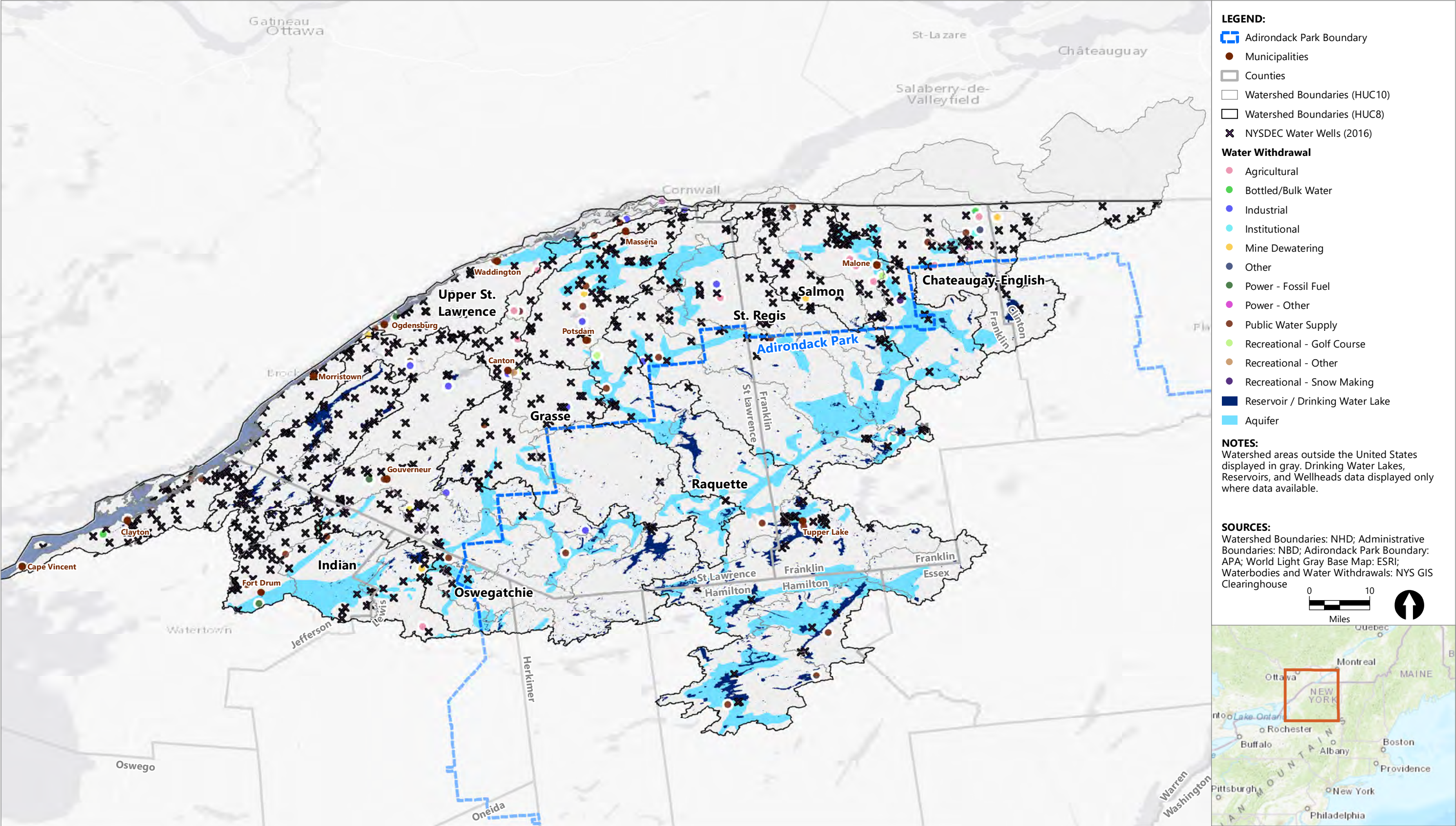
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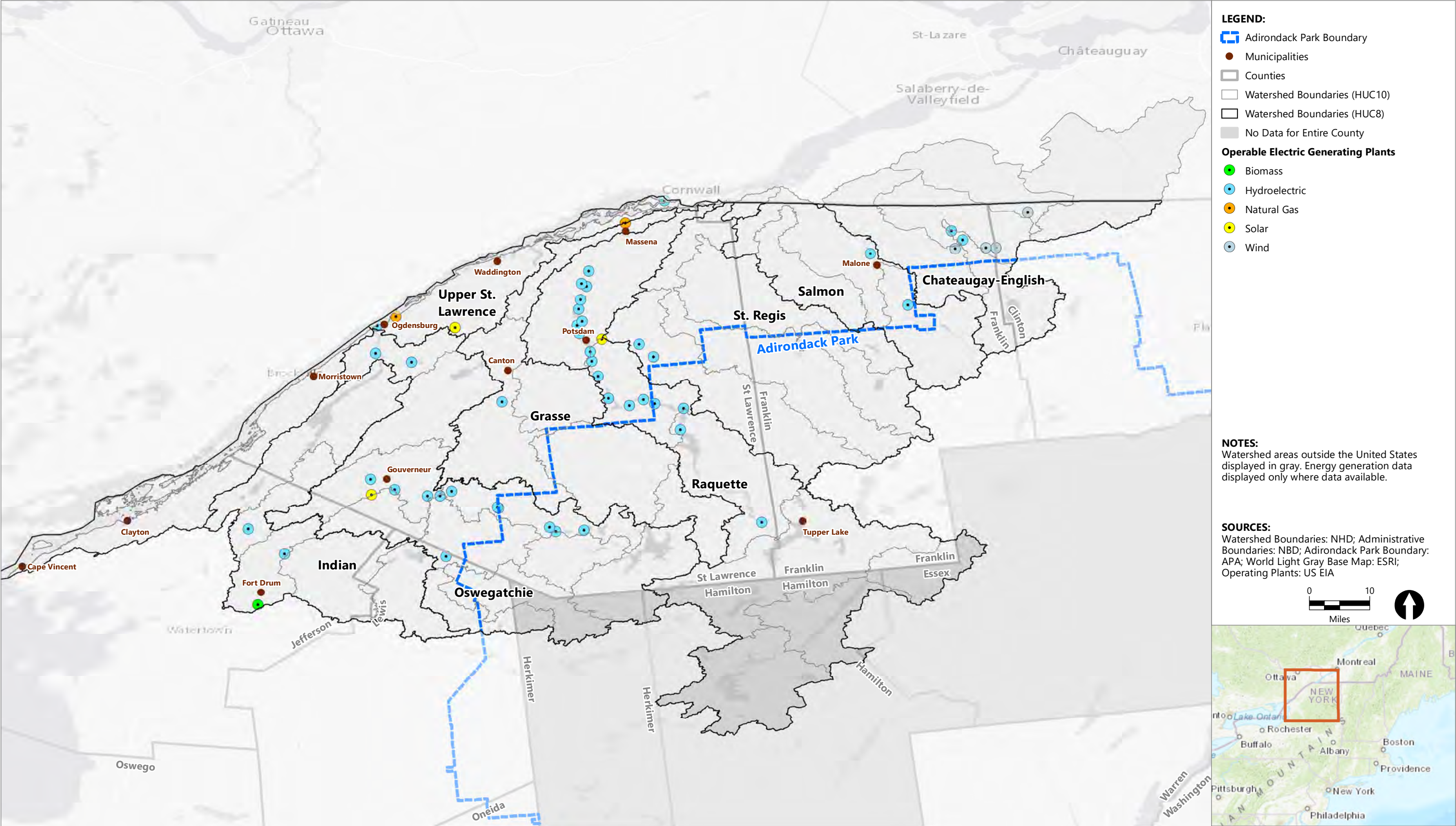
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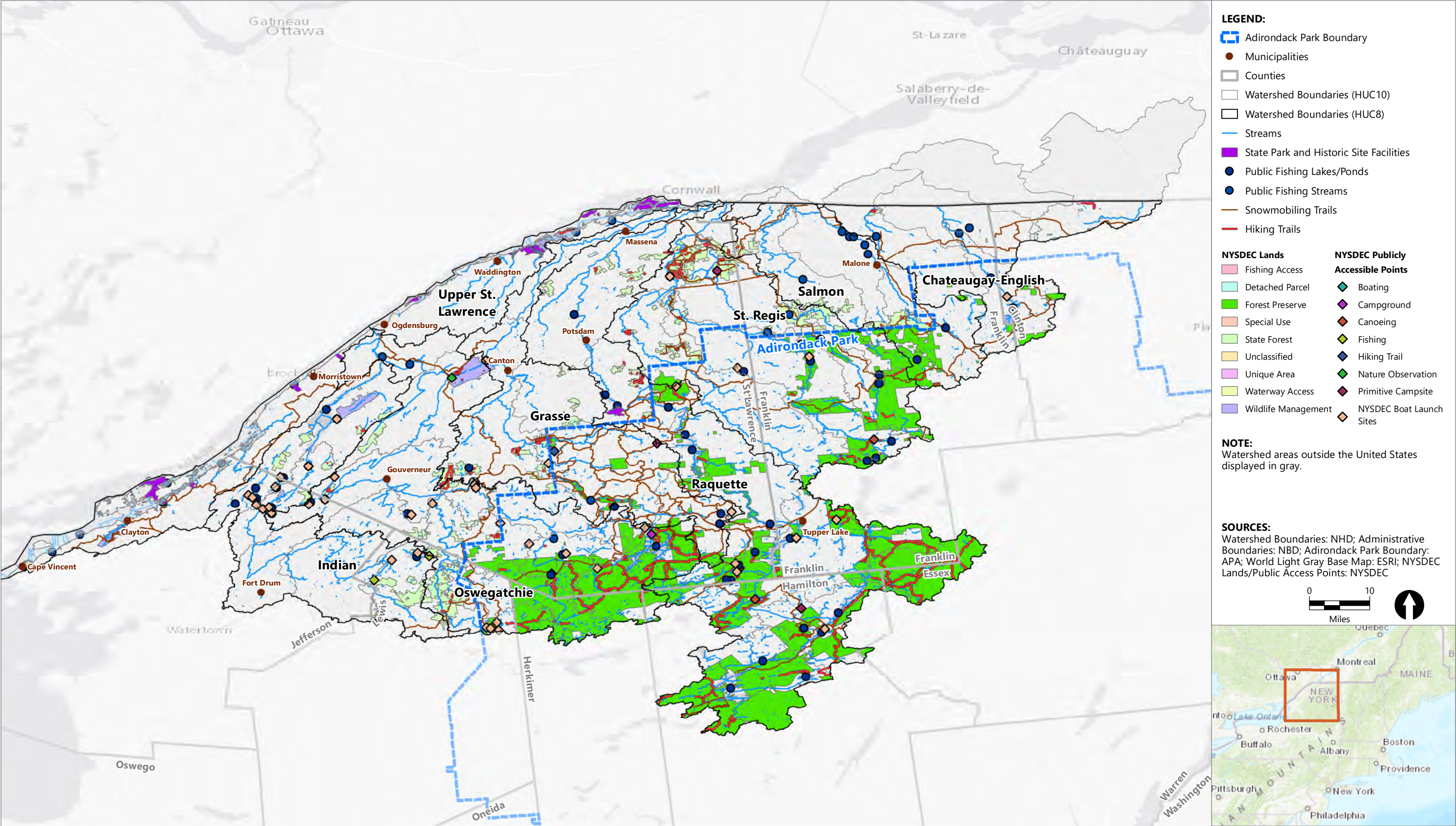


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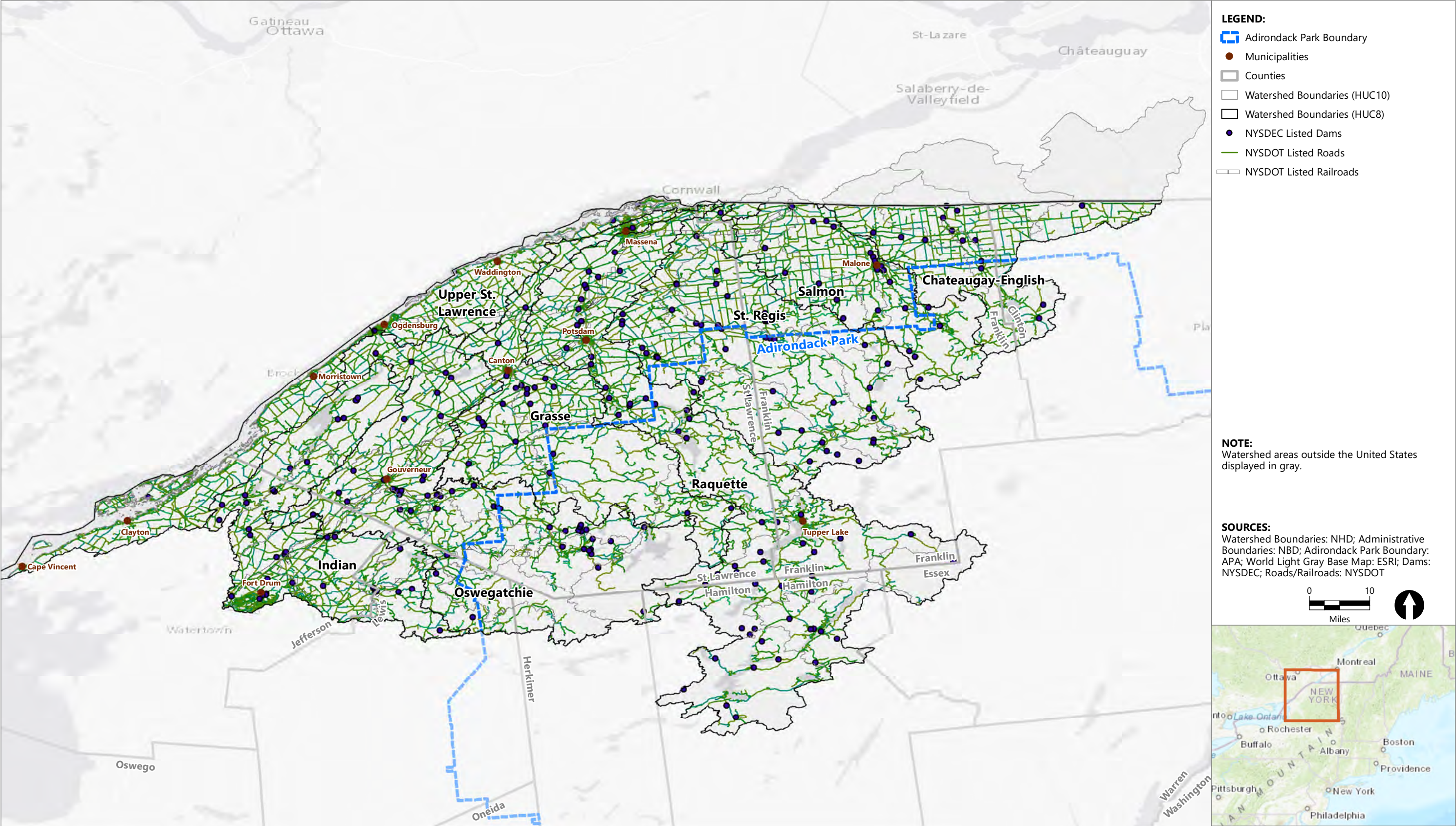


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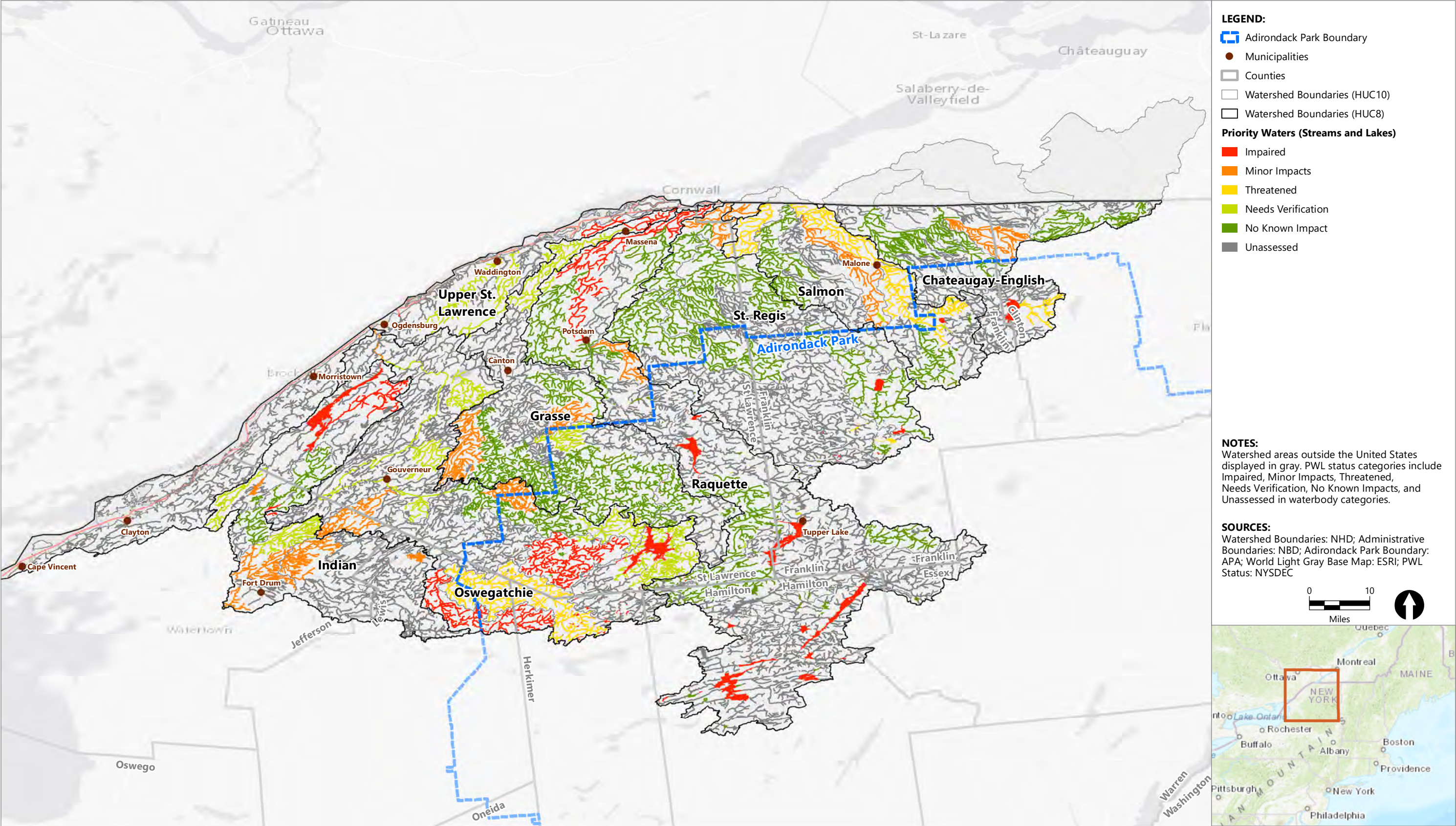
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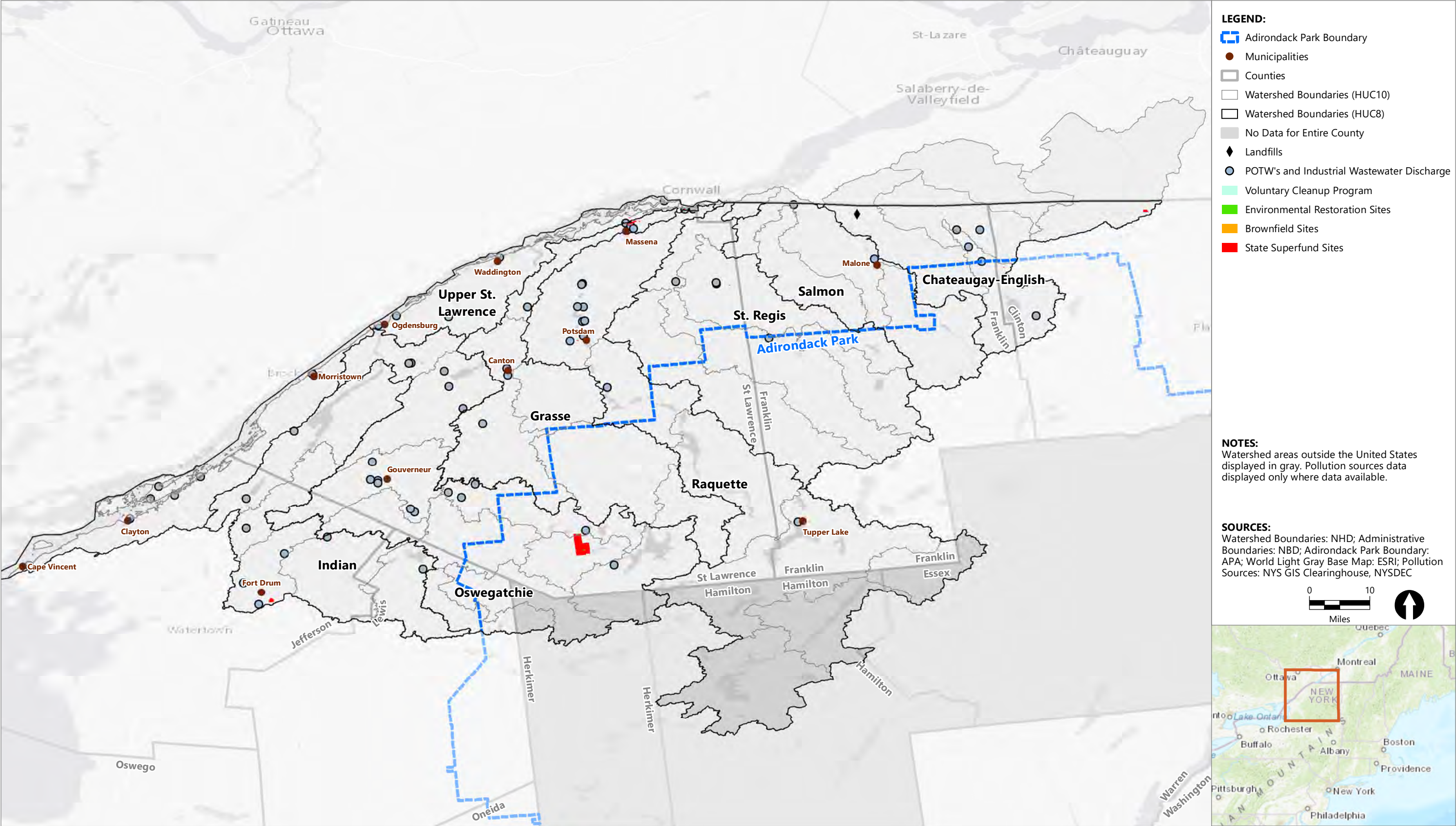


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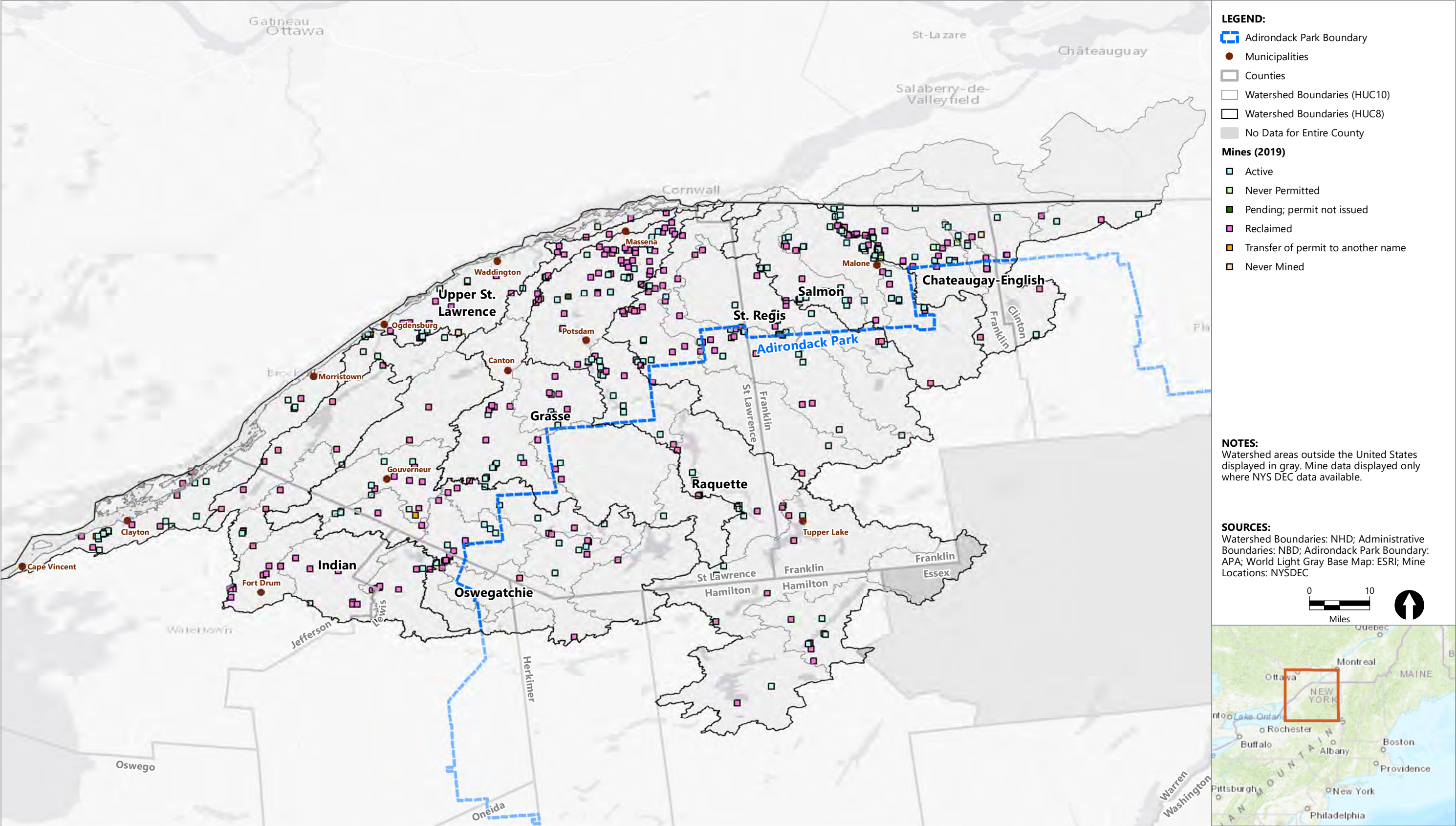




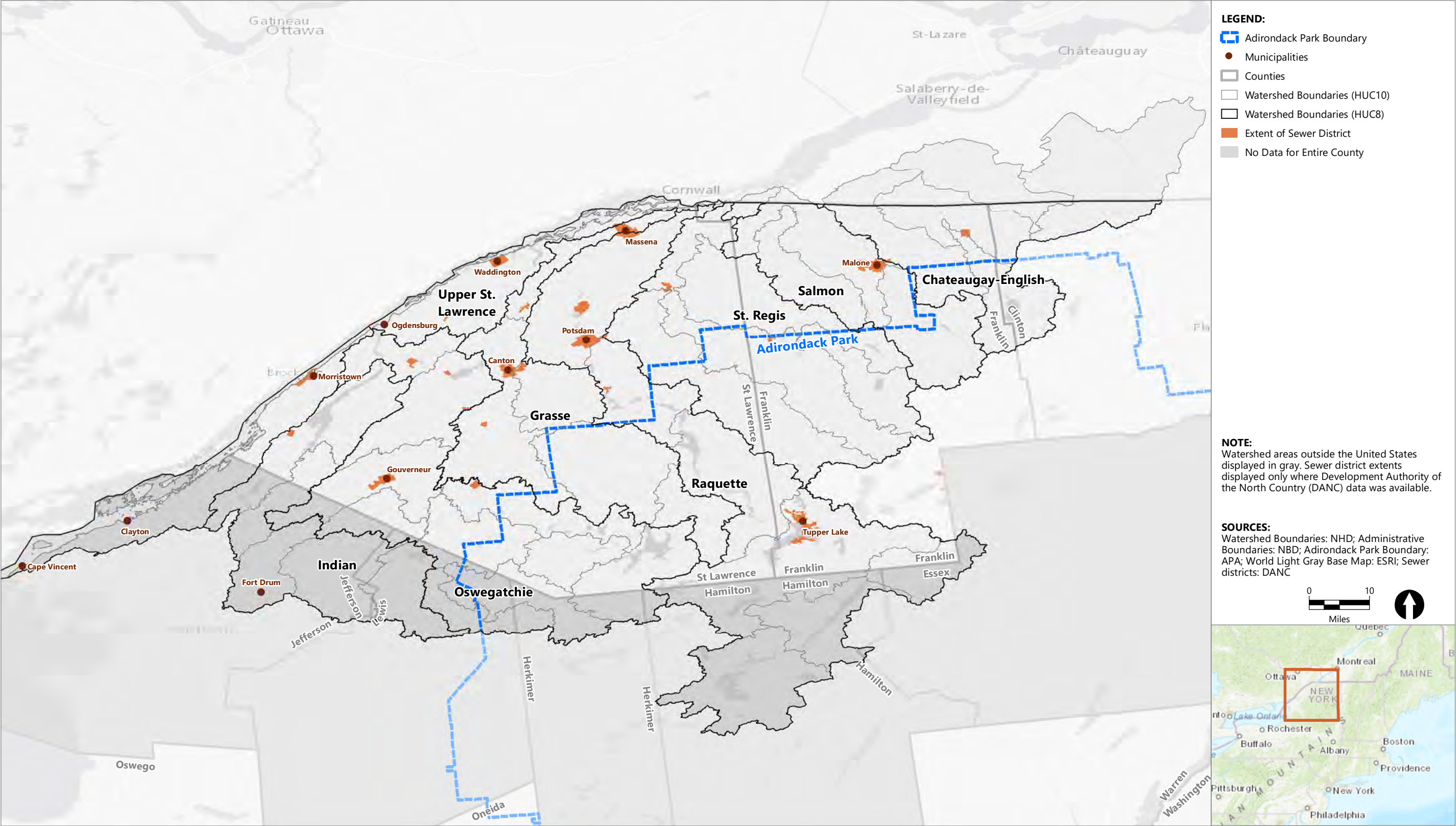
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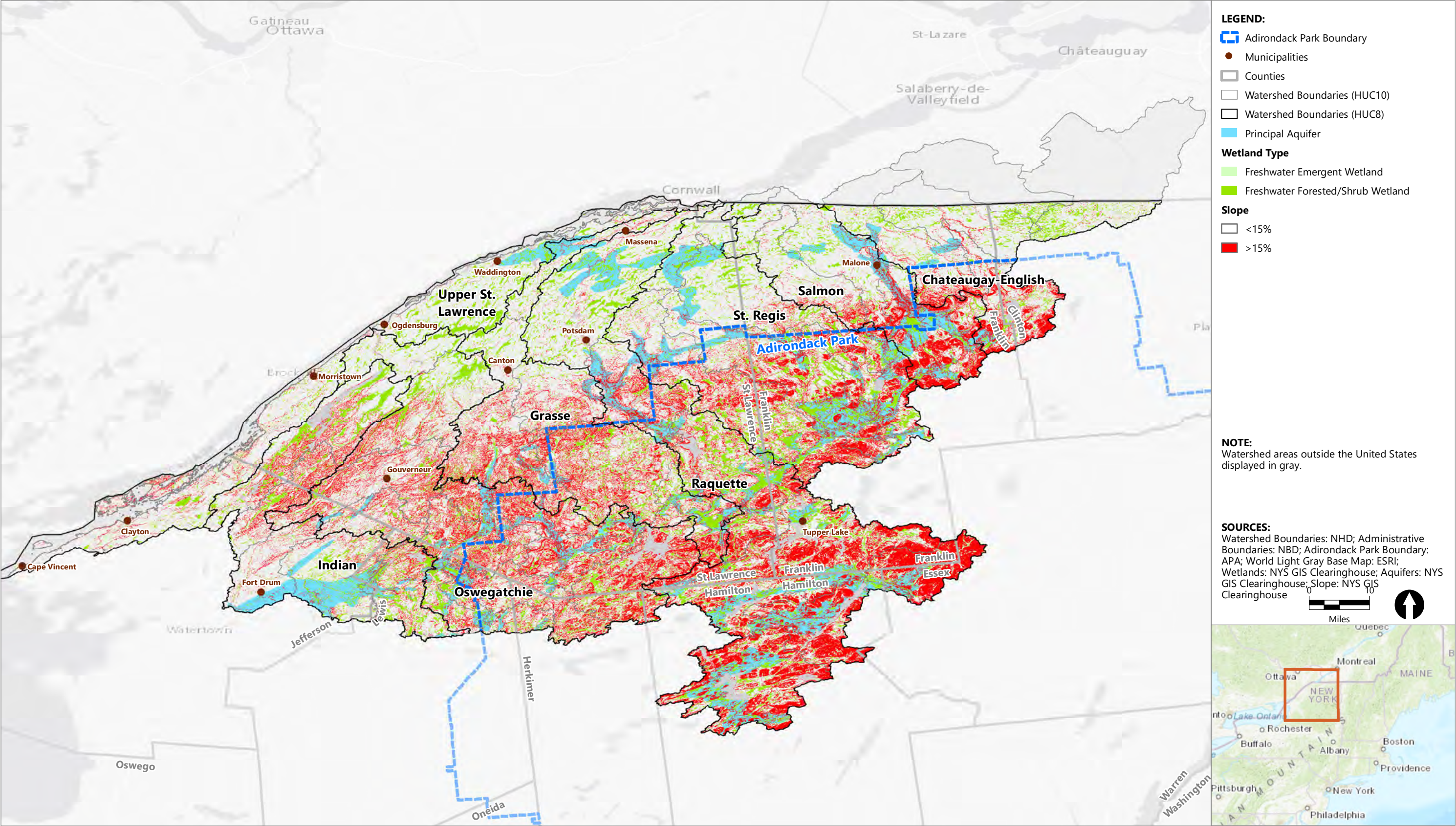


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Appendix A

Local Laws and Programs Affecting Water Quality

FINAL



December 2019

St. Lawrence River Watershed Revitalization Plan: Local Laws and Programs Affecting Water Quality

This plan was prepared with funding provided by the New York State Department of State under Title 11 of the Environmental Protection Fund.

Prepared for Franklin County Soil & Water Conservation District

Prepared by:



DRAFT

December 2019

St. Lawrence River Watershed Revitalization Plan: Local Laws and Programs Affecting Water Quality

Prepared for

Franklin County Soil & Water Conservation District
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ABBREVIATIONS

ACEP	Agricultural Conservation Easement Program
AEM	Agricultural Environmental Management
ALA	Adirondack Lake Association
ANSCAP	Agricultural Nonpoint Source Abatement and Control Program
APA	Adirondack Park Agency
APIPP	Adirondack Park Invasive Plant Program
AWI	Adirondack Watershed Institute
CAFO	Concentrated Animal Feeding Operation
CCE	Cornell Cooperative Extension
CEA	Critical Environmental Area
CFA	Consolidated Funding Application
CNMP	Comprehensive Nutrient Management Plan
CRP	Conservation Reserve Program
CSC	Climate Smart Community
CTA	Conservation Technical Assistance
DANC	Development Authority of the North Country
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
GIS	Geographic Information System
GLAM	Great Lakes-St. Lawrence River Adaptive Management
IJC	International Joint Commission
IRLC	Indian River Lakes Conservancy
LCLGRPB	Lake Champlain-Lake George Regional Planning Board
LWRP	Local Waterfront Revitalization Plan
MS4	Municipal Separate Storm Sewer System
NCREDC	North Country Regional Economic Development Council
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NYSEFC	New York State Environmental Facilities Corporation
NYSERDA	New York State Energy Research and Development Authority
NYS DAM	New York State Department of Agriculture and Markets
NYS DEC	New York State Department of Environmental Conservation
NYS DOH	New York State Department of Health
NYS DOS	New York State Department of State
NYS DOT	New York State Department of Transportation
OPD	Office of Planning and Development

PRISM	Partnership for Regional Invasive Species Management
SLELO	St. Lawrence-Eastern Lake Ontario
SLRWP	St. Lawrence River Watershed Partnership
SPDES	State Pollution Discharge Elimination System
SRMT	St. Regis Mohawk Tribe
SWCD	Soil and Water Conservation District
TILT	Thousand Island Land Trust
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey

1 Introduction

New York State has adopted a wide variety of laws and programs designed to help protect and maintain water quality and aquatic habitat. The purpose of this component of the St. Lawrence River Watershed Revitalization Plan is to examine the regulatory environment affecting water resources and identify opportunities for improvement, with a focus on local municipal actions. To accomplish this, the project team collaborated with County representatives to inventory and assess each watershed municipality's regulatory programs (e.g., zoning ordinances, site plan review regulations, comprehensive plans) as they relate to nonpoint source pollution. The findings of the analysis support recommendations for specific measures to improve resilience, water quality, and aquatic habitat.

This report includes the following sections:

- Description and analysis of the broad institutional framework that guides decision making and activities in the watershed, including the roles and responsibilities of federal, state, and county governments, as well as initiatives and collaborations involving regional entities, nonprofit organizations, and academic institutions (Chapter 2);
- Overview and analysis of the roles and responsibilities of local governments in the watershed (Chapter 2);
- Inventory of specific local laws and programs, and a gap analysis regarding local laws for municipalities in the St. Lawrence River watershed (Chapter 3); and
- Preliminary recommendations for municipal governments focusing primarily on developing local laws and programs as well as opportunities for best management practices that positively affect the quality of water resources (Chapter 3).

The St. Lawrence watershed planning effort is led by the St. Lawrence River Watershed Project and the Franklin County Soil and Water Conservation District and is funded through a Title 11 Environmental Protection Fund grant from the New York State Department of State. This document was prepared following a modified approach described in the guidebook *Protecting Water Resources through Local Controls and Practices* (Genesee/Finger Lakes Regional Planning Council, 2006).

2 Institutional Framework

The St. Lawrence River watershed is affected by regulations, plans, and programs at the federal, state, regional, county, and local level, as well as by collaborations involving nonprofit organizations and academic institutions. This chapter presents an overview of the broad institutional framework guiding decisions and actions in the watershed.

2.1 Federal Agency and Watershed-Related Resources

The federal government maintains various programs associated with the conservation and protection of water and natural resources. These programs monitor and report on a vast array of issues related to hydrology, water quality, terrestrial and aquatic habitat, soil health, economic activities, transportation, energy generation and much more. Federal agencies can also provide technical and financial assistance to stakeholders within the watershed. In addition to these federal resources, the online Catalog of Federal Domestic Assistance (www.cfda.gov) provides access to a comprehensive database of federal programs.

2.1.1 International Joint Commission (IJC)

Website: www.ijc.org/en

Description: The United States and Canada created the International Joint Commission (IJC) in recognition of the many ways the two nations are affected by management decisions related to the Great Lakes system. The IJC is guided by the 1909 Boundary Waters Treaty; Canada and the United States agreed that neither country would pollute boundary waters, or waters that flow across the boundary, to an extent that could cause injury to public health or damage property in the other country.

The IJC has two main responsibilities: approving projects that affect water levels and flows across the boundary and investigating transboundary issues and recommending solutions. The IJC's recommendations and decisions consider the needs of a wide range of water uses, including drinking water, commercial shipping, hydroelectric power generation, agriculture, ecosystem health, industry, fishing, recreational boating and shoreline property.

In December 2016, the IJC approved 'Plan 2014' - a new plan for managing water levels and flows in Lake Ontario and the St. Lawrence River. Before the IJC took this action, the Governments of Canada and the United States concurred on amendments to the IJC's Order of Approval, which specifies conditions and criteria for setting the

flow through the Moses-Saunders Dam, located between Cornwall, Ontario and Massena, New York.

Relevant programs and committees:

The Great Lakes Science Advisory Board provides advice on research to the IJC and to the Great Lakes Water Quality Board. It also provides advice on scientific matters referred to it by the Commission, or by the Great Lakes Water Quality Board in consultation with the Commission.

The Great Lakes Water Quality Board is the principal advisor to the IJC under the Great Lakes Water Quality Agreement. The Board assists the Commission by reviewing and assessing the progress of the governments of Canada and the United States in implementing the Agreement, identifying emerging issues and recommending strategies and approaches for preventing and resolving complex challenges facing the Great Lakes, and providing advice on the role of relevant jurisdictions to implement these strategies and approaches.

The Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee will undertake the monitoring, modeling and assessment needed to support ongoing evaluation of the regulation of water levels and flows.

The International Lake Ontario - St. Lawrence River Board is responsible for ensuring that outflows from Lake Ontario meet the requirements of the IJC order. The Board also has responsibilities to communicate with the public about water levels and flow regulation, and work with the GLAM Committee to monitor and assess performance of the Plan 2014 water level regulations.

2.1.2 United States Environmental Protection Agency (USEPA)

Website: www.epa.gov

Description: The USEPA protects environmental quality through a variety of air, water, pollution, and toxics and chemicals management programs, primarily through its Office of Water. USEPA provides information on water quality programs and assistance with planning and managing watersheds (www.epa.gov/hwp), source water protection (www.epa.gov/sourcewaterprotection), water quality, wetlands (water.epa.gov/), groundwater and surface water supplies (www.epa.gov/ccr), and septic systems (www.epa.gov/septic) and wastewater treatment (www.epa.gov/npdes/municipal-wastewater). The agency's watershed-related responsibilities include defining and ensuring compliance with basic water programs; developing national standards and tools; providing funds to support state and tribal programs; and assessing national

progress toward meeting goals and standards. The Great Lakes Restoration Initiative <https://www.epa.gov/great-lakes-funding/great-lakes-restoration-initiative-glri>) is a major program of EPA that provides federal funds to strategically target the most significant threats to the Great Lakes ecosystem. The major focus areas include restoration of legacy contaminants in identified Areas of Concern, invasive species, nonpoint sources of pollution and impacts on nearshore health, and habitat protection and restoration.

Relevant programs: Great Lakes Restoration Initiative (GLRI)
Environmental Monitoring and Assessment Program (EMAP)
Healthy Watersheds Program
National Aquatic Resource Surveys (NARS) Program
National Nonpoint Source Program
National Pollutant Discharge Elimination Systems (NPDES) Programs
Great Lakes National Program Office Lake Ontario Lakewide Management Plan Acid Rain Program
Office of Standards (supports Clean Water Act and Safe Drinking Water Act) Research and Development

2.1.3 U.S. Fish and Wildlife Service (USFWS)

Website: www.fws.gov

Description: The USFWS administers most of the nation's fish and wildlife management programs, including terrestrial and freshwater endangered species protection and migratory bird management. USFWS manages public lands and outdoor recreation (www.recreation.gov) as part of the National Wildlife Refuge system. USFWS also offers several funding programs (see below). The field office in Cortland, New York can provide state and regional information (www.fws.gov/northeast/nyfo).

Relevant programs: Partners for Fish and Wildlife
Wildlife and Sport Fish Restoration Programs
North American Wetlands Conservation Act (NAWCA) grants
Conservation Planning Assistance (through Habitat Resource and Conservation)
Great Lakes Restoration Initiative grants

2.1.4 U.S. Geological Survey (USGS)

Website: www.usgs.gov

Description: The USGS is a primary source of information on stream flow, water quality, water quantity, maps, and application software. The agency has real time data, surface water

data, and groundwater information. USGS also provides historic topographic maps that can be helpful in delineating watersheds. The New York office of USGS (<https://www.usgs.gov/centers/ny-water>), in partnership with collaborating agencies, has conducted assessments of streams in several of New York's physiographic regions to develop regional stream rating curves, which illustrate the relationship between watershed size, stream form, and discharge. These relationships are useful in guiding stream restoration activities. USGS publications, including site specific investigations and circulars, provide information and training on watershed processes.

Relevant programs: Water Availability and

2.1.5 U.S. Army Corps of Engineers (USACE)

Website: www.usace.army.mil

Description: The USACE's Civil Works programs focus on water resource development activities including flood risk management, navigation, recreation, and infrastructure and environmental stewardship. USACE provides technical guidance for managing water levels in the Great Lakes System, including the Lake Ontario- St. Lawrence River System through collaboration with the International Joint Commission.

Relevant programs: Section 10 of the Rivers & Harbors Act of 1899 (33 U.S.C. 403)
Section 404 of the Clean Water Act (33 U.S.C. 1344)
Flood Risk Management Program

2.1.6 U.S. Department of Agriculture (USDA): Natural Resources Conservation Service (NRCS), Forest Service

Website: www.usda.gov ; www.nrcs.usda.gov ; www.fs.fed.us

Description: The USDA supports rural development and helps communities with natural resource concerns, such as erosion control, watershed protection, and sustainable forestry practices. The USDA's Natural Resources Conservation Service (NRCS) is the major federal agency responsible for addressing nonpoint sources of pollution. Its county-based Soil and Water Conservation Districts provide conservation planning and technical assistance to landowners and managers to benefit the soil, water, and related natural resources for productive lands and healthy ecosystems.

Relevant programs: Agricultural Conservation Easement Program (ACEP)
Agricultural Environmental Management (AEM) Plans
Conservation Technical Assistance (CTA)
Conservation Reserve Program (CRP)

Environmental Quality Incentives Program (EQIP)
National Conservation Practice Standards (e.g., Nutrient Management Code 590)

2.1.7 Fort Drum

Website: home.army.mil/drum/

Description: Fort Drum is the home of the 10th Mountain Division, located in northern New York. The installation is in the middle of one of the most historically unique and geographically beautiful areas of the United States. Fort Drum is approximately 30 miles south of Canada, with the Great Lakes to the west, the Adirondack Mountains to the east, and the St. Lawrence River and the Thousand Islands in between. The installation covers about 107,265 acres, or 168 square miles. Fort Drum provides full-spectrum training and base operations support to the United States Army service branches, 11 states, and parts of Canada.

Relevant activities: *Environmental Division:* The Environmental Division mission is to support Fort Drum and the 10th Mountain Division (LI) by protecting land, air and water; preserving history and cultural heritage; conserving natural resources; restoring land impacted by historical oil and chemical releases; and keeping the Fort Drum community informed about innovative environmental programs and accomplishments.

Natural Resources Branch: The Natural Resources Branch provide quality sustainable natural resources as a critical training asset upon which to accomplish the military mission of Fort Drum. Natural resource managers proactively manage natural resources on Fort Drum to ensure sound sustainable stewardship of public lands entrusted to the care of the Army. The Natural Resources Branch also delivers an extensive environmental outreach program that is critical to maintaining effective relationships with other professionals, neighbors, and the public for the benefit of both natural resources and military mission.

Compliance Branch: Although protecting the environment is the responsibility of everyone on post, the Environmental Compliance Branch has the unique role of coordinating the installation's overall pollution control programs. As one of the largest industrial facilities in the state, Fort Drum's operations have the potential to pollute soil, water, and air. To prevent this, the Compliance Branch oversees a comprehensive Environmental Management System (EMS) that provides specific procedures for minimizing or eliminating releases of contaminants into the natural environment. The Environmental Compliance Branch implements both legally mandated as well as best management practices related to hazardous waste, solid waste, recyclables, wastewater, stormwater, drinking water, toxic substances, spill

prevention, petroleum storage tanks, and air emissions. Pollution prevention efforts that reduce the toxicity or quantity of pollutants generated by industrial processes is an integral part of the branch's mission. Finally, the branch ensures conformance with pollution control standards by implementing a comprehensive training and inspection program.

Restoration Section: The Fort Drum Installation Restoration Program, more commonly called the Fort Drum Cleanup Program, addresses hazardous substances, pollutants, and contaminants released to the environment from historical activities that have occurred on the installation. The Cleanup Program mission, along with protecting human health and the environment, is to enable readiness by returning Army lands to usable condition. Fort Drum accomplishes the cleanup mission by performing appropriate, cost-effective remediation of contaminated sites. The Cleanup Program is executed in close coordination with New York State Department of Environmental Conservation in accordance with environmental regulations, consent orders, and decision documents that are applicable to hazardous waste sites across the installation.

2.2 State Agencies and Watershed-Related Resources

Many New York State agencies provide an array of technical and financial assistance that can support the watershed planning process.

2.2.1 NYS Department of State (NYSDOS)

Website: www.dos.ny.gov

Description: The NYSDOS Office of Planning and Development (OPD) (www.dos.ny.gov/opd/) increases resilience and sustainable growth of communities by advancing progressive land use solutions, community-based development, and building standards and codes. OPD provides technical and financial assistance to help communities integrate watershed planning with efforts to expand public access, reinvigorate urban waterfronts, restore habitats, protect scenic resources, preserve historic resources, manage water uses, improve water quality, protect against flooding and erosion, plan for storm resiliency, and strengthen local economies. OPD provides financial assistance to eligible waterfront communities on a competitive basis, through Title 11 of the Environmental Protection Fund-Local Waterfront Revitalization Program, as well as guidance and training for the revitalization of communities, protecting and improving the environment, and strengthening local economies.

The NYSDOS Division of Local Government Services (LGS) (www.dos.state.ny.us/lgss/) provides training and technical assistance to local governments and community organizations throughout the state, helping local officials solve problems involving basic powers and duties, public works, municipal organization, planning, land use and regulatory controls, and community development. It also provides training assistance to municipalities related to zoning procedures, identifying opportunities for cost savings and other practical legal and technical advice.

Relevant programs:

Local Waterfront Revitalization Program (through Title 11 of Environmental Protection Fund)
 Local Government Efficient (LGe) Program
 Local Government Training (LGt) Programs
 Local Planning Clean Vessel Act
 Coastal erosion, flooding, dredging, nonpoint sources
 Coastal resources information
 Remote sensing, GIS Watershed Planning

2.2.2 NYS Department of Environmental Conservation (NYSDEC)

Website: www.dec.ny.gov

Description: The NYSDEC's Division of Water uses a watershed management approach to guide many of its programs. Water quality protection is central to the mission of NYSDEC, which regulates wastewater and thermal discharges and has responsibilities for monitoring waterbodies, controlling surface runoff, managing water availability, preventing flood damage and beach erosion, and promoting stewardship and education. A variety of funds are available for municipal wastewater treatment improvement, pollution prevention, and agricultural and nonagricultural nonpoint source abatement and control. Significant support is available to acquire open space that protects water resources, and to acquire public parklands and protect farmland.

Relevant programs:

Priority Waterbodies List (PWL), NYS Section 303(d)
 Rotating Intensive Basin Surveys (RIBS)
 Citizens' Statewide Lake Assessment Program
 Water Quality Improvement Program
 Nonpoint Source Management Program, NYS Section 319
 Natural Heritage Program
 Protection of Waters Program (implements Article 15 of Environmental Conservation Law)
 Stormwater Phase II Program

Environmental Conservation Laws:

- State Environmental Quality Review Act (SEQR) (Article 8): SEQR requires investigation into alternative actions and the mitigation of harmful effects of proposed development. Potential nonpoint source pollution can be remediated through revised design or other measures.
- Water Resources Law: Water withdrawals; permit (§ 15-0501)
- State Pollution Discharge Elimination System (SPDES) (Article 17). This water pollution control law is modeled after the National Pollution Discharge Elimination System approved by the Environmental Protection Agency for the control of wastewater and stormwater discharges in accordance with the Clean Water Act. Through SPDES, NYSDEC reviews permit applications to develop the limits for types and quantities of pollutants in the effluent. The permit also includes the schedules and conditions under which discharges are allowed. Owners or operators of facilities must treat wastewater in order to meet the limits listed in their SPDES permit.
 - Prohibition against pollution (§ 17-0501)
- Concentrated Animal Feeding Operations (CAFOs) Permitting (§ 17-0105) 6: The NYSDEC created and enforces regulations regarding CAFOs, which apply to dairy farms and other farms where animals are stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period. CAFOs are categorized as either "large" or "medium" based on the numbers of animals confined. The federal Clean Water Act (33 USC 1251) is the overarching authority governing discharges to waterways, and each state adopts its own related laws regarding permits required for operations that might discharge to waterways within that state.
- Stormwater permitting (§ 17-0808)
- Discharge of sewage into waters (§§ 17-1701, 1704, 1710,)
- Nutrient runoff, phosphorus fertilizer (§§ 17-2101-2105)
- Freshwater Wetlands Act (Article 24): Preserves, protects and conserves freshwater wetlands and their benefits, consistent with the general welfare and beneficial economic, social and agricultural development of the state. Protected under the Freshwater Wetlands Act are wetlands 12.4 acres or larger, and wetlands smaller than 12.4 acres if they are considered of unusual

local importance. Around every wetland is an “adjacent area” of 100 feet that is also regulated to provide protection for the wetland. A permit is required to conduct any regulated activity in a protected wetland or its adjacent area; however, certain activities are exempt from regulation. The permit standards in the regulations require that impacts to wetlands be avoided and minimized. Compensatory mitigation often is required for significant impacts to wetlands. This may include creating or restoring wetlands to replace the benefits lost by the proposed project.

- Septic System Replacement Program: Established as part of the Clean Water Infrastructure Act of 2017 (L. 2017, c. 57, Part T), the Septic System Replacement Fund provides a source of funding for the replacement of cesspools and septic systems in New York State and seeks to reduce the environmental and public-health impacts associated with the discharge of effluent cesspools and septic systems on groundwater used as drinking water, as well as threatened or impaired water bodies.

2.2.3 NYS Department of Health (NYSDOH)

Website: www.health.state.ny.us

Description: The NYSDOH provides information and technical assistance related to financing mechanisms, preventing drinking water contamination, and additional public health related water protection programs including publications outlining the regulatory framework. NYSDOH’s Bureau of Public Water Supply Protection is responsible for ensuring that source water assessments are completed for all of New York’s public water systems and made available to the public. New York’s Final Source Water Assessment Program Plan and a list of contacts by county can be viewed at www.health.state.ny.us/nysdoh/water/swap.htm.

Relevant programs: Contaminant monitoring and fish advisories
Source Water Assessment Program (SWAP)
Drinking Water Protection Program
Septic System Standards
Bathing Beach rules and regulations (10 NYCRR 6-2)

2.2.4 NYS Department of Agriculture and Markets (NYSDAM)

Website: www.agmkt.state.ny.us

Description: NYSDAM administers funding programs including the Agricultural and Farmland Protection Implementation Grant, the Farmland Protection Planning Grant, and Land Trust Grant programs. The Soil and Water Conservation Committee of New York's Department of Agriculture and Markets develops and oversees implementation of Soil and Water Conservation District programs and AEM programs, which provide technical assistance, including comprehensive nutrient management planning, streamside conservation, and community conservation. Financial assistance is also provided through the New York State Agricultural Nonpoint Source Abatement and Control Program (ANSCAP). The NYS Conservation Reserve Enhancement Program (NYS CREP) also aims to reduce pollution in streams by helping agricultural landowners to voluntarily plant trees, shrubs, and grasses on streambanks to trap sediment, pesticides, and fertilizers in runoff. In addition, New York's Agricultural Districts law states that the Agriculture and Markets commissioner can intervene when local governments enact laws that unreasonably restrict farm operations in agricultural districts; this power places limits on the municipalities to regulate land uses in agricultural areas.

Relevant programs: NYS Agricultural Nonpoint Source Abatement and Control Program (SWCD law §11-B); Competitive grant fund for County Soil and Water Conservation Districts (source is Environmental Protection Fund and Clean Air/Clean Water Bond Fund).

Specialty Crop Block Grant Program: Funding to enhance the competitiveness of specialty crops, defined as "fruits, vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture)."

Organic Farming Development/Assistance: Guidance in locating resources on organic agriculture and organically produced foods.

NYS Agriculture and Markets law:

- Agricultural Environmental Management (AEM) (Article 11-A).
- Agricultural Districts Law (Article 25-AA, §305-a). This law authorizes the creation of local agricultural districts in order to encourage the continued use of farmland for agricultural production. Agricultural districting provides a combination of landowner incentives and protections that are designed to

forestall the conversion of farmland to nonagricultural uses. Included in these benefits are preferential real property tax treatments, tools such as the purchase of development rights, and grant programs aimed at assisting local governments and land trusts with farmland protection efforts. State agricultural laws also offer protections against overly restrictive local laws.

2.2.5 NYS Environmental Facilities Corporation (NYSEFC)

Website: www.nysefc.org

Description: The NYSEFC's mission is to promote environmental quality by providing low-cost capital and expert technical assistance to municipalities, businesses, and State agencies for environmental projects in New York State. Its purpose is to help public and private entities comply with federal and State environmental requirements. NYSEFC's primary activities are the State Revolving Funds (SRF), the Industrial Finance Program (IFP), and Technical Advisory Services (TAS). The EFC is among the partner agencies on the Lake Ontario Resiliency and Economic Development Initiative (REDI) and is responsible for administering funds to communities and homeowners affected by flooding in 2017 and 2019 in affected areas, including shoreline areas of Jefferson and St. Lawrence counties.

Relevant programs: NYSEFC Green Innovation Grant Program
REDI

2.2.6 NYS Soil and Water Conservation

Website: www.nys-soilandwater.gov

Description: Soil and Water Conservation Districts (SWCDs) were established throughout the United States in response to the Dust Bowl of the 1930s. In 1940, the New York State Soil Conservation District Law was passed, which created the State Soil and Water Conservation Committee (State Committee). The mission of State Committee is to advance comprehensive natural resource management through the support of local Soil and Water Conservation Districts (see section 2.7.1). The Conservation District Law also gave counties authority to create local Soil and Water Conservation Districts; whereby, District successes soon led counties to fully recognize their value and designate them as the lead local water quality agency. The State Committee and the Department of Agriculture and Markets, support Conservation Districts by establishing policies to guide local programs, providing technical and administrative support, and administering State grant programs.

Relevant programs: Agricultural Environmental Management (AEM)
 Agricultural Non-point Source Abatement and Control (AgNPS)
 Climate Resilient Farming (CRF)
 Ecosystem Based Management (EBM)

2.2.7 NYS Department of Transportation

Website: www.nysdot.gov

Description: The NYSDOT provides design and guidance documents, standard specifications, and procedural manuals (Highway Design Manual, Environmental Procedures Manual, Maintenance Guidelines, etc.) that can be incorporated into local laws and highway department operating procedures. The NYSDOT also funds and implements environmental benefit projects that improve water quality, manage salt storage and application, restore wetlands, promote eco-tourism, protect fish and wildlife habitat, and enhance transportation corridors through its Environmental Initiative.

Relevant programs:

GreenLITES
 Stormwater Management
 Roadside Vegetation Management
 Culvert Sizing and Connectivity
 Coastal Management

2.2.8 NYS Energy Research and Development Authority

Website: www.nyserda.ny.gov

Description: The NYS Energy Research and Development Authority (NYSERDA) promotes energy efficiency and the use of renewable energy sources. Collectively, NYSERDA's efforts aim to reduce greenhouse gas emissions, accelerate economic growth, and reduce customer energy bills. These efforts are key to developing a less polluting and more reliable and affordable energy system for all New Yorkers.

NYSERDA works with stakeholders throughout New York including residents, business owners, developers, community leaders, local government officials, university

researchers, utility representatives, investors, and entrepreneurs. NYSERDA partners develop, invest, and foster the conditions that:

- Attract private sector capital investment needed expand New York's clean energy economy
- Overcome barriers to large-scale adoption of renewable energy
- Enable the state's communities and residents to benefit from energy efficiency and renewable energy

Relevant programs: The Climate Smart Communities Program
Agriculture Energy Audit Program

2.3 Tribal Community

2.3.1 Saint Regis Mohawk Tribe

Website: www.srmt-nsn.gov/

Description: The Saint Regis Mohawk Tribe (SRMT) resides on the St. Regis Reservation in Franklin County, New York. It is also known by its Mohawk name, Akwesasne. As a sovereign nation, the tribal nation shares jurisdiction with the state of New York and the United States. The elected tribal governments on the New York and Canadian sides and the traditional chiefs of Akwesasne work together as a "Tri-Council" concerning areas of shared interest. The SRMT has one of the most advanced environment divisions of any Tribe in the country. The efforts of the Environment Division are directed toward preventing disease and injury, while at the same time, promoting lifestyles that respect, protect and enhance the environment for the next seven generations at Akwesasne.

Relevant programs: Ecological Restoration: The SRMT has performed a variety of ecological restoration projects, including restoration and/or enhancement of wetlands, streambanks, native grasslands, bird nesting and roosting habitat, fisheries and fish habitat and acquisition of unique habitat under threat of development.

Fisheries: The SRMT works to preserve existing fish species and re-establish their presence in the St. Lawrence River basin and Akwesasne territory by locating populations of rare, threatened and endangered species; estimating their abundances and assessing habitat conditions; identifying threats and prioritizing areas for protection; and restoring species populations. Example projects include the reintroduction of Atlantic salmon (extirpated from the St. Lawrence River), lake sturgeon habitat rehabilitation in the St. Regis River, and the assessment of threatened and endangered species in the St Lawrence River.

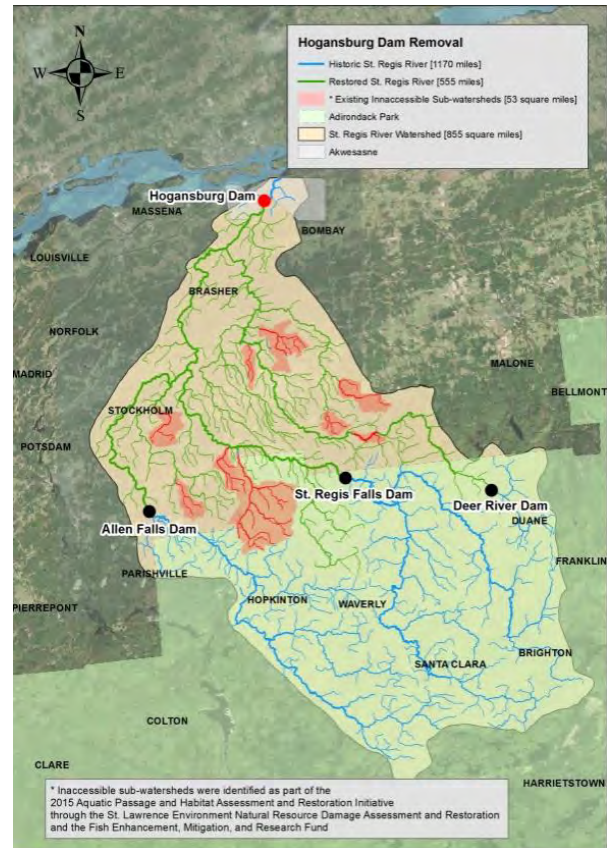
Habitat Improvement: The SRMT, in collaboration with USFWS, demolished a hydroelectric dam in Hogansburg, NY. Removal of the dam has restored up to 275 river and stream miles of habitat for migratory fish.

Source is <https://www.srmt-nsn.gov/environment>

Wetlands Protection: The SRMT has developed a Wetlands Protection Plan which committed the Tribe to implementation of a "no net loss - future net gain" policy. This program identifies an area that would support the establishment of a Mohawk Wetlands Sanctuary.

River Health: The SRMT has implemented EPA approved water quality standards under the Clean Water Act. The tribe is enabled to administer the various sections of the act to manage ambient water quality, non-point source pollutants, construction activities, and direct discharges to waters of the reservation.

Environmental Remediation: The SRMT ensures protective and sustainable cleanup of polluted lands and waters under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); including, involvement with remedial actions at Areas of Concern associated with the Grass River and St. Lawrence River.



Habitat connectivity efforts and progress in the St. Regis watershed area.

2.4 Regional Agencies and Initiatives

2.4.1 St. Lawrence River Watershed Partnership (SLRWP)

Website: www.fcsxcd.org/partnerships.orgst-lawrence-river-water-partnership-slrwp

Description: The SLRWP is a coalition formed to encourage watershed partnerships and the implementation of conservation projects that promote, enhance and protect natural resources and water quality. Partners include Soil & Water Conservation Districts, Black River St. Lawrence RC&D, New York State Department of Environmental Conservation, St. Regis Mohawk Tribe, United States Department of Agriculture-NRCS, Paul Smiths College, Adirondack Watershed Institute, New York State Department of Ag and Markets, North Country Community College, Mountain View Association, and Malone Revitalization Foundation. The organizational purpose is to promote the sharing of information, data, ideas and resources to foster a dynamic and collaborative watershed management program with an ecosystem-based approach to support water quality improvement and protection.

Relevant programs: The SLRWP led preparation of the St. Lawrence River Watershed Revitalization Plan, to which this Local Laws and Programs is appended.

2.4.2 Adirondack Park Agency (APA)

Website: www.apa.ny.gov

Description: The APA is a governmental agency created in 1971 by the New York State Legislature to develop long-range land use plans for both public and private lands within the boundary of the Park. The APA is responsible for maintaining protection of the forest preserve and overseeing development proposals of the privately-owned lands. The Agency prepared the State Land Master Plan, which was signed into law in 1972, followed by the Adirondack Park Land Use and Development Plan in 1973. Both plans are periodically revised to reflect the changes and current trends and conditions of the Park. The mission of the APA is to protect the public and private resources of the Park through the exercise of the powers and duties provided by law.

Relevant acts: APA's mission is rooted in three statutes administered by the Agency, they are:

- The Adirondack Park Agency Act
- The New York State Freshwater Wetlands Act and
- The New York State Wild, Scenic, and Recreational Rivers System Act.

2.4.3 Great Lakes Commission

Website: www.glc.org

Description: The Great Lakes Commission is a binational leader and a trusted voice ensuring the Great Lakes and St. Lawrence River support a healthy environment, vibrant economy and high quality of life for current and future generations. The

Commission represents, advises and assists its member states and provinces by fostering dialogue, developing consensus, facilitating collaboration and speaking with a unified voice to advance collective interests and responsibilities to promote economic prosperity and environmental protection and to achieve the balanced and sustainable use of Great Lakes – St. Lawrence River basin water resources.

2.4.4 Lake Champlain – Lake George Regional Planning Board (LCLGRPB)

Website: www.lclgrpb.org

Description: The LCLGRPB is one of nine regional planning and development organizations operating in New York State. The LCLGRPB's service area contains portions of the watersheds of Lake Champlain, the Upper Hudson River, the Mohawk River, the Black River and the St. Lawrence River. The LCLGRPB service area in the St. Lawrence River watershed lies in northern Hamilton County, and small parts of western Essex and Clinton Counties. The LCLGRPB works with communities and organizations to develop plans and programs to ensure the long-term health of the region's waterbodies. Because actions upland from a waterbody have a direct impact on the waterbody itself, many water quality plans take a broader approach and are based around the entire watershed.

2.4.5 North Country Regional Economic Development Council (NCREDC)

Website: www.regionalcouncils.ny.gov/north-country

Description: The NCREDC is dedicated to economic development in Clinton, Essex, Franklin, Hamilton, Jefferson, Lewis, and St. Lawrence counties. The NCREDC is comprised of public-private partnerships made up of local experts and stakeholders from business, academia, local government, and non-governmental organizations. The NCREDC has embraced the power of regional partnership and welcomed historic new levels of support from NYS. Just as it represents historic advancements in areas such as destination tourism and value-added agriculture, the NCREDC is focused on technology related investments such as broadband access, a growing Transportation Equipment and Aerospace Cluster, emerging biotech opportunities, and the Innovation Hot Spot at Clarkson.

Relevant programs: Consolidated Funding Application (CFA): The CFA has been designed to give economic development project applicants expedited and streamlined access to a combined pool of grant funds and tax credits from dozens of existing programs. The CFA is a modern and easy-to-use online application that allows businesses and other entities to apply for multiple agency funding sources through a single, web-based

application. It is the primary portal for businesses to access state agency resources, including resources for community development, direct assistance to business, waterfront revitalization, energy and environmental improvements, government efficiency, sustainability, workforce development, and low-cost financing.

2.4.6 Development Authority of the North Country (DANC)

Website: www.danc.org

Description: The Development Authority was created in 1985 by the New York State Legislature to develop and manage infrastructure to support the reactivation of the 10th Mountain Division at Fort Drum, and to serve the common interests of Jefferson, Lewis and St. Lawrence counties. The Authority operates as a revenue-based public benefit corporation, independent of state operational funding.

Since the Authority was created, the coinciding needs of Fort Drum and the region have resulted in benefits for both. The Development Authority of the North Country is unique among public authorities in New York State in its scope of activities. Unlike other single-purpose state authorities, the Development Authority owns and operates numerous revenue-based infrastructure facilities including water and wastewater facilities, an extensive fiber optic network, and a regional landfill.

Due to its geographic scope, the Authority has evolved into a problem-solving partner in regional development and is the region's largest provider of shared services. Staff manages a wide range of business and housing loan programs that encourage growth and contribute to the prosperity of communities. Authority staff with a wide range of expertise provide fee-based technical services to municipalities including consolidation studies, Geographic Information System (GIS) hosting, and the management of water and wastewater facilities.

Relevant programs: Water Quality: Water and sewer infrastructure were the foundation of the Development Authority, with initial projects built to serve the wastewater and drinking water needs of a growing Fort Drum. The Water Quality Division emerged as the Authority evolved to assist an ever-growing number of communities struggling to meet their water and wastewater needs. The Authority's technical expertise and ability to implement solutions that cross municipal boundaries has made it a valuable partner in helping communities across the region develop cost-effective methods of meeting their water and wastewater needs as well as providing the capacity for growth.

2.4.7 Partnership for Regional Invasive Species Management

Website: www.dec.ny.gov/animals/47433.html; www.sleloinvasives.org; www.adkinvasives.com

Description: Partnerships for Regional Invasive Species Management (PRISMs), comprising diverse stakeholder groups, were created to address threats posed by invasive species across New York State. PRISMs are key to New York's integrated approach to invasive species management. Partners include federal and state agencies, resource managers, non-governmental organizations, industry, recreationists, and interested citizens. The NYS DEC provides financial support, via the Environmental Protection Fund, to the host organizations that coordinate each of the eight PRISMs, resulting in statewide coverage. Two PRISMs exist within the St. Lawrence River watershed: St. Lawrence-Eastern Lake Ontario (SLELO) and Adirondack Park Invasive Program (APIPP).

Relevant programs:

- Boat inspections, decontamination stations, and education and outreach to prevent aquatic invasive species
- iMapInvasives, GIS-based data management system
- Rapid Response Program
- Regional Invasive Species Management Strategic Plan
- Vulnerability Assessments Utilizing C-Map BioBase
- NYS Invasive Species Awareness Week

2.5 Initiatives associated with Academic Institutions

2.5.1 Paul Smith's College, Adirondack Watershed Institute (AWI)

Website: www.ecommunitypaulsmiths.edu/awi

Description: The AWI is a component of Paul Smith's College that conducts work broadly focused on conserving and protecting natural resources in the Adirondack region. They offer a range of services to the public, including invasive species management, water quality monitoring, recreational use studies, ecological studies, educational programs and publications. AWI also provides jobs and research experiences to undergraduate students.

Relevant programs: Adirondack Lake Assessment Program
Lake & Stream Monitoring
Aquatic Invasive Management
Stewardship Program (Boat Wash Stations, Public Education, Field Monitoring)

2.5.2 Clarkson University, Center of Excellence in Healthy Water Solutions

Website: <https://www.clarkson.edu/news/clarkson-university-esf-partner-new-center-excellence-healthy-water-solutions>

Description: Clarkson was recently designated along with SUNY College of Environmental Science and Forestry (ESF) to launch the state's new Center of Excellence in Healthy Water Solutions. There are now 13 Centers of Excellence managed by NYSTAR, a program of Empire State Development. These partnerships between the academic research community and the business sector are created to develop and commercialize new products and technologies, promote critical private sector investment in emerging high-technology fields, and create and expand technology-related businesses and employment. Clarkson and ESF will deploy experts and students to deliver technology innovations and research-based solutions on watershed and water quality challenges. The Center of Excellence plans to work with industry, government, and regional academic collaborators to develop early-warning systems to monitor, model, predict and avoid threats before they become issues. The Center will also work on management practices and ecosystem design to improve the resilience of the state's aquatic resources.

2.5.3 Cornell University Cooperative Extension

Website: www.cce.cornell.edu

Description: Cornell Cooperative Extension (CCE) extends Cornell's land-grant programs to every county in the state. CCE staff serve on committees and working groups related to agriculture and water quality and are involved in the development of recent agricultural plans. While each county CCE office has a unique focus depending on the specific needs, CCE offers access to a range of important services related to food systems. Some examples include: support to beginning farmers and those expanding into new crops or animal products; food safety issues; connecting to agricultural developments and innovative technologies from faculty and staff from Cornell University and other research institutions; and youth development programs to connect generations of producers.

Relevant programs

- Local Roads Program
- Agricultural Experiment Station
- Cornell AgriTech
- Pesticide Management Education Program
- Recycling Agricultural Plastics Program
- PRO-Dairy

Cornell University Nutrient Management Spear Program
NYS Integrated Pest Management Program

2.6 Nonprofit Organizations

2.6.1 Indian River Lakes Conservancy (IRLC)

Website: www.indianriverlakes.org

Description: The IRLC is a 501 (c)(3) not-for-profit and an accredited New York State Land Trust through The Land Trust Alliance. IRLC was created to preserve the unique natural resources of the Indian River Lakes Region in Northern New York State. The Indian River Lakes system, located on the St. Lawrence River plain in Jefferson and St. Lawrence Counties, consists of the Indian River and 18 natural lakes. The watershed occupies an extraordinary landscape of rocky, wooded uplands and teeming wetlands, lakes, and streams. Sitting astride the rugged, geologic backbone of the Frontenac Arch connecting the Adirondacks to Algonquin Park in Canada, the Indian River Lakes and neighboring Thousand Islands share a vital confluence of pathways for migratory birds and one of the most diverse habitats for wildlife in the northeast. The IRLC is committed to preserving, protecting, and encouraging the sustainable management of this uniquely valuable watershed for the benefit and the enrichment of the future generations.

Relevant programs: Water Quality: IRLC, in partnership with Research, Applied Technology, Education and Services (RATES) has implemented a water quality monitoring program in the Indian River Lakes and Indian River watershed. Water quality sensors, known as Real Time Hydrologic Stations (RTHS), have been installed to monitor water temperature, meteorological data, turbidity, salinity, and other water quality parameters. The data are used to assess climate and water quality conditions that precede and contribute to impairments, such as harmful algal blooms.

Septic Program: IRLC's Water Project involved contacting residents, lake associations and other stakeholders to share information about water quality issues in the lakes and river and to find ways to improve septic systems so as to preserve water quality, protect property values and the local tax base, and benefit the quality of life on the lakes for future generations. This initiative has been supported by a New York State Conservation Partnership Program Grant to provide cottage owners with a professional assessment of their wastewater systems and options for improvement.

Education & Outreach: IRLC hosts a 1,000-square foot Trailside Learning Center at their Redwood Hill Preserve. IRLC hosts a Kids' Camp Summer STEAM Extravaganza

that focuses getting children connected with nature by teaching them the basic tenants of protecting water quality and preventing spread of invasive species. In addition, IRLC launched a new education program titled Protectors of Water and Habitat on the Indian River Lakes (Project WHIRL), which environmental professionals and college level mentors lead high school students in action oriented programs that connect the students with the environment and local community in the tracks of invasive species, aquatic resources, and watershed management.

Lake Management: IRLC has provided financial assistance to lake associations that have committed to the engagement of SUNY Oneonta's Biological Field Station Graduate Student Program to support development of specific lake management plans.

Habitat Restoration: IRLC partnered with Audubon New York, Cornell Lab of Ornithology, Clarkson University, the Thousand Islands Land Trust, and NYS Department of Environmental Conservation to restore endangered bird (i.e., Golden-winged Warbler) habitat at the Grand Lake Reserve.

Public Access: The organization conserves nearly 2,500 acres and land within the Indian River Lakes subwatershed, including Redwood Hill Preserve, Baker Woods Preserve, Grand Lake Reserve, Indian River Preserve, and Oxbow Tract. In 2019, IRLC constructed a wheelchair accessible trail on its Redwood Hill Preserve in the hamlet of Redwood, NY. The trail provides a unique woodland experience for people of all ages and abilities, including veterans and active duty soldiers suffering from the effects of post-traumatic stress disorder. Trail construction represented a coalition of community support, including the Town of Alexandria, the NNY Association of the US Army, the River Hospital Community Wellness Program, the Jefferson County Office of the Aging, the Northern Regional Center for Independent Living, and the Thousand Islands Regional Tourism Development Corporation.

2.6.2 Thousand Island Land Trust (TILT)

Website: www.tilandtrust.org

Description: The TILT has been working to conserve the natural beauty, diverse wildlife habitats, water quality and outdoor recreation opportunities of the Thousand Islands region since 1985. TILT has been Land Trust Alliance Accredited since 2009. The organization now conserves over 10,000 acres within the Thousand Islands region through preserve lands that are owned by TILT, and through conservation easements that TILT holds on private land. TILT actively stewards these lands, conducting habitat

restoration projects and invasive species control in an effort to strengthen the resiliency of the natural resources in the coastal environment.

Relevant programs: Education and Outreach: TILTreks and Talks, TeenTreks, KidsTreks and TILTKids Camp programs promote living, learning and conserving in the 1000 Islands.

2.6.3 Save The River

Website: www.savetheriver.org

Description: Save The River has been the leading grassroots advocacy organization working to protect and preserve the ecological integrity of the Upper St. Lawrence River through advocacy, education, and research. Save The River is a member-based organization representing more than 4,500 individuals, followers and families who live, work and play along the St. Lawrence River. Save The River is designated as the Upper St. Lawrence Riverkeeper and is a member of the international Waterkeeper Alliance. Over the years, Save The River has fought to stop winter navigation, expansion of the St. Lawrence Seaway infrastructure, pressed for better spill response planning and sought public accounting of shipping accidents, and campaigned for better water level management.

2.6.4 Mountain View Association

Website: www.mountainviewassn.com

Description: The Mountain View Association was founded in 1907 as a nonprofit organization. It's one of the oldest lake associations in the Adirondack Park. The Association is dedicated to preserving and protecting Mountain View Lake, Indian Lake and the Channel. Their mission is to promote and improve the beauty, navigation, purity and safety; promote, preserve and improve the environmental quality; and conserve and promote the common good and general welfare of persons owning or occupying camps and other properties on the shores.

2.6.5 Adirondack Lake Association

Website: www.adirondacklakesalliance.org /

Description: The Adirondack Lakes Alliance (ALA) representing lake and river associations within the Adirondacks, has as its primary mission the protection and preservation of our Adirondack waters. The ALA provides a forum for lake and river associations to share information and resources and to make recommendations to appropriate state, county and local agencies, and educational and other relevant non-profit

organizations, regarding environmental and ecological issues threatening Adirondack lakes and rivers.

2.6.6 Other Nonprofit Organizations

There are many other nonprofit organizations within the St. Lawrence River watershed, including but not limited to, the following:

- Black Lake Association
- Butterfield Lake Association
- Chateaugay Lake Foundation
- Historical Society of Lake Pleasant
- Indian Lake Community Development Corporation
- Indian Lake Garden Club
- Lake Abanakee Civic Association
- Lake Pleasant Sacandaga Association
- Long Lake Association
- Nature up North
- New York Federation of Lake Associations (NYSFOLA)
- Nicandri Nature Center
- Piseco Lake Association
- Research, Applied Technology, Education and Services (RATES)
- Raquette R. Advisory Council & West Branch St. Regis R. Advisory Council
- Sixth and Seventh Lake Improvement Association
- St. Lawrence Land Trust
- The Nature Conservancy
- Tug Hill Tomorrow

2.7 County-Level Agencies and Initiatives

2.7.1 Soil and Water Conservation Districts (SWCD)

Website: <https://www.nys-soilandwater.org/>

Description: Each County government maintains a SWCD, which provide technical assistance and education to their residents to ensure the wise use of soil, water, and other natural resources. SWCD activities are guided by the state's Soil and Water Conservation Committee, which works closely with the NYS Department of Agriculture and Markets. SWCD have authority to work with private landowners on

non-agricultural projects. As urban centers and suburban development have grown, Conservation Districts have broadened to have expertise in stormwater management, stream degradation and repair, invasive species management, green infrastructure, outreach and education, and other fields to meet local needs. Typical programs conducted by SWCDs are listed below.

Agricultural Programs:

Agricultural Environmental Management (AEM): AEM is a voluntary, incentive-based program that supports agriculture of all types and sizes, i.e. dairy, beef, sheep, etc., in their efforts to be environmentally sound and economically viable. AEM planning commonly addresses barnyard runoff and management, manure and nutrient management, grazing systems, milk-house wastewater, stream crossings, and waste storage facilities. AEM participation allows farms to be considered for State and Federal Cost Sharing programs (NYS Agricultural Non-point Source Grant, Environmental Quality Incentives Program) that support environmental management projects on local agricultural related operations. The AEM planning approach utilizes a tiered process, as described below:

- Tier 1 - Inventory current activities, future plans and potential environmental concerns
- Tier 2 - Document current land stewardship; assess and prioritize areas of concern
- Tier 3 - Develop conservation plans addressing concerns and opportunities tailored to farm goals
- Tier 4 - Implement plans utilizing available financial, educational and technical assistance
- Tier 5 - Evaluate to ensure the protection of the environment and farm viability

By using this approach, farmers can document their environmental stewardship and further advance their positive contributions to their communities, our food systems, the economy, and the environment.

Comprehensive Nutrient Management Planning (CNMP): Unique to animal feeding operations, CNMPs evaluate aspects of farm production and offer conservation practices that help achieve production and natural resource conservation goals. CNMPs are the foundation for the NYSDEC's regulatory program to control potential water pollution from concentrated animal feeding operations (CAFOs) under State General Permit GP-04-04, and are also a

requirement for farms seeking federal or state cost-sharing to construct manure storage facilities.

Ag Value Assessment: The SWCD assists landowners filing for an Agricultural Assessment for their taxes by creating “soil group worksheets” that are required for the program.

Soil Testing: tests agricultural soils to define optimal fertilization rates and amendments

Agricultural Non-point Source Abatement and Control Program: provides cost-share funding to correct and prevent water pollution from farms and farming activities. The program is a competitive grant program, with funds applied for and awarded through county Soil and Water Conservation Districts.

GRAZE NY: assists farmers with prescribed grazing efforts by providing pasture quality assessments, stocking rate recommendations, infrastructure improvements, and planning guidance. Among the potential benefits of these practices is a reduction of soil erosion, increase in plant diversity, and water quality improvements.

Tile Drain Layout: Subsurface tile or artificial drainage is the practice of placing slotted drain tubes beneath the soil surface well below tillage depth to help lower the water table of poorly drained fields and/or wet areas within fields. Though the concepts and benefits of artificial drainage are ancient, it continues to be an important crop production practice for modern agriculture and changes in input prices and crop values has made subsurface drainage an even more valuable investment.

Rental Equipment: offers specialty equipment. Examples include: hydroseeding equipment to municipalities (to help stabilize soil and reduce sediment loss); no-till grain drills for farmers to use seeding or pasture renovations (to reduce compaction, improve soil health, and conserve water for plant growth).

Forest Management Programs

Forest Management Plans: SWCD staff assist landowners with developing a forest management plan. A forest management plan is written based the goals and desires of the landowner and includes actions to be taken to achieve these. The plan itself is a document that landowners and foresters can refer to for guidance while a property is being managed. Forest management includes following short-term and long-term plans for: site preparation, weeding and/or timber stand improvement practices, harvesting timber, maintaining wildlife management, tree planting, natural regeneration, enhancing aesthetics, recreational use, etc. All

efforts are made with conservation in mind and maintaining water quality protection.

Invasive Species: SWCD are involved in many regional and local efforts related to early detection and rapid response to invasive species (including terrestrial and aquatic organisms that affect agriculture, forests, wetlands, and aquatic ecosystems). For example, Clinton County is involved in a multiyear project to inventory and eradicate high priority areas of Japanese Knotweed.

Water Resource Management Programs

Stormwater is water from rain or melting snow that doesn't soak into the ground but runs off into waterways. As stormwater flows, it picks up a variety of materials on its way including soil, animal waste, salt, pesticides, fertilizers, oil and grease, debris and other potential pollutants. SWCDs provide services to municipalities and landowners to protect our natural resources by implementing stormwater management practices.

Lake and Stream Monitoring: SWCD technicians monitor lake and stream health using a variety of water quality parameters including water levels.

Erosion and Sediment Control: This program offers training on erosion control practices and stormwater pollution prevention to contractors, developers, engineers, highway departments, municipal boards, and code enforcement officers. Site visits are conducted to determine slope, water courses, drainage patterns, and soil types. Streambank and shoreline stabilization assistance is offered to prevent sedimentation and erosion, including bioengineering with live willow stakes and natural channel design. Critical area seeding assistance is offered to landowners and municipalities dealing with disturbed areas in need of seeding.

Aquatic Vegetation Control: This program aims to increase the accessibility and usability of the county's water bodies, while seeking to leave the lakes in the most ecologically intact manner possible.

Invasive Species: The SWCD partners with PRISMs and the federal Animal and Plant Health Inspection Service on invasive species initiatives.

Urban- Development Programs

Drinking water testing: SWCDs provide cost-share for water quality testing to assist landowners with concerns about the quality of their private well water.

Green Infrastructure Demonstration Projects: The Hamilton County SWCD implemented several Green Infrastructure Demonstration Projects at their office building to offer the public and municipalities the chance to see the installation and use of green infrastructure stormwater practices, while capturing and reusing

the stormwater runoff from their facilities. These demonstration projects provide an excellent educational tool to illustrate and promote the numerous benefits of rain gardens, bioswales, and rain barrel systems.

On-site Septic: The SWCD offers site assessments and septic system dye kits. **St. Lawrence and Jefferson Counties** have been designated as a priority geographic area eligible to assist septic system projects by the DEC and DOH. This program provides property owners with funding to replace cesspools and septic systems and reduce the environmental and public-health impacts associated with the discharge of effluent to groundwater used as drinking water, as well as threatened or impaired water bodies.

Culvert Enhancements: The SWCD provides technical assistance to municipalities and landowners to enhance and repair culverts. Adequately sized and properly installed culverts are important to flood prevention and fish passage.

Community Engagement Programs

Recreational Trails: SWCDs maintain multi-use recreational trails throughout County's lands. Proper construction of trails is crucial for forest management and protecting our natural resources.

Arbor Day: SWCDs work with towns, schools, and public groups to promote Arbor Day.

Tree and Shrub Sale: The SWCD offers a wide variety of bare root seedlings and ground covers to be used for erosion control, wildlife habitat improvement, beautification, windbreaks, and wood product production.

Conservation Field Days: This program is to assist and educate the communities about conservation practices.

Envirothon: The Northern Adirondack Regional Envirothon is a hands-on environmental education competition where teams of five high school students work together in hopes of winning scholarships and awards. The teams compete in five different environmental categories (i.e., soils/land use, aquatic ecology, forestry, wildlife and current environmental issues)

Fish Sale: a fish stocking program, including trout, bass, catfish, and minnows, is offered to the residents

Technical Assistance

Information: SWCD offers Technical Assistance to the public as well as private contractors. Topics most often requested for assistance include soils maps and information, USGS Topographic maps, National Wetlands Inventory maps, NYS Freshwater Wetlands maps, and information on pond construction.

Permit Assistance: Technical assistance is provided to landowners, municipalities and farms with many types of permits including stream, wetland, mined land, storm water and bulk petroleum storage permits.

2.7.2 St. Lawrence County

Website: www.stlawco.org; <https://www.stlawco.org/Departments/Planning/>;
<https://www.stlawco.org/Departments/SoilWater/>;
<https://www.stlawco.org/Departments/HighwayDepartment/>;
<https://www.stlawco.org/Departments/PublicHealth/>

Description: All of St. Lawrence County is within the St. Lawrence River watershed; this county also encompasses the majority of the river's shoreline. The County's **Planning Department** is involved in water resource protection activities by providing land use regulations, community zoning maps, and model ordinances. The Planning Department led preparation of the St. Lawrence River Shoreline Resiliency Plan (2019) and participates in many of the related water resource protection activities (e.g., public drinking water supplies, public bathing beaches, septic system installation). The County's Planning Department (2016) prepared an Agricultural Development Plan (2016) to strengthen and diversify its agricultural economy, and to protect and improve farmland. The Department also hosts advisory boards such as the Environmental Management Council and Agriculture and Farmland Protection Board. The **Highway Department** is responsible for road and bridge maintenance, traffic safety, and tree trimming. They are also responsible for winter maintenance of 118 miles of State roads and 144 miles of County roads plus 555 miles of roadside mowing during the summer months. The Public Health Department leads a Public Health Sanitarian Program that conducts investigations of nuisance complaints, collects water samples from private water supplies, and provides technical assistance and evaluations of private sewage disposal systems.

Relevant plans, programs, and laws

- Agricultural Districts Law
- AEM Program (in cooperation with the SWCD)
- Right to Farm Law
- Agricultural Development Plan (December 2016)
- Hammond Joint Comprehensive Plan
- Hermon Comprehensive Plan
- Raquette River Blueway Corridor
- Massena Brownfield Opportunity Area
- Community Development Block Grants
- St. Lawrence River Shoreline Resiliency Plan

Public Health Sanitarian Program
 Agricultural Assessments
 Ag Equipment Rentals
 Grasse River Blueway Trail Plan
 Canton Grasse River Waterfront Revitalization Plan
 Septic System Replacement Program

2.7.3 Franklin County

Website: www.countyfranklin.digitaltowpath.org

Description: Nearly 1,400 square miles of Franklin County are within the St. Lawrence River watershed, with much of that area (60%) lying within the Adirondack Park. Franklin County is home to more than 670 bodies of water. A Water Quality Coordinating Committee convenes regularly to discuss emerging issues and actions affecting the county's waterbodies. Franklin County **Highway Department** maintains 266.28 miles of roads, 188 county owned bridges and is responsible for winter snow and ice removal.

Relevant plans, programs, and laws

- St. Lawrence River Watershed Project (SLRWP)
- AEM
- Agricultural Districts Law
- Drinking Water Program (through SWCD)
- Franklin County Water Quality Coordinating Committee
- Emergency Preparedness Program (Public Health Department)

2.7.4 Jefferson County

Website: www.co.jefferson.ny.us

Description: Jefferson County has 256 miles of shoreline on Lake Ontario and the St. Lawrence River; 1800 miles of rivers and streams; over 150 inland ponds, lakes, reservoirs, and rivers; high quality groundwater supplies in the eastern and southern portions of the County; and over 40,000 acres of wetlands, swamps, and marshes. The County **Planning Department** updated their Agricultural and Farmland Protection Plan in 2016. The plan created an Agricultural and Farmland Protection Board and hosts focus group meetings to learn about CAFO farms, agri-business, and farmland protection. A Water Quality Coordinating Committee meets monthly to coordinate efforts to protect and improve the quality of surface and groundwater for their intended uses. The **Highway Department** maintains 555 miles of roads and 450 drainage structures throughout the County.

Relevant plans, programs, and laws	<p>Septic System Replacement Program</p> <p>Agricultural and Farmland Protection Plan</p> <p>Agricultural Nonpoint Source Grant Program</p> <p>Comprehensive Nutrient Management Planning</p> <p>Agricultural Assessments</p> <p>Ag Equipment Rentals</p> <p>Jefferson County Agricultural Development Corporation</p> <p>Agricultural Districts Law</p> <p>Comprehensive Economic Development Strategy</p>
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2.7.5 Hamilton County

Website: www.hamiltoncounty.com

Description: Approximately 420 square miles of Hamilton County is located within the St. Lawrence River watershed. Tourism is the most important industry and the whole area is a favorite spot for vacationers and sportsmen. The County **Public Health Department** maintains a septic treatment/septic system inspection program, where staff inspect mechanical household sewage treatment every five years. A Water Quality Coordinating Committee meets regularly to discuss water resources issues; committee members also conduct stream and lake assessments and survey benthic macroinvertebrates.

Relevant plans, programs, and laws	<p>Right to Farm Law</p> <p>Safeguard Waters Law</p> <p>Solid Waste and Recycling Law</p>
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2.7.6 Lewis County

Website: www.co.lewiscounty.org

Description: Most of Lewis County drains into the Black River watershed; the northernmost section is part of the St. Lawrence River watershed. The **Highway Department** maintains the roads, drainage ditches, tree removal within the right of way. The **Planning Department** updated the Agricultural and Farmland Protection Plan in 2019; the Plan identifies areas and strategies for promoting continued agricultural use.

Relevant plans,	<p>AEM</p> <p>Agricultural Nonpoint Source Abatement and Control Program</p>
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programs, and laws	Agricultural Value Assessments
	Black River Watershed Planning Initiative
	Lewis County Highway Tree Policy
	Agricultural and Farmland Protection Plan
	Central Lewis County Water Study
	Lewis County Comprehensive Plan
	Agricultural Districts Law

2.7.7 Clinton County

Website: www.clintoncountygov.com

Description: Clinton County is in the northeast corner of New York State. Clinton County **Planning Department** serves a source for land development information, including wetlands, floodplains, and aerial photos. The **Highway Department** maintains 351 miles of County highways and 109 County-owned bridges in addition to open and closed drainage systems. The **Health Department** supports a private well testing program.

Relevant plans, programs, and laws	Agricultural Districts Law
	Adopt-A-Highway Program
	Soil Testing Cost Share Program
	Tile Drainage Assistance
	Environmental Quality Review Act

2.7.8 Herkimer County

Website: www.herkimercounty.org

Description: The northern part of Herkimer County is in the Adirondack Park, of which, nearly 100 square miles of the county are located in the St. Lawrence River watershed area. Herkimer County has elected not to participate as part of this Watershed Revitalization Plan because of its relatively minute drainage area within the St. Lawrence River watershed.

Relevant plans, programs, and laws	Agricultural Districts Law
	Agricultural and Farmland Protection Plan (2007)
	Herkimer County Sewer District Sewer Use Law
	Herkimer County NY Rising Countywide Resiliency Plan (2014)
	Herkimer-Oneida Groundwater Monitoring Program (through NYSARC)
	Herkimer-Oneida Local Groundwater and Wellhead Protection Implementation Program (through NYSARC)

2.7.9 Essex County

Website: www.co.essex.ny.us

Description: The county encompasses an area of 1,916 square miles; only a tiny portion (56 square miles) falls within the St. Lawrence River watershed. The **SWCD** has a strong emphasis on forest management and habitat restoration. It has created a culvert inventory which inspects culvert condition, height, width, dry passage, barriers, and more, with the hope to improve wildlife connectivity issues. The **Department of Public Works** maintains 356 miles of roads and 134 bridges throughout the county.

Relevant plans, programs, and laws Agricultural Districts Law
 AEM
 Essex County Destination Master Plan (2009)

2.8 Local Government

The St. Lawrence River watershed includes 103 municipalities in eight counties (see Section 3.0). While laws and policies at the federal, state, regional, and county levels can influence watershed health, municipal governments play an especially important role in watershed planning in New York State. New York is a “home rule” state, meaning that primary authority for guiding community planning and land development is vested in cities, towns and villages. While this provides local municipalities with the power to define how their community grows, it can also complicate watershed management efforts, particularly related to nonpoint sources of pollution. Differences among local laws can result in inconsistent water resources-related protections within a watershed. Some relevant local planning and zoning tools with significant potential to affect lands and waters include delineation of and protections for areas of local importance, such as:

- Open space
- Scenic resources (natural and built environment)
- Aquifer recharge zones
- Critical environmental areas
- Water resources (shorelines, wetlands)
- Agricultural lands
- Floodplains and flood hazard areas

In addition, local codes can specify required actions and practices related to sources of pollutants:

- Wastewater management, including on-site septic disposal systems
- Erosion and sediment loss from forestry, construction, and other land uses

- Solid wastes and junk yards
- Mining practices
- Stormwater runoff
- Land development (tools include requirements for lot size, setbacks, limits on impervious surfaces, stormwater management, site plan review, etc.)

2.8.1 Comprehensive Planning

Comprehensive plans are strategic documents that define a community's goals and vision for the future. Developed with citizen input and formally adopted by a legislative body, comprehensive plans (or an equivalent set of adopted reports and maps) provide the legal foundation for a community to enact laws such as zoning and subdivision regulation. Comprehensive plans create an opportunity to prioritize watershed-related topics such as stormwater management and erosion and sediment controls; these documents are most useful when they reflect current conditions (i.e., have been updated within the past five to ten years). Comprehensive plans are not legally binding documents; municipalities must adopt local laws consistent with their comprehensive plans in order to ensure that the community's vision and goals are achieved. Once adopted, the local laws must be filed with New York State.

2.8.2 Zoning

Zoning is a regulatory tool that enables communities to make the leap from planning to implementation and enforcement of land-use controls to support their vision and goals. Zoning controls the use, density, siting, and form of development on individual land parcels, and is especially effective in preventing future adverse impacts related to development patterns or uses that can threaten public health and safety, environmental quality, or community character.

To provide additional protections, municipalities can create an overlay zoning district with more stringent regulations for an area that is environmentally sensitive such as an aquifer recharge zone or floodplain.

2.8.3 Site Plan Review

Site Plan Review is a powerful tool when development is planned on a single parcel of land and does not fall within the scope of subdivision regulations. The site plan review process creates an opportunity for municipal decision makers to examine a plan's potential impacts related to erosion, impervious surfaces, vegetation, and stormwater, and to require changes that will protect water quality and promote environmental sustainability. Since site plan review often relies on the expertise and knowledge of the reviewing board, training of decision makers is important to ensuring that this tool is effective. Professional staff can assist the appointed boards. In some rural areas, a professional planner serves multiple communities through shared service arrangements with county or regional planning departments.

2.8.4 Subdivision Regulations

Subdivision regulations come into play when land is divided into smaller parcels. These regulations are intended to ensure that the design of developments supports the municipality's land use objectives. Subdivision ordinances can help mitigate the potential for adverse impacts on waterbodies during and after construction. Some communities include specific provisions to preserve open space and vegetation, protect unique natural areas, minimize impervious surfaces, limit erosion and runoff, cluster buildings, improve resilience to floods and related impacts of climate change, and promote green infrastructure.

2.8.5 Stormwater and Erosion Control Regulations (MS4)

Federal stormwater regulations known as "Stormwater Phase II" require urbanized municipalities and those additionally designated by the NYSDEC to develop a Municipal Separate Storm Sewer System (MS4) management program and obtain a NPDES (National Pollutant Discharge Elimination System) permit. These designated MS4 municipalities are required to enact six minimum control measures as part of an approved stormwater management program. Even communities that are not designated as MS4 can work toward voluntary compliance with MS4 guidelines and adoption of some control measures. The six minimum control measures (MCMs) required of operators of regulated MS4s include:

- MCM 1: Public Education and Outreach
- MCM 2: Public Involvement and Participation
- MCM 3: Illicit Discharge Detection and Elimination
- MCM 4: Construction Site Runoff Control
- MCM 5: Post-Construction Runoff Control
- MCM 6: Pollution Prevention and Good Housekeeping

2.8.6 Local Waterfront Revitalization Program

The Waterfront Revitalization of Coastal Areas and Inland Waterways Act offers local governments the opportunity to participate in the State's Coastal Management Program (CMP) on a voluntary basis by preparing and adopting a Local Waterfront Revitalization Program (LWRP). This St. Lawrence River Watershed Revitalization Plan was prepared under this program. Revitalization Plans may be comprehensive and address all issues that affect a community's entire waterfront, or they may address the most critical issues facing a significant portion of its waterfront. Any village, town, or city located along the State's coast or designated inland waterways can prepare or amend an existing Revitalization Plan. Municipalities are encouraged to address local revitalization issues in alignment with regional economic development strategies and regional resource protection and management programs. However, like comprehensive plans, community plans developed under the LWRP are not laws. Recommendations developed under an LWRP that is formally adopted and accepted by New

York State can provide the legal foundation for municipalities to enact local laws or modify their codes to be consistent with the Plan's recommendations.

2.8.7 Model Local Laws

Model local laws are commonly developed by state governments and regional entities to help guide communities in their local laws and programs. Two guidance documents focused on local laws to enhance floodplain management resiliency were recently developed. In 2018, Genesee/Finger Lakes Regional Planning Council had prepared *Model Intermunicipal Floodplain Overlay District Local Law*. This model local law incorporates intermunicipal project review, such as those commonly found useful in the General Municipal Law §239 Referral Process that promotes the coordination of land use decision-making and enhances consideration of potential intermunicipal and county-wide impacts, to foster a program that is effective in reducing and preventing flood problems. The overlay district aims to create more socially and environmentally responsible development beyond the floodplain; managing development in the watershed where floodwaters originate while still allowing the local government to have significant control over the approval process.

in 2019, NYS DOS's had prepared *Model Local Laws to Increase Resiliency*- a guidance document available to local governments. The model local laws were developed from a variety of sources, including existing models, existing local laws, and a combination of sections from various laws assembled with professional expertise. A range of regulatory choices are provided, with some models consisting of simple changes to enhance resiliency aspects of typical local laws, and others that would constitute a comprehensive approach to a topic that may require more advanced administrative skills to be effective.

2.8.8 Municipal Maintenance Programs and Practices

Both formal and informal programs and practices can have a positive impact on water quality. Municipalities can incorporate NYSDOT design and guidance documents, standard specifications, and procedural manuals into local laws and highway department operating procedures. Towns and villages can also adopt procedures to ensure proper operation and maintenance of runoff management facilities and to ensure application of appropriate solid and hazardous waste generation and disposal practices, including source controls and recycling. In addition, municipalities can take advantage of training programs, such as the Cornell Local Roads Program, or can develop their own training programs targeted at highway officials, contractors, construction workers, inspectors, and zoning and planning officials.

2.8.9 Training Opportunities

In addition to the laws and tools discussed above, towns and villages can take advantage of training opportunities through federal, state, regional and county-level programs. For example, local county and municipal officials around the North Country attend Local Government Conferences, which cover

a variety of topics such as stormwater regulation and protecting sensitive natural features. Also, high school students from Clinton, Essex, Franklin, and St. Lawrence Counties convene at Paul Smith's College each spring to compete in the Annual North Adirondack Regional Envirothon. The Envirothon tests the student's knowledge on topics such as soils, water resources, forestry, wildlife and current environmental issues. Teams compete in an outdoor setting where they learn that cooperation is needed to achieve success. The activities are designed to help students become environmentally aware, action-oriented adults.

Under the NYSDEC's Stormwater Permit (i.e., GP-0-10-001), all developers, contractors, and subcontractors must designate at least one individual from their organization responsible for implementing the required Storm Water Pollution Prevention Plan (SWPPP). The designated individual must be trained and certified; NYSDEC certification extends for a three-year period. A certified professional must be on-site each day when soil is being disturbed as well as conduct regular site inspections in accordance with permit conditions.

2.8.10 Local Government and Agriculture

Although municipalities in New York State have broad powers to enact laws governing land use, there are certain restrictions on government authority related to agriculture. The federal Clean Water Act specifically exempts agricultural runoff from its requirement that discharges of pollutants to surface waters be regulated by permit. In NY, the Agriculture and Markets Law (Article 25-AA, Section 305-a) states that: "Local governments...shall not unreasonably restrict or regulate farm operations within agricultural districts in contravention of the purposes of this article unless it can be shown that the public health or safety is threatened"(Coon 2013). Consequently, most efforts to reduce agricultural pollution are voluntary and incentive-based (e.g., cost sharing and technical support).

One way that municipalities can address watershed-related agricultural issues is through participation in AEM programs, which are overseen by the NYS Department of Agriculture and Markets and implemented through county Soil and Water Conservation Districts (see sections 2.2.6 and 2.5.9). Agriculture is a significant land use and economic activity in the St. Lawrence River watershed, particularly in the eastern lowlands between the River and the Adirondack Park boundary. Consequently numerous governmental and nongovernmental organizations are collaborating on identifying and strengthening the connections between agricultural practices and water quality protection.

Recent agricultural plans and reports include:

- St. Lawrence County Agricultural Development Plan (2016)
- Jefferson County Agricultural and Farmland Protection Plan (2016)
- Herkimer County Agriculture and Farmland Protection Plan (2007)

- Lewis County Agricultural and Farmland Protection Plan (In progress)
- Lewis County Agricultural Enhancement Plan (2004)

Active agencies and groups focused on agriculture in the St. Lawrence River watershed include:

- Harvest NY, Cooperative Extension of Franklin County
- USDA Farm Service Agency
- USDA Natural Resources Conservation Services
- USDA Rural Development
- New York State CAFO Working Group (convenes when reviewing NRCS standards)
- Northern NY Agricultural Development Program
- New York Animal Agriculture Coalition (NYAAC)
- New York Farm Bureau and County chapters
- NY Farm Net
- Cornell Cooperative Extension programs in each county

Municipalities in the St. Lawrence River watershed can review existing plans and identify locally acceptable measures to enhance water quality protections while maintaining agricultural sustainability.

3 Evaluation of Local Laws and Programs

3.1 Introduction

This chapter presents an overview of local municipal laws, programs and practices currently in place for managing water resources across the St. Lawrence River watershed. Opportunities for improving the local laws and programs are identified; this analysis will inform recommendations of the St. Lawrence River Watershed Revitalization Plan, to which this document is appended. Because of the size of the watershed, much of the reported information was gathered from respondents at the county level (planning departments, SWCD).

3.2 Methodology

The inventory and assessment of municipal measures to protect water resources in the SLR watershed was based on a modified version of the process outlined by the Genesee/Finger Lakes Regional Planning Council (2006).

1. Identification of existing local laws and tools that guide land use, with a focus on:
 - » Comprehensive/Land Use Plans
 - » Local Waterfront Revitalization Plan (where appropriate)
 - » Site Plan Review
 - » Zoning Law
 - » Subdivision Regulations
2. Review of existing measures to assess their strength in addressing issues that influence water quality. This review was led by professional staff of County Departments of Planning and/or Soil and Water Conservation Districts. The County staff worked with their individual municipalities to complete a modified Municipal Nonpoint Assessment Form; the form evaluated local laws and practices related to:
 - » Waterbody/Shore Protection
 - » Floodplain/Flood Protection
 - » Waste Management/Junk Yard Regulation
 - » Wastewater/On-site Septic Systems
 - » Stormwater Management
 - » Road and ditch maintenance practices
 - » Agricultural Environmental Management
 - » Other emerging issues (Invasive Species, etc.)

The municipal evaluations, and the primary informants and reviewers, are included in **Appendix B: Local Laws and Programs Assessment Form.**

3. Identification of gaps, or opportunities for improvement, that can form the basis for recommendations in the St. Lawrence River Watershed Revitalization Plan. Staff from the County Planning Departments in collaboration with Project Team members reviewed existing municipal laws to assess their effectiveness in preserving and improving water quality and habitat conditions. The evaluation focused on the ability of the regulatory environment to address these priority issues:

- » Stormwater management and drainage
- » Erosion and sediment control
- » Riparian, wetland, and shoreline protection
- » Forest management
- » Steep slopes
- » Flood prevention/management
- » Invasive species

3.3 Results: Local Laws Inventory and Nonpoint Assessment

3.3.1 Adirondack Park Agency

About 44% of the lands within the NYS portion of the St. Lawrence River Watershed lie within the “blue line”, the boundary of the Adirondack Park (**Map 24**). Given the mission and authority vested within the Adirondack Park Agency (APA) described in this section, it is inevitable that much of the variability in local laws and programs is associated with whether or not a municipality is located within the park boundaries.

The mission of the APA is to protect the public and private resources of the Adirondack Park through the exercise of the powers and duties provided by law. APA’s mission is rooted in three acts:

- The Adirondack Park Agency Act
https://www.apa.ny.gov/Documents/Laws_Regs/APAACT.PDF
- The New York State Freshwater Wetlands Act
http://www.dec.ny.gov/docs/wildlife_pdf/wetart24a.pdf
- The New York State Wild, Scenic, and Recreational Rivers System Act
<http://www.dec.ny.gov/permits/6033.html>

The APA prepared the State Land Master Plan, which was signed into law in 1972, followed by the Adirondack Park Land Use and Development Plan in 1973. Both plans are periodically revised to reflect the changes and current trends and conditions of the Park. The APA developed a Citizen’s Guide to Adirondack Park Agency Land Use Regulations (https://www.apa.ny.gov/Documents/Laws_Regs_Standrds.html) to help familiarize landowners with

the APA's regulations pertaining to private land within the Adirondack Park. The APA uses the collective statutes, planning documents, and a permitting process to regulate land use and development in the Adirondack Park.

The APA Act allows any local government within the Park to develop its own local land use programs which, if approved by the APA, may transfer some permitting authority from the APA to the local government's jurisdiction. The remainder of this chapter provides a summary of key land use regulations and practices within the Adirondack Park that offer protection to watershed resources.

3.3.1.1 *Land Use and Development*

In the Adirondack Park Land Use and Development Plan ("APLUDP"), all private lands in the Park are classified into six categories: hamlet, moderate intensity use, low intensity use, rural use, resource management, and industrial use. The classification of a particular area depends on such factors as:

- existing land use and population growth patterns;
- physical limitations related to soils, slopes and elevations;
- unique features such as gorges and waterfalls;
- biological considerations such as wildlife habitat, rare or endangered plants or animals, wetlands and fragile ecosystems; and
- public considerations such as historic sites, proximity to critical state lands, and the need to preserve the Park's open space character.

The purpose of the land classifications in the APA Act is to channel growth into the areas where it can best be supported and to minimize the spread of development in areas less suited to sustain growth. By setting limits on the amount of building—and accompanying roads, clearing, support services, etc.—the Act contemplates that the Park will retain its natural, open space character while communities in the Park continue to grow in an environmentally sensitive manner. While very few activities are prohibited outright by the Act, some activities are restricted from certain defined areas.

3.3.1.2 *Critical Environmental Areas*

Critical Environmental Areas ("CEAs") are the more sensitive features of the Park's natural environment. They are subcategories of the general land use area classifications and are provided extra protection by the law. Generally, CEAs include wetlands, high elevations, areas around designated wild or scenic rivers, state or federal highways, and lands in proximity to certain classifications of state-owned lands. Under the APA Act and the NYS Freshwater Wetlands Act, almost all land uses, such as draining, dredging, placing fill, structures, and subdivisions in or involving wetlands require an Agency permit.

3.3.1.3 Shoreline Restrictions

Among the most valuable resources in the Park is the land along its thousands of streams, rivers, ponds and lakes. The laws the Agency administers provide protection to water quality and aesthetics of Adirondack shorelines by establishing setbacks, lot widths and restrictions on vegetation removal. Shoreline restrictions apply to all lakes and ponds, rivers considered for inclusion in the Wild, Scenic and Recreational Rivers System, and all navigable waterways.

Shoreline setback restrictions apply to all structures greater than 100 square feet in size except docks and boathouses. However, docks and boathouses must comply with specific requirements to be exempt from shoreline setback restrictions. Shoreline restrictions by land use type can be found in **Table 1**.

Table 1
Shoreline Restrictions: Minimum Lot Widths and Setbacks

Land Use Type	Min. Lot Width (ft)	Min. Structure Setback (ft)
Hamlet	50	50
Moderate Intensity Use	100	50
Low Intensity Use	125	75
Rural Use	150	75
Resource Management	200	100
Industrial	NA	NA

Source: Citizen's Guide to Adirondack Park Agency Land Use Regulations.

Note: For sewage disposal systems, the minimum setback for any water body or wetland is 100 ft, measured from the leach field or other absorption components to the closest point on the shoreline or wetland.

3.3.1.4 Designated Rivers and Adjoining Land

Many rivers in the Park are subject to special regulations and permit requirements adopted under the New York State Wild, Scenic and Recreational Rivers System Act. APA regulations apply to the designated rivers and lands adjoining them, generally up to 1/4 mile from the edge of the river. The river regulations seek to protect water quality and aesthetics by:

- establishing a 100-foot buffer strip along rivers in which vegetative cutting is highly restricted;
- establishing minimum lot widths and building setbacks (larger than those in the APA Act);
- requiring an Agency rivers project permit for nearly all subdivisions, single family dwellings and mobile homes in river areas;
- restricting motor boating and motorized activities on and adjacent to wild and scenic rivers;

- regulating bridge and road building;
- prohibiting structures (such as dams) and activities (such as dredging) which would alter the river's natural flow;
- allowing continuation of lawfully existing nonconforming uses, but requiring permits or variances for expansion or change in use;
- prohibiting certain "noncompatible" uses; and
- prohibiting new structures in Wild River areas.

Designated rivers within the St. Lawrence River watershed include the Grasse, Indian, Oswegatchie, Raquette, St. Regis, Salmon, and the Chateaugay-English.

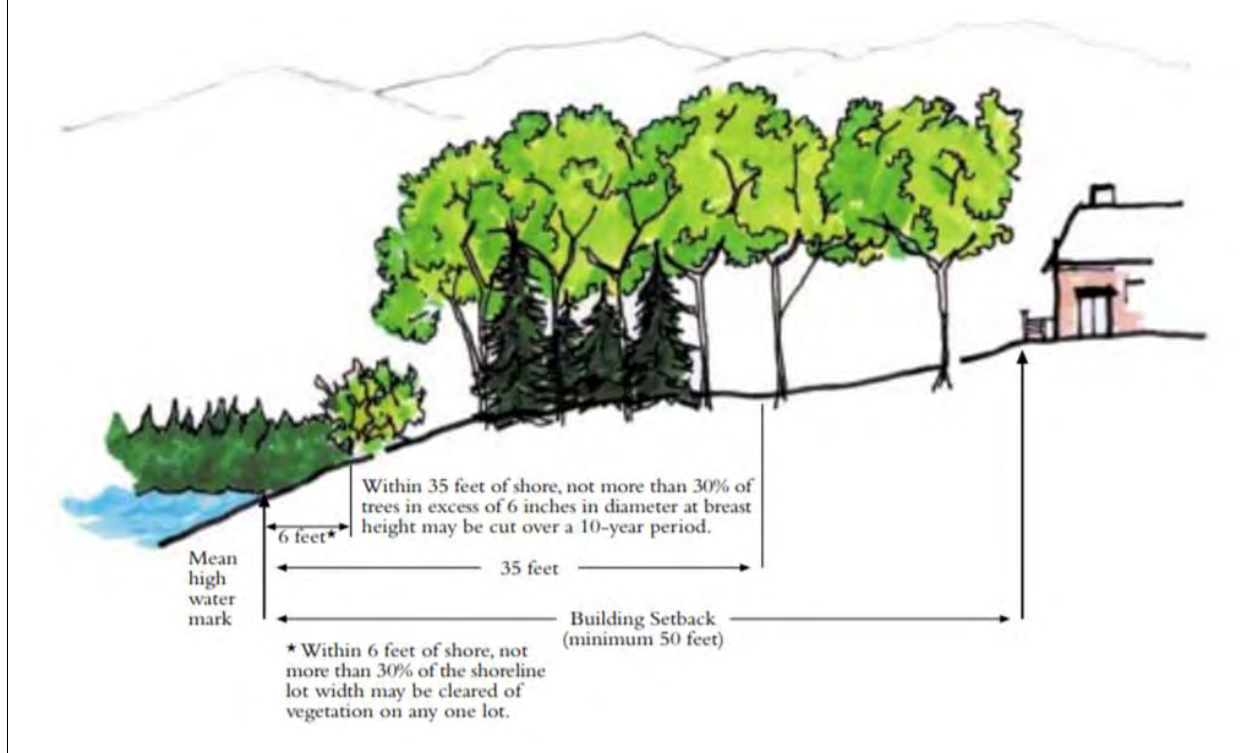
3.3.1.5 *Tree Removal*

Generally, there are no requirements for harvesting trees on non-shoreline parcels unless property owners plan to clear-cut more than 25 upland acres or 3 wetland acres, or if the property is within a Designated River Area. However, tree removal may not begin until all required permits are obtained. Tree removal may also have seasonal restrictions because of the potential presence of the northern long-ear bat. Along shorelines, cutting is limited to the following:

- Within 6 feet of shore, no more than 30 percent of the shoreline may be cleared of vegetation (bushes and trees) on any one lot; and
- within 35 feet of shore, no more than 30 percent of trees in excess of 6 inches in diameter at breast height (i.e., 4.5 feet above the ground) may be cut over a 10-year period.

Figure 1 illustrates these restrictions.

Figure 1
Restrictions That Apply to Cutting Trees and Vegetation along Shorelines



Source: Citizen's Guide to Adirondack Park Agency Land Use Regulations

3.3.2 County Level Assessment

The St. Lawrence River watershed includes 100 municipalities in eight counties, including 74 towns, 24 villages, 1 city and 1 tribal community (see **Table 2** and **Map 24**).

- St. Lawrence County: 32 towns, 11 villages, 1 city, total 2,819 mi²; 49% of watershed.
- Franklin County: 18 towns, 4 villages, 1 tribal area, total 1,368 mi²; 24% of watershed.
- Jefferson County: 9 towns, 7 villages, total 538 mi²; 9% of watershed.
- Hamilton County: 5 towns, 1 village, total 421 mi²; 7% of watershed.
- Lewis County: 3 towns, 1 village, total 226 mi²; 4% of watershed.
- Clinton County: 4 towns, total 168 mi²; 3% of watershed.
- Herkimer County: 1 town, total 100 mi²; 2% of watershed.
- Essex County: 2 towns, total 56 mi²; 1% of watershed.

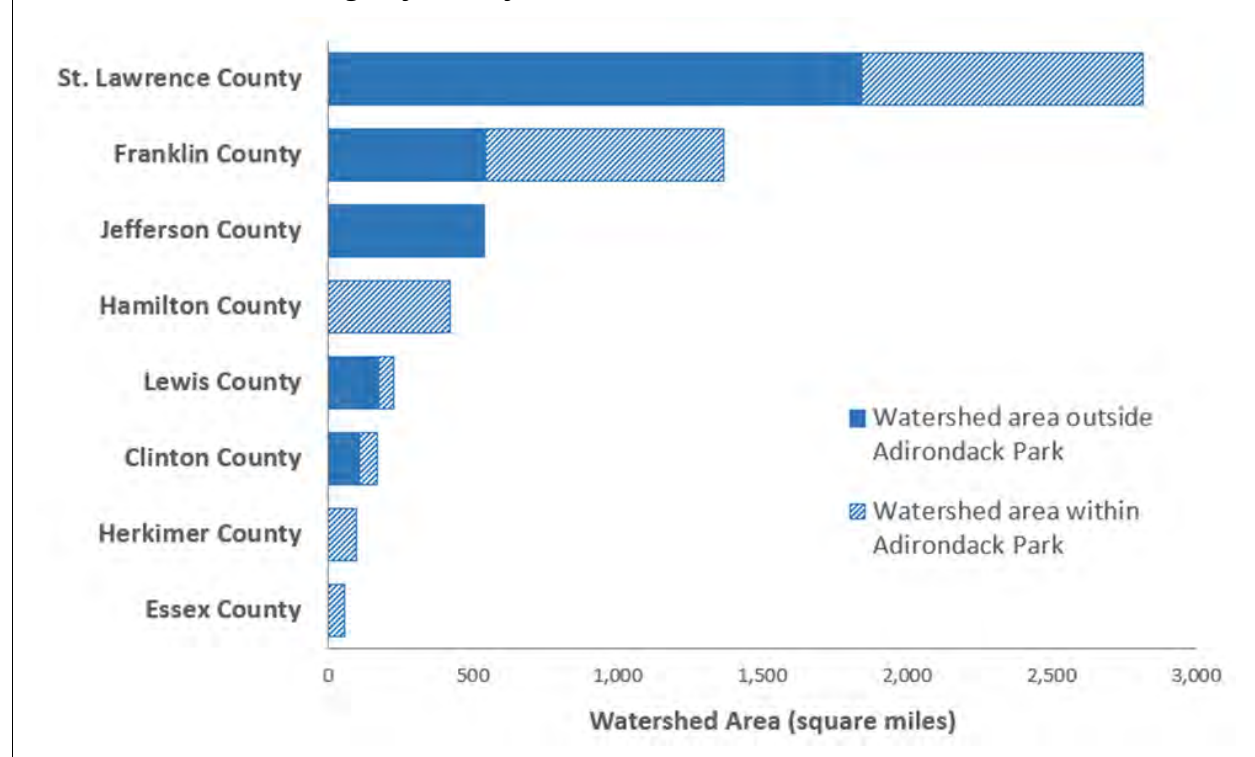
Table 2
Municipalities of the St. Lawrence River Watershed

Clinton	Essex	Franklin	Hamilton	Jefferson	Lewis	St. Lawrence	Herkimer
Towns Clinton *Dannemora Ellenburg Mooers	Towns N. Elba Newcomb	Towns Bangor *Bellmont Bombay Brandon Center Brighton Burke Chateaugay Constable Dickinson Duane Fort Covington Franklin Malone Moir Santa Clara *Tupper Lake Waverly Westville Villages Brushton Chateaugay Malone *Tupper Lake Tribal St. Regis Mohawk Tribe	Towns *Arietta *Indian Lake *Inlet *Lake Pleasant *Long Lake Villages Speculator	Towns Alexandria Antwerp Cape Vincent Clayton Leray Orleans Philadelphia Theresa Wilna Villages Alexandria Bay Antwerp Cape Vincent Clayton Evans Mills Philadelphia Theresa	Towns *Diana Croghan Watson Villages Harrisville	Towns Brasher Canton Clare Clifton Colton Dekalb Depeyster Edwards Fine Fowler Gouverneur Hammond Herman Hopkinton Lawrence Lisbon Louisville Macomb Madrid Massena Morristown Norfolk Oswegatchie Parishville Piercefield Pierrepont Pitcairn *Potsdam Rossie Russell Stockholm Waddington Villages *Canton Gouverneur Hammond Heuvelton Massena Morristown *Norwood *Potsdam Rensselaer Falls Richville Waddington City *Ogdensburg	Towns Webb

Notes: **1. Bold blue=ADK**; Asterisk (*) = registered Climate Smart Community. **2.** Herkimer County elected not to participate as part of the Local Laws and Programs Assessment.

The proportions of the total watershed area covered by each county, including areas within and outside of the Adirondack Park, are shown in Figure 3-1.

Figure 2
Areal Watershed Coverage by County



The Municipal Nonpoint Assessment results for each County government and each local municipal or tribal government appear in **Table 3** and are summarized in this chapter. The gap analysis derived from this inventory and assessment from responses to the Local Laws and Programs Assessment Forms provide the basis of preliminary recommendations made in this chapter (focused on local laws). Preliminary recommendations in this document focus primarily on laws and programs; these will form the basis of broader recommendations (including best management practices) in the St. Lawrence River Watershed Revitalization Plan.

Table 3
Local Laws Assessment Summary Chart

Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
Tribal													
St. Regis Mohawk Tribe (SRMT)		P	●			●	P	●	●	●	●		Solid Waste Management Code in place and Brownfields program deal with abandoned waste sites. SRMT has WQS authority under Clean Water Act. Wetlands Protection Act is Tribal Law and protects wetland resources. Majority of residents have onsite wastewater treatment--limited geographic extent for wastewater collection. Limited stormwater infrastructure is in place on the Territory. Limited agriculture on the Territory.
St. Lawrence													
Towns													
Brasher			●	●			●	●					Planning Board; solar regs; mobile home regs; sign law; junk law
Canton	●	●	●	●	●		●	●					Planning Board; Telecommunication tower regs
Clare				●	●	●	●	●	●	●	●		
Clifton		●		●	●	●	●	●	●	●	●		Planning Board; Adirondack Park Agency has land use regs that govern a portion of the Town
Colton	●		●	●	●	●	●	●	●	●	●		Planning Board; APA regs; solar regs; mobile home regs; sign regs; junk laws; Telecom regs; wind tower regs
Dekalb			●										Planning Board
Depeyster							●						

DRAFT													
Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
Edwards	•		•	•	•		•	•					Planning Board; solar regs; mobile home regs; sign law; junk law; telecom regs
Fine	•	•	•			•	•	•					Planning Board
Fowler			•		•		•	•					Planning Board; Freshwater Wetland regs; telecom regs
Gouverneur			•	•	•			•					Planning Board; Freshwater wetland regs; mobile home regs;
Hammond (Joint w Vil.)	•		•		•		•	•					
Hermon	•						R	•					
Hopkinton				•	•	•	•	•	•	•	•		Planning Board; APA regs
Lawrence			•		•	•	R	R					APA regs; telecom regs
Lisbon	•		•				R	•					Planning Board; telecom regs
Louisville	•		•	•	•	•	•	•	•	•	•		Planning Board; mobile home regs; sign law; telecom regs
Macomb	•		•		•		R	•					Planning Board; mobile home regs; sign law; telecom regs
Madrid	•		•	•	•	•	R	•					Planning Board; mobile home regs; sign law; telecom regs
Massena	•	•	•	•	•		•	•					Planning Board; mobile home regs; sign law; telecom regs
Morristown	•	•	•	•	•		•	•					Planning Board; mobile home regs; sign law; telecom regs
Norfolk	•		•	•	•		•	•					Planning Board; mobile home regs; sign law; telecom regs
Oswegatchie			•		•		•	•					Planning Board; mobile home regs; sign law
Parishville	•		•	•	•	•	•	•	•	•	•		Planning Board; APA regs; mobile home regs; sign regs;
Piercefield	•		•	•	•	•	•	•	•	•	•		Planning Board; APA regs; mobile home regs; telecom regs

DRAFT													
Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
Pierrepoint	●		●	●	●		R	●					Planning Board; mobile home regs; sign regs
Pitcairn	●				●	●	●						Planning Board; APA regs
Potsdam	●		●	●	●		●	●					Planning Board; mobile home regs; sign regs; telecom regs
Rossie			●		●		●						Planning Board; telecom regs
Russell							R						Mobile home regs
Stockholm			●	●	●		●						Planning Board; mobile home regs; sign regs; Freshwater wetland regs; telecom regs
Waddington	●	●	●	●	●		●	●					Planning Board; sign regs; telecom regs
Villages													
Canton	●	P	●	●	●		●	●					Planning Board; mobile home regs; sign regs; telecom regs
Gouverneur			●	●	●		●	●					Planning Board; mobile home regs; sign regs; Freshwater wetland regs
Hammond (Joint with Town)	●		●		●		R	●					Planning Board
Huevelton	●		●	●	●		●	●					Planning Board; mobile home regs; sign regs
Massena	●		●	●	●		●	●					Planning Board; solar regs; mobile home regs; sign regs; telecom regs
Morristown	●	●	●	●	●		●	●					Planning Board; solar regs; mobile home regs; sign regs; Freshwater wetland regs
Norwood	●			●	●		●	●					Planning Board; mobile home regs;
Potsdam	●		●	●	●		●	●					Planning board; solar regs; mobile home regs; telecom regs
Resselaer Falls			●	●	●		●	●					Planning Board; mobile home regs;
Richville (Joint with Town)			●					●					Planning Board; mobile home regs;
Waddington	●	●	●	●	●		●	●					Planning Board; mobile home regs;

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Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
City													
Ogdensburg	•	•	•	•	•		•	•					Planning Board; solar regs; mobile home regs;
Jefferson													
Towns													
Alexandria	•	•	•	•	•		•	•	•	•	•	•	
Antwerp	•						•	•	•	•	•	•	
Cape Vincent	•		•	•	•		•	•		•	•	•	
Clayton	•	•	•	•	•		•	•	•	•	•	•	
Leray	•		•	•	•		•	•		•	•	•	
Orleans	•		•	•	•		•	•		•	•	•	
Philadelphia	•		•	•	•		•	•		•	•	•	
Theresa			•	•	•		•	•		•	•	•	
Wilna	•		•	•	•		•	•		•	•	•	
Villages													
Alexandria Bay	•		•	•	•	•	•	•		•		•	
Antwerp	•									•		•	
Cape Vincent	•	P	•	•	•	•	•	•		•		•	
Clayton	•		•	•	•		•	•		•		•	
Evans Mills	•			•	•		•	•		•	•	•	
Philadelphia	•			•	•		•	•		•		•	
Theresa				•	•		•	•		•	•		
Franklin													
Towns													

DRAFT													
Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
Bangor								•					
Bellmont				•	•	•	•	•	•	•	•		
Bombay								•					
Brandon								•					
Brighton				•	•	•	•	•	•	•	•		
Burke								•					
Chateaugay								•					
Constable								•					
Dickinson				•	•	•	•	•	•	•	•		
Duane				•	•	•	•	•	•	•	•		
Fort Covington								•					
Franklin				•	•	•	•	•	•	•	•		
Harrietstown				•	•	•	•	•	•	•	•		
Malone	P	•	•	•				•					
Moir								•					
Santa Clara				•	•	•	•	•	•	•	•		
Tupper Lake			•	•	•	•	•	•	•	•	•		
Waverly				•	•	•	•	•	•	•	•		
Westville								•					
Villages													
Brushton		•						•					
Malone	•	•	•	•		•	•	•	•	•			

DRAFT													
Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
Tupper Lake				•	•	•	•	•	•	•	•		
Lewis													
Towns													
Croghan			•	•				•	•	•	•		Zoning is limited in this area.
Diana			•	•				•	•	•	•		Zoning is limited in this area.
Watson				•	•	•	•	•	•	•	•		
Villages													
Harrisville				•	•	•	•	•	•	•	•		
Essex													
Towns													
North Elba	•		•	•	•	•	•	•	•	•	•		
Newcomb	•		•	•	•	•	•	•	•	•	•		
Clinton													
Towns													
Clinton							•						
Dannemora				•	•	•	•	•	•	•	•		
Ellenbrug	•			•	•	•	•	•	•	•	•	•	
Mooers	•			•			•	•				•	
Hamilton													
Towns													
Arietta	•		•	•	•	•	• P	•	•	•	•		Piseco Lake Association (PLA) efforts include dam improvements, invasive species, and water quality. PLA is working with SUNY Oneonta to develop a Lake Management Plan. Green Waste Management Program. Local transport law for invasive species.
Indian Lake	•		•	•	•	•	•	•	•				

DRAFT													
Municipality	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/Shore Protection	Floodplain/Flood Protection	Waste Management/Junk Yard	Wastewater/On-site Septic	Stormwater	Agriculture	Special Permit	Others/Comments
Inlet	●	●	●	●	●	●	●	●	●	●	●		Local Lake Associations - also have on shore wastewater inspection local law
Lake Pleasant	●		●	●	●	●	●	●	●	●	●		Town is partner with our local Lake Association (LPSA). Town does not have an A.P.A. approved land use plan but works with A.P.A. on regulations. Floodplain protection under DEC emergency action plan / Wakely Dam.
Long Lake	P			●	●	●	●	●	●	●	●		Active invasive species program that is funded by town and grants from the Adirondack Watershed Institute, two active lake associations.
Villages													
Speculator				●	●	●	●	●	●	●	●		
Herkimer													
Towns													
Webb				●	●	●	●	●	●	●	●		

Legend:

1. | Local regulation in effect
2. P = In progress of being developed
3. R = Rescinded

Note: **Bold green** municipalities indicate those primarily within the Adirondack Park.

Within the St. Lawrence River watershed, there is significant variation in the degree to which municipal laws address protection of watershed resources, ranging from municipalities with overlay zoning to safeguard vulnerable areas (e.g., lakes, rivers, streams, wetlands) to municipalities that have few local laws to manage water quality matters, such as aquatic buffers, floodplain management, or stormwater and erosion controls. The following subsections present strengths and gaps, or opportunities for improvement, and preliminary recommendations for each County in the St. Lawrence River watershed.

3.3.2.1 *St. Lawrence County*

St. Lawrence County includes 32 towns, 11 villages and 1 city and covers 2,819 square miles (49%) of the St. Lawrence River watershed area. St. Lawrence County has a Planning Department and SWCD as part of its organizational structure. These departments work with local municipalities to provide technical assistance on issues related to land use development and water quality protection. Approximately 35% of St. Lawrence County's watershed area is located within the Adirondack Park. Municipalities located within the Park are governed by APA's laws, regulations and programs. This governance structure influences land use development and water quality protection within St. Lawrence County.

Most municipalities (29/44) within St. Lawrence County have a Comprehensive Plan. In addition, most of the municipalities located along the St. Lawrence River have completed or are in the process of developing a Local Waterfront Revitalization Plan. These strategic land use plans define the community's goals and vision for the future. In addition, most of the municipalities administer general land use controls; including zoning laws, site plan reviews, subdivision regulations, stormwater management, agriculture management and floodplain protections. In addition, municipalities located within the Adirondack Park administer waterbody/shore protection. These land use laws and regulations help guide development practices and improve water quality.

Most municipalities lack local laws related to wastewater/on-site septic systems, stormwater management and agriculture. In addition, municipalities located outside the Adirondack Park lack laws and programs related to waterbody/shore protection. It was also noted that St. Lawrence County has only limited staffing capacity to provide technical support for the vast number of agricultural producers and extent of agricultural lands. These issues are identified as gaps.

St. Lawrence County's municipalities would benefit from adopting applicable model local laws and building on established programs for best management practices (BMPs) related to waterbody/shore protection, wastewater/on-site septic systems, stormwater management and agriculture. APA's laws and programs and NYSDOS model local laws

(https://www.dos.ny.gov/opd/programs/resilience/Model_Local_Laws_to_Increase_Resilience.pdf)

could serve as a basis for evaluation and adoption. In addition, due to the extent and significance of agriculture, St. Lawrence County municipalities would benefit from enhancing the use of agricultural BMPs, including vegetated buffers and other sustainable agricultural practices that reduce nonpoint source pollution (e.g., stormwater runoff, soil erosion, nutrient and other chemical loading) to watercourses. Focused efforts to expand the use of BMPs would enhance land use development practices and water quality protection measures within the St. Lawrence County portion of the watershed.

3.3.2.2 *Franklin County*

Franklin County includes 18 towns, 4 villages and 1 tribal community, and covers 1,368 square miles (24%) of the St. Lawrence River watershed area. The Adirondack Park encompasses 60% (822 square miles) of the county. Those municipalities within the Park are governed by APA's laws, regulations and programs. This governance structure influences land use development and watershed protection within Franklin County.

The SWCD of Franklin County is a valuable asset to the county's municipalities. The SWCD works closely with local municipalities to develop local laws, programs and practices to protect water quality. Many of the municipalities administer general land use controls, particularly zoning laws, subdivision regulations, waterbody/shore protection, floodplain management/protection, waste management/ junk regulations, wastewater/on-site septic systems, stormwater management, and agriculture environmental management. These land use laws and regulations help protect and improve water quality.

Few municipalities (2-3/21) have developed or are developing a Comprehensive Plan and/or Local Waterfront Revitalization Plan, where applicable. In addition, most of the County's municipalities (17/21) have no site plan review laws. Franklin County does not have a Planning Department, which limits its capacity to assist communities with their planning efforts. These issues are identified as impediments to effective water resources management, especially for areas outside of the Adirondack Park.

Franklin County's municipalities would benefit from adopting Comprehensive Plans and/or Local Waterfront Revitalization Plans as well as local laws for site plan review. These strategic land use plans define the community's goals and vision for the future, including necessary land use practices and water resource protections. In addition, due to the significance and importance of agriculture within the watershed, Franklin County municipalities would benefit from promoting sustainable and resilient agricultural BMPs to reduce nonpoint source pollution (e.g., stormwater runoff, soil erosion, and nutrient and other chemical loading) to watercourses. With more regulatory tools and professional support capacity, Franklin County municipalities could strengthen water quality protection within the St. Lawrence River watershed.

3.3.2.3 *Jefferson County*

Jefferson County includes nine towns and seven villages, covering 538 square miles (9%) of the St. Lawrence River watershed. The entire watershed area is outside of the Adirondack Park boundary. Jefferson County's Planning Department and SWCD work closely with local municipalities in development of local laws, programs, and practices that affect water resources.

Of the 16 towns and villages located within the St. Lawrence River watershed, most (14/16) have adopted Comprehensive Plans. In addition, three of four municipalities along the St. Lawrence River have adopted (or are completing) a Local Waterfront Revitalization Plan. Many Jefferson County municipalities administer general land use controls, including zoning laws, site plan reviews, subdivision regulations, stormwater management, agriculture management, and floodplain protections.

Jefferson County's municipalities have several strengths identified as part of this assessment. The County benefits from established programs involving stormwater management and land conservation. The County has organized a Stormwater Coalition, which includes the City of Watertown, seven surrounding communities, and Jefferson County. The Coalition works collaboratively to meet stormwater management regulations; achieve water quality goals; and promote awareness and stewardship of water resources in the urbanized areas. Additionally, Jefferson County is participating in the NYS Septic System Replacement Program. The purpose of this fund is to replace existing cesspools and septic systems that are having significant and quantifiable environmental and/or public health impacts to groundwater used for drinking water, or a threatened or impaired waterbody. In Jefferson County, the Priority Areas are Moon Lake, Red Lake, and the Indian River near these lakes. In addition, several NYS Land Trust Alliance members, including Tug Hill Tomorrow, Thousand Island Land Trust, and the Indian River Lakes Conservancy, have established land conservation programs or efforts to inventory and conserve undeveloped sensitive areas, open space, or areas of historical or cultural value.

There are weaknesses as well; most of the County's municipalities lack local laws related to waterbody/shore protection and wastewater/on-site septic systems. These deficiencies are identified for gap analysis and recommendations.

In 2016, Jefferson County promulgated a 'Right to Farm' law. The local law includes a legislative finding and intent recognizing agriculture as an important industry in the County that contributes to the economy, maintains open space, enhances the quality of life, promotes environmental quality, and places minimal demands on services provided by local governments. Passage of the Right to Farm law was intended to help maintain and enhance the agricultural industry of the County in several ways: permitting acceptable agricultural practices to continue; protecting the existence and continued operation of farms; encouraging initiation and expansion of agricultural businesses; and promoting new ways to resolve disputes concerning agricultural practices and farm operations. It accomplishes this by limiting the circumstances under which farming may be deemed to be a

nuisance and to allow agricultural practices inherent to and necessary for the business of farming to proceed and be undertaken free of unreasonable and unwarranted interference or restriction.

Jefferson County's Agricultural and Farmland Protection Plan (2016) noted a disconnect between language in adopted plans and the actual laws. The towns with comprehensive plans that include the most expressed support for agriculture may not exhibit the same level of support in their zoning laws. Farm-friendly practices that are most often incorporated into local zoning laws include:

- Many agricultural operations are allowed in most places as a use permitted by right (no planning board review needed).
- Towns do not direct more growth or higher density in core agricultural areas.
- Local agricultural districts or special ag-related districts are established.
- Off-site signs allowed in many places to advertise farm uses.
- Farm stands and farm retail uses are allowed, often without requiring site plan or special use permits.
- Zoning allows for agricultural-related accessory uses.
- Definitions of agriculture are broad and flexible so many different types of agriculture can be included.
- Towns do not usually regulate farms by acreage or number of animals.

Farming-related practices that are not typically addressed in local laws include:

- Use of buffer areas between non-agricultural uses and farms.
- Use of techniques such as conservation subdivisions, transfer of development rights, or other innovative land use practices that allow development as well as preservation of open space.
- Requiring development applications to include information about on-site and adjacent agricultural activities.
- Specific requirement that the reviewing board evaluate impacts of a development proposal on agriculture. This is especially important for both SEQRA and when a proposal is within a NYS Agricultural District.
- Lack of design standards directing buildings to be placed in a manner that protects or allows farming to take place.
- Requiring the NYS Agricultural Data Statement.
- Requiring an agricultural disclosure notice when a project is in a NYS Agricultural District to inform future landowners that agricultural activities are taking place nearby.

- Addressing farm worker housing and allowing a variety of housing options for farm workers such as mobile homes.
- Waivers of municipal approvals for on-farm windmills and solar panels.

Jefferson County's municipalities would benefit from adopting applicable model local law and established programs using BMPs related to waterbody/shore protection and wastewater/on-site septic systems. APA's laws and programs and NYSDOS model local laws could serve as a basis for evaluation and adoption. In addition, due to the significance and importance of agriculture within the watershed, Jefferson County municipalities would benefit from supporting adoption of agricultural BMPs to reduce nonpoint source pollution (e.g., soil erosion, nutrients, and chemicals). Additional regulatory tools coupled with technical support and meaningful cost-sharing measures could help mitigate the adverse impacts of land development and land use practices on water resources and ultimately benefit the St. Lawrence River watershed.

3.3.2.4 *Lewis County*

Lewis County includes four municipalities that cover 226 square miles (4%) of the St. Lawrence River watershed area. Of the 226 square miles, a majority of the land area (78%) is located outside the Adirondack Park. Town governments administer general land use laws and programs, including site plan review, waste management/junk yard regulations, wastewater/on-site septic systems, stormwater management, and agriculture environmental management. These land use laws and programs help protect and improve water quality. In addition, the SWCD makes their no-till drill 'interseeder' equipment available to local farms. This program has been successful; in 2019, the SWCD equipment covered over 1,000 acres, planting many varieties of seed

Neither of the Lewis County towns within the St. Lawrence River watershed has a Comprehensive Plan, subdivision law, waterbody/shore protection, floodplain management/flood protection. In addition, laws and programs were either absent or overlooked for smaller agricultural parcels. These deficiencies are identified as gaps, or opportunities for improvement.

Lewis County's municipalities would benefit from developing Comprehensive Plans to provide a regulatory framework for adopting local laws designed to protect water resources. Because of the importance of agricultural land uses, continued efforts to expand the use of BMPs that reduce nonpoint source pollution (e.g., soil erosion, nutrients, and chemicals) to watercourses is important. Enhancing these watershed and water resource efforts would ultimately benefit the quality of the St. Lawrence River watershed.

3.3.2.5 *Essex County*

Essex County's portion of the St. Lawrence River watershed is limited to two towns within the Adirondack Park totaling 56 square miles (1% of the total watershed). Consequently, all four

municipalities are governed by APA's laws, regulations and programs; this affects land use development and watershed protection.

Essex County's Community Resources (formerly termed the Planning Department) and SWCD work closely with local municipalities, as well as state and federal funding and regulatory agencies, to develop feasible solutions for local land use and development projects. The concept of feasibility encompasses fiscal and operational criteria, plus environmental sustainability and compliance at the regional and state levels. Essex County's Community Resources has a strong organizational structure and specialized staff resources (i.e., grant writer and environmental engineer) that enable them to successfully apply for and manage federal and state grant funding. Currently, their main focus areas involve assisting municipalities with planning, funding and implementing improvements to water supply and wastewater infrastructure.

Both municipalities within Essex County have a Comprehensive Land Use Plan and administer general land use controls, particularly site plan review, zoning laws, subdivision regulations, waterbody/shore protection, floodplain management/flood protection, waste management/ junk yard regulations, wastewater/on-site septic system regulations, stormwater and erosion control regulations, agriculture environmental management and special permit. These land use laws, regulations and programs help protect and improve water quality.

Overall, very few gaps are identified in the Local Laws and Programs Assessment form. Essex County can provide effective templates for other municipalities within the St. Lawrence River watershed.

3.3.2.6 *Clinton County*

Clinton County includes four municipalities (all towns) that encompass 168 square miles (3%) of the St. Lawrence River watershed area. Of the 168 square miles, 37% of the watershed area (62 square miles) is located within the Adirondack Park and 63% (106 square miles) is located outside the Adirondack Park. Therefore, the towns within the Park are governed by APA's laws, regulations and programs. This governance structure influences land use development and watershed protection within Clinton County.

Most of the municipalities have a Comprehensive Land Use Plan and administer general land use controls; including zoning law, floodplain management/ flood protection, waste management/junk yard regulations and conditional use permit. These land use laws and programs positively influence land use practices and watershed protection. However, gaps remain. The majority of Clinton County towns have not promulgated local laws governing site plan review, subdivisions, waterbody/shore protection, wastewater/on-site septic systems, stormwater management, or agricultural practices.

Clinton County's municipalities would benefit from adopting model local law related to site plan review and subdivision regulations. These planning tools guide development and land use practices

and protections, including water resource protections. In addition, municipalities would benefit from adapting general land use laws and programs to address the gaps cited above. These specific tools and regulations promote sustainable land use practices and watershed protection.

3.3.2.7 *Hamilton County*

Hamilton County includes five towns and one village that cover 421 square miles (or 7%) of the St. Lawrence River watershed area. All (100%) of the watershed area is located within the Adirondack Park. Therefore, these municipalities are governed by APA's laws, regulations and programs. This governance structure influences land use development and watershed protection.

In addition to the APA regulations, Hamilton County has many local laws and programs influencing land use development and watershed protection. This programmatic assessment identified several strengths; all five towns have adopted (or are in the process of adopting) a Comprehensive Land Use Plan and administer general land use controls. Controls include site plan review, zoning, subdivision regulations, waterbody/shore protection, floodplain management/ flood protection, waste management/junk yard regulations, wastewater/on-site septic system, stormwater and erosion control, agriculture practices, and invasive species control. These land use laws and programs positively influence watershed protection.

3.3.3 **Climate Smart Communities (CSC)**

Counties, cities, towns, and villages are best able to assess their own vulnerability to a changing climate, and to initiate adaptive measures. Many adaptive land use measures, such as water quality protection and flood resiliency, are best managed within a watershed context. Any city, town, village, or county in New York State can take the Climate Smart Communities (CSC) pledge. To become a registered CSC, the municipality's governing body must adopt a resolution that includes commitment to the following ten actions:

- Build a climate-smart community
- Inventory emissions, set goals, and plan for climate action
- Decrease energy use
- Transition to clean, renewable sources of energy
- Use climate-smart materials management
- Implement climate-smart land use
- Enhance community resilience to climate change
- Support a green innovation economy
- Inform and inspire the public
- Engage in an evolving process of climate action

Several communities within the St. Lawrence River watershed have adopted the Climate Smart Community pledge, see **Table 2**.

4 Conclusions

The St. Lawrence River watershed includes 100 municipalities in eight counties, covering nearly 5,700 square miles in New York State. Home rule vests the primary authority for community planning and land use regulations with local municipalities. Hence, municipal governments play a significant role in watershed planning in New York State. While this provides municipalities with the power to define how their community grows, it can also complicate water resources management since watershed boundaries rarely conform to municipal boundaries. This governance structure often results in inconsistent regulations within a watershed. Meanwhile, each county-level SWCD plays a significant role with providing guidance and technical assistance in land use and development practices.

Within the St. Lawrence River watershed, there is significant variation in the degree to which municipal laws address protection of watershed resources. Some municipalities have extensive planning and regulatory tools such as overlay zoning to provide additional safeguards to vulnerable areas (e.g., lakes, rivers, streams, wetlands, or aquifer recharge areas). In contrast, other municipalities could benefit from adopting additional laws to manage water quality challenges, such as buffers to reduce the risk of pollutant transport to surface waters, guidelines for construction in sensitive areas such as floodplains or steep slopes, or measures to manage stormwater runoff. In many cases, staff resources and technical ability were identified as limiting factors, particularly within the local municipal and county-level governments.

This variation, in part, was also influenced by the locality inside or outside the Adirondack Park boundary. The APA maintains protection of the forest preserve, which includes 44% of the St. Lawrence watershed area, and oversees development proposals on the privately-owned lands. APA's governance is rooted in three acts which influence land use and development practices in a manner that promotes water quality and resource protection. For example, the APA regulates critical environmental areas, restricts impervious surfaces along shorelines, protects designated Wild, Scenic and Recreational Rivers and adjoining lands, and strictly manages removal of vegetation. Generally, municipalities outside of the Adirondack Park would benefit from adopting land use and development laws and programs that ensure a comparable level of protection of natural resources.

Inventory and assessment have identified specific gaps in local laws; these gaps provide a basis for identifying recommended actions that could strengthen the institutional framework for protecting the St. Lawrence River Watershed. In general, most municipalities would benefit from updating existing and/or adopting model local laws, such as those identified in Model Local Laws to Increase Resiliency (NYS DOS, June 2019). Two additional recommendations noted during the first public meeting on December 3, 2019 are as follows: i) support capacity building for municipalities to review and modify their local laws and programs, similar to a 'circuit rider' at the Tug Hill Commission; and ii) assess Provincial policy statement – Ontario, Canada, whereby provinces adopt policy statements that represent a baseline for local land use laws (can be more protective, cannot be less protective).

This assessment provides the foundation for identifying a suite of 'best practices' for local municipalities as they chart the future of the watershed. The St. Lawrence River Watershed Revitalization Plan will build on these findings to recommend local laws and programs that, with public support, could enhance sustainable land use development and water resource protection.

5 References

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NYSDOT Environmental Manual. Available at

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USEPA Watershed Approach Framework: Implementing Guiding Principles. Available at

<http://www.epa.gov/owow/watershed/framework/ch6.html>.

Waterbody Inventory/Priority Waterbodies List (NYSDEC) Available at

<http://www.dec.ny.gov/chemical/36730.html>.

Appendix B

Municipal Nonpoint Assessment Form

County Lewis County

Author Frank Pace

Date 7/30/2019

Municipality	Municipal Land Use Planning Tools and Regulations												Comments
	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision Law	Waterbody/ Shore Protection	Floodplain/ Flood Protection	Waste Management/ Junk Yard	Wastewater/ On-site Septic	Stormwater	Agriculture	Others	
TOWNS													
Croghan			X	X				XZ	XZ	XZ	XZ		Zoning is limited in this area.
Diana			x	X				XZ	XZ	XZ	XZ		Zoning is limited in this area.

LEGEND

X= Local Regulation, in effect

P= In Process of Being Developed or Adopted

R= Rescinded

APA= Covered by Adirondack Park Agency Regulations

FW= Covered by Freshwater Wetland Regulations

MS4= Covered by EPA's Phase II Stormwater Rule

Z= Covered by Zoning Law

County St. Lawrence County

Reviewer John Tenbusch

Date September 27, 2019

Municipality	Municipal Land Use Planning Tools and Regulations											
	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/ Shore Protection	Floodplain/ Flood Protection	Waste Management/ Junk Yard	Wastewater/ On-site Septic	Stormwater	Agriculture	Others /Comments
TOWNS												
Brasher			X	X			X	X				Planning Board; solar regs; mobile home regs; sign law; junk law
Canton	X	X	X	X	X		X	X				Planning Board; Telecommunication tower regs
Clare												
Clifton		X				X/APA						Planning Board; Adirondack Park Agency has land use regs that govern a portion of the Town
Colton	X		X	X	X	X	X	X				PLanning Board; APA regs; solar regs; mobile home regs; sign regs; junk laws; Telecom regs; wind tower regs
Dekalb			X									Planning Board
Depeyster							X					
Edwards	X		X	X	X		X	X				Planning Board; solar regs; mobile home regs; sign law; junk law; telecom regs
Fine	X	X	X			X/APA	X	X				Planning Board; APA regs
Fowler			X		X		X	X				Planning Board; Freshwater Wetland regs; telecom regs
Gouverneur			X	X	X			X				Planning Board; Freshwater wetland regs; mobile home regs;
Hammond	Joint with Vill	X	X		X		X	X				
Hermon	X						R	X				
Hopkinton						X/APA	X					Planning Board; APA regs

Lawrence			X		X	X/APA	R	R				APA regs; telecom regs
Lisbon	X		X				R	X				Planning Board; telecom regs
Louisville	X		X	X	X	X	R	X				Planning Board; mobile home regs; sign law; telecom regs
Macomb	X		X		X		R	X				Planning Board; mobile home regs; sign law; telecom regs
Madrid	X		Z	X	X	X	R	X				Planning Board; mobile home regs; sign law; telecom regs
Massena	X	X	Z	X	X		X	X				Planning Board; mobile home regs; sign law; telecom regs
Morristown	X	X	Z	X	X		X	X				Planning Board; mobile home regs; sign law; telecom regs
Norfolk	X		X	X	X		X	X				Planning Board; mobile home regs; sign law; telecom regs
Oswegatchie			X		X		X	X				Planning Board; mobile home regs; sign law
Parishville	X		X	X	X	X/APA	X	X				Planning Board; APA regs; mobile home regs; sign regs;
Piercefield	X		X	X		X/APA	X					Planning Board; APA regs; mobile home regs; telecom regs
Pierrepont	X		Z	X	X		R	X				Planning Board; mobile home regs; sign regs
Pitcairn	X				X	X/APA	X					Planning Board; APA regs
Potsdam	X		Z	X	X		X	Z				Planning Board; mobile home regs; sign regs; telecom regs
Rossie			X		X		X					Planning Board; telecom regs
Russell							R					Mobile home regs
Stockholm			X	X	X		X					Planning Board; mobile home regs; sign regs; Freshwater wetland regs; telecom regs
Waddington	X	X	Z	X	X		X	Z				Planning Board; sign regs; telecom regs
VILLAGES												
Canton	X	P	X	X	X		X	X				Planning Board; mobile home regs; sign regs; telecom regs
Gouverneur			Z	X	X		X	X				Planning Board; mobile home regs; sign regs; Freshwater wetland regs
Hammond	Joint with Town		X		X		R	X				Planning Board

Heuvelton	X		Z	X	X		X	X				Planning Board; mobile home regs; sign regs
Massena	X		X	X	X		X	X				Planning Board; solar regs; mobile home regs; sign regs; telecom regs
Morristown	X	X	X	X	X		X	X				Planning Board; solar regs; mobile home regs; sign regs; Freshwater wetland regs
Norwood	X			X	X		X	X				Planning Board; mobile home regs;
Potsdam	X		Z	X	X		X	X				Planning board; solar regs; mobile home regs; telecom regs
Resselaer Falls			X	X	Z		X	X				Planning Board; mobile home regs;
Richville	Joint with Town		X					X				Planning Board; mobile home regs;
Waddington	X	X	X	X	X		X	X				Planning Board; mobile home regs;
City												
Ogdensburg	X	X	Z	X	X		X	X				Planning Board; solar regs; mobile home regs;

LEGEND

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R= Rescinded

APA= Covered by Adirondack Park Agency Regulations

FW= Covered by Freshwater Wetland Regulations

MS4= Covered by EPA's Phase II Stormwater Rule

Z= Covered by Zoning Law

County Jefferson County

Reviewer Erin Zevrah

Date August 29, 2019

Municipality	Municipal Land Use Planning Tools and Regulations												Comments
	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/ Shore Protection	Floodplain/ Flood Protection	Waste Management/ Junk Yard	Wastewater/ On-site Septic	Stormwater	Agriculture	Special Permit	
TOWNS													
Alexandria	X	X	Z	Z	X		X	Z	Building Code	Z	Z	Z	In general, zoning laws have criteria for boards to consider stormwater during reviews.
Antwerp	X						X	Z	X	Z	Z	Z	
Cape Vincent	X		Z	Z	X		X	Z		Z	Z	Z	
Clayton	X	X	Z	Z	Z		X	Z	X	Z	Z	Z	
Leray	X		Z	Z	X		X	Z		MS4	Z	Z	
Orleans	X		Z	Z	X		X	Z		Z	Z	Z	
Philadelphia	X		Z	Z	X		X	Z		Z	Z	Z	
Theresa			Z	Z	X		X	Z		Z	Z	Z	
Wilna	X		Z	Z	X		X	Z		Z	Z	Z	
VILLAGES													
Alexandria Bay	X		Z	Z	X	X	X	Z		Z		Z	
Antwerp	X									Z		Z	
Cape Vincent	X	P	Z	Z	X	X	X	Z		Z			
Clayton	X		Z	Z	X		X	Z		Z		Z	

Evans Mills	X			Z	X		X	Z		Z	Z	Z	
Philadelphia	X			Z	X		X	Z		Z		Z	
Theresa				Z	X		X	Z		Z	Z		

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Z= Covered by Zoning Law

Date September 12, 2019

[illegible]

Constable								X					
Dickinson				X	X	X	X	X	X	X	X		
Duane				X	X	X	X	X	X	X	X		
Fort Covington								X					
Franklin				X	X	X	X	X	X	X	X		
Harrietstown				X	X	X	X	X	X	X	X		
Malone	P	X	X	X				X					
Moir								X					
Santa Clara				X	X	X	X	X	X	X	X		
Tupper Lake			X	X	X	X	X	X	X	X	X		
Waverly				X	X	X	X	X	X	X	X		
Westville								X					
VILLAGES													
Brushton		X						X					
Malone	X	X	X	X		X	X	X	X	X			
Tupper Lake				X	X	X	X	X	X	X	X		

LEGEND

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FW= Covered by Freshwater Wetland Regulations

MS4= Covered by EPA's Phase II Stormwater Rule

Z= Covered by Zoning Law

County Essex County

Reviewer Jessica DesLauriers

Date Septmber 6, 2019

Municipality	Municipal Land Use Planning Tools and Regulations												
	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/ Shore Protection	Floodplain/ Flood Protection	Waste Management/ Junk Yard	Wastewater/ On-site Septic	Stormwater	Agriculture	Others	Comments
TOWNS													
North Elba	X		X	X	X	X, APA	X	X	X	X	APA		
Newcomb	X		X	X	X	X, APA	X	X	X		APA		
St. Armand						APA			X		APA		
VILLAGES													
Lake Placid	X		X	X	X	X, APA	X	X	X	X	APA		

LEGEND

X= Local Regulation, in effect

P= In Process of Being Developed or Adopted

R= Rescinded

APA= Covered by Adirondack Park Agency Regulations

FW= Covered by Freshwater Wetland Regulations

MS4= Covered by EPA's Phase II Stormwater Rule

Z= Covered by Zoning Law

County Clinton County

Reviewer Glen Cutter

Date August 27, 2019

Municipality	Municipal Land Use Planning Tools and Regulations												Comments
	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/ Shore Protection	Floodplain/ Flood Protection	Waste Management/ Junk Yard	Wastewater/ On-site Septic	Stormwater	Agriculture	Conditional Use Permit	
TOWNS													
Altona	x			X			X	X				X	
Black Brook	x			X			X	X				X	
Clinton							X						
Dannemora													
Ellenburg	x			X			X	X				X	
Mooers	x			X			X	X				X	

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Notes:

1. Flood Protection only through the requirements of NYS Building Code, which includes same or more restrictive regs on building above floodplain; however mapping and determining whether a structure or building site is within floodplain is still not easy for CEO.
2. Countywide Agriculture and Farmland Protection Plan implemented in 2002.

County Hamilton County
 Caitlin Steart,
 Hamilton County
 Soil and Water
 Conservation
 District

Reviewer District

Date July 15, 2019

Municipality	Municipal Land Use Planning Tools and Regulations												
	Comprehensive Plan	Local Waterfront Revitalization Plan	Site Plan Review	Zoning Law	Subdivision	Waterbody/ Shore Protection	Floodplain/ Flood Protection	Waste Management/ Junk Yard	Wastewater/ On-site Septic	Stormwater	Agriculture	Others (invasive species etc.)	Comments
TOWNS													
Arietta	X		X, APA	X, APA	X, APA	X	P. County started one in 2012 after the hurricane, but it was not completed.	X. Leaves, brush, limbs, branches.	XZ	No plan, zoning oversees stormwater, town staff have completed the Erosion, Sediment	XZ. Livestock mentioned / covered in zoning.	Local transport law for invasive species.	Piseco Lake Association efforts include dam improvements, invasive species, and water quality. PLA is

										Control, and Stormwa ter training in 2018.			working with SUNY Oneonta to develop a Lake Managem ent Plan.
Indian Lake	X		XZ	XZ	XZ APA	APA	X DEC	XZ	XZ				
Inlet	X	X	XZ	X	XZ APA	XAPAF WZ	N/A	XZ	XZ	APA	N/A	X	Local Lake Associatio ns - also have on water wastewate r inspection local law
Lake Pleasant	X		XZ	X	XZ APA	LPSA	X DEC	XZ	XZ	XZ		Town of Lake Pleasant Aquatic Invasive Species Preventi on Law: Boaters must remove all standing water, and aquatic plants	Town is partner with our local Lake Associatio n (LPSA). Town does not have an A.P.A. approved land use plan but works with A.P.A. on regulation s. Floodplain

												and animals from watercraft before entering and after exiting a town waterbody.	protection under D.E.C. emergency action plan / Wakely Dam.
Long Lake	P	No plan, but projects have been implemented.			Had 1 subdivision, affordable housing project, DOH approval			X. Code enforcement officer is responsible for waste management. There is a law regarding junk yard.	X. Yes, under code enforcement officer.			Long Lake Association, Raquette Lake Preservation Foundation.	Active invasive species program that is funded by town and grants from the Adirondack Watershed Institute, 2 active lake associations.

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Stormwater Rule

Z= Covered by

Zoning Law