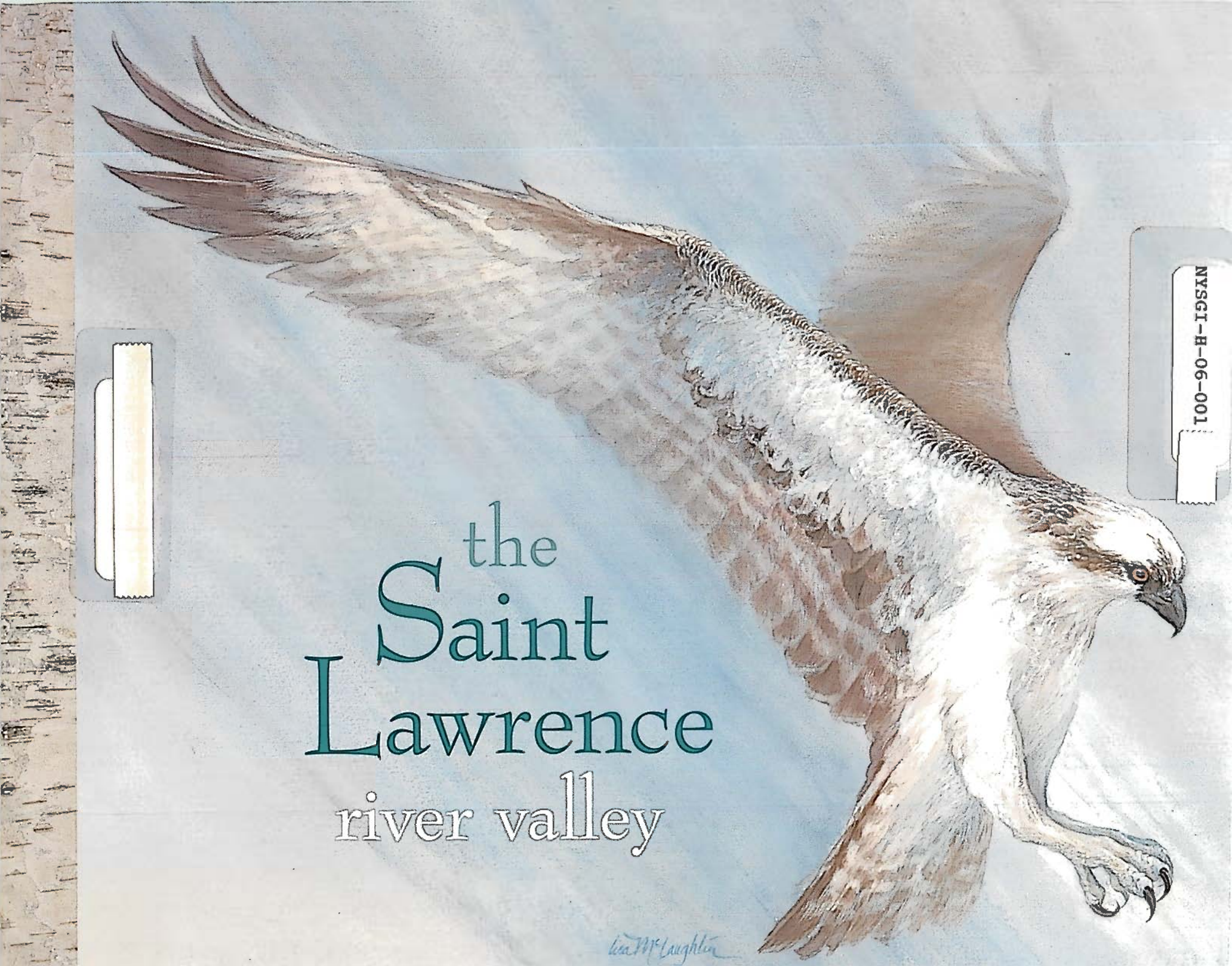
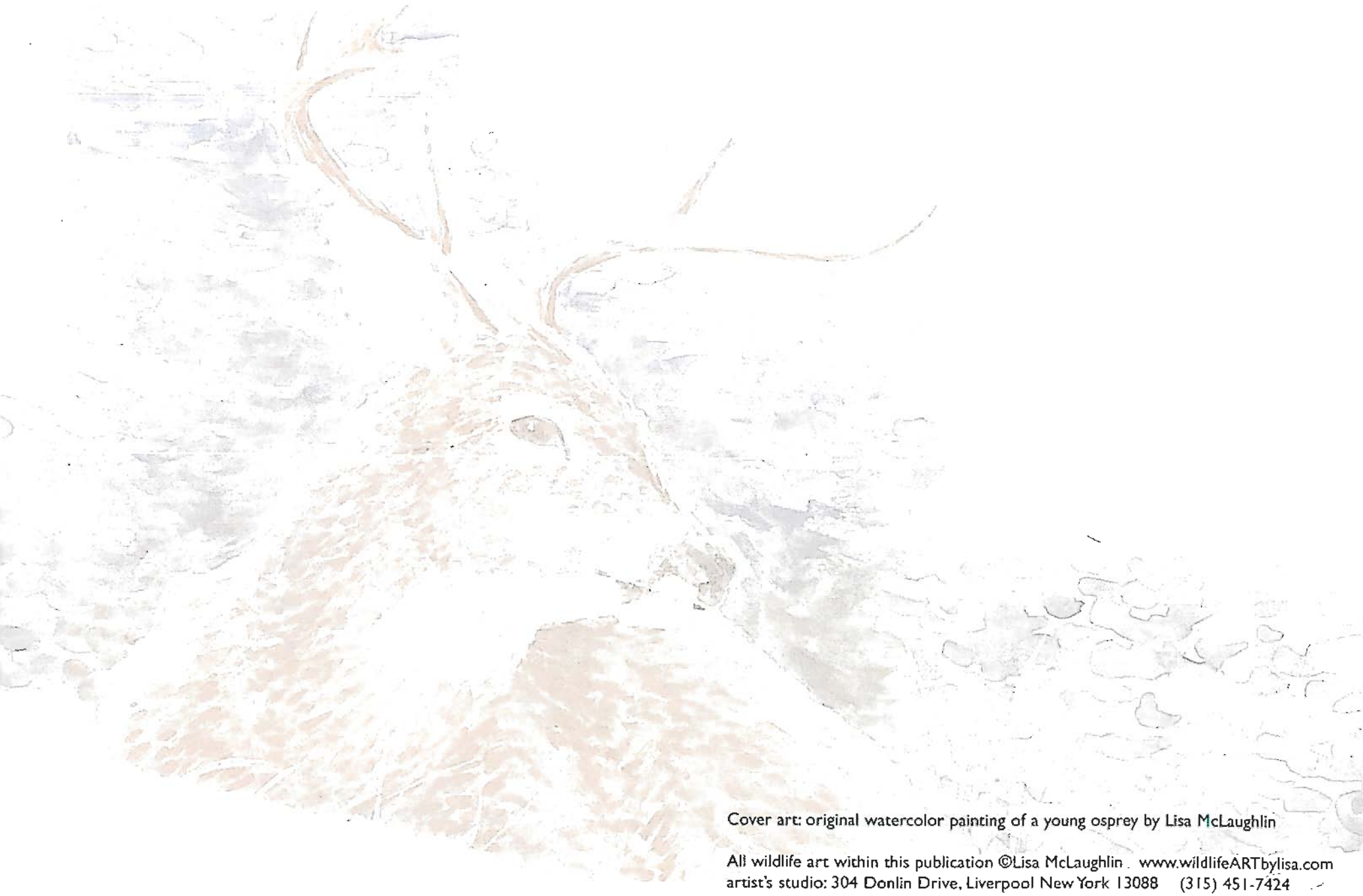




Cover art: original watercolor painting of a young osprey by Lisa McLaughlin

artist's studio: 304 Donlin Drive, Liverpool New York 13088 (315) 451-7424

contents

1 At a Glance 3

2 Demographics 5
- economies 6
- agricultural districts 7
- municipalities 8
- population 9
- land use 10-11
- shoreline land use 12
- transportation 13

3 Geographic Features 15
- precipitation 16
- elevation 17
- St. Lawrence River depth 18-19
- rivers & streams 20
- dams 21
- soils 22-23
- shoreline geology & protection 24-25

4 The Natural World 27
- watersheds 28-29
- wetlands 30-33
- flora & fauna 34-35

5 Recreation 37-41

6 Invasive Species 43-45

Photo Credits & Acknowledgements 46-47

the Saint Lawrence river valley

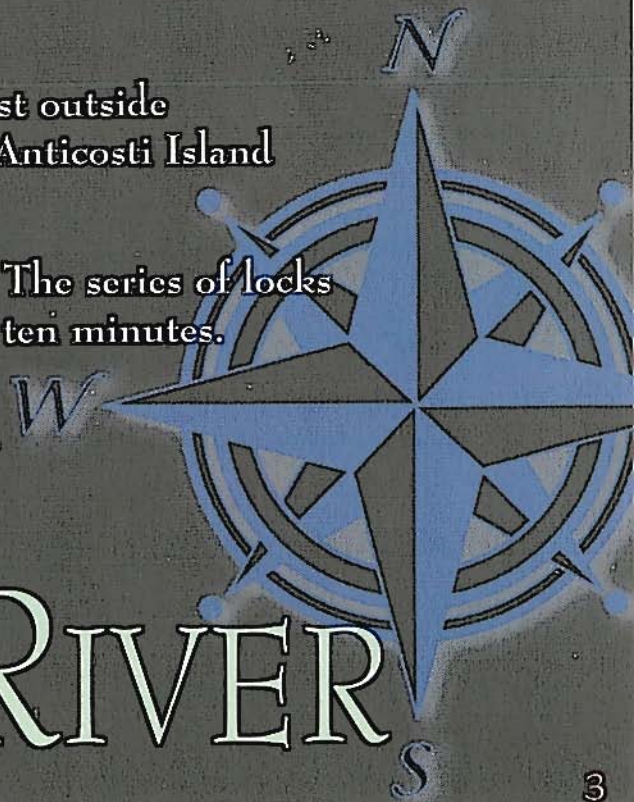
New York Sea Grant
SUNY College at Oswego
Oswego NY 13126-3599

www.nyseagrant.org

1 at a glance

New York State

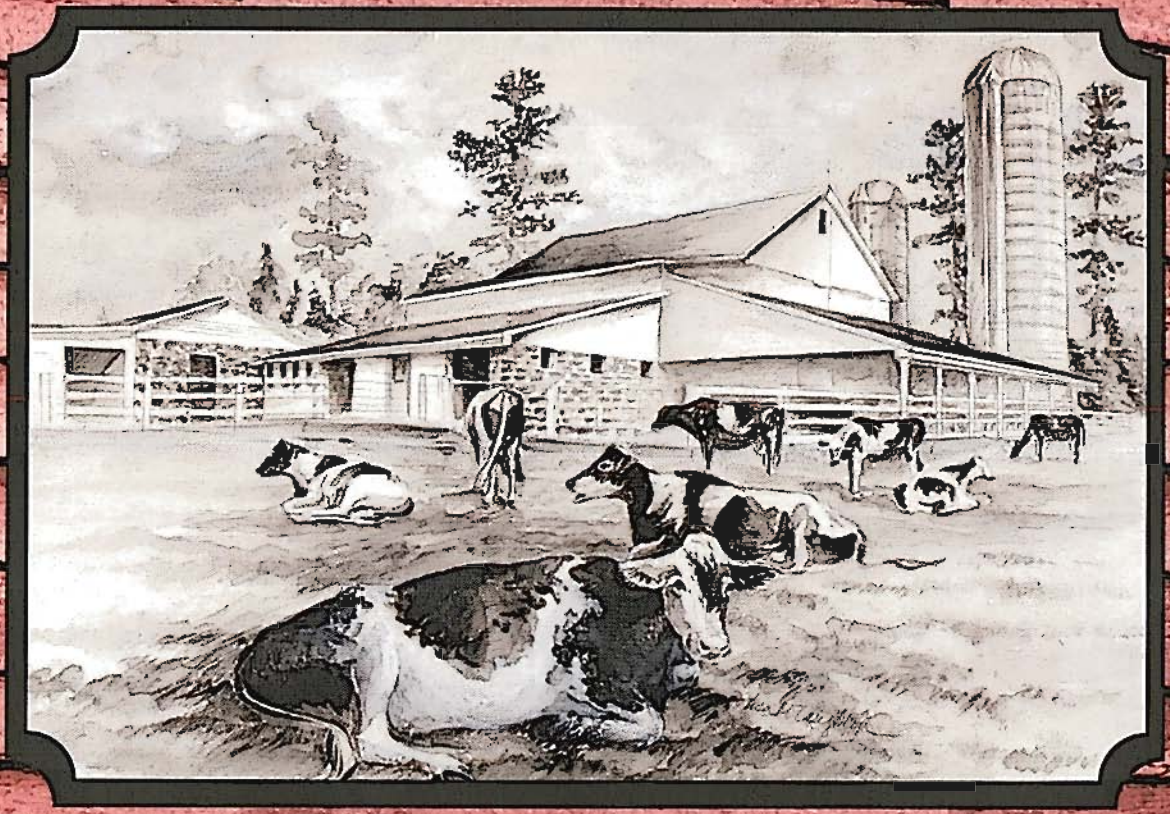
- Length: NY section—114 miles
- Length of section from Lake Ontario to Atlantic Ocean: 800 miles (1287 km)
- Greatest Depth: approximately 250 feet
- Average Width: 2 miles
- Annual Discharge Rate: 347,849 cubic feet of water per second
- Number of "1000 Islands"—1864
- Drainage area: U.S.—194,981 mi^2 (505,000 km^2); Canada—324,017 mi^2 (839,200 km^2)
  Total Drainage area—518,996 mi^2 (1,344,200 km^2)
- Mohawk name: *Kanaiatarowenenneh* "Big Waterway"
- Value of Goods Transported Annually on River: $80 billion
- River Segments: the freshwater river extends from Lake Ontario to just outside the city of Quebec; the St. Lawrence estuary extends from Quebec to Anticosti Island and the Gulf of St. Lawrence leads into the Atlantic Ocean
- The St. Lawrence Seaway took 15,000 people and four years to build. The series of locks allows ships up to 760 feet long to raise or lower more than 40 feet in ten minutes.



References
St. Lawrence River history...a summary and links www.vsr.cape.com/~powens/riverhistory.htm
The Atlas of Canada http://atlas.gc.ca

Saint Lawrence River

2

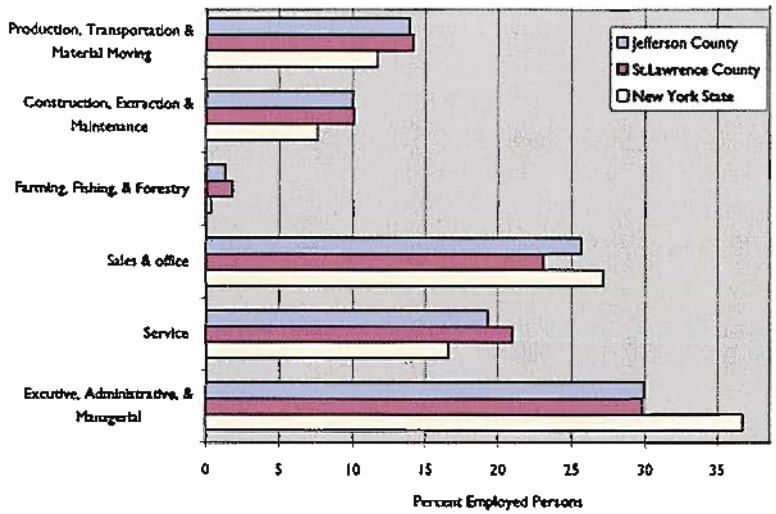


demographics

Jefferson and St. Lawrence Counties have historically had rural resource-based economies. Early settlers established a prosperous agricultural, industrial and mercantile tradition.

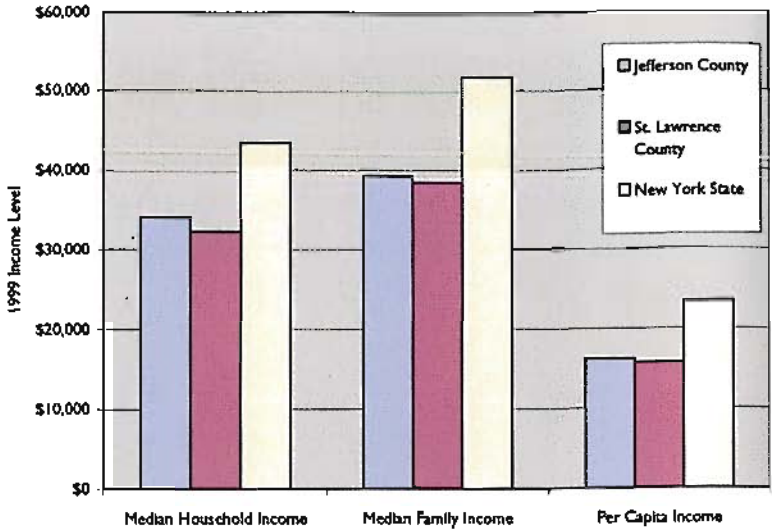
In Jefferson County, dairy farming, food processing and paper-making have been major industries. Cotton yarns, woolen yarns, carriages, sewing machines, water pumps, oil lamps, plows, papermaking machinery, and turbine starting systems were produced. Currently, dairy farming, food processing and papermaking, along with the manufacture of: railroad equipment, industrial machinery and medical equipment are important to the local economy. Tourism developed around the Thousand Island region, with sport fishing, boating and winter recreation leading in popularity. Total visitor expenditures were $162.24 million in 2003. At least 15% of the total workforce was employed in tourism in 2004. North of Watertown, Fort Drum, is home to the 10th Mountain Division. The 2000 Census stated that Fort Drum had a population of 12,123, with 2,253 households, and 2,203 families. Recent expansions enhance the economy.

% Employment by Occupation, Census 2000



St. Lawrence County is especially suited for dairy farming, timber harvest, aluminum, zinc and talc mining. In 2000, the county led the state in farm acreage with 403,000 acres, and had the second highest number of farms: 1,625. The 2002 census reported 403,364 acres, 1,451 farms and 33rd in the nation for milk production. Other agricultural industries include cheese, beef and maple syrup. Current employment in St. Lawrence County is primarily in non-manufacturing, including: government, retail trade and the service industry. Manufacturing accounts for approximately 19% of the labor force. Products manufactured include aluminum and electronics assembly. Electricity is generated at the Robert H. Moses Power Dam in Massena and numerous other hydro-generation facilities along the Oswegatchie, Raquette and St. Regis Rivers. According to the St. Lawrence County Chamber of Commerce, skiing, fishing and hunting generate $54 million for residents, contributing about $1.6 million in sales tax revenues. In 2003, visitor expenditures totaled $80.58 million. In 2004 at least 12% of the total county workforce was in tourism.

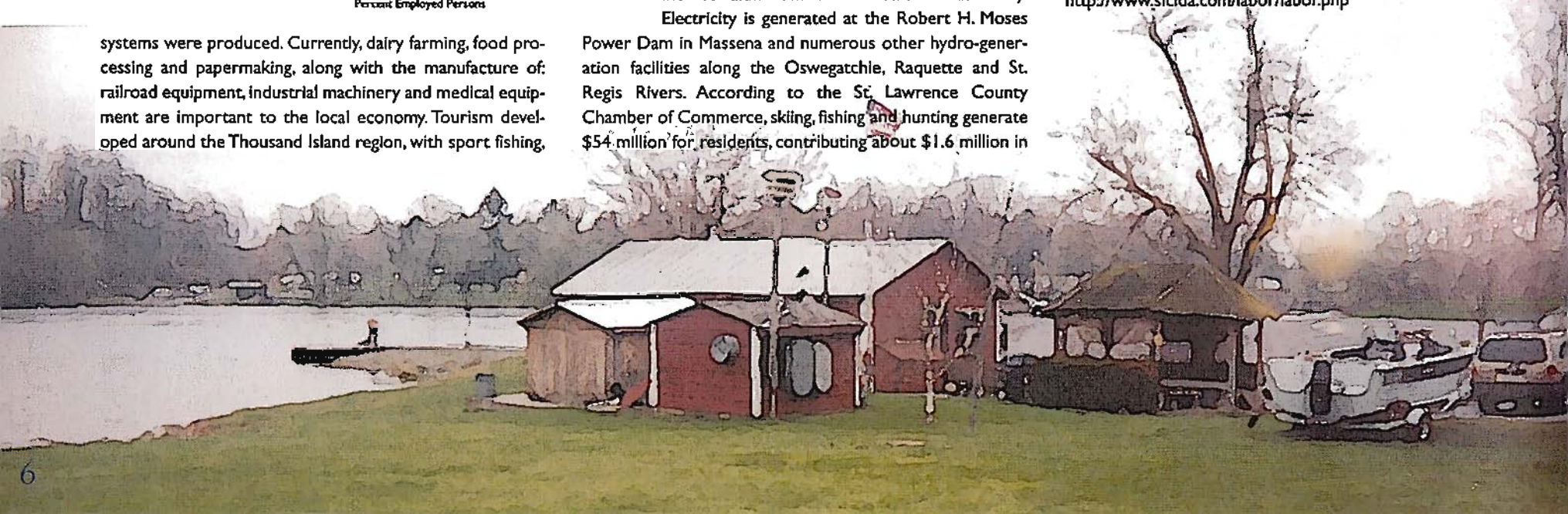
Income Levels, Census 2000



References

Northern New York Travel & Tourism Center
http://nnytourismresearch.org

St. Lawrence County Industrial Development Agency
http://www.slcida.com/labor/labor.php



Agriculture is an important part of the economies of Jefferson and St. Lawrence counties. Both consistently rank in the top 10 for many agriculture categories in the state. Such rankings include:

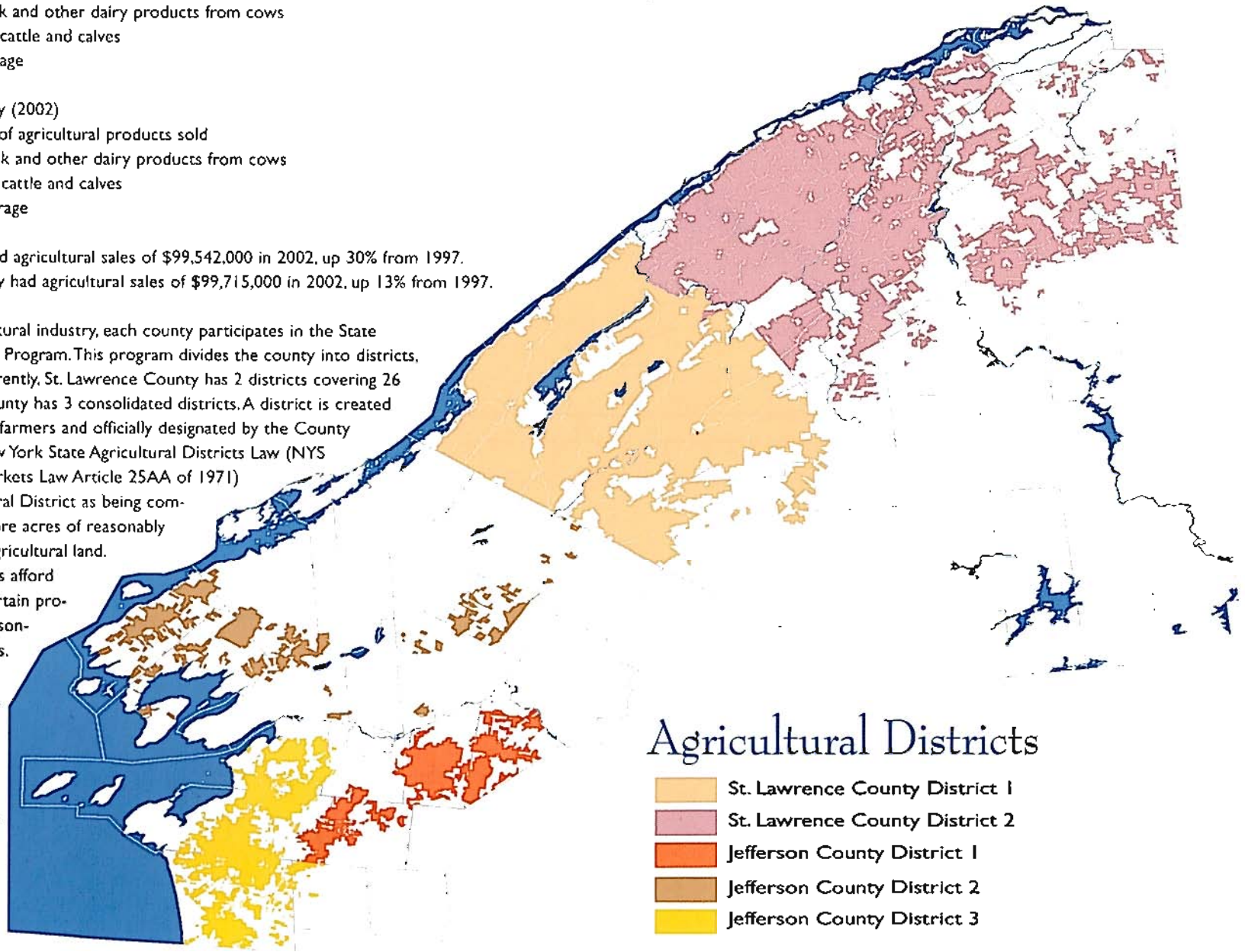
Jefferson County (2002)
- 7th for total value of agricultural products sold
- 4th for sales of milk and other dairy products from cows
- 3rd for number of cattle and calves
- 1st for acres of forage

St. Lawrence County (2002)
- 6th for total value of agricultural products sold
- 2nd for sales of milk and other dairy products from cows
- 2nd for number of cattle and calves
- 2nd for acres of forage

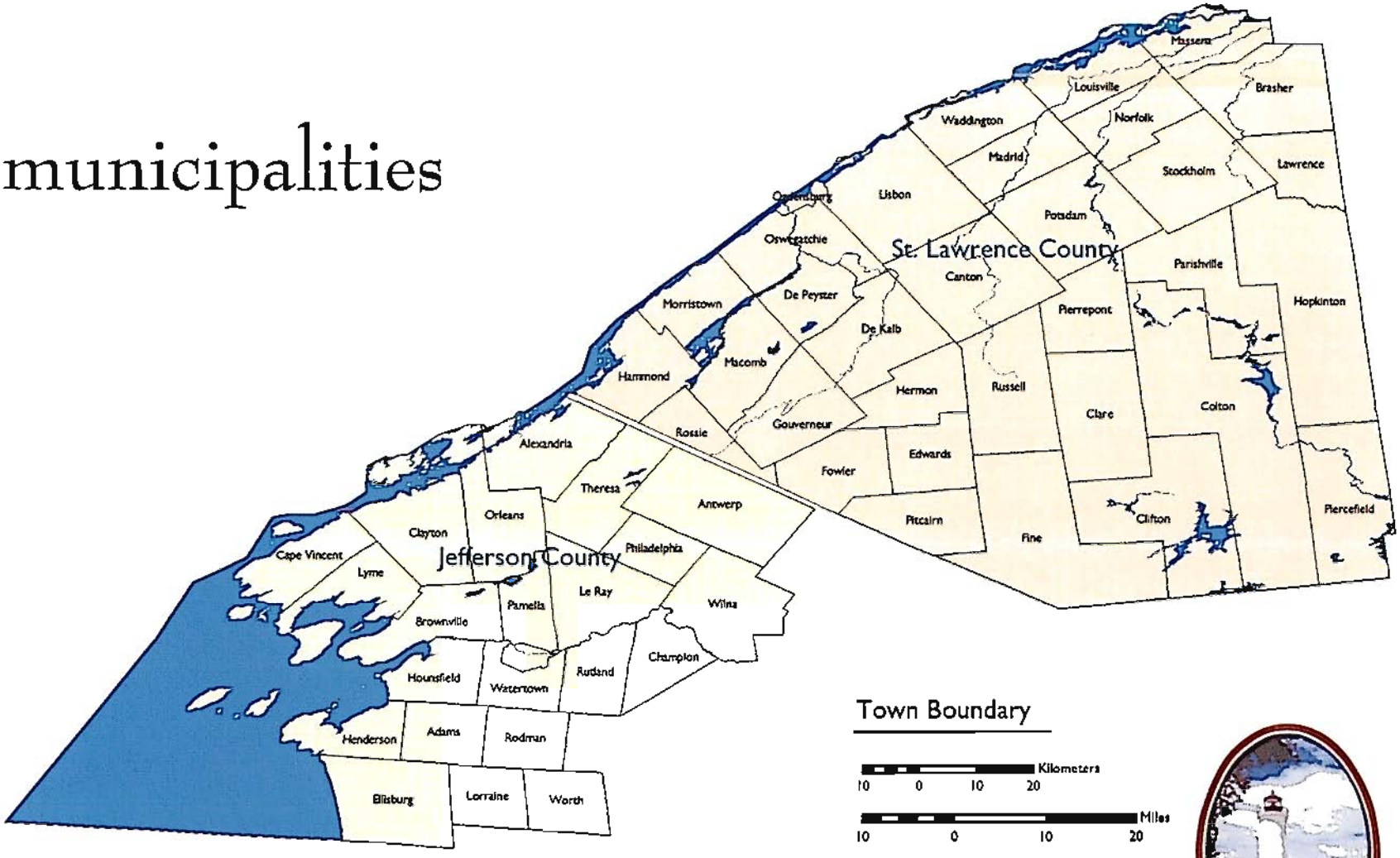
Jefferson County had agricultural sales of $99,542,000 in 2002, up 30% from 1997.
St. Lawrence County had agricultural sales of $99,715,000 in 2002, up 13% from 1997.

To assist the agricultural industry, each county participates in the State Agricultural District Program. This program divides the county into districts, as shown here. Currently, St. Lawrence County has 2 districts covering 26 towns; Jefferson County has 3 consolidated districts. A district is created through petition by farmers and officially designated by the County Legislature. The New York State Agricultural Districts Law (NYS Agricultural and Markets Law Article 25AA of 1971) defines an Agricultural District as being comprised of 500 or more acres of reasonably contiguous, viable agricultural land. Agricultural Districts afford enrolled farmers certain protections from unreasonable local regulations. They also require state agency policies supporting the continuation of farming in the districts, and provide for special review of the use of eminent domain.

Runoff from farm fields can affect nearby water sources. An excess of phosphorus, for example, can cause eutrophication, an algae bloom that disturbs the aquatic habitat of lakes and streams. Programs such as the Northern New York Agricultural Development Program provide farmers with current information for balancing agricultural practices with environmental protection.



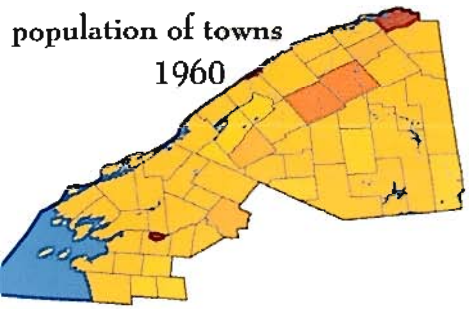
municipalities



Jefferson and St. Lawrence counties are the two U. S. counties bordering the St. Lawrence River. Jefferson County has 22 towns, 20 incorporated villages and one city. It is the 9th largest county in New York, encompassing 1293 mi². Watertown is the county seat.

St. Lawrence County has 32 towns, 13 villages and one city. It is the 5th largest U.S. County east of the Mississippi, and the largest county in New York, encompassing 2685 mi². Canton is the county seat.

population



The ethnicity breakdown in Jefferson County, for the year 2000:

Non-Hispanic White	87.2%
Non-Hispanic Black/African American	5.5%
Hispanic/Latino population	4.0%
Non-Hispanic other/Multiracial	1.5%
Non-Hispanic Asian, Hawaiian and Pacific Islander	1.2%
Non-Hispanic American Indian/Alaska Native	0.5%

The ethnicity breakdown in St. Lawrence County, for the year 2000 :

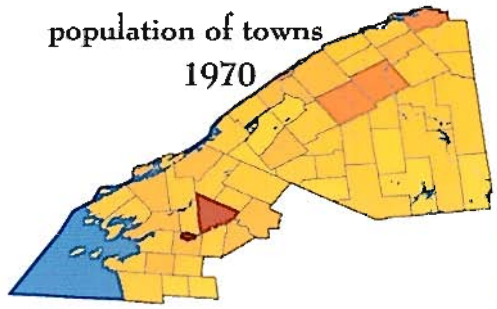
Non-Hispanic White	93.7%
Non-Hispanic Black/African American	2.2%
Hispanic/Latino population	1.7%
Non-Hispanic other/Multiracial	0.7%
Non-Hispanic Asian, Hawaiian and Pacific Islande	0.6%
Non-Hispanic American Indian/Alaska Native	0.9%

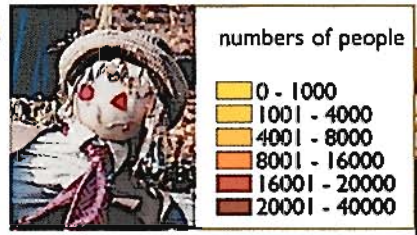
Jefferson County Population centers:

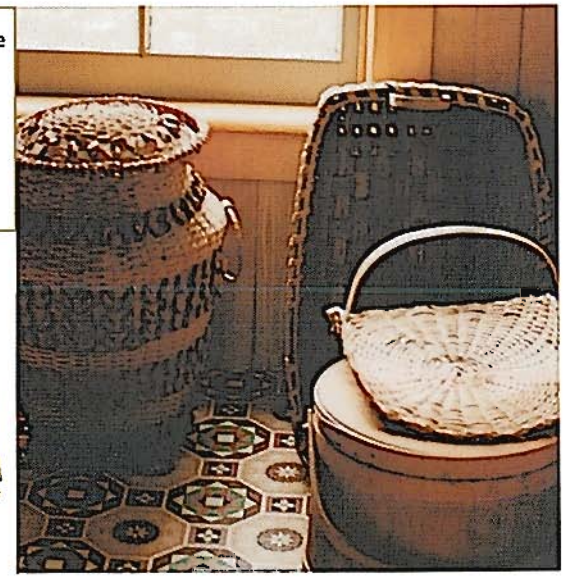
City of Watertown	26,705
Fort Drum	12,123
Carthage	3,667
Villiage of Clayton	1,944
Sackets Harbor	1,385

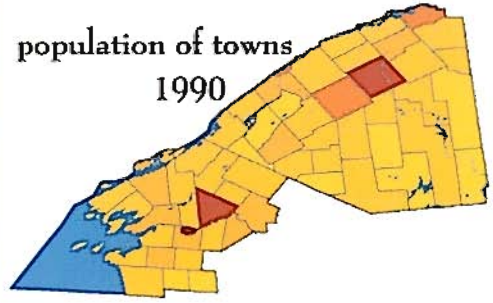
St. Lawrence County Population centers:

City of Ogdensburg	12,358
Massena	11,222
Villiage of Potsdam	9,513
Villiage of Canton	5,698
City of Gouverneur	4,512



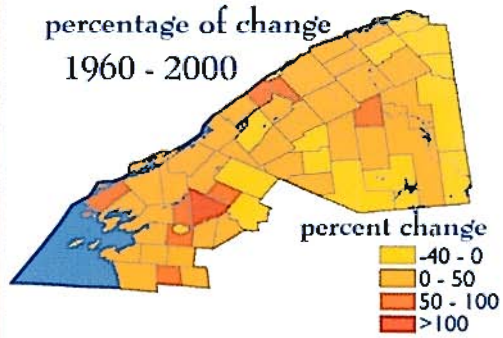


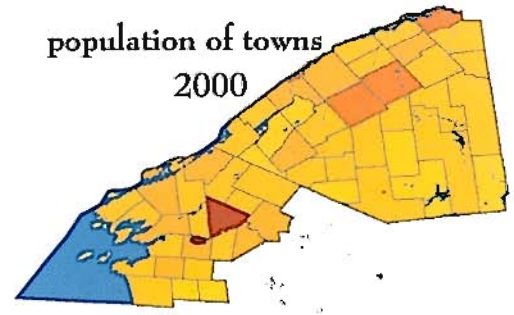


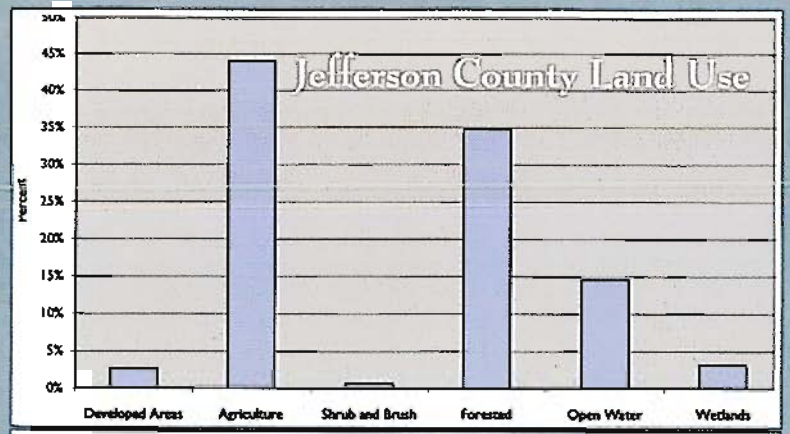


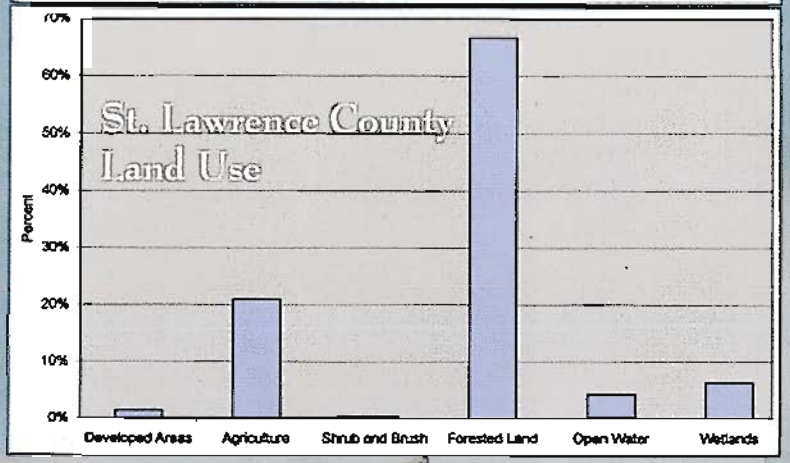
According to the 2000 Census, 111,738 people lived in Jefferson County and 111,919 lived in St. Lawrence County. The 2000 Population of Towns Map shows the population distribution by towns in each county. The population density of Jefferson County was 88 persons per square mile in 2000. St. Lawrence County had a population density of 41 persons per square mile in 2000.

The Percentage of Change 1960-2000 map shows the population changes by town between 1960 and 2000. The total population of Jefferson County increased 27.2% between 1960 and 2000. From 1980 to 1990, Jefferson County had the highest growth rate of any New York State county (26%), 1990 largely due to the development of Fort Drum. The total population of St. Lawrence County increased 0.6% between 1960 and 2000.

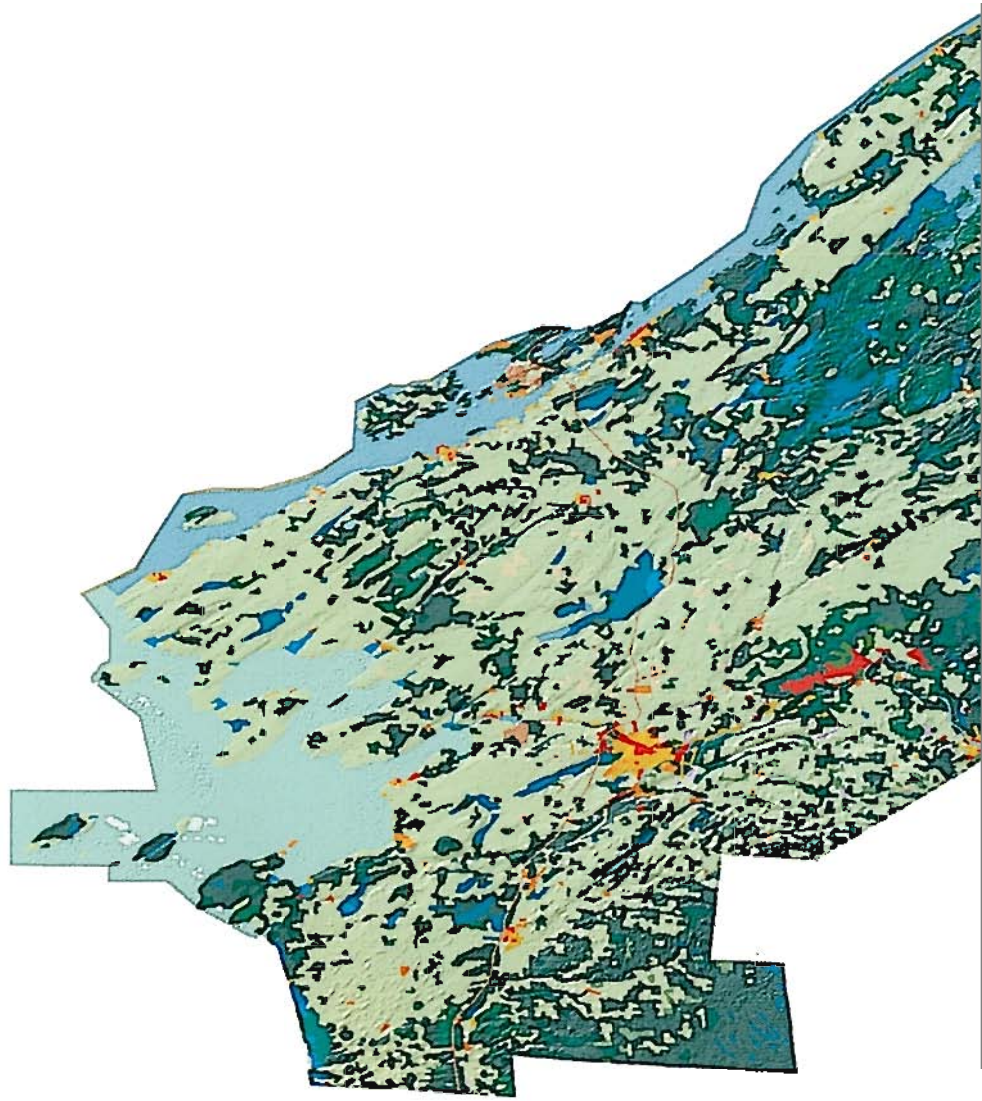


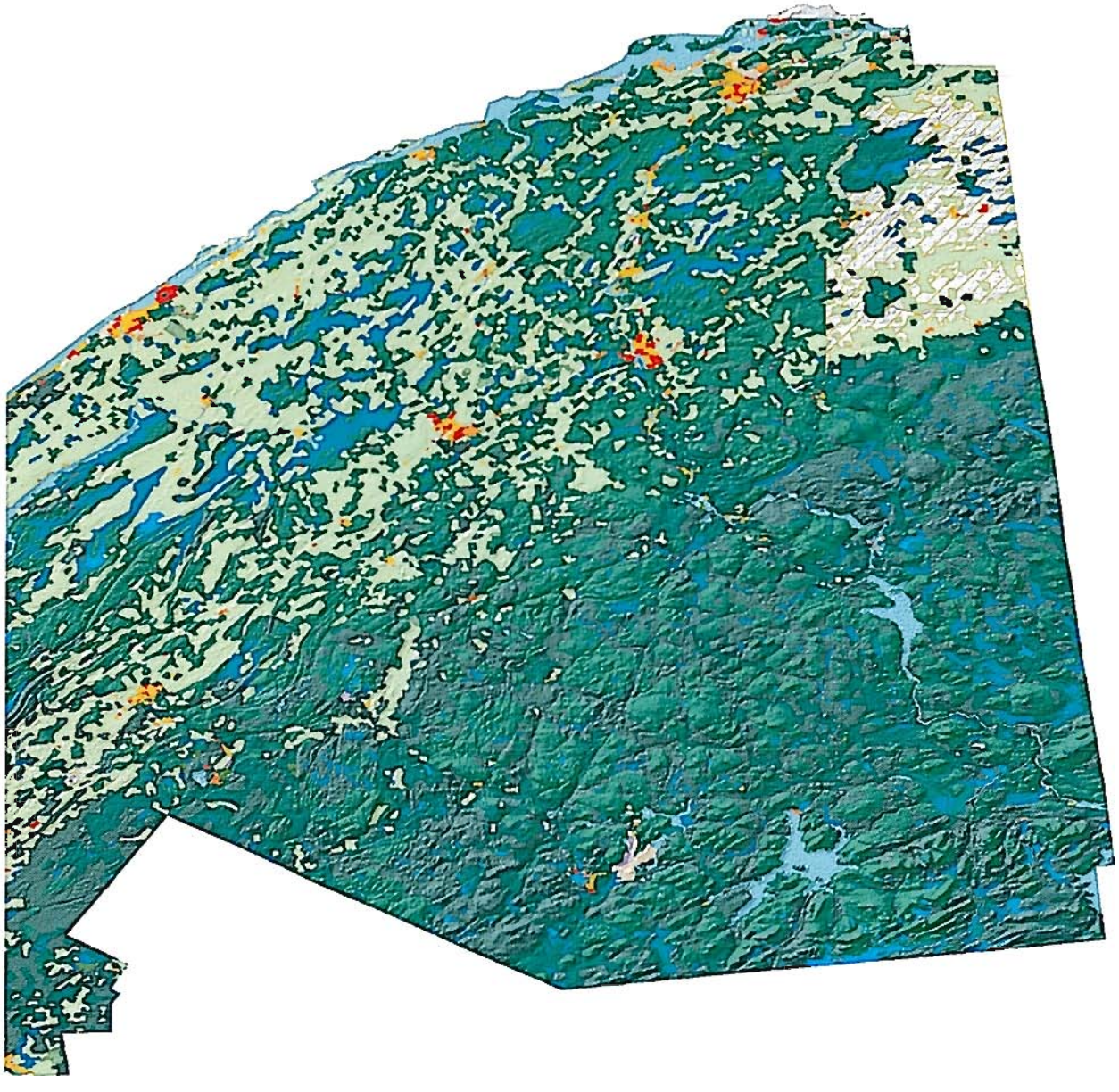



Jefferson County Land Use
Percent
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Developed Areas
Agriculture
Shrub and Brush
Forested
Open Water
Wetlands


St. Lawrence County
Land Use
Percent
60%
50%
40%
30%
20%
10%
0%
Developed Areas
Agriculture
Shrub and Brush
Forested Land
Open Water
Wetlands

land use





Land Use Categories

- Commercial & Service
- Industrial
- Residential
- Transportation & Utilities
- Mixed Urban or Built Up Land
- Other Urban or Built Up Land
- Cropland & Pasture
- Orchards, Groves, & Vineyards
- Other Agriculture
- Shrub & Brush
- Broadleaf Forest
- Conifer Forest
- Mixed Forest
- Lakes
- Streams & Canals
- Reservoirs
- Forested Wetlands
- Non-forested Wetlands
- Bogs & Estuaries
- Strip mines, Quarries, & Gravel Pits
- Transitional Areas
- Sandy Areas
- No Information Available

shoreline land use

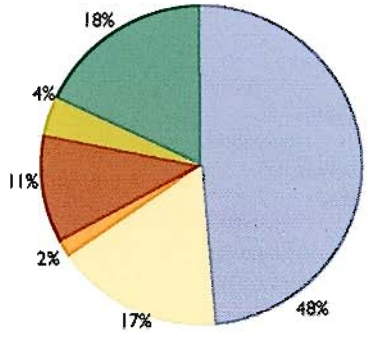
In 2000, the International Joint Commission initiated the Lake Ontario-St. Lawrence River Water Level Regulation Study. The goal of this five-year study was to "assess and evaluate the current criteria used for regulating water levels on Lake Ontario and the St. Lawrence River." (Stewart, 2004)

Part of this study included the mapping of shoreline usage in kilometer segments along the Lake Ontario and St. Lawrence River shorelines. The charts on this page show the results of this mapping effort in St. Lawrence and Jefferson counties. The counties were divided into four regions as follows:

Region 1 – Lake St. Lawrence
Region 2 – Morrisburg to Jones Creek Marsh
Region 3 – Chippewa Point to Wolfe Island
Region 4 – Tibbetts Point to Stony Creek

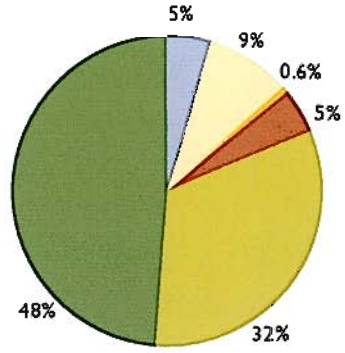
Results of the analysis show shoreline land use in Region 1 is 80% natural areas or open space. Residential/cottage use dominates the shoreline use in Regions 2, 3 and 4. Region 2 has the highest amount of shoreline classified as industrial at 17%.

Planners can use this data to analyze the current shoreline land use and plan for future land use. This data also provides baseline information for analyzing changes in land use in the future.



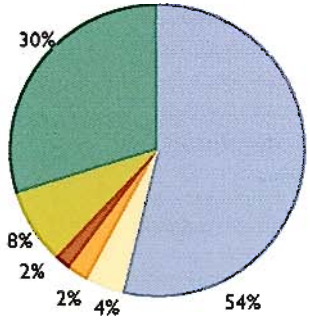
Region 2

- Residential / Cottage
- Industrial / Commercial
- Transportation
- Agriculture
- Parks and Rec. Areas
- Natural



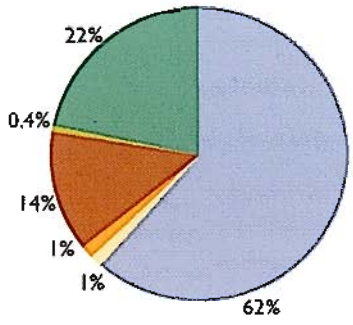
Region 1

- Residential / Cottage
- Industrial / Commercial
- Transportation
- Agriculture
- Parks and Rec. Areas
- Natural



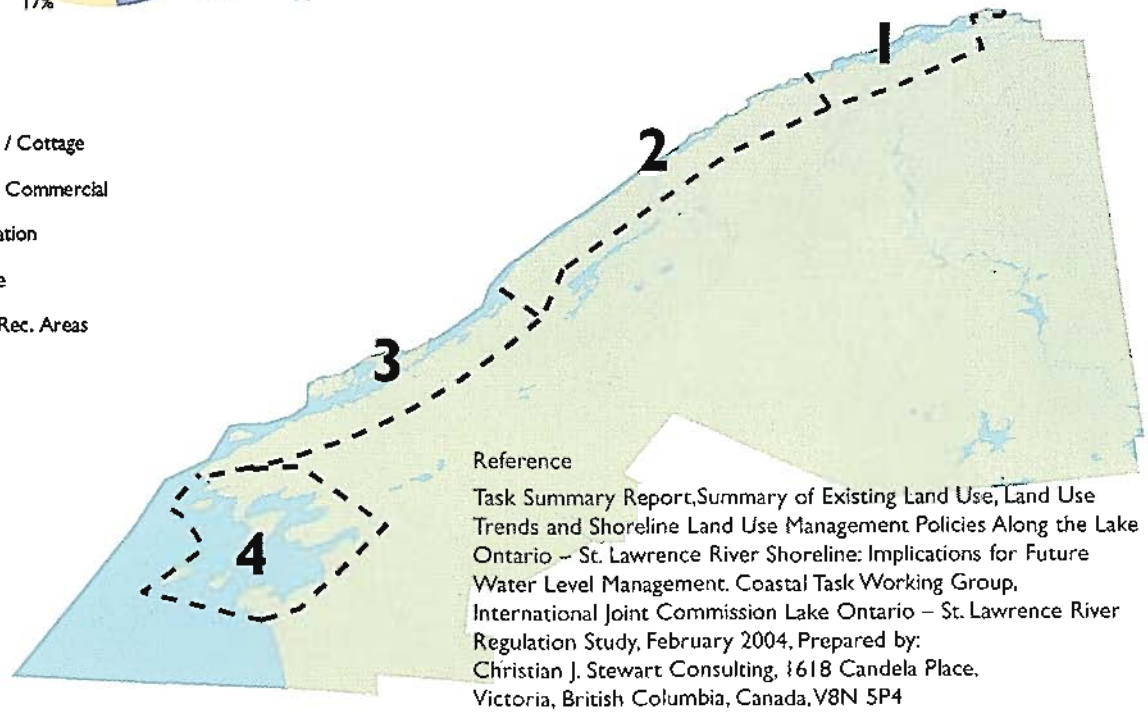
Region 3

- Residential / Cottage
- Industrial / Commercial
- Transportation
- Agriculture
- Parks and Rec. Areas
- Natural



Region 4

- Residential / Cottage
- Industrial / Commercial
- Transportation
- Agriculture
- Parks and Rec. Areas
- Natural



Reference

Task Summary Report, Summary of Existing Land Use, Land Use Trends and Shoreline Land Use Management Policies Along the Lake Ontario – St. Lawrence River Shoreline: Implications for Future Water Level Management. Coastal Task Working Group, International Joint Commission Lake Ontario – St. Lawrence River Regulation Study, February 2004. Prepared by:

Christian J. Stewart Consulting, 1618 Candela Place, Victoria, British Columbia, Canada, V8N 5P4
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e-mail: cstewart@cjscons.com

Transportation infrastructure in Jefferson and St. Lawrence counties consists of a variety of roadways, railways, airports and waterways. The proximity of both counties to Canada allows for cross-border trade and travel via ports and bridges along the St. Lawrence.

Interstate 81 is the major north/south highway in the region. It connects to Canada's Highway 401 via the 1000 Islands Bridge in Jefferson County. St. Lawrence County is connected to I-81 via New York State Routes 11 and 37. The region has three international border crossings: Seaway International Bridge in Massena, Ogdensburg-Prescott International Bridge in Ogdensburg, and the 1000 Islands Bridge between Wellesley Island in the U.S. and Hill Island, Ontario, Canada.

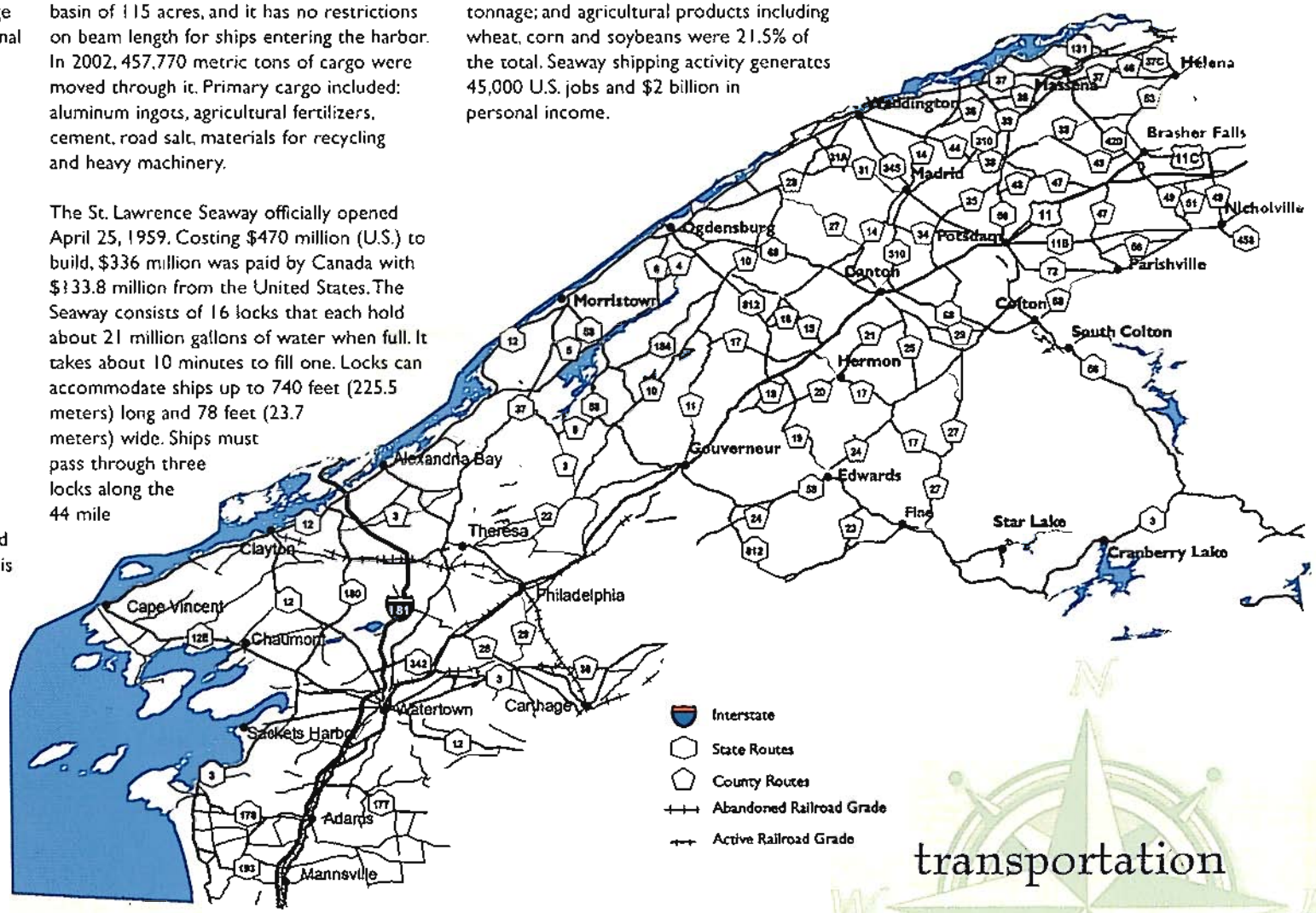
The Seaway Trail, a federally-designated National Scenic Byway, runs parallel to the St. Lawrence River and Lake Ontario in St. Lawrence and Jefferson counties. This route is also a National Recreation Trail continuing west along Lake Ontario, the Niagara River and along Lake Erie in New York and Pennsylvania. The Seaway Trail region is promoted by several public and private organizations for its scenic, natural, historic, archaeological, cultural and recreational resources.

CSX Transportation, the largest freight railroad system in the Northeastern U.S., provides commercial rail service in Jefferson and St. Lawrence counties. St. Lawrence County is also served by the St. Lawrence Railroad—approximately 22 miles of shortline track between Norfolk and Norwood and between Norwood and Ogdensburg.

Watertown International Airport serves Jefferson County. Richards Field, Massena, and Ogdensburg International Airports serve St. Lawrence County.

The Port of Ogdensburg is the only Great Lakes port designated as a Port of National Defense. It is also Foreign Trade Zone-qualified. Owned and operated by the Ogdensburg Bridge and Port Authority, the port has two berths at 1,250 feet in length with a main channel depth of 27 feet. In 2002, 108,488 metric tons of cargo moved through this port. Primary cargo included: talc, road salt, limestone, grain and zinc concentrate. The Port of Oswego in Oswego County is the first U. S. port of call on Lake Ontario and the Great Lakes from the Atlantic and the St. Lawrence Seaway. The port has an entrance depth of 27 feet, a width of 750 feet, a turning basin of 115 acres, and it has no restrictions on beam length for ships entering the harbor. In 2002, 457,770 metric tons of cargo were moved through it. Primary cargo included: aluminum ingots, agricultural fertilizers, cement, road salt, materials for recycling and heavy machinery.

The St. Lawrence Seaway officially opened April 25, 1959. Costing $470 million (U.S.) to build, $336 million was paid by Canada with $133.8 million from the United States. The Seaway consists of 16 locks that each hold about 21 million gallons of water when full. It takes about 10 minutes to fill one. Locks can accommodate ships up to 740 feet (225.5 meters) long and 78 feet (23.7 meters) wide. Ships must pass through three locks along the 44 mile (71 km) International Section of the Seaway. These are the Bertrand H. Snell Lock and the Eisenhower Lock near Massena, NY, and the Iroquois Lock north of Ogdensburg, NY. It takes approximately 8.5 days for a ship to travel the 2,038 nautical miles (2,342 statute miles or 3,700 kilometers) from the Atlantic Ocean to Duluth, Minnesota. An average of 50 million tons of cargo are transported annually on the Seaway. In 2004, mine products such as iron ore, coal and salt accounted for 50% of the total annual tonnage; processed products such as iron and steel were 28% of the total tonnage; and agricultural products including wheat, corn and soybeans were 21.5% of the total. Seaway shipping activity generates 45,000 U.S. jobs and $2 billion in personal income.



References

Great Lakes St. Lawrence Seaway System
www.greatlakes-seaway.com/

Jefferson County Job Development Corp.
800 Starbuck Avenue, Suite 100
Watertown NY 13602
phone 315-782-5865 www.jcjdc.net/

St. Lawrence County
Industrial Development Agency
www.slcida.com/labor/labor.php

transportation

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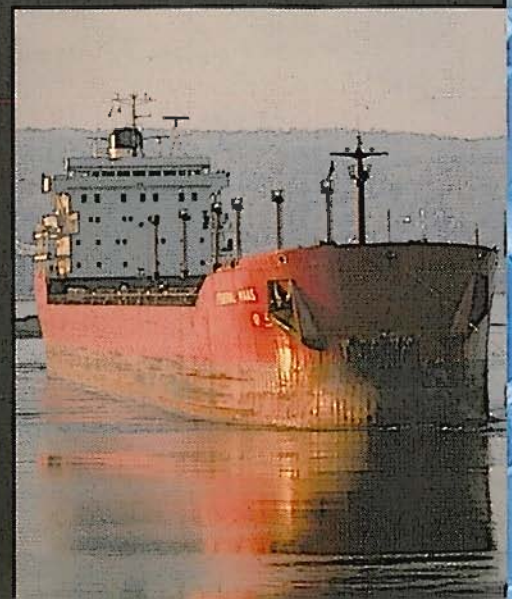
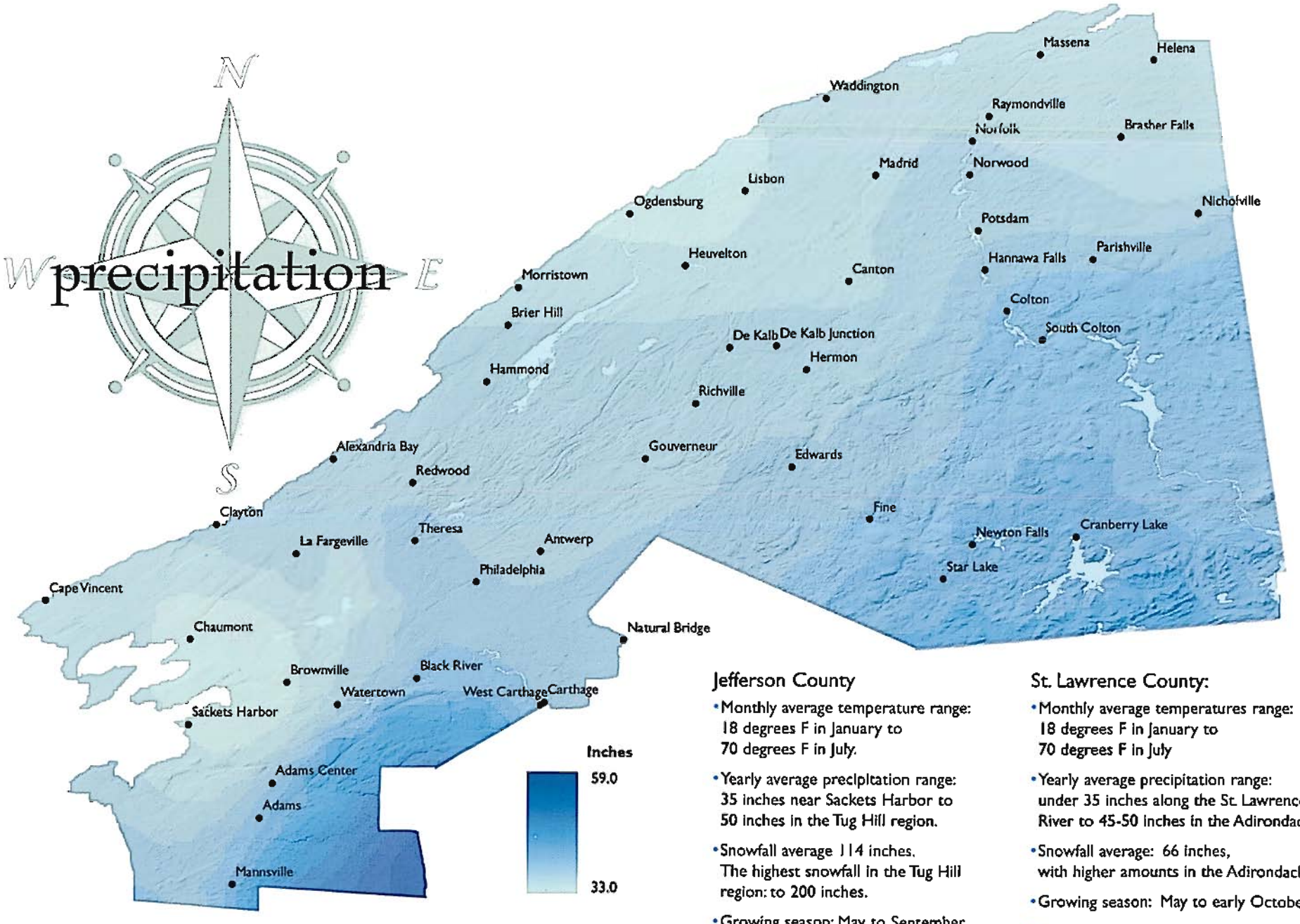
geographic features





Jefferson County

- Monthly average temperature range: 18 degrees F in January to 70 degrees F in July.
- Yearly average precipitation range: 35 inches near Sackets Harbor to 50 inches in the Tug Hill region.
- Snowfall average 114 inches. The highest snowfall in the Tug Hill region: to 200 inches.
- Growing season: May to September.
- First frost expected between September 20 in higher regions to October 20 along the lake and river shorelines.

St. Lawrence County:

- Monthly average temperatures range: 18 degrees F in January to 70 degrees F in July
- Yearly average precipitation range: under 35 inches along the St. Lawrence River to 45-50 inches in the Adirondacks.
- Snowfall average: 66 inches, with higher amounts in the Adirondacks.
- Growing season: May to early October
- First frost expected between September 10 in higher regions to October 20 near the St. Lawrence River.

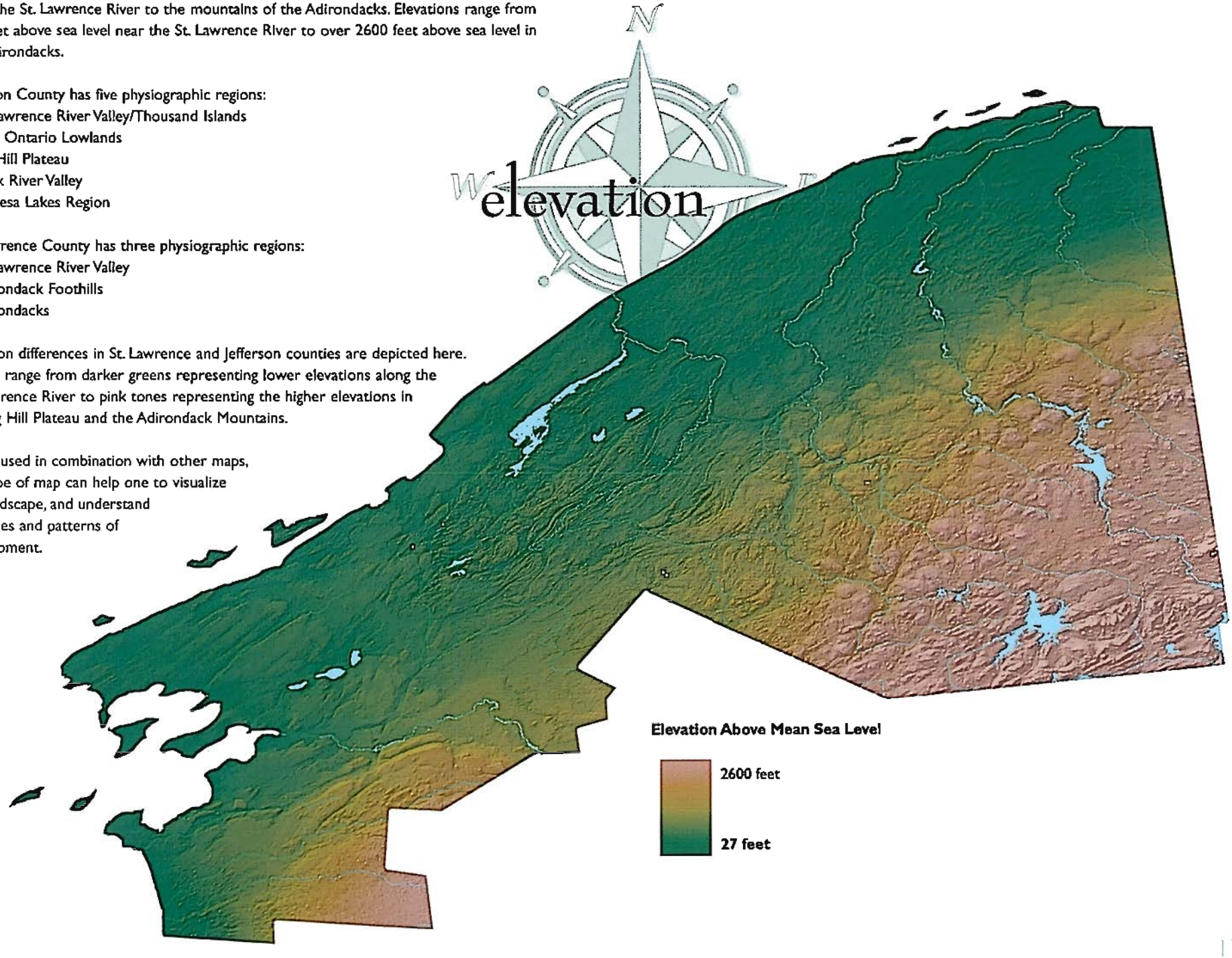
The landscape of Jefferson and St. Lawrence counties ranges from level and gently sloping along the St. Lawrence River to the mountains of the Adirondacks. Elevations range from 224 feet above sea level near the St. Lawrence River to over 2600 feet above sea level in the Adirondacks.

Jefferson County has five physiographic regions:
1. St. Lawrence River Valley/Thousand Islands
2. Lake Ontario Lowlands
3. Tug Hill Plateau
4. Black River Valley
5. Theresa Lakes Region

St. Lawrence County has three physiographic regions:
1. St. Lawrence River Valley
2. Adirondack Foothills
3. Adirondacks

Elevation differences in St. Lawrence and Jefferson counties are depicted here. Colors range from darker greens representing lower elevations along the St. Lawrence River to pink tones representing the higher elevations in the Tug Hill Plateau and the Adirondack Mountains.

When used in combination with other maps, this type of map can help one to visualize the landscape, and understand land uses and patterns of development.



The St. Lawrence has undergone dramatic alterations since the early settlement of the area. Canals were built around the Lachine Rapids, upstream from Montreal, beginning in 1680, completed in 1824. From 1780 - 1804, lock canals, nine ft. deep, were constructed between Lake Ontario and Montreal. Deepened in 1875, the canals accepted ships with a 14 ft. draft. Additional canals were constructed at Soulange, Cornwall and Welland, thus allowing small vessels to travel up the river to the Great Lakes. After years of discussion and debate, the St. Lawrence Seaway was completed in 1959, at a cost of $470 million. The construction required: building two American locks; five Canadian locks; two ship channels and extensive dredging.

This diagram shows alterations in river bedrock and water surface profile. Annual water fluctuations were modified from 6 ft. to 4 ft. after the construction of the Seaway. Ships with less than a 26 ft. draft can now use the river west of Montreal. The total length of the St. Lawrence Seaway is over more than 2,200 miles and ascends 600 ft. through seven locks in the St. Lawrence River, eight locks through the Welland Canal, and one lock at Sault Ste. Marie. The St. Lawrence River locks ascend 225 ft. in the 190-mile section from Montreal Harbor to Lake Ontario. There are over 15 major ports, including the Port of Ogdensburg in St. Lawrence County.

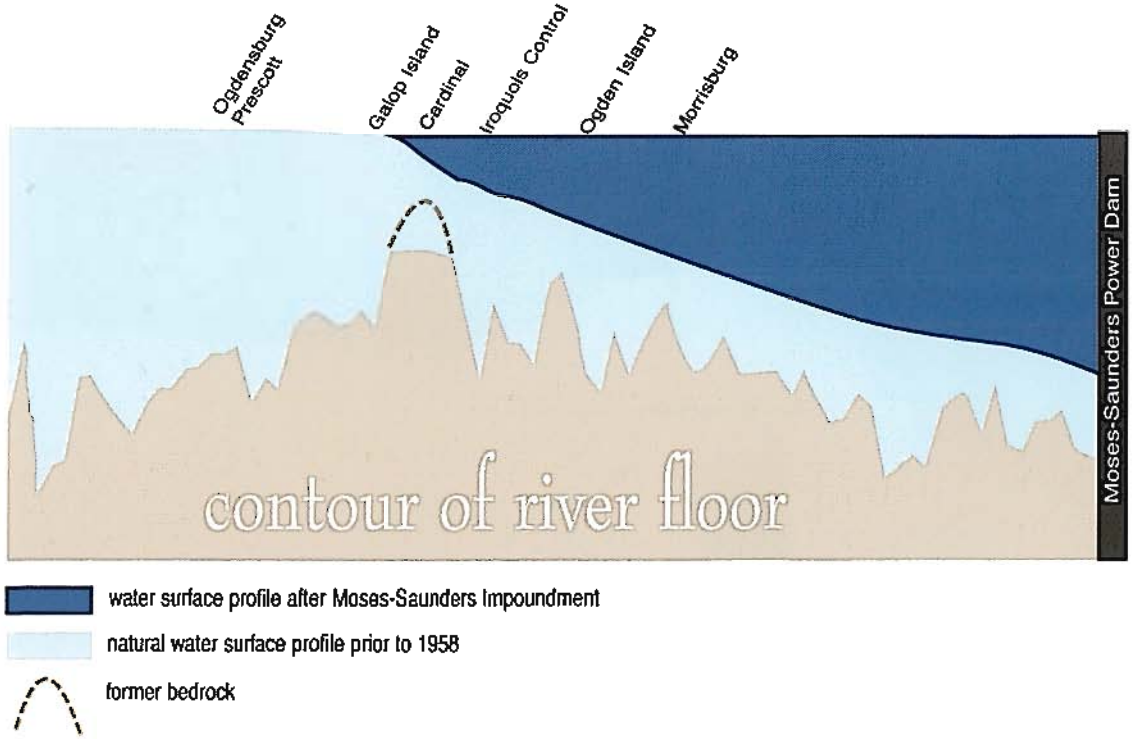
References

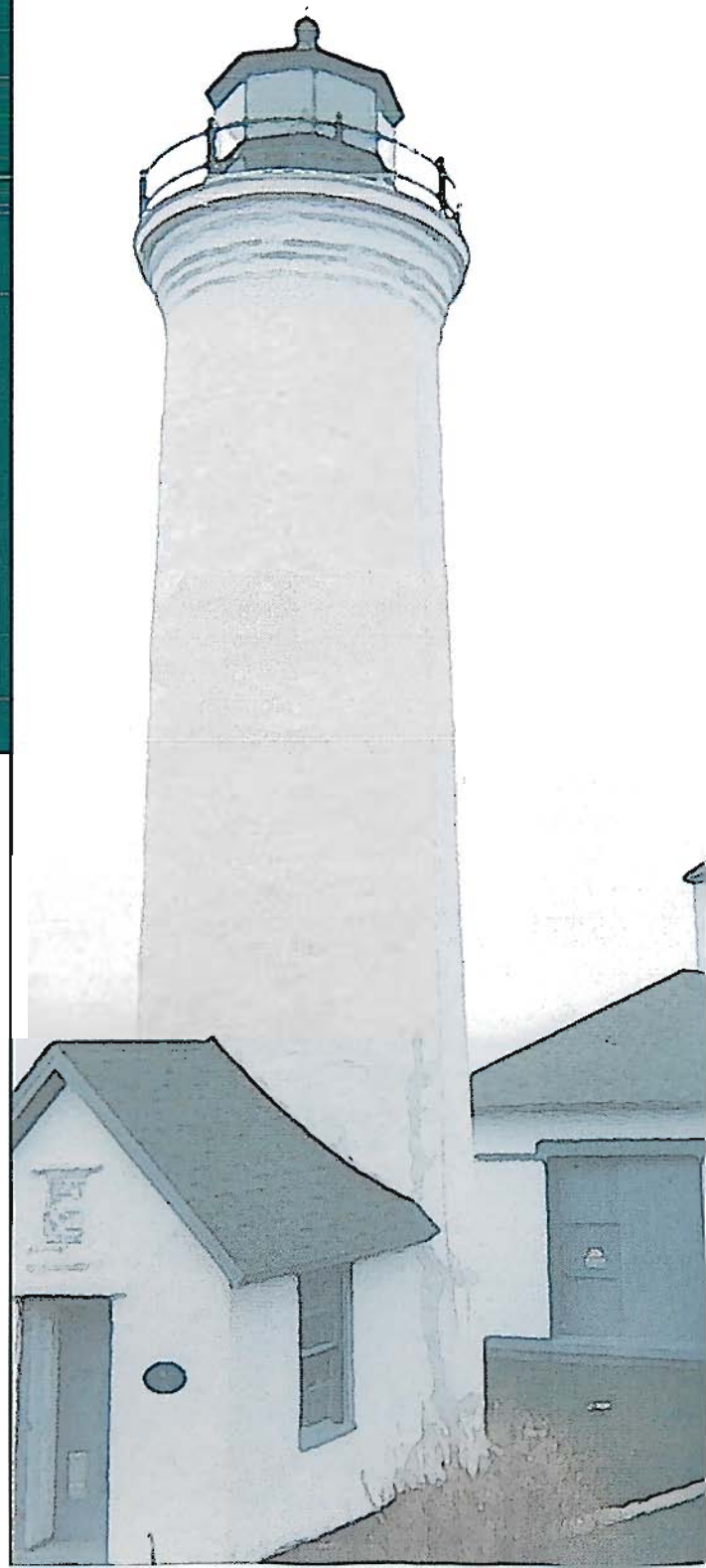
Saint Lawrence Seaway Development Corp.
180 Andrews Street, Massena NY 13662
315-764-3200, www.seaway.dot.gov

Save the River, 409 Riverside Drive, Clayton NY 13624, 315-686-2010 www.savetheriver.org/

U.S. Army Corps of Engineers, www.usace.army.mil/

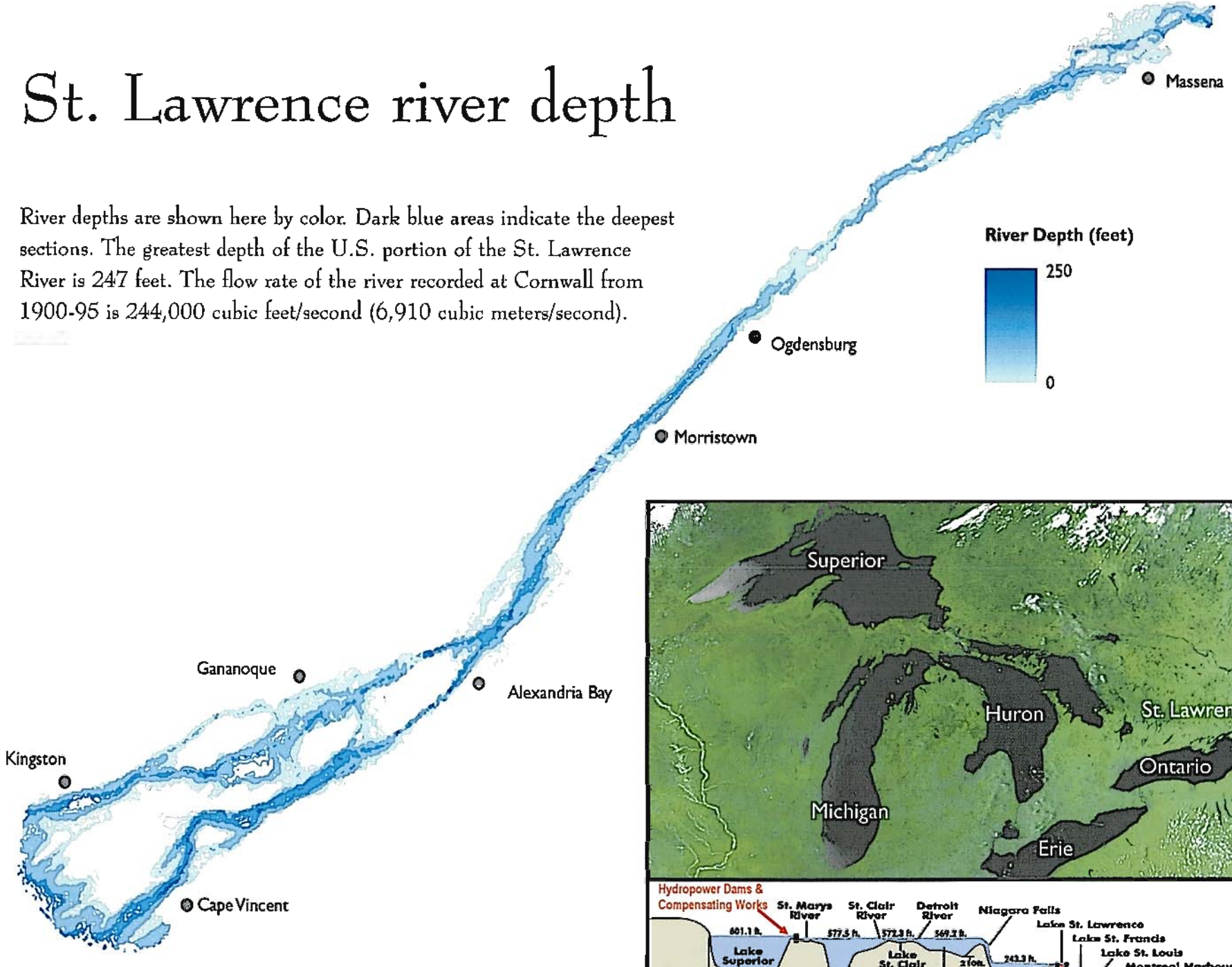
St. Lawrence River history a summary & links
www.vsr.cape.com/~powens/riverhistory.htm

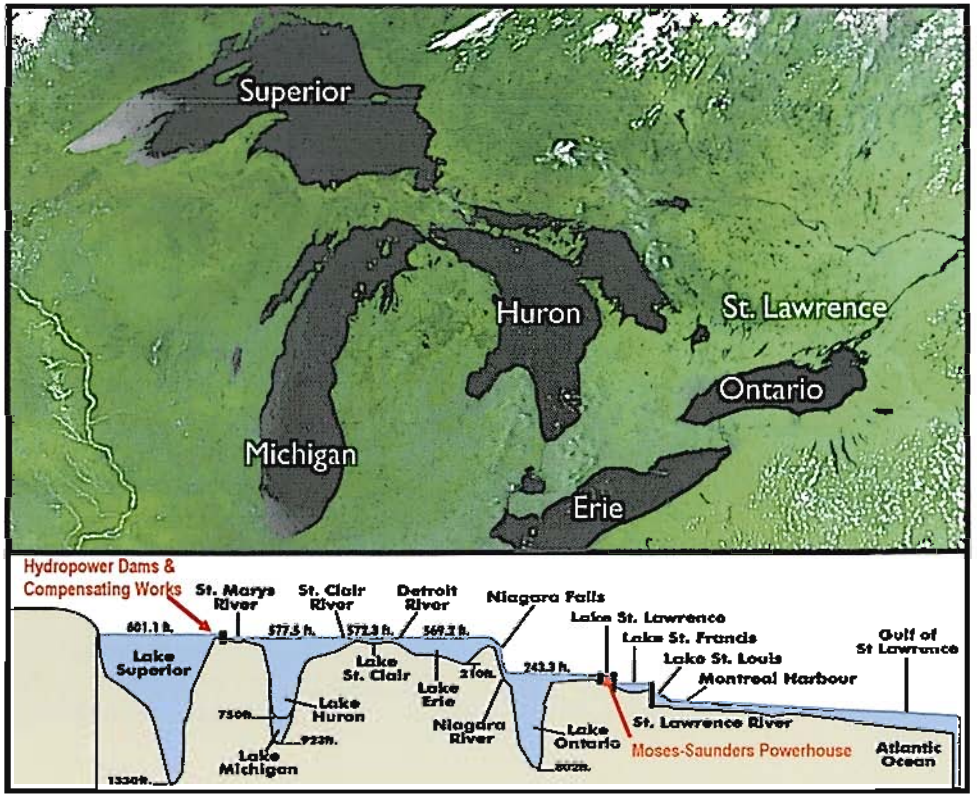




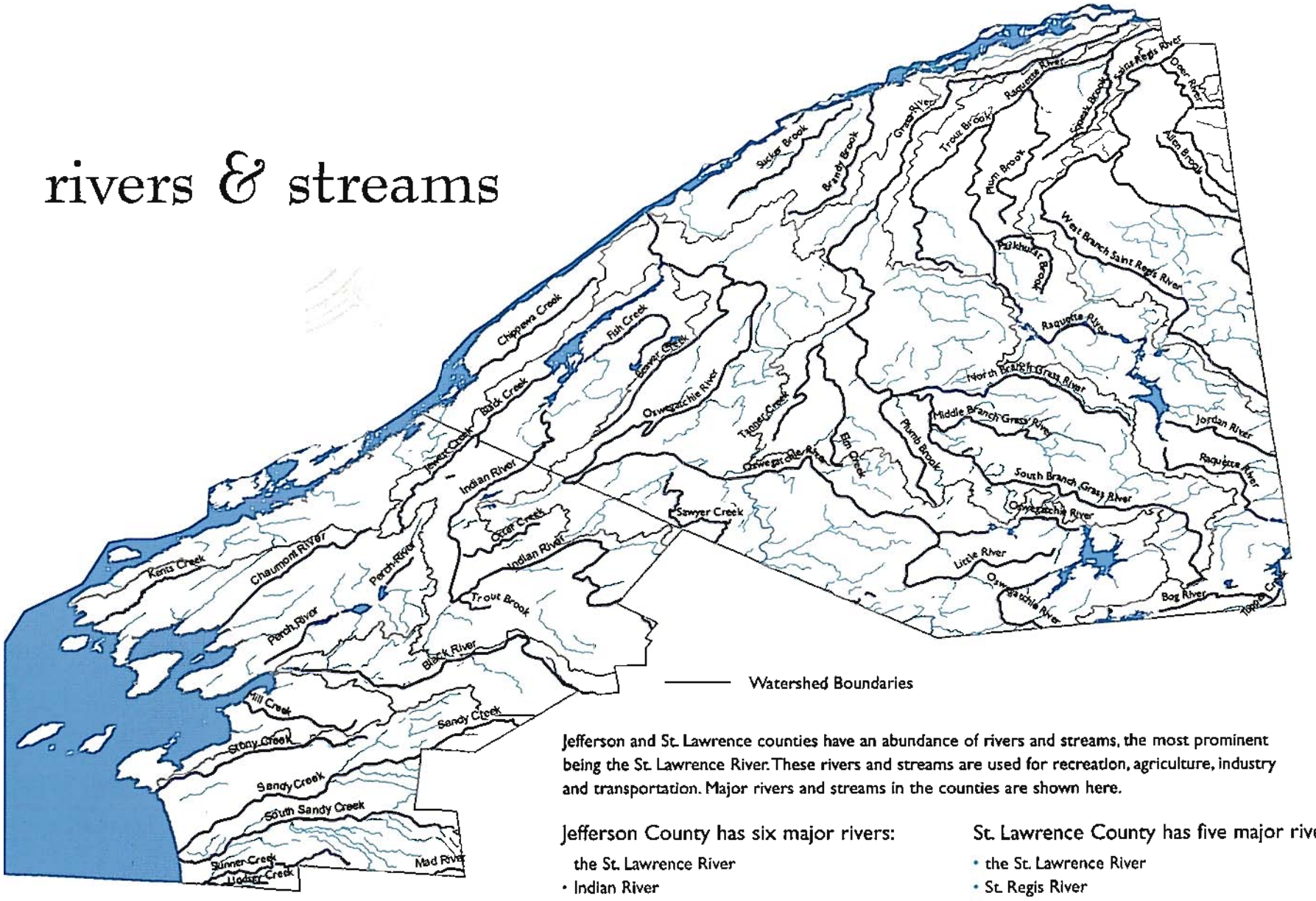
St. Lawrence river depth

River depths are shown here by color. Dark blue areas indicate the deepest sections. The greatest depth of the U.S. portion of the St. Lawrence River is 247 feet. The flow rate of the river recorded at Cornwall from 1900-95 is 244,000 cubic feet/second (6,910 cubic meters/second).





rivers & streams



Watershed Boundaries

Jefferson and St. Lawrence counties have an abundance of rivers and streams, the most prominent being the St. Lawrence River. These rivers and streams are used for recreation, agriculture, industry and transportation. Major rivers and streams in the counties are shown here.

Jefferson County has six major rivers:

the St. Lawrence River
- Indian River

Chaumont River
- Perch River

Black River
- Sandy Creek

All, but the Indian River, drain into Lake Ontario.

St. Lawrence County has five major rivers:

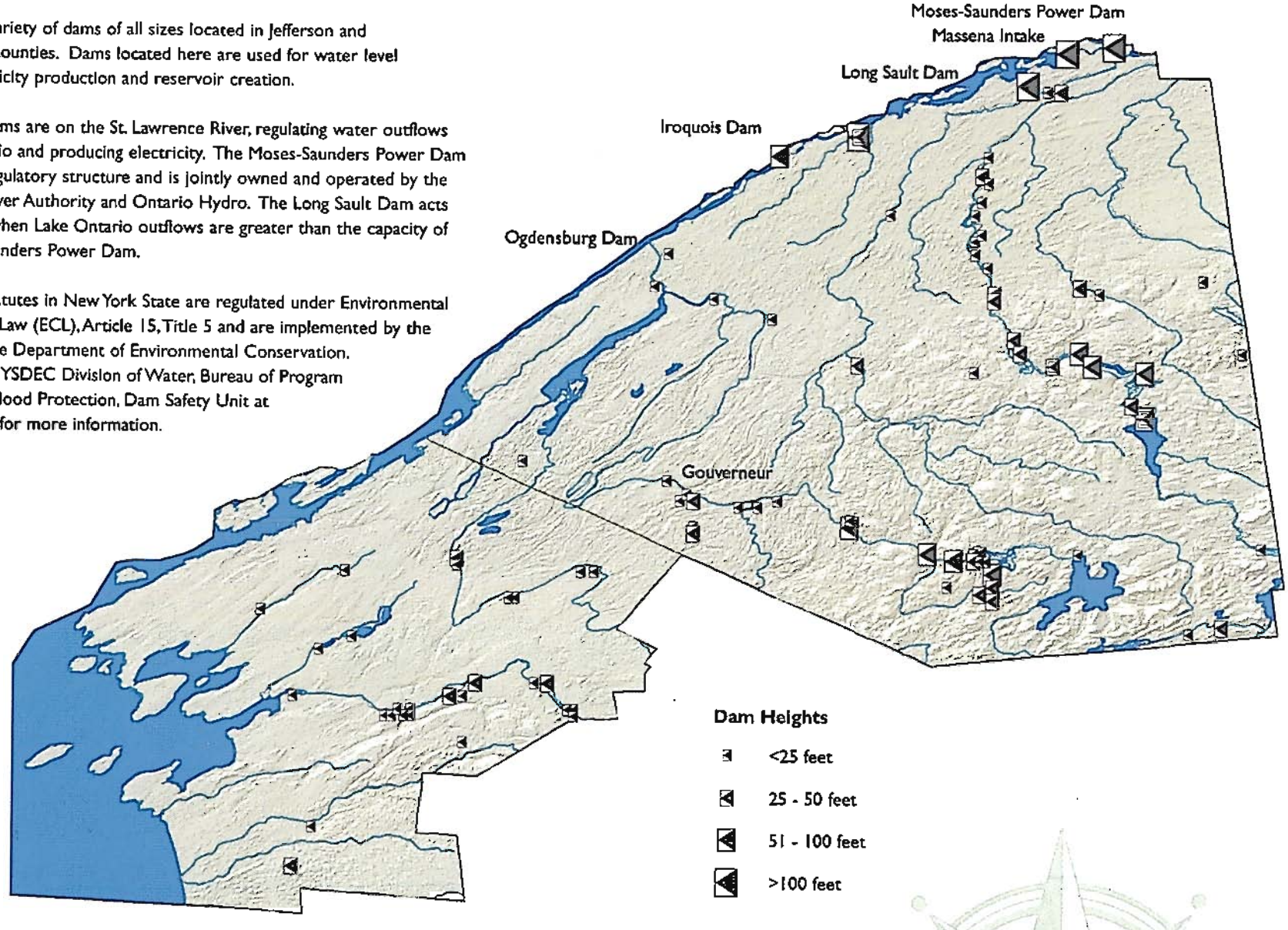
- the St. Lawrence River
- St. Regis River
- Raquette River
- Grasse River
- Oswegatchie River

The St. Regis, Raquette, Grasse and Oswegatchie rivers Rivers drain most of the county's water into the St. Lawrence River.

There are a variety of dams of all sizes located in Jefferson and St. Lawrence counties. Dams located here are used for water level control, electricity production and reservoir creation.

The largest dams are on the St. Lawrence River, regulating water outflows of Lake Ontario and producing electricity. The Moses-Saunders Power Dam is the main regulatory structure and is jointly owned and operated by the New York Power Authority and Ontario Hydro. The Long Sault Dam acts as a spillway when Lake Ontario outflows are greater than the capacity of the Moses-Saunders Power Dam.

Dam safety statutes in New York State are regulated under Environmental Conservation Law (ECL), Article 15, Title 5 and are implemented by the New York State Department of Environmental Conservation. Contact the NYSDEC Division of Water, Bureau of Program Resources & Flood Protection, Dam Safety Unit at 518-402-8130 for more information.



dams

Understanding the soil in a region is essential to agricultural landowners and land use planners. Other landowners benefit from this knowledge as well. Agricultural landowners need to understand their soil to better utilize their land for crops or livestock. Land use planners need a basic knowledge of the soil in their communities in order to make wise decisions, such as zoning ordinances to protect valuable agricultural land and for the safe placement of structures. Other landowners may be interested in having a healthier backyard.

Soils are classified by their differentiating characteristics. The most specific classification category is a series name.

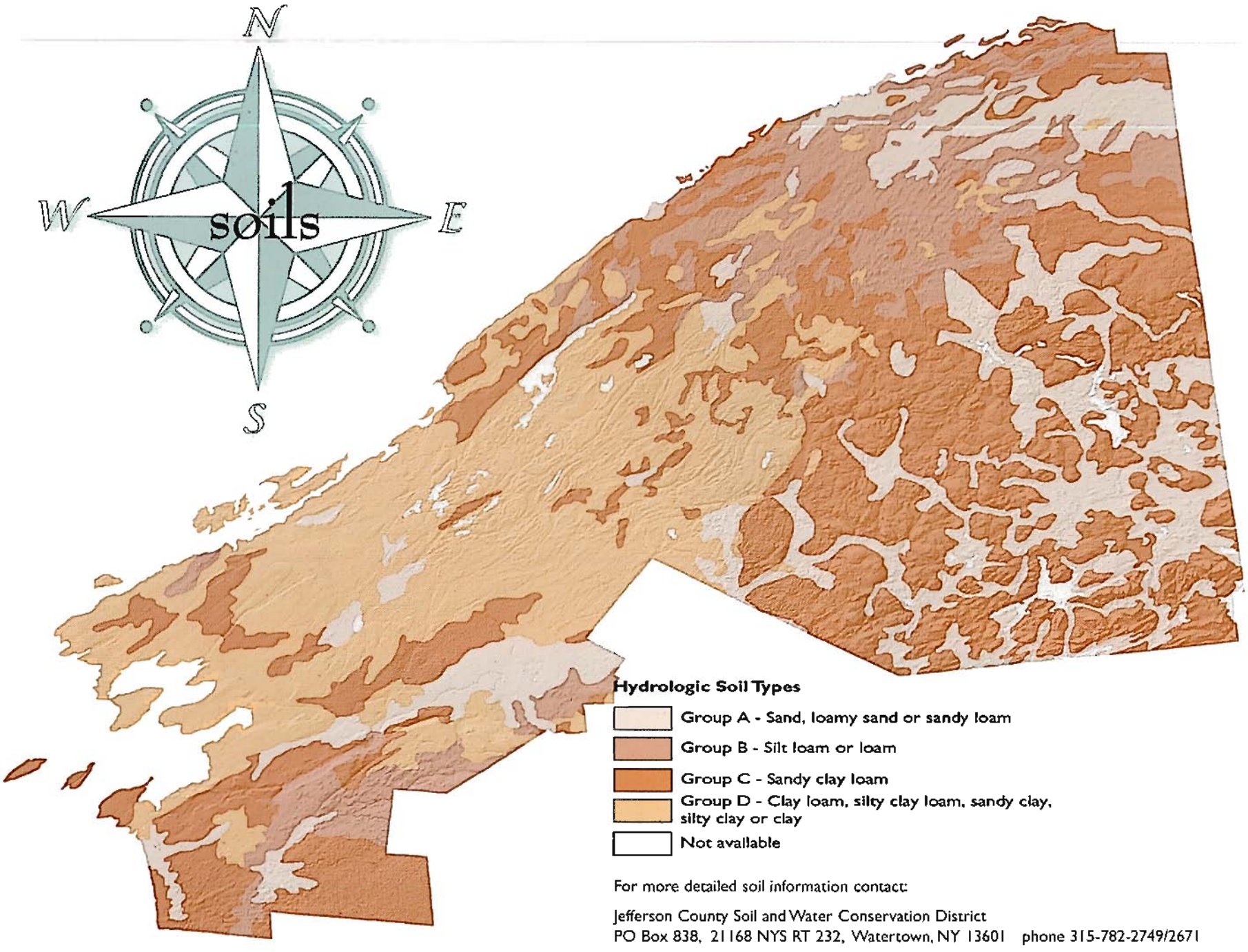
The Hydrologic Soil Group map depicts the soils runoff potential. There are four groups: A, B, C and D. Group A soils have the least runoff potential, Group D soils the greatest.

Group A: sand, loamy sand or sandy loam types of soils with low runoff potential and high infiltration rates even when thoroughly wetted.

Group B: silt loam or loam, with moderate infiltration rate when thoroughly wetted.

Group C: sandy clay loam. They have low infiltration rates when thoroughly wetted.

Group D: clay loam, silty clay loam, sandy clay, silty clay or clay. This group has the highest runoff potential.



For more detailed soil information contact:

Jefferson County Soil and Water Conservation District
PO Box 838, 21168 NYS RT 232, Watertown, NY 13601 phone 315-782-2749/2671

St. Lawrence County Soil and Water,
1942 Old DeKalb Road, Canton NY 13617 phone: 315-386-3582

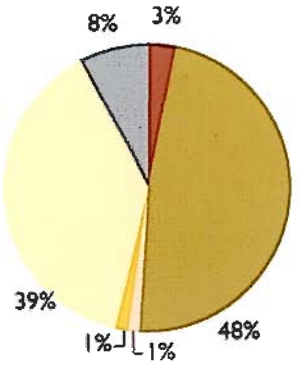
shoreline geology

In 2000, the International Joint Commission initiated the Lake Ontario-St. Lawrence River Water Level Regulation Study. The goal of this five year study was to "assess and evaluate the current criteria used for regulating water levels on Lake Ontario and the St. Lawrence River." (See Reference below)

Part of this study included the mapping of shoreline protection types and geologic shoreline types in kilometer segments along the Lake Ontario and St. Lawrence River shorelines. The charts on this page show the results of this mapping effort in St. Lawrence and Jefferson counties. The counties were divided into four regions as follows:

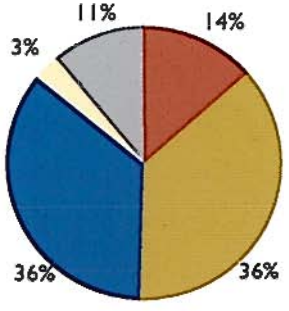
Region 1 – Lake St. Lawrence
Region 2 – Morrisburg to Jones Creek Marsh
Region 3 – Chippewa Point to Wolfe Island
Region 4 – Tibbetts Point to Stony Creek

Results of the analysis show that less than 50% of the protective structures along the shoreline in Regions 1, 2 and 3 has structural protection that is expected to last 5 to 50 years. In Region 1, this analysis corresponds to the abundance of natural and recreation areas that are predominant along the shoreline in this region. Regions 2 and 3 have an abundance of bedrock along the shoreline resulting in less of a need for structural protection. Region 4 also has a predominance of bedrock along the shoreline, but is also has a lot of residences along the shoreline corresponding in a greater buildup of shoreline protection structures. Planners can use this type of data to analyze current shoreline land use, assess needs for erosion control, and plan for future land use.



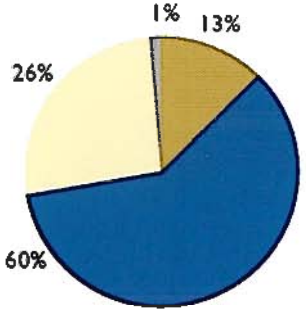
Region 1

- Sand or Cohesive Bluffs
- Low Bank
- Sandy Beach / Dune Complex
- Coarse Beaches
- Open Shoreline Wetlands
- Artificial



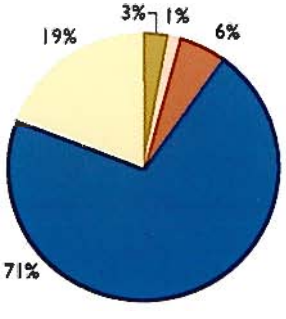
Region 2

- Sand or Cohesive Bluffs
- Low Bank
- Bedrock (Resistant)
- Open Shoreline Wetlands
- Artificial



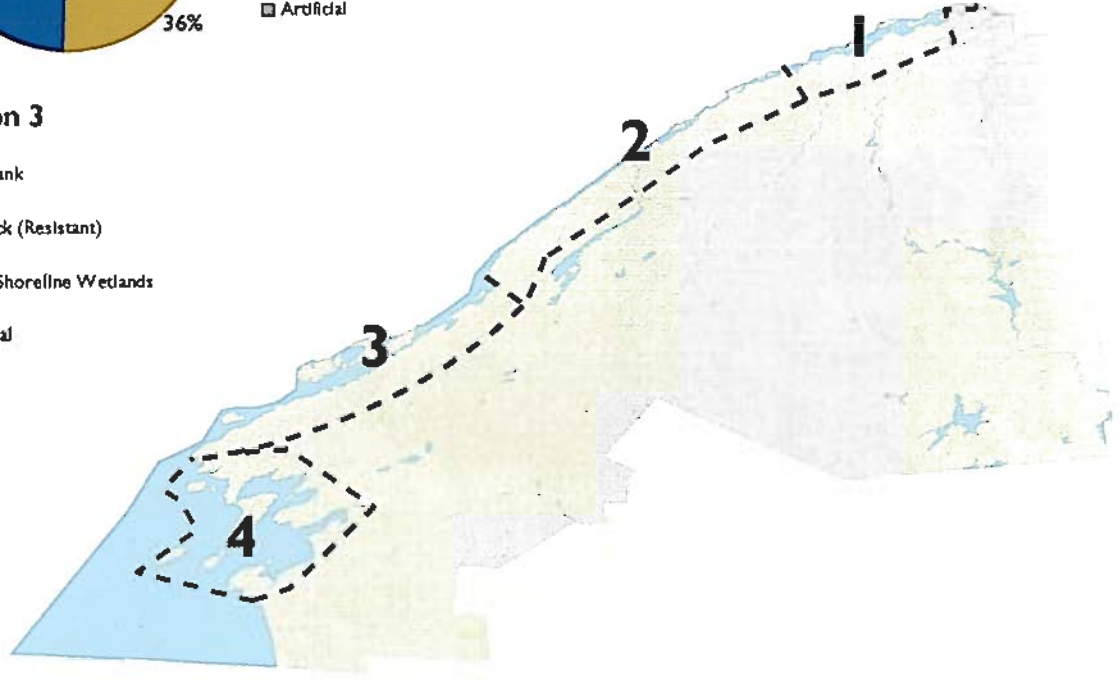
Region 3

- Low Bank
- Bedrock (Resistant)
- Open Shoreline Wetlands
- Artificial



Region 4

- Low Bank
- Sandy Beach / Dune Complex
- Coarse Beaches
- Bedrock (Resistant)
- Open Shoreline Wetlands



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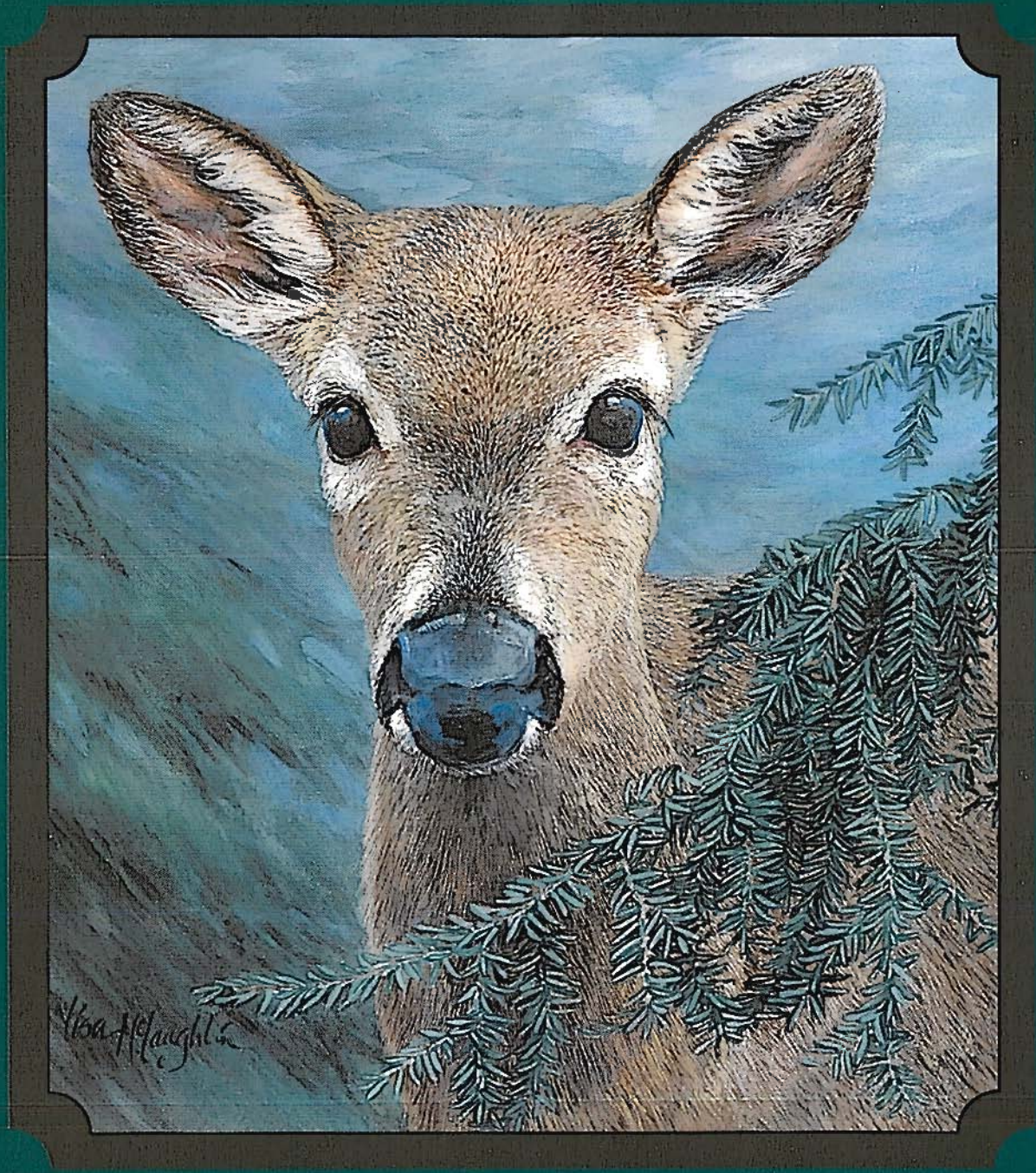
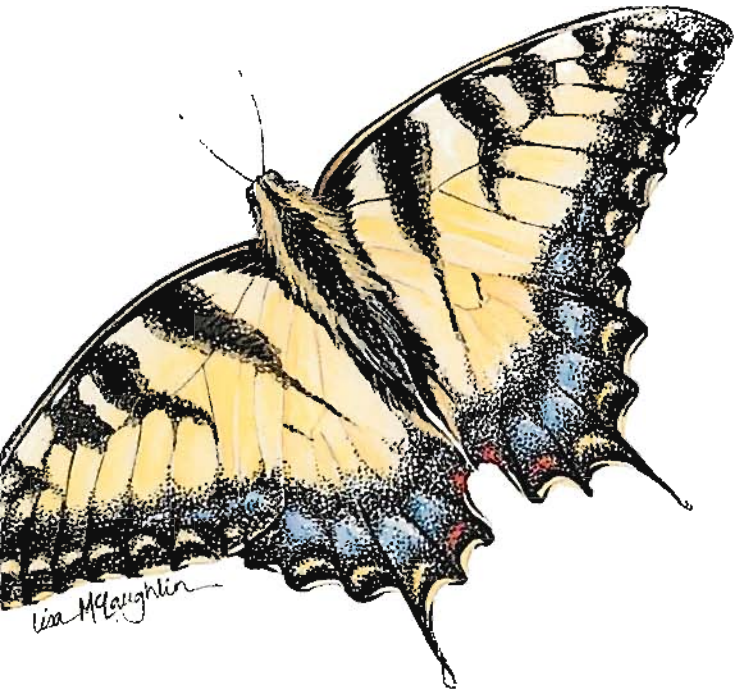
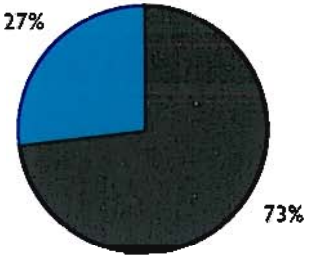
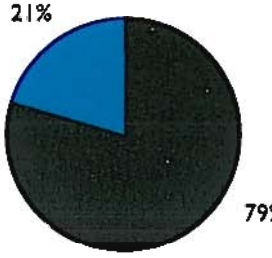






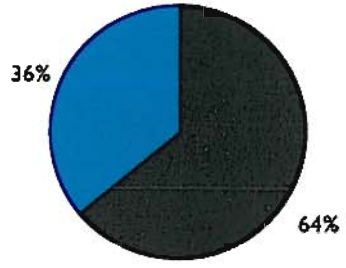
Region 2

- No Structures
- Structures



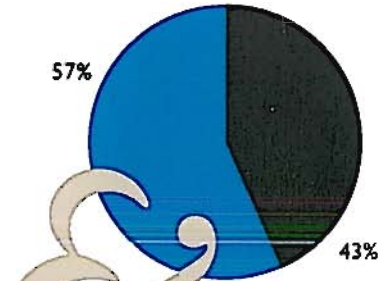
Region 1

- No Structures
- Structures



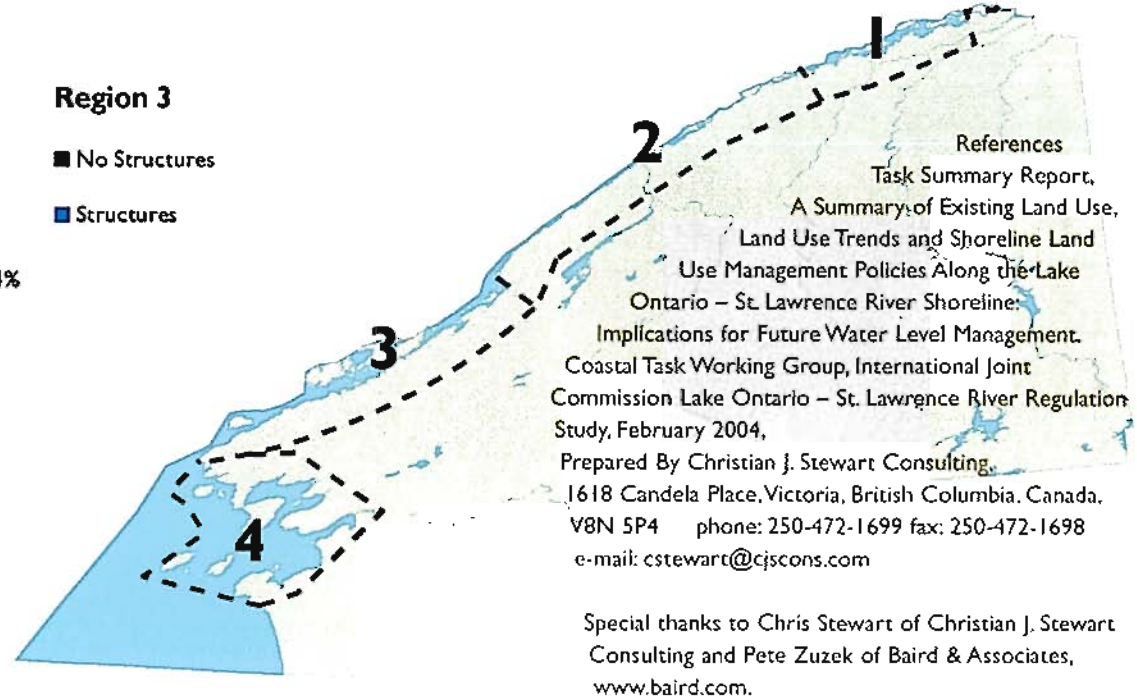
Region 3

- No Structures
- Structures



Region 4

- No Structures
- Structures



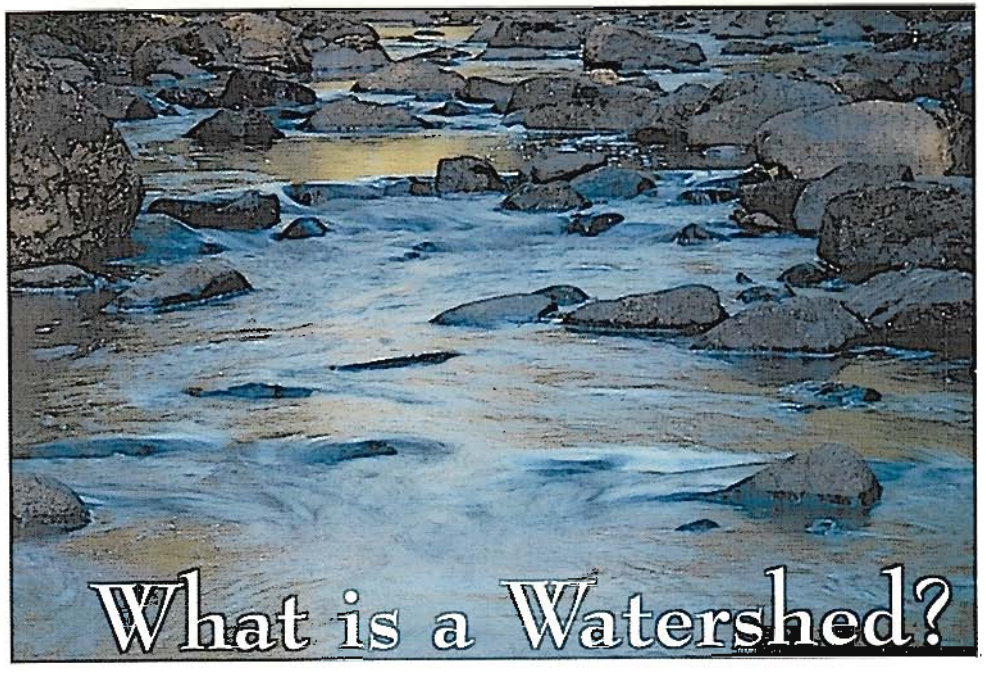
References

Task Summary Report, A Summary of Existing Land Use, Land Use Trends and Shoreline Land Use Management Policies Along the Lake Ontario – St. Lawrence River Shoreline: Implications for Future Water Level Management. Coastal Task Working Group, International Joint Commission Lake Ontario – St. Lawrence River Regulation Study, February 2004,

Prepared By Christian J. Stewart Consulting, 1618 Candela Place, Victoria, British Columbia, Canada, V8N 5P4 phone: 250-472-1699 fax: 250-472-1698 e-mail: cstewart@cjscons.com

Special thanks to Chris Stewart of Christian J. Stewart Consulting and Pete Zuzek of Baird & Associates, www.baird.com.

& shoreline protection



What is a Watershed?

A watershed, or drainage basin, is an area of land which drains into a body of water, such as a river, lake or wetland. A watershed includes both the waterway and the land that drains into it. Human activities in a watershed, such as disposing of oil into drains or the overuse of lawn chemicals, can affect the quality of the water in the watershed and ultimately impact drinking water sources.

Watersheds can be as small as the area that drains into a small creek or wetland, or as large as the area that drains into a large river such as the St. Lawrence River. Watersheds are typically named after the body of water they drain into and are classified into hydrological units which are given unique series of identifying numbers. Large watersheds, such as those shown on this map, are given 8 digit identification numbers and are named after the major water body into which they drain . These 8-digit named watershed units can be further divided into smaller watersheds that are given 11-digit numbers, These smaller watersheds, in turn can be further divided into watersheds with 14-digit numbers.

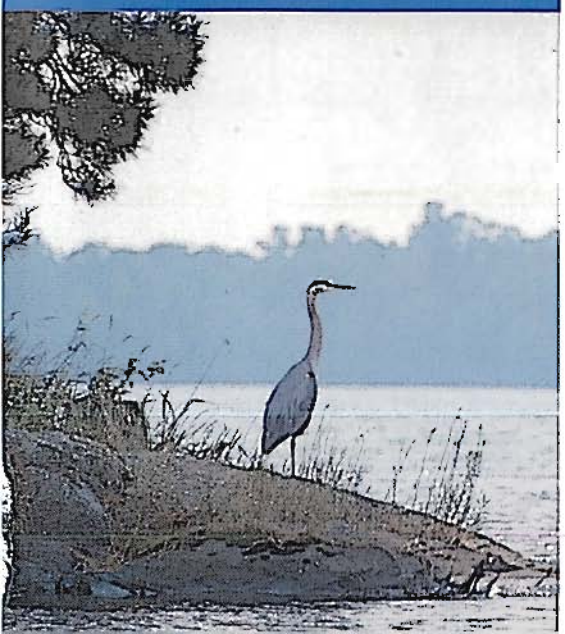
Watershed planning and monitoring can be done at either the large scale, 8-digit watershed unit size or the smaller watershed unit sizes, depending on the goal of the project. For instance, New York State is participating in the U.S. Environmental Protection Agency's Clean Water Action Plan, Section 319 funding opportunity that helps states with water quality restoration activities. A key element of the plan requires each state to: prepare a Unified Watershed Assessment (UWA); identify restoration priorities and develop action strategies to be eligible for the funding. The UWA requires that watersheds be delineated at the 8-digit level, but environmental professionals have decided that it is too coarse a level for pinpointing water quality problems. Therefore, New York will be using the 11-digit watershed units to plan their watershed restoration efforts and more effectively pinpoint sources of problems.

Watershed statistics from the New York State
Department of Environmental Conservation: Division of Water
625 Broadway, Albany NY 12233-3500, phone: (518) 402-8233

the natural world

This map delineates the 8-digit watersheds in Jefferson and St. Lawrence counties. These watersheds drain into the larger St. Lawrence watershed.

The St. Lawrence watershed encompasses 405,261 square miles (1,049,621 sq. km.) draining approximately 12% of North America.



Chaumont-Perch Watershed
Miles of streams: 339
Drainage area: 609 sq. miles
Major waters include:
Chaumont River, Kents Creek, Mill Creek, Perch Lake and Perch River

Black Watershed
Miles of streams: 2417
Drainage area: 1945 sq. miles
Major waters include:
Beaver River, Big Moose Lake, Fulton Chain Lakes, Independence River, Moose River, Stillwater Reservoir and Whetstone Creek

Salmon-Sandy Watershed
Miles of streams: 1453
Drainage area: 1144 sq. miles
Major waters include:
Butterfly Creek, Deer Creek, Little Salmon River, Little Sandy Creek, Mad River, South Sandy Creek, Salmon River, Sandy Creek, Skinner Creek and Stony Creek

Indian Watershed
Miles of streams: 612
Drainage area: 567 sq. miles
Major waters include:
Black Creek, Fish Creek, Indian River Oswegatchie River and Otter Creek

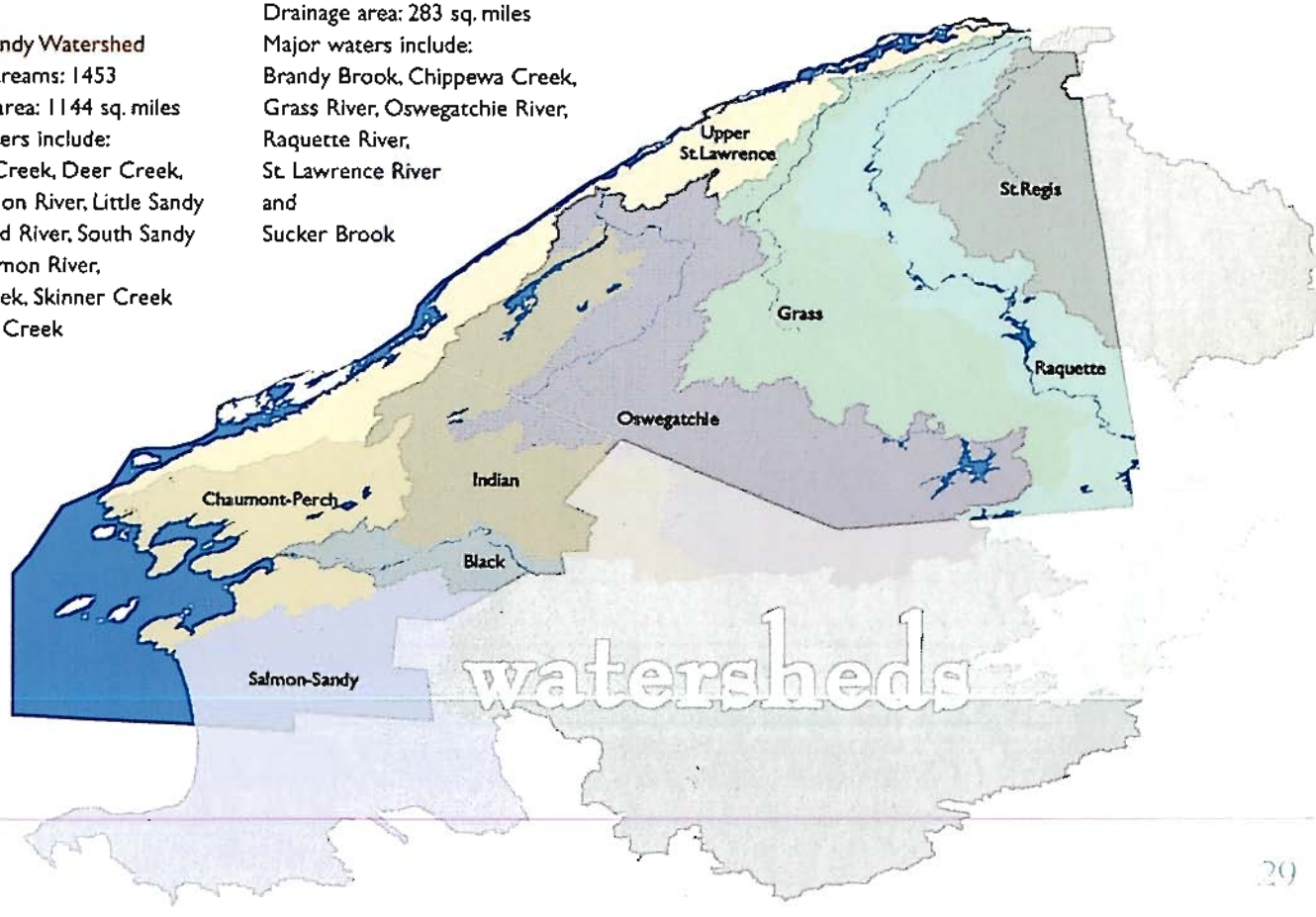
Oswegatchie Watershed
Miles of streams: 1344
Drainage area: 1034 sq. miles
Major waters include:
Beaver Creek, Black River, Little River and Oswegatchie River

Upper St. Lawrence Watershed
Miles of streams: 357
Drainage area: 283 sq. miles
Major waters include:
Brandy Brook, Chippewa Creek, Grass River, Oswegatchie River, Raquette River, St. Lawrence River and Sucker Brook

Grass Watershed
Miles of streams: 852
Drainage area: 646 sq. miles
Major waters include:
Elm Creek, Grass River, Little River, Plumb Brook and Tanner Creek

St. Regis Watershed
Miles of streams: 1198
Drainage area: 845 sq. miles
Major waters include:
Allen Brook, Deer River, Lawrence Brook, Long Pond Outlet and St. Regis River

Raquette Watershed
Miles of streams: 1233
Drainage area: 1257 sq. miles
Major waters include:
Bog River, Jordan River, Plumb Brook, Raquette Lake, Raquette River, Round Lake, Trout Brook and Tupper Lake



What is a Freshwater Wetland?

New York's Freshwater Wetlands Act identifies wetlands on the basis of vegetation. Characteristic wetland plants include wetland trees and shrubs, such as willows and alders; emergent plants, such as cattails and sedges; aquatic plants, such as waterlily, and bog mat vegetation, such as sphagnum moss. There are three major types of wetlands: bogs, swamps and marshes. Each type is identified by its soil, vegetation and hydrology. It is important to remember that wetlands are not necessarily wet year-round.

Why Protect Wetlands?

Wetlands are extremely valuable to both people and the environment along the St. Lawrence River shoreline. Some of the functions and benefits of wetlands include:

Erosion and Sedimentation Control -

Wetlands act as buffers along shorelines, protecting property from waves or stream activity. Wetland vegetation filters out sediment by decreasing water velocity and settling suspended particles in the wetland, thereby preventing the sediment from reaching the lake.

Flood Protection and Abatement -

Wetlands act like giant sponges, soaking up excess water and releasing it slowly.

Water Filtration and Purification -

Wetlands are capable of filtering many pollutants from water that is destined for lakes, rivers and your drinking source water. Water leaving a wetland is frequently cleaner than water entering the wetland.

Fish and Wildlife Habitat -

Wetlands are one of the most productive and valuable wildlife habitats. Many species of fish and wildlife depend on wetlands for breeding, nesting and feeding. Due to the loss of wetland habitat, many of New York's endangered fish, wildlife and plant species depend on remaining wetlands.

Recreation -

Wetlands provide a variety of recreational opportunities, including fishing, bird watching, photography, canoeing, hiking, hunting and trapping.

Federal Wetland Regulations:

The U.S. Army Corps of Engineers protects wetlands under Section 404 of the U. S. Environmental Protection Agency Clean Water Act. This Act includes wetlands less than 12.4 acres in size. Section 401 of the Clean Water Act allows states to review and approve, condition or deny all federal permits or licenses that might result in a discharge into waters in New York, including wetlands. Once a request is reviewed and approved by the state, the state issues a Water Quality Certificate. This certifies that the proposed activity will not violate water quality standards and that it complies with other appropriate requirements of New York State law. These activities include: the placement of dredge and fill material in waters of the U.S.; erosion control or property protection devices such as rip-rap and bulkheads; and fill for recreational, industrial, commercial, residential and other uses. Exempt activities include: established, ongoing farming activities, such as plowing, harvesting, seeding, minor drainage, and cultivating; and maintenance of irrigation ditches, farm ponds, stock ponds or farm roads, in accordance with best management practices. Contact the local U.S. Army Corps of Engineers office for more information.

State Regulations:

In New York State, the Freshwater Wetlands Act was passed in 1975 with the "intent to preserve, protect and conserve freshwater wetlands and their benefits, consistent with the general welfare and beneficial economic, social and agricultural development of the state." This Act applies to wetlands that are at least 12.4 acres or larger. Smaller wetlands may be protected if they are considered of unusual local importance. An adjacent area of 100 feet around every wetland is also protected. Under this act, certain activities are exempt from regulation, while others are regulated if they could have a negative impact on the wetland. Regulated activities require a permit to proceed. Almost any activity that may adversely impact the natural values of the wetlands or their adjacent areas is regulated.

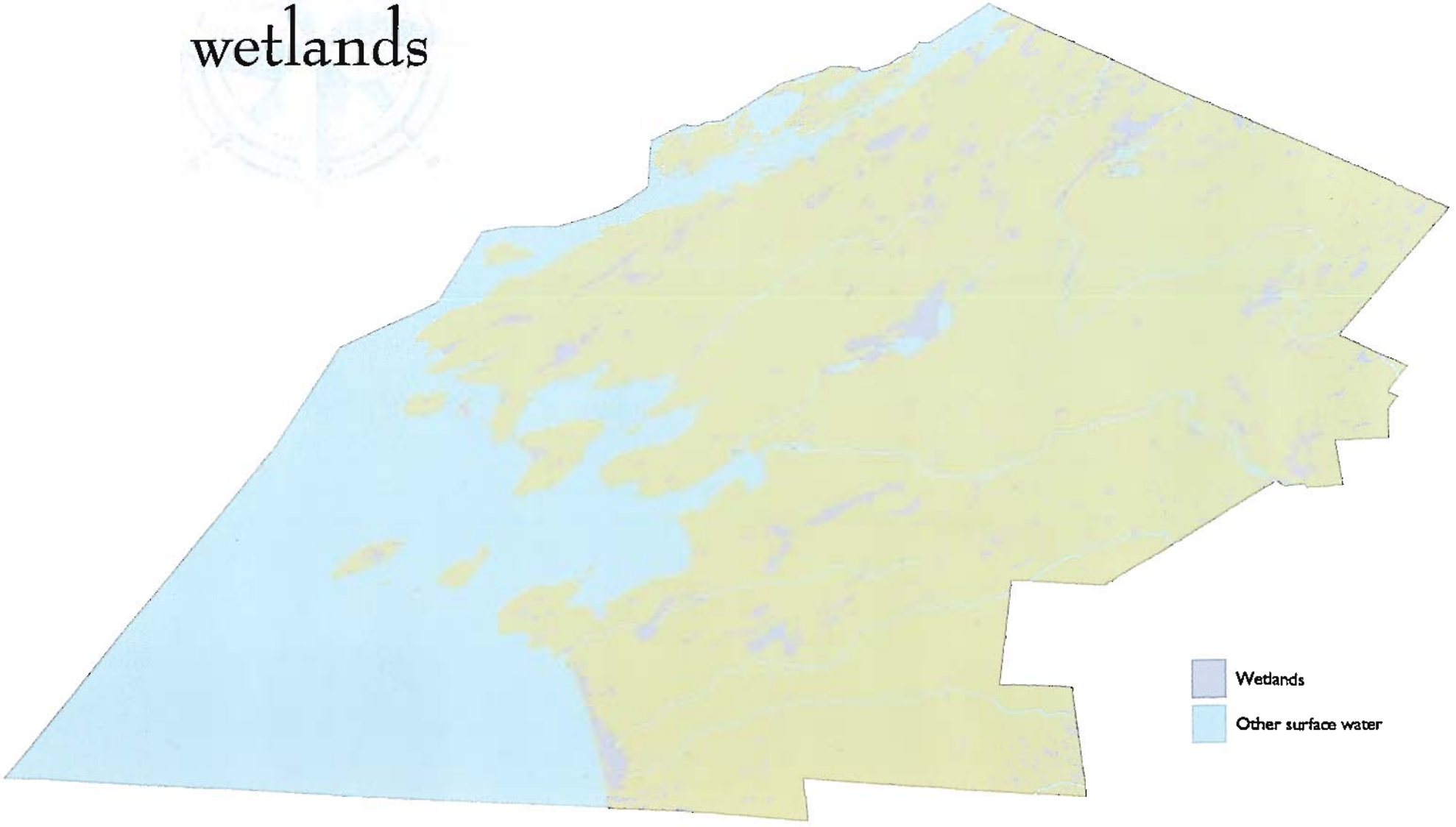
Local Wetland Regulations:

Under the Freshwater Wetlands Act, local governments may assume jurisdiction for regulating wetlands once the NYSDEC has filed a map for local areas. Your municipality or county may be the regulating body. For questions of jurisdiction, check with local government or the New York State Department of Environmental Conservation (NYSDEC) Regional Office for the county where the wetland is located. The Division of Environmental Permits staff can advise you regarding which agency has permit jurisdiction.

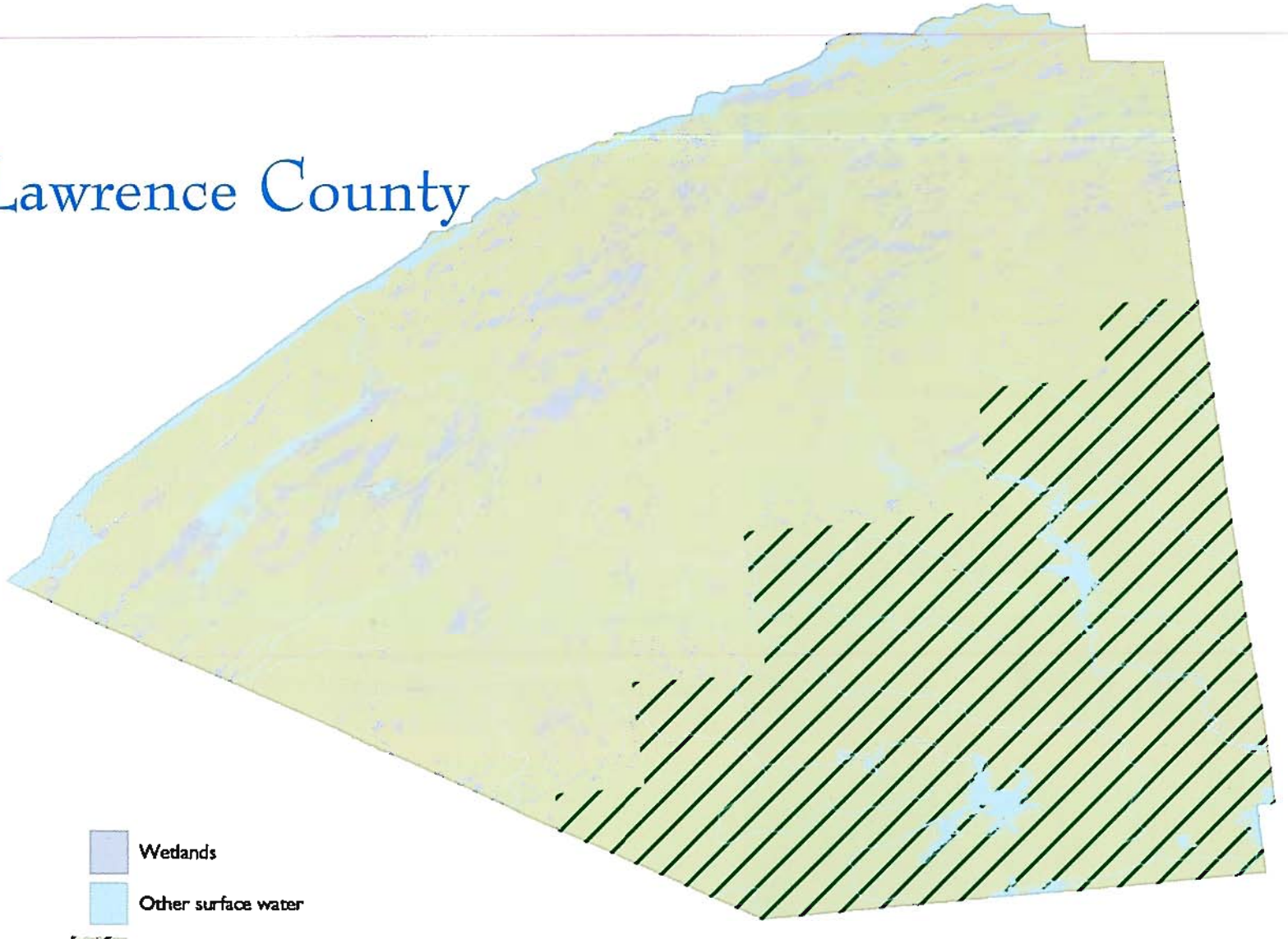
Much of the information above is from the New York State Department of Environmental Conservation's web site:
A Brief Description of the Freshwater Wetlands Act and What it Means to Wetlands Landowners
http://www.dec.state.ny.us/website/dfwmr/habitat/wetdes.htm

Jefferson County

wetlands



St. Lawrence County



Over 127,000 acres of Freshwater Wetlands Act regulated wetlands were identified in St. Lawrence County in 1987.

In Jefferson County, over 55,000 acres of regulated wetlands were identified in 1986.

From the waters of Lake Ontario and the St. Lawrence River, to the forests of the Tug Hill and Adirondack Mountains, the diversity of habitats in Jefferson and St. Lawrence counties provide homes for many species of plants and animals.

Abundant species, such as white-tailed deer and beaver, thrive in many of these habitats, which are also home to some rare, endangered, and threatened species, such as the Black Tern, Indiana Bat, Short-eared Owl and Champlain Beachgrass. Regionally and internationally rare habitat types are also found in these counties including alvars, freshwater dunes and grasslands. Many species of fish and wildlife are managed jointly by the New York State Department of Environmental Conservation, United States Fish and Wildlife Service and Canadian natural resources agencies when appropriate.

Jefferson and St. Lawrence counties are known by New York bird watchers as great places to go bird watching due to the variety of habitats and abundant rural areas. During the spring and fall, the migration of birds along the Lake Ontario and St. Lawrence River shorelines is spectacular. Certain winters bring an abundance of owls and hawks to the Point Peninsula area in Jefferson County. And the grasslands of St. Lawrence County are summer nesting areas for many birds that are uncommon in the Northeastern United States.

The hardwood forest habitat of Wilson Hill Wildlife Management Area near Louisville in St. Lawrence County includes stretches of the Grass and Raquette Rivers. Herons, loons, geese, owls, hawks, and the occasional bald eagle are seen here. This area can be traveled by car, on foot or on bicycle.

The most abundant fish found in the New York portion of the St. Lawrence River is the smallmouth bass. Other fish found in the river include Northern pike, walleye, largemouth bass, panfish, bullhead, yellow perch and muskellunge. Persons fishing in the river should understand both U.S. and Canadian fishing regulations and carry the proper license. For more information about fish and fishing the St. Lawrence River and other sites in Jefferson and St. Lawrence counties contact:

New York License and Fishing Information
NYS DEC State Office Building
317 Washington Street
Watertown NY 13501
Phone: 315-785-2262

Canadian License and Fishing Information
District Manager
Ministry of Natural Resources
13 Amelia Street, Box 1949
Cornwall, Ontario, Canada K6H 5V7
Phone: 613-933-1774

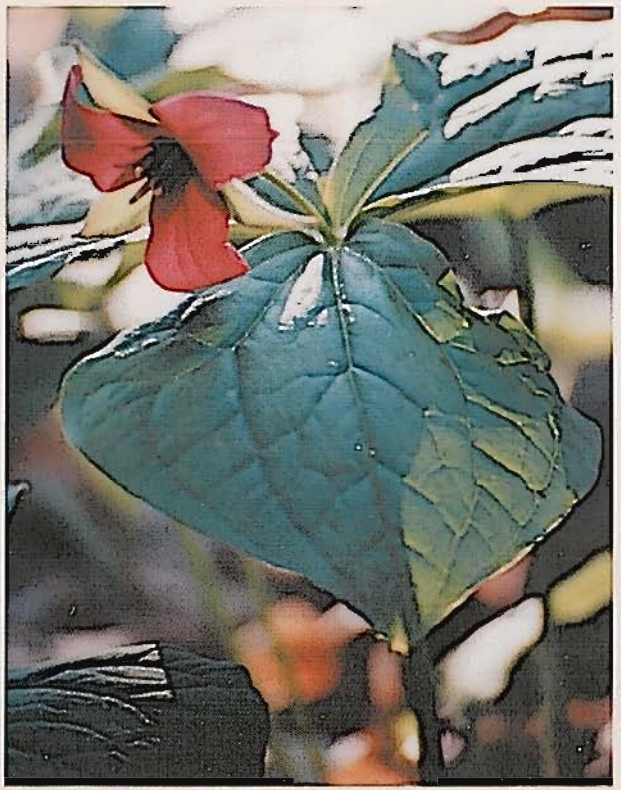
A variety of mammals live in Jefferson and St. Lawrence counties including the common white-tailed deer and beaver and the lesser seen flying squirrel and woodland jumping mouse. Hunting and trapping are common outdoor activities in Jefferson and St. Lawrence counties. Hunting and trapping regulations and season information is available from the New York State Department of Environmental Conservation web site http://www.dec.state.ny.us/
Although not as common or easy to find, reptiles and amphibians inhabit the many wetlands, lakes and ponds of the counties. In the early spring, listen for wood frogs and spring peepers in wetlands and throughout the summer on any sunny day, painted turtles can be seen sunning themselves in the many ponds and wetlands in these counties.
The Minna Anthony Common Nature Center at Wellesley Island State Park and 14 New York State Wildlife Management Areas are great places to watch wildlife in Jefferson and St. Lawrence counties. To find out more about these areas visit the New York State Department of Environmental Conservation web site at http://www.dec.state.ny.us/ or call (315) 785-2261.

The exhibits at the New York State Zoo at Thompson Park in Watertown feature fish, birds and mammals native to the North Country. Snowy owl, fishers, otters, mountain lions, elk and other majestic animals are seen at this nationally-accredited attraction.

The dune walkover at Southwick Beach State Park near Woodville allows you to observe dune grasses and shoreline birds without damaging the fragile sand-shore ecosystem. Beach grass plantings over the years have greatly restored the natural plant community along the shoreline here. To see how the dunes have been restored over time, go to the web site at http://www.nysgextension.org/photomonitoring/monitoringhome.htm.

The Chaumont Barrens is a unique alvar area managed by The Nature Conservancy. The Barrens, found near the village of Chaumont in Jefferson County, are unlike any other natural area in the Northeastern United States. Among the plants that grow in the shallow soil, fissures and exposed outcrops here are mosses, grasses, and wildflowers—everything from saxifrage and balsam ragwort in the spring to prairie smoke in the summer and fall asters. This is an excellent location for birdwatching.

Shoreline property owners interested in creating wildlife-friendly environments using native plant species can learn more by linking to Lake Ontario Stewardship information at http://www.nysgdunes.org/epacd/introduction.htm.



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recreation

Jefferson and St. Lawrence counties offer a variety of recreational activities year 'round. There is something for everyone. Boating is enjoyed on the St. Lawrence River and Lake Ontario. The Thousand Islands region offers many attractions. The Seaway Trail is one of America's Byways and a National Recreation Trail.

Recreational resource contacts include:

Adirondack Park Information:
New York State Adirondack Park Agency
PO Box 99, 1133 NYS Route 86
Ray Brook NY 12977
Tel: 518-891-4050
Web site: www.apa.state.ny.us/
Visitor Interpretive Centers welcome travellers at Paul Smiths and Newcomb.

Boat Launch Sites
New York State Office of Parks,
Recreation and Historic Preservation
1000 Islands Regional Office
Keewaydin State Park
Alexandria Bay NY 13607
Tel: 315-482-2593
Web site:
www.nysparks.state.ny.us/boating/resource.asp
Web site has information on boating resources, education, marine law enforcement, marine services and navigation law updates.

Special Fishing Regulations for
Jefferson County, Web site: http://www.dec.-state.ny.us/ website/ dfwmr/fish/fishregs/fshregsjefferson.html
Lists exceptions to General Angling Recreations of New York's Freshwater Fishing Regulations.

Special Fishing Regulations
for St. Lawrence County
Web site:
http://www.dec.state.ny.us/website/-dfwmr/fish/fishregs/-fshregsstlawrence.html
Lists exceptions to General Angling Recreations of New York's Freshwater Fishing Regulations.

I Love NY Tourism Information for 1000 Islands/ Seaway Region NYS Dept. of Economic Development
PO Box 2603, Albany NY 12220-0603
Tel: 800-CALL-NYS
Web site: www.iloveny.com/search/regions_index.asp
Search for accommodations, attractions, camping, events, group travel services, information resources, recreation/adventure and transportation.

Jefferson County Tourism Information:
Greater Watertown-North Country
Chamber of Commerce
1241 Coffeen Street, Watertown NY 13601
Tel: 315-788-4400
Web site:
www.watertownny.com/

New York State Parks
1000 Islands Region Info.
NYS Office of Parks,
Recreation and Historic
Preservation
1000 Islands
Regional Office:
Keewaydin State Park
Alexandria Bay
NY 13607
Tel: 315-482-2593

Web site:
www.nysparks.state.ny. us/regions/
thousandis.asp
Web site has information on
recreation, 30 State parks, and the
Sackets Harbor Battlefield historic site,
golf courses, accommodations, and events.

New York State Natural Heritage Areas
NY Natural Heritage Program
625 Broadway, 5th Floor
Albany NY 12233-4757
Tel: 518-402-8935
Web site: www.dec.state.ny.us/website-/
dfwmr/heritage/#contact
The NY Natural Heritage Program is a partnership
between New York State Department of
Environmental conservation and The Nature
Conservancy. Web site has information on
biodiversity, and rare plants and animals.

St. Lawrence County Tourism Information
St. Lawrence County Chamber of Commerce
101 Main Street, Canton NY 13617
Tel: 315-386-4000, (877) 228-7810
Web site: www.north countryguide.com

Seaway Trail National Scenic Byway, Seaway Trail, Inc.
Seaway Trail Discovery Center
Ray & West Main Streets, Sackets Harbor NY 13685
Tel: 315-646-1000, 800-SEAWAY-T
Web site: www.seawaytrail.com
The 518-mile Great Lakes Seaway Trail is one of
America's Byways and a National Recreation Trail.

Snowmobile Trails
NYS Office of Parks, Recreation
and Historic Preservation
Planning Bureau Snowmobile Unit
17th Floor, Agency #1, Empire State Plaza
Albany NY 12238
Tel: 518-474-0446
Web site: www.nysparks.state.ny.us/snow/gen_info.asp
Web site has snowmobiling education,
registration information and a link to the
New York State Snowmobilers Guide.

Sporting Licenses
Web site: www.dec.state.ny.us
/website/dfwmr/license/
Information on fishing, hunting, marine
and trapping licenses; links to
Freshwater Fishing Regulations Guide
and Hunting & Trapping Guide.

State Forest Lands
New York State Department of
Environmental Conservation
Region 6 Office, State Office Building
Washington Street
Watertown NY 13601-3787
Tel: 315-785-2236
Web site: www.dec.state.ny.us
/website/dlf/lfoffice.html

Wildlife Management Areas Region 6
Web site www.dec.state.ny.us/
website/dfwmr/wma/r6wmas.htm
Information for 14 New York State
Wildlife Management Areas.

Thousand Islands Visitor Information
Thousand Islands International Tourism Council
Collins Landing, Box 400
Alexandria Bay NY 13607
Tel: 315-482-2520, 800-8-ISLAND
Web site: www.visit1000islands.com

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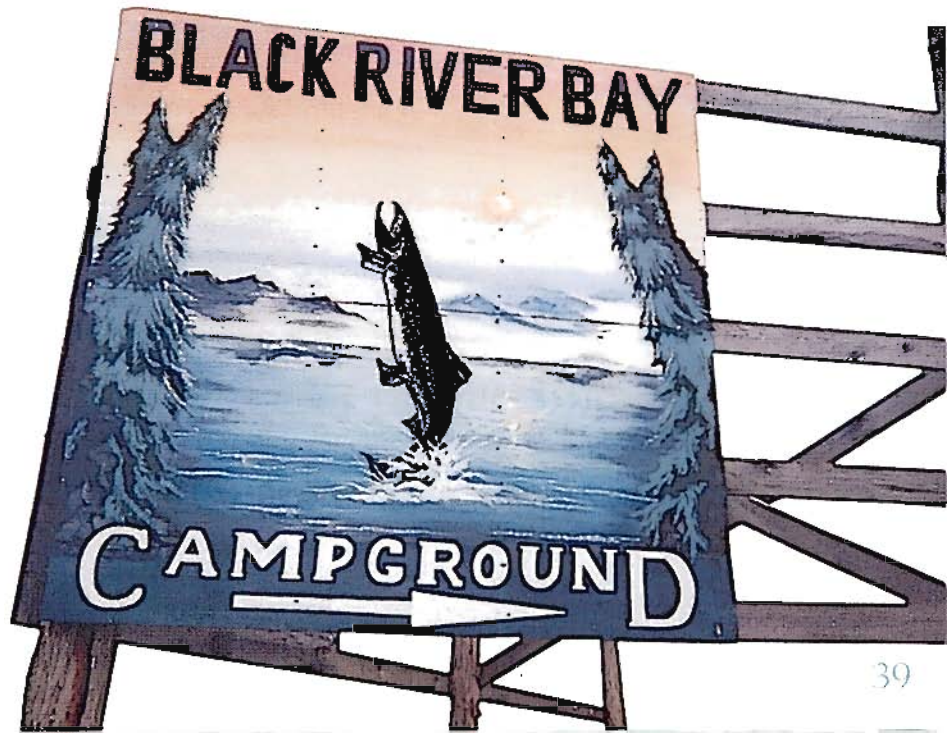
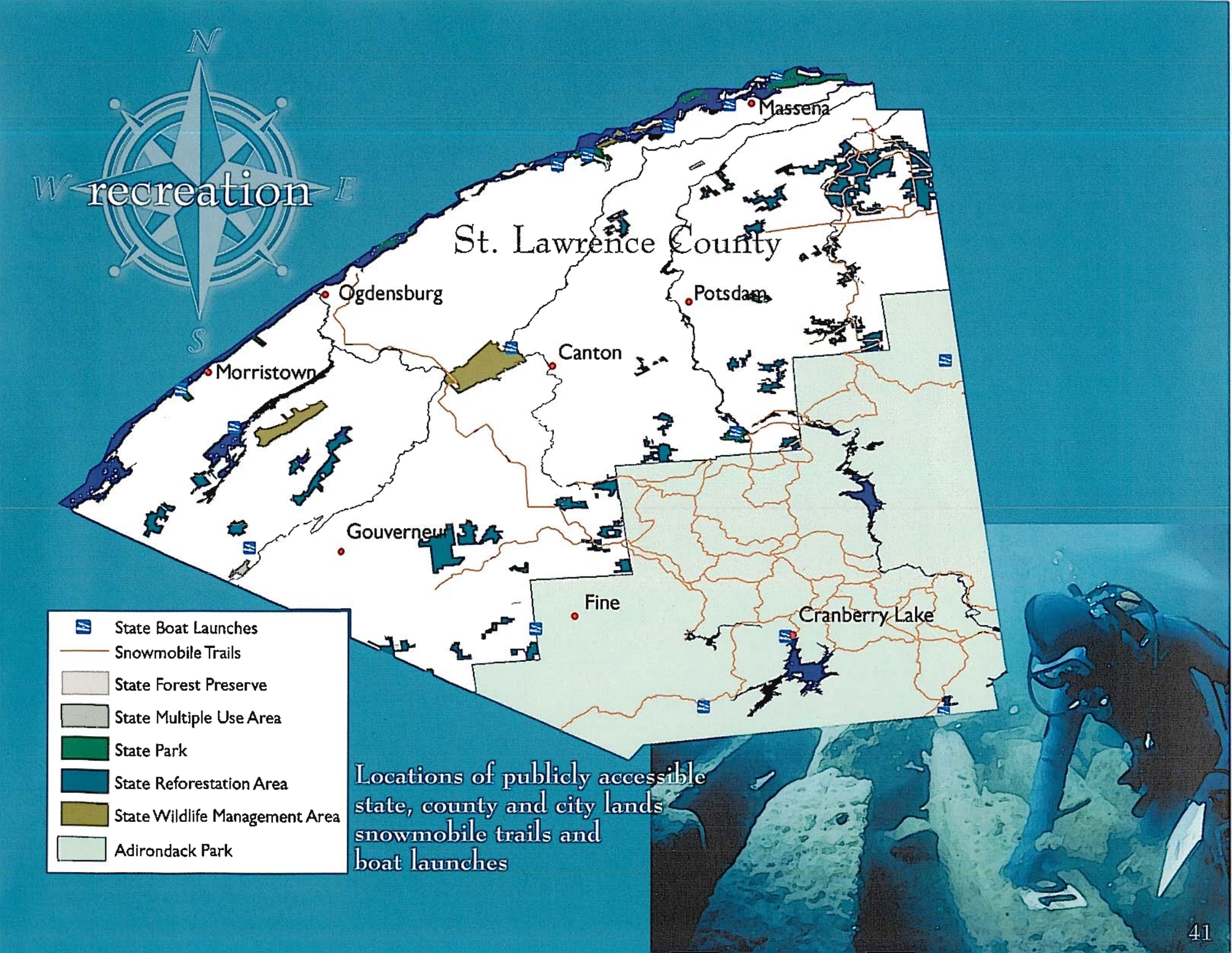
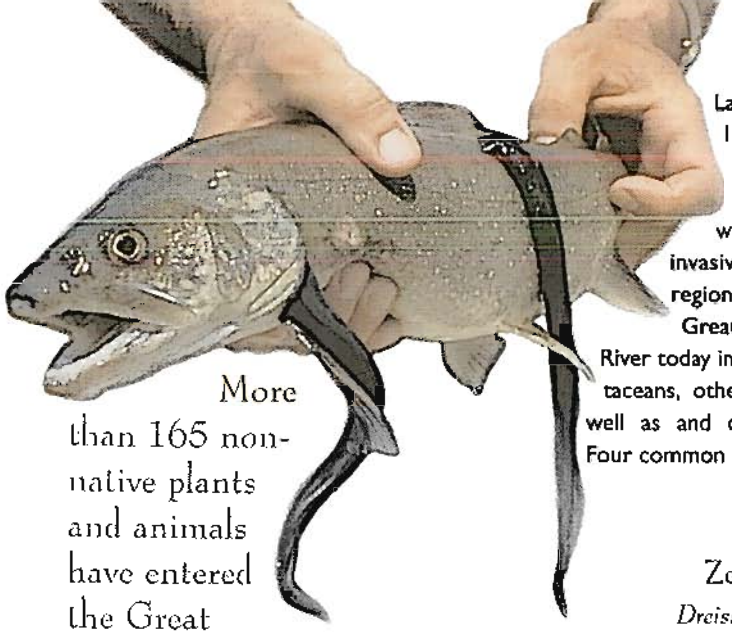



Jefferson County
Chaumont
Watertown
Adams
Boat Launches
Snowmobile Trails
State Unique Area
State Wildlife Management Area
State Reforestation Area
State Park
County Forests and Park
Municipal Park



Locations of publicly accessible state, county and city lands snowmobile trails and boat launches

invasive species



More than 165 non-native plants and animals have entered the Great Lakes and St. Lawrence River ecosystems in the past 200 years.

Non-native plants and animals (also called invasives/exotics) are plants and animals that have been introduced into an ecosystem in which they did not evolve. These are species that have been transported, most often by human activities—intentionally or unintentionally—from their native range outside the Great Lakes and St. Lawrence River Basins and are now reproducing in the wild in their new environment.

In some cases, these organisms are relatively benign; in other situations, they may have beneficial impacts. However, in many cases, they exhibit an ability to spread throughout an ecosystem, depleting food and habitat, and competing with or displacing native species. They cause or have the potential to cause harm to the environment, the economy or human health. Invasive species have been entering Great Lake waters since the advent of canals in the early 1800s. The invasion accelerated with the opening of the St. Lawrence Seaway in the late 1950's. Large, ocean-going ships carried millions of gallons of freshwater ballast water and a multitude of invasive species entered the region. Invasive species in the Great Lakes and St. Lawrence River today include: fishes, mollusks, crustaceans, other invertebrates, plants, as well as and disease-carrying organisms. Four common species are described here.

Species: Zebra Mussel *Dreissena polymorpha* and Quagga Mussel *Dreissena bugensis*

Description: Small (1-2 inches), bivalve mussels with striped shells.

Origin: During the late 1980s, zebra and quagga mussels were introduced into the St. Lawrence River and Great Lakes as veligers (larvae) from freshwater ballast discharged from freighters that originated in the Black and Caspian Sea regions of Eastern Europe and western Asia.

Diet: Zebra and quagga mussels primarily consume phytoplankton, the microscopic plant life that forms the base of the aquatic food chain. They also consume small zooplankton (tiny aquatic animals) and bacteria.

Threat: These small, bivalve mussels have the ability to filter huge amounts of water, resulting in the subsequent removal of plankton from the lakes, creating a dramatic increase in water clarity. Although the clearer lake water is seen as an aesthetic benefit to some, the loss of nutrients it represents significantly reduces the food available for fish and other organisms. Zebra and quagga mussels attach to solid underwater substrate, like rocks, piers, intake pipes, and boat hulls, using tough elastic strands called byssal threads. In addition to the ecological damage the mussels cause, hundreds of millions of dollars have been spent to clean up fouled pipes and keep the mussels from fouling drinking water treatment, industrial and power plant intakes.

In the St. Lawrence River the mussels' impacts have been a two-edged sword: on one hand, the clearer water has increased the enjoyment of recreational diving, particularly on shipwrecks; on the other hand, those once-pristine wrecks are now covered in inches-thick layers of mussels. Although quagga mussels are similar to zebra mussels, they have the ability to survive in deeper, colder water and, in areas with low concentrations of plankton. They can survive on bacteria better than zebra mussels. In many areas, original settlements of zebra mussels have been displaced by quagga mussels.

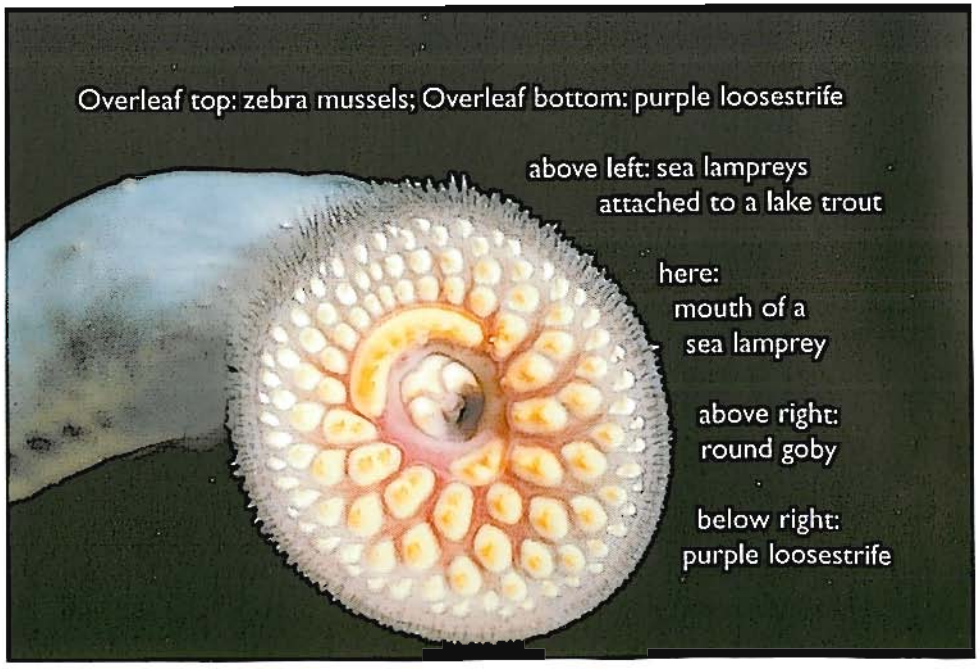
Species: Spiny Waterflea *Bythotrephes longimanus*

Description: Small (5-15 mm), predatory crustaceans with a long, barbed tail spine that protects them from predators.

Origin: A native to Great Britain and Northern Europe, spiny waterfleas were first discovered in Lake Ontario in 1982. These creatures entered the lakes via ballast water discharges and spread to all five Great Lakes and the St. Lawrence River within a few years. They are able to reproduce rapidly; during warm summer months, each female can produce up to 10 offspring every two weeks.

Diet: Zooplankton.

Threat: Waterfleas are a nuisance to anglers, who often find cotton-like globs of the creatures on fishing lines and nets. Some anglers have had to cut their lines and lose fish. The food web impacts are still unknown.



Species:
Sea Lamprey
Petromyzon marinus

Description: Predatory, eel-like fish.
Origin: Native to the coastal regions of the Atlantic Ocean. It is thought to have migrated from its native habitat in the Atlantic drainage from the Hudson River through the Erie Canal or by attaching itself to boats plying the Erie and St. Lawrence Canal systems.
Diet: Blood and body fluids of fish.
Threat: The sea lamprey attaches itself to the sides of its target fish (important sportfish such as trout and salmon) using a sucking disk, while sharp teeth in its circular mouth cut through the skin of the fish. The lamprey then sucks the blood and body fluids from the fish. Often pictured firmly attached to the sides of a valuable lake trout or whitefish, lamprey have been blamed for the decline in these and other fish species. A single adult lamprey can be responsible for the death of up to 40 pounds of fish in its lifetime. An attack by a sea lamprey results in the death of six out of seven prey fish, directly by the loss of bodily fluids or from a secondary infection that occurs at the wound site. Fish that survive lamprey attacks are weakened and are more vulnerable to future attacks by lampreys or capture by more powerful predators.
To control lamprey populations, the binational Great Lakes Fishery Commission relies on constructed stream barriers that do not interfere with the passage of other fish species, and the use of chemical lampricide treatments in spawning streams around the Great Lakes. The lampricide treatments have proven to be very effective, but can cost millions of dollars each year. An innovative male catch-sterilize-and-release program has also been used to reduce populations.
Research continues on alternative lamprey control methods, including the innovative use of pheromone attractants that could be used to draw sea lamprey into traps or towards unsuitable stream spawning sites.

Species:
Round Goby
Neogobius melanostomus

Description: An aggressive fish, 4-10 inches, grey with blotches of black and brown.
Origin: Originally from the Black and Caspian Seas region, round gobies were first discovered in the Great Lakes in 1990.
Diet: Includes insect larvae and zebra mussels.
Threat: Although some see the zebra mussel-eating goby as a beneficial invader, researchers are concerned that gobies may move the contaminants found in the flesh of zebra mussels up the food chain, where the toxins have the potential to impact valuable game fish, such as smallmouth bass. Research continues on the link between round gobies and toxins from zebra and quagga mussels and on a possible zebra mussel-round goby link to the recent outbreak of avian botulism plaguing Lake Erie.

Invasive Plants

When European settlers moved to the Great Lakes region, they brought with them a number of familiar plants from their homelands. These included species for use as food for humans and livestock, flowers (decoration) and medicinal purposes. Some of the plants that migrated with the early settlers have proven to be detrimental to the health of the Great Lakes and St. Lawrence Valley ecosystem. One commonly seen invasive plant is purple loosestrife.

Species: Purple loosestrife (Lythrum salicaria)
Description: An erect, perennial emergent aquatic plant, 4-10 feet in height, with a square woody stem and magenta colored flowers.
Origin: Native to Eurasia, was first introduced into North America in the early 1800s, most likely as a stowaway in the form of seeds in the solid (soil) ballast used to stabilize ships making trans-Atlantic crossings in the early 1800s. The seeds were probably also mixed in with the fodder and bedding that the settlers brought with them for their [imported] livestock. The plant was likely favored as both an ornamental plant and a medicinal herb. American beekeepers like the plant for the production of honey.
By the late 1800s, purple loosestrife was found throughout much of the Northeastern United States and Southeastern Canada. The construction of the Erie Canal (and numerous other regional canals in the mid- and late 1800s) opened most of the Great Lakes Basin to loosestrife colonization by the end of the 19th century. Today, loosestrife can be found in every continental state except Florida. In the 1930s, purple loosestrife began to aggressively colonize St. Lawrence River flood plains; it has since become a major nuisance plant in most of its North American range.
Threat: Purple loosestrife is a very aggressive colonial plant. One mature plant can produce more than a million seeds per growing season. The plant can also be established from stem or root fragments. Once purple loosestrife becomes established in a wetland, it can out-compete native vegetation, such as cattails, sedges and rushes, and can form monospecific stands in which as much as half of the native wetland vegetation biomass can be displaced. Loosestrife has little value as a food source for waterfowl and wetland animals, and dense stands of loosestrife can eliminate the cover value of native vegetation. The loss of native vegetation can result in the loss of the native wetland wildlife. Loosestrife can also reduce the productivity of shallow waters utilized as spawning habitat for native fish. Some stands of loosestrife in shallow waters can be thick enough to block the passage of small boats.
New, small, patches of purple loosestrife can be controlled by hand pulling, by treatment with broad-spectrum herbicides, or by flooding. Such control methods are generally ineffective, too costly or physically difficult against well-established stands. Mowing is not effective since new plants can be established from stem fragments. Burning is ineffective unless the fire is intense enough to kill the plant's roots. Years of research into control of loosestrife by insect predation has resulted in five species of insect being approved as biological control agents, including a root-mining weevil, two leaf-eating beetles, a flower-feeding weevil and a seed-feeding weevil.

Text written by
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NATIONAL AQUATIC NUISANCE SPECIES CLEARINGHOUSE
http://www.aquaticinvaders.org

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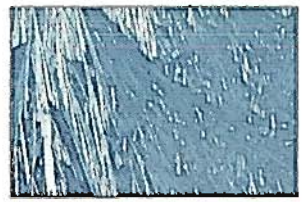

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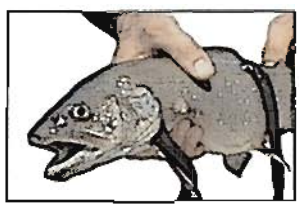

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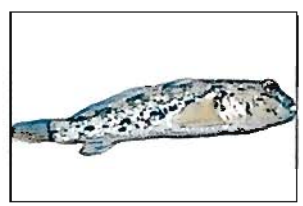

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Eric Coombs
-page 45

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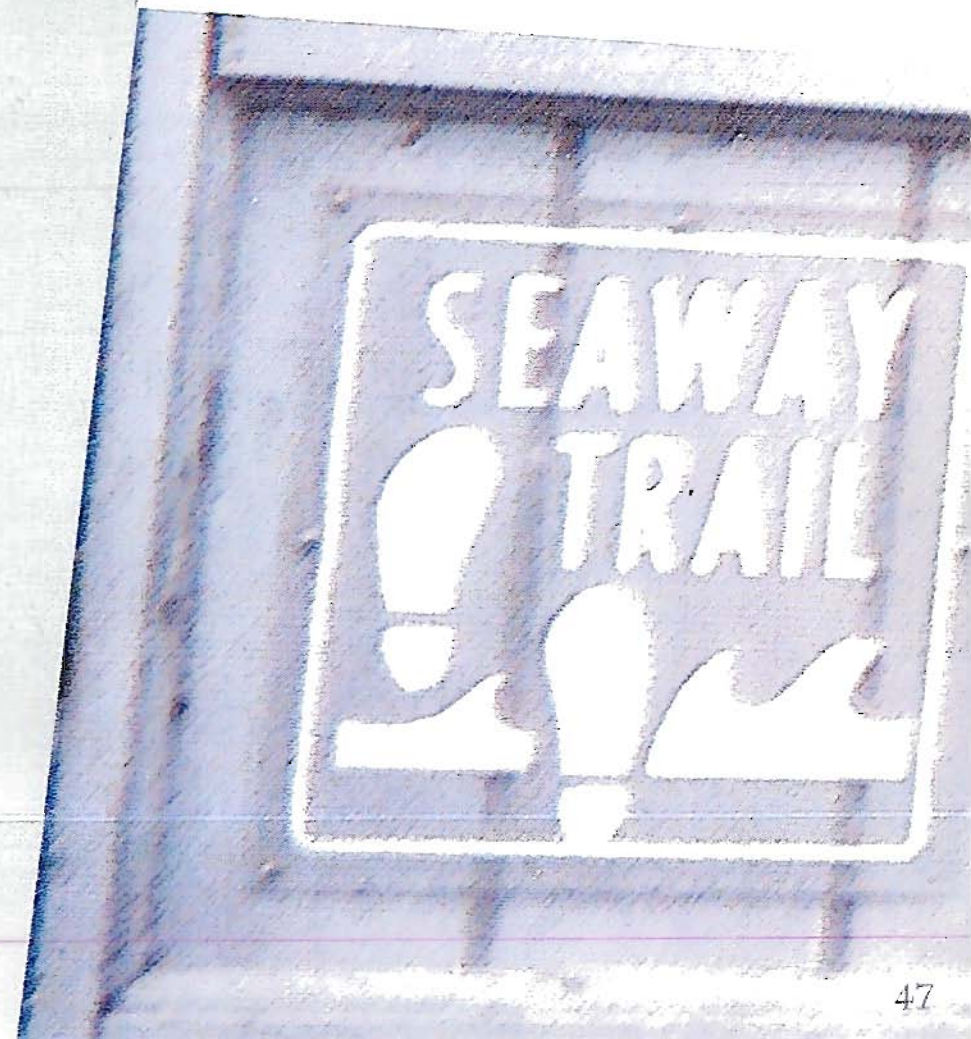

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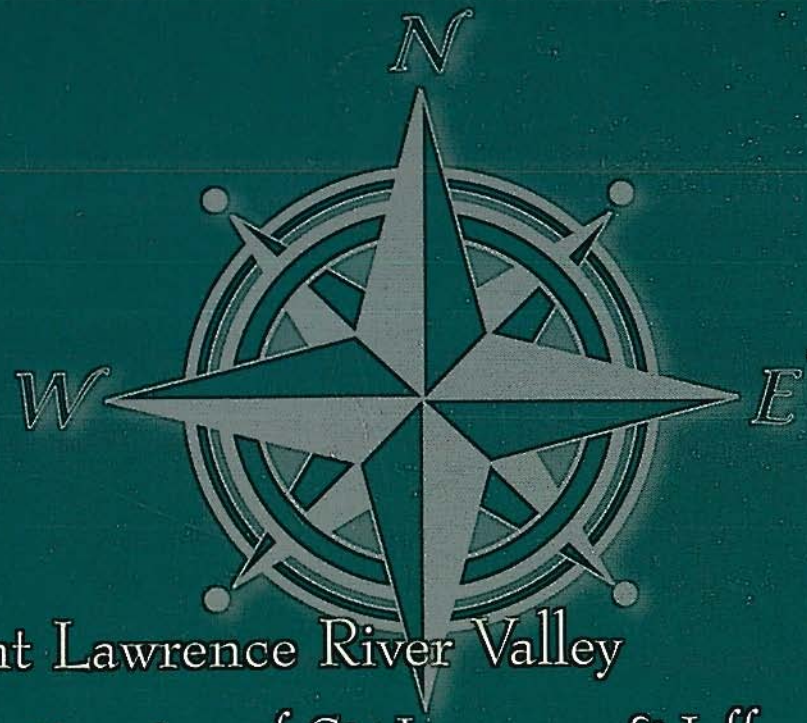

The Saint Lawrence River Valley

An informative view of St. Lawrence & Jefferson Counties
shown in maps, facts & figures

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