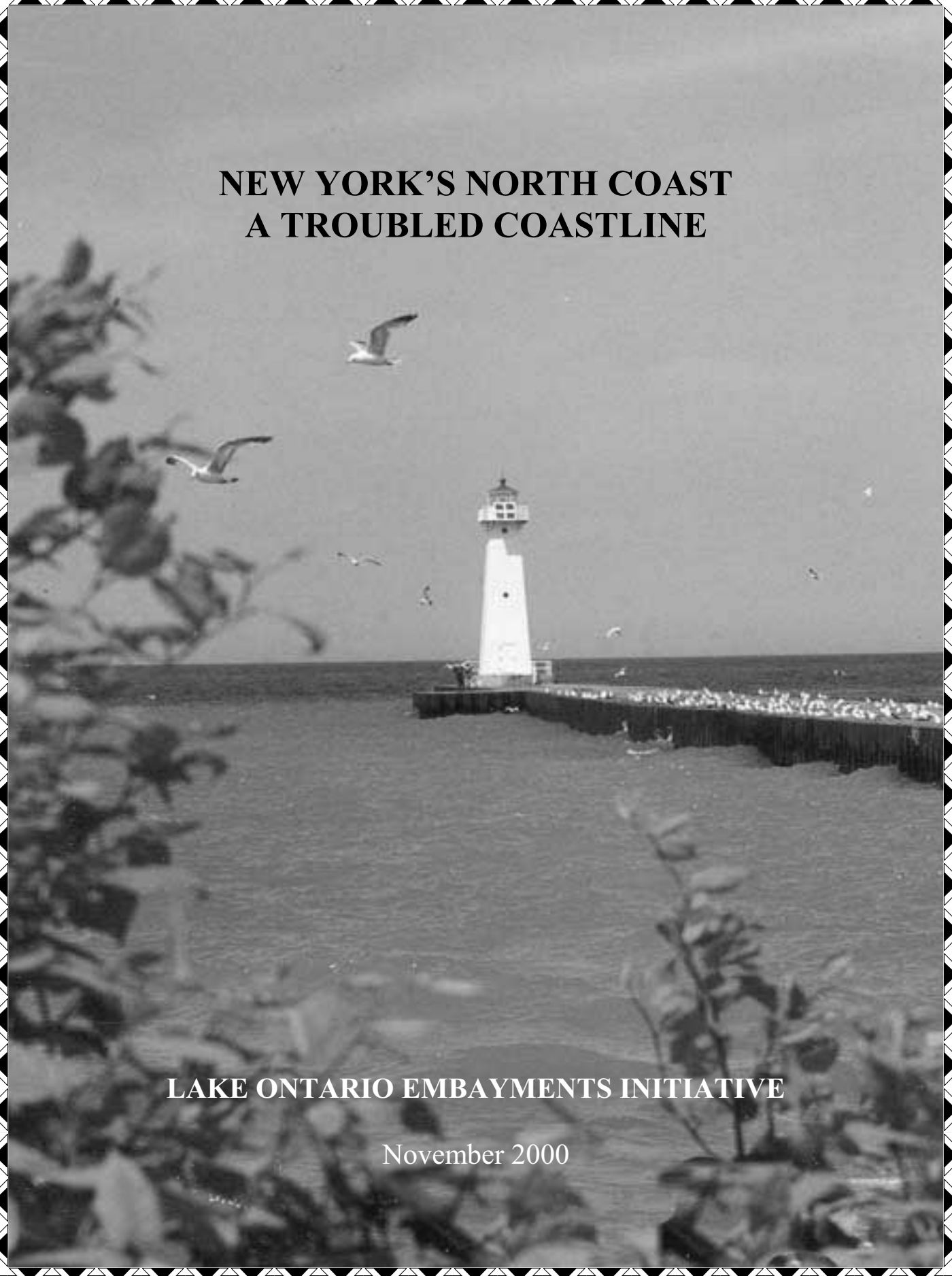
NEW YORK'S NORTH COAST
A TROUBLED COASTLINE



LAKE ONTARIO EMBAYMENTS INITIATIVE

November 2000

Cover Photograph

Looking North toward
The lighthouse at Great Sodus Bay
Wayne County

Note the blue waters of Lake Ontario in the background
and the brown turbid waters of Great Sodus Bay in the foreground

Photo by
William (Bill) Huff, Jr.

Acknowledgements

This report was prepared by

Joseph C. Makarewicz, Ph.D.
Center for Applied Aquatic Sciences and Aquaculture
Department of Biological Sciences
SUNY Brockport

Funding for this project was provided by
The Special Projects Fund of the Water Resources Board
Finger Lakes-Lake Ontario Watershed Protection Alliance (FL-LOWPA)

A Special Thanks To

The New York State Legislature
for supporting FL-LOWPA Programming

The following project reviewers

Robert K. Williams, Wayne County Soil and Water Conservation District
Karen Noyes, Oswego County Planning Board
Tom Goodwin, Monroe County Planning Board

The following county reviewers
who kindly provided supporting documents

Nichelle Billhardt, Orleans County Soil and Water County District
Robert Brower, Cayuga County Planning Board
Cynthia Long, Niagara County Soil and Water Conservation District
Jay Matteson, Jefferson County Soil and Water Conservation District
Karen Noyes, Oswego County Planning Board
Margaret Peet, Monroe County Health Department
Robert K. Williams, Wayne County Soil and Water Conservation District
Michelle Wunderlich, Cayuga County Planning Board

The following for their valued counsel, opinions and reviews

Betsy Landre, FL-LOWPA
James Haynes, Ph.D. and Theodore Lewis
Department of Biological Sciences, SUNY Brockport

Charles O'Neil and David MacNeil
New York Sea Grant Extension, SUNY Brockport

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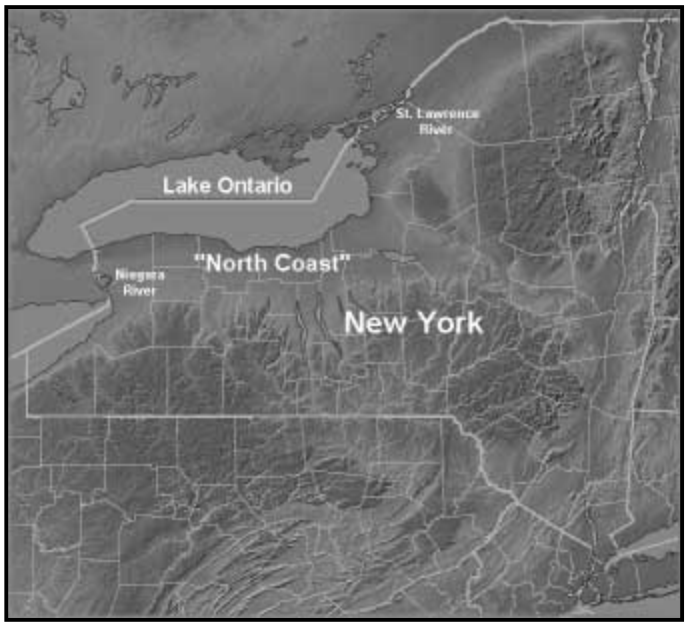
New York's North Coast – A Troubled Coastline

The **North Coast** of New York State stretches over 140 miles through seven counties from the **Niagara River** in the west to the **St. Lawrence River** in the east creating a boundary between the Province of Ontario in Canada and New York State. The bays, river and creek mouths, wetlands, and ponds, generally called the embayments in this report, are the subject of this initiative. Located on the south shore of Lake Ontario, they are of vital importance to the economic well-being of the area and are threatened by pollution. The embayments are suffering from many impairments that significantly limit their recreational use and ultimately affect the economic development of a region which has not been touched by the national upswing in the economy. By identifying their usage and identifying their water quality problems and impairments, we hope to develop an awareness and concern for the environmental health of these embayments and to create a dialog that will ultimately influence policy makers on the need to develop sources of government funding to restore these unique but ecologically damaged ecosystems.



Many of the embayments on the southern Lake Ontario coastline are severely polluted.

The Problem

Irondequoit Bay, **Great Sodus Bay**, **Oswego Harbor**, **Henderson Harbor**, **Chaumont Bay**, **Port Bay**, **Little Sodus Bay** and **Braddock Bay** are several miles in length and are, in reality, lakes that connect to but are separate entities or ecosystems from **Lake Ontario**. Compared to Lake Ontario, they are distinct in biology, ecology, usage by people and each has unique problems. Water-based resources available in these embayments include, but are not limited to, swimming, boating, fishing, marinas, staging areas for charter boat operations, tourism linked to historical sites, and drinking water. Unfortunately, water quality is generally poor. Swimming and recreational boating are often impaired by harbors choked with aquatic weeds.

The river mouths of **Eighteenmile Creek**, **Sixteenmile Creek**, the **Genesee River** and the **Salmon River** are known to have usage impairments. In some cases, the impairments are of such severity that the International Joint Commission has designated them as Areas of Concern. Along the **North Coast**, a multitude of small ponds and harbors, such as **Long Pond**, **North** and

A major portion of the Great Lakes ecosystem, the embayments, are not being restored.

Wilson Harbor at Twelvemile Creek

South Sandy Ponds, **Oswego Harbor**, **Fairhaven Harbor**, **Pultneyville Harbor** and **Henderson Harbor** in Monroe, Cayuga, Oswego and Jefferson Counties, are heavily polluted.

Unlike the open waters of Lake Ontario that over the last decade have steadily improved in water quality, the embayments have not had measurable improvement in water quality. Most of the bays suffer from cultural eutrophication. This excessive growth of microscopic plants and weeds is caused by enhanced amounts of nutrients from the watersheds. Increased shoreline development and the lack of peripheral sewer systems also contribute to this problem. Numerous funding programs dedicated to the cleanup of the offshore waters of Lake Ontario, the Areas of Concern, the Finger Lakes, Superfund sites, etc. exist. However, very few funding programs are available to restore the water quality of the embayments of the **North Coast** of New York.

A catalyst for dialog and action through education on the ecological state of Lake Ontario embayments is the goal.

Significant improvements in water quality of the open waters of Lake Ontario, but not the embayments, have occurred.

North Coast Success Stories

Federal and state management plans have rightfully and successfully focused on the large obvious problems – **Lake Ontario** and the **Niagara River**. Under the **Niagara River Toxics Management Plan**, 18 persistent toxic chemicals or "toxics" were identified. As of 1995, the daily loading of the 18 priority toxics has been reduced by 99% in Canada. On the American side of the River, the New York State Department of Environmental Conservation (NYSDEC) and the Environmental Protection Agency (EPA) estimate a reduction of 80% of the potential toxic inputs into the **Niagara River** by 1999. The estimated cost for remediation up to 1998 is at least $327 million.

A similar success story exists for the open waters of **Lake Ontario**. Hundreds of millions of dollars have been spent to improve water quality and to restore a sport fishery to the open waters of **Lake Ontario**. A sport fishery, considered by many to be second to none, has been established for the lake and brown trout, and steelhead and coho and chinook salmon. Recent survey data has estimated that 2.5 million days were spent fishing on Lake Ontario waters during 1996 with close to 40% from shoreline anglers. In 1996, anglers spent over $170 million on trips to New York's Great Lakes waters. An estimated 188,210 anglers fished **Lake**

Ontario for a total of 2.5 million days; 23% of the anglers were from outside New York State. The sport fishing industry, so dependent on good water quality and aesthetic values, provides a major economic boost to the **North Coast**.

The phosphorus abatement program has been an undeniable success at halting cultural eutrophication of the open waters, nearshore and offshore, of **Lake Ontario**. The amount of phosphorus, the causal factor of elevated phytoplankton abundance, entering the lake has declined markedly since the late 1960s from a peak of 15,036 tons per year in 1969 to 7,410 tons per year by 1981. Since the early 1980s, phosphorus loading has fluctuated close (mean = 7,927 tons per year) to the Great Lakes Water Quality Agreement (GLWQA) target of 7,000 tons per year. In response to the reduction in phosphorus loading, ambient levels of phosphorus (Fig. 1), and abundance of phytoplankton (Fig. 2) have decreased in Lake Ontario. Water clarity of the open waters of Lake Ontario has reached unprecedented levels. The bottom can often be seen at a depth of 30 feet during the summer and fall compared to 10 feet just two decades ago. However, the major improvements in **Lake Ontario** water quality have not translated into measurable improvements in water quality for the embayments of the **North Coast**. A realistic water quality goal for the Lake Ontario embayments is to achieve improvements in water quality similar to the improvements realized in the open waters of Lake Ontario.

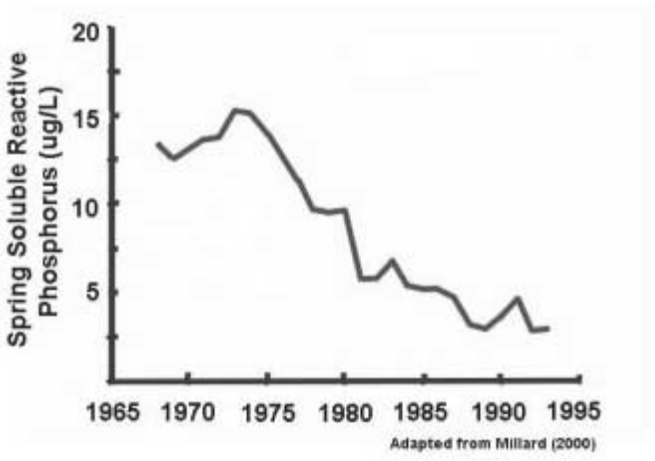


Figure 1

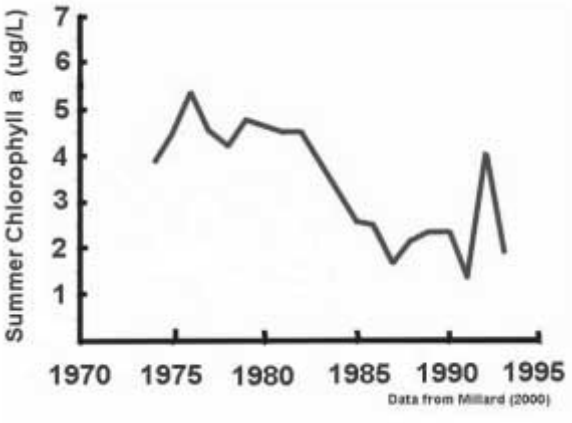


Figure 2

The Initiative

It is time to focus on remediating pollution problems in the embayments, ponds, harbors, rivers and creeks located along the "North Coast" of New York

The public has responded to the significant improvements in Lake Ontario water quality by spending millions of recreational dollars on charter boats, fishing licenses, boat berthing, summer homes and vessels. However, the rough, unpredictable waters of Lake Ontario are often the second choice for boaters, water skiers, swimmers, sailors and fishermen. The quiet, protected waters of **North Coast** bays provide a recreation experience similar to smaller lakes. However, many of the embayments used by boaters and others are far from ideal as the waters are affected with

It is a misconception that all water-based recreation is focused on Lake Ontario.

an over abundance of aquatic weeds, blooms of algae, fecal contamination and aesthetically unpleasant conditions. Tourism, water-based recreation, including the economically viable sport fishing industry, and property values are detrimentally affected in the seven counties that make up the **North Coast** of New York. It is time to refocus our remediation efforts to the bays, creeks, harbors, rivers and ponds located on the New York's **Lake Ontario** coastline. The **Embayment Initiative** seeks to initiate a dialog to refocus restoration efforts and funding toward the goal of improving water quality of the **Lake Ontario** embayments of the **North Coast** of New York. A concentrated effort requiring substantial funding, such as the successful remediation programs on the **Niagara River** and on **Lake Ontario**, is warranted to improve environmental conditions of the embayments. Enhanced funding would benefit the ecologically unique and economically important water resources of the embayments of the **North Coast**. Significantly, any improvement in embayment water quality and habitat ultimately improves the entire **Lake Ontario** ecosystem.

Water Quality Issues of the Embayments

Below is a summary of the environmental problems associated with the embayments, harbors, ponds, creeks and rivers of each county bordering **Lake Ontario**. Greater detail on water quality problems is provided in a county by county review in the following sections.

Weeds Choking a Sodus Bay Marina

In the deep waters of **Irondequoit**, **Port** and **Great Sodus Bays** of **Monroe** and **Wayne Counties**, cultural eutrophication is the cause of benthic anoxia or a lack of oxygen in the sediments. Benthic anoxia often extends into the water above the sediments, reducing oxygen in the bottom waters and precluding the establishment of cold water fisheries believed by some to have been historically present in these waters. Anoxia in bottom waters also allows the release of the limiting nutrient phosphorus, which further stimulates plant growth in a process known as self-fertilization.

At **Port Bay** in **Wayne County** and **Long Pond** in **Monroe County**, partially treated sewage effluent from the Village of Wolcott and the Village of Spencerport Sewage Treatment Plants is legally discharged into tributaries that empty into small **North Coast** embayments. Partially treated sewage effluent contributes to overall poor water quality of these embayments, even with phosphorus removal as in the Spencerport Sewage Treatment Plant. The aesthetic value of **Little Sodus Bay** is impaired by the high turbidity of water and the resulting low water clarity and aquatic weed problems. Swimming is impaired due to low transparency of the water caused by blooms of algae and the presence of dense weed beds. Aquatic weeds, primarily Northern

and Eurasian Milfoil, are densest in the southern and western shallow areas of **Little Sodus Bay** and are so severe that boat navigation in some areas is inhibited. Because of high coliform counts in the past, the Village of Fair Haven has been under a New York State Department of Environmental Conservation Consent Order for polluting **Little Sodus Bay.**

Sewage Treatment Plant Discharging into a North Coast Tributary

At both **North** and **South Sandy Ponds** of **Oswego County**, agriculture run-off, septic system failures, "gray water" discharge, and lawn run-off are believed to be major sources of nutrients. Over 186,000 gallons of discharge per day from hotels, campgrounds, restaurants, etc. are permitted each day into Sandy Creek. **Henderson Bay**, located south of Point Peninsula in **Jefferson County**, is a four-mile long bay of Lake Ontario receiving discharge of inadequately treated sewage from the Hamlet of Henderson Harbor. In addition, failing on-site sewage systems around the **Bay** contribute pathogens and nutrients that lead to excessive macrophyte growth, increased oxygen demand of the water and, in general, a decrease in water quality and aesthetic beauty of **Henderson Bay**. The NYS Department of Health has concluded that the use of the **Henderson Bay** waters for drinking water supply and swimming is impaired due to these pollutants.

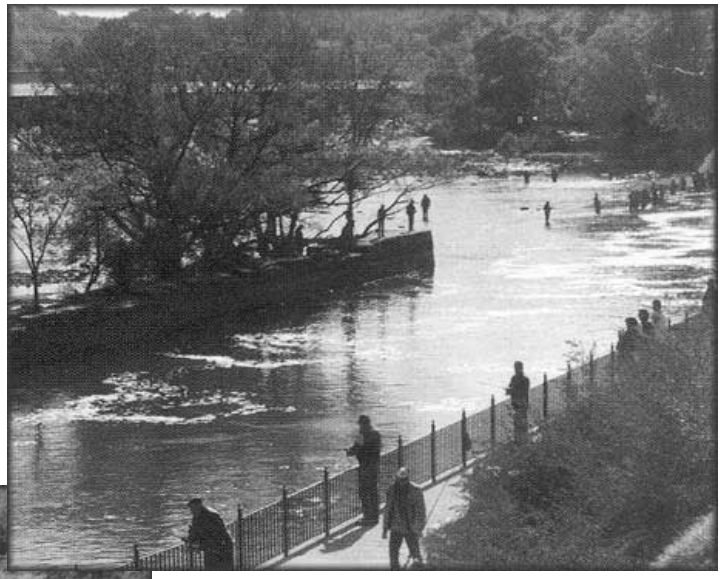
Public bathing is the primary impairment of **Chaumont Bay**, a 9000-acre embayment, with fish consumption, boating and aesthetic value either impaired or stressed. Recreational boating and swimming are impaired by algal blooms and excessive weed growth. Nutrients from direct discharges of sewage into **Chaumont Bay** occur, but failing and inadequate on-site septic systems are thought to be primary sources of nutrients. There are currently several tiers of linear shoreline development, and continuing development insures that water quality will not improve without remedial action. In general, cultural eutrophication of the bays and ponds of the **North Coast** has resulted in poor water quality including lack of clarity, high algal abundance and high weed abundance that ultimately decrease the recreational usefulness and aesthetic appeal of these waters to year-round residents and to the tourism industry.

An Area of Concern (AOC) is a place where significant pollution problems have been identified by the International Joint Commission as impairing the beneficial uses of a water body. **Eighteenmile Creek** in **Niagara County** is designated as an Area of Concern polluted by past industrial and municipal discharges, disposal of waste and the use of pesticides. Fishing is impaired by PCBs and dioxins found in the flesh of various game fish. The health of the benthos, or bottom–dwelling organisms, is impaired by PCBs and metals in the creek sediments. Bird and animal health is likely impaired by PCBs, dioxins, DDT and its metabolites, and dieldrin found in fish flesh. In addition, large areas of the north portion of the County are in agriculture and may be losing large amounts of nutrients and soil to **Twelvemile**

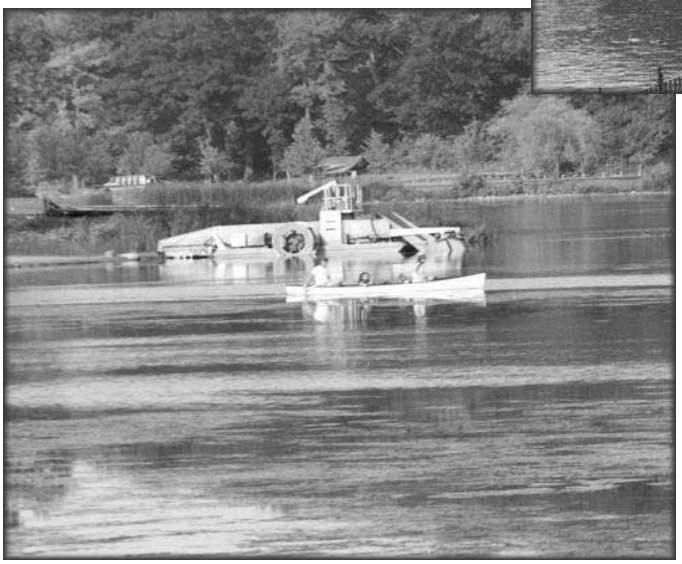
and **Eighteenmile Creeks** causing cultural eutrophication of the receiving river mouths and nearshore of Lake Ontario.

The New York State Department of Environmental Conservation lists fishing in **Johnson** and **Oak Orchard Creeks** as threatened, while **Oak Orchard** aesthetics are considered stressed. Several Inactive Hazardous Waste Disposal sites exist in **Orleans County** watersheds that are likely to be affecting the down-stream embayments of **Oak Orchard** and **Johnson Creeks**. For example, there is widespread contamination by DDT, DDE, DDD and PAHs and arsenic near Lyndonville, NY by an inactive hazardous waste disposal site. **Oak Orchard Creek**, **Johnson Creek** and **Sandy Creek** are moderately polluted by phosphorus. Sixty-two tons of phosphorus (56,056 kg), approximately 113 pounds of phosphorus per day, were lost from the combined **Oak Orchard Creek**, **Johnson Creek** and **Sandy Creek** watersheds and delivered into harbor waters located at the river mouths and eventually into the nearshore of Lake Ontario.

The **Oswego River** and **Harbor** is one of the 43 Areas of Concern designated in the Great Lakes Basin. Primary impairments are restrictions of fish and wildlife consumption. Municipal sewage discharge, combined sewer overflows and agricultural runoff in the basin contribute nutrients to the water, causing eutrophication of the embayment. Pollutants of concern in the Oswego AOC are PCBs, dioxin, phosphorus, mercury, mirex and photomirex and octachlorostyrene. Sediments contain moderately high levels of phosphorus.

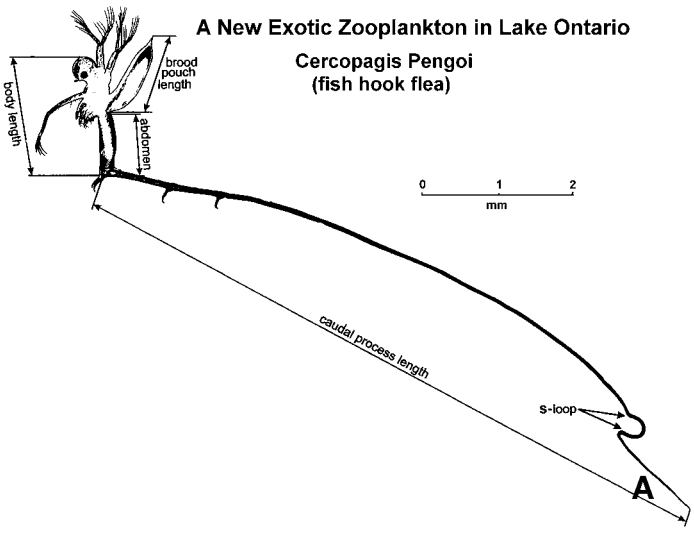


Fishing on the Oswego River



Weed Cutter at Fairhaven State Park

Twelve use-impairments are confirmed for the **Rochester Embayment** – another embayment designated as an Area of Concern by the International Joint Commission. These use-impairments range from consumption restrictions of Lake Ontario fish due to PCBs, mirex and dioxin, to restrictions on drinking water consumption. Invasion by exotic species is another problem that is magnified in the



embayments and rivers of the **North Coast**. Due to ballast water discharge from international shipping on the Great Lakes, the Great Lakes have become an invasion route for alien species from all over the world. The impact of non-indigenous species continues to be a major problem. Purple Loosestrife and Water Chestnut are weeds literally taking over wetland areas in embayments and tributaries. Zebra mussels have clogged water pipes, boat engine exhausts and water pumps; they have changed the nature of beaches with their shells. As of 1998, another exotic species the "Fishhook Flea" has invaded and is ubiquitous in Lake Ontario with yet unknown ecological consequences in the embayments.

The Lake Counties

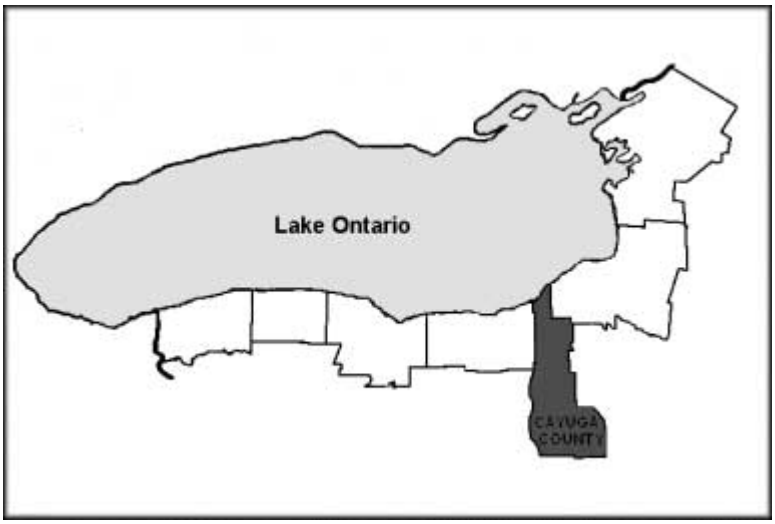
Cayuga, Jefferson, Monroe, Niagara, Orleans, Oswego, Wayne

In the sections that follow, many of the water-based resources associated with the embayments, rivers and wetlands of each of the counties bordering on Lake Ontario are described. Recreational, economic and ecological importance and significance are briefly discussed. In addition, a short description of water quality issues, but not an all-inclusive list, is presented for the embayments, creeks, rivers and wetlands by county in greater detail.

A Great Sodus Bay Marina

Cayuga County

Although Cayuga County has only a few miles of shoreline on Lake Ontario, it possesses one of the most popular embayments for recreational boating and fishing, **Little Sodus Bay**. Often called Fairhaven Harbor, **Little Sodus Bay**, is a large bay of 715 acres with a shoreline of 6.8 miles lined with summer and permanent homes. Several private launch ramps and the New York State boat launch at the northwest end of the bay are heavily used during the spring, summer and autumn. Surveys demonstrate that **Little Sodus Bay** was the second most popular site to launch a boat during the 1994 spring fishing derby. The barrier beach that separates the embayment from Lake Ontario is a popular destination for boaters. That same barrier beach extends to the northeast and becomes **Fairhaven State Park**, which has a large bathing beach, campgrounds and picnic area heavily used during the summer.



Water Quality Issues

Weeds at Fairhaven Harbor

The New York State Department of Environmental Conservation indicates that **Little Sodus Bay** has several use impairments. Aesthetic value of **Little Sodus Bay** is impaired by the high turbidity of water and the resulting low water clarity and aquatic weed problems. Bathing is stressed due to low transparency of the water caused by blooms of algae and the presence of dense weed beds. Aquatic weeds, primarily Northern and Eurasian Milfoil, are densest in the southern and western shallow zones of **Little Sodus Bay** and is so severe that boat navigation in some areas is inhibited. Nutrient and soil loss via streams draining watersheds are generally implicated as the major cause of excess plant production or cultural eutrophication. Soil loss from agriculture and stream and road bank erosion is accumulating in the **Bay** providing additional rooting substrate for aquatic weeds. To control aquatic weed growth, diquat

dibromide had been applied in the 1980s. In the 1990s, the Cayuga County Soil and Water District began a weed harvesting program that mechanically removed 150 truckloads of aquatic weeds in 1997, 110 in 1998 and 40 in 1999. Other factors accentuating the cultural eutrophication of **Little Sodus Bay** are reported as lawn fertilization of beach front properties and the lack of oxygen in the hypolimnion releasing phosphorus from the sediments back into the water column – sometimes termed self-fertilization of the **Bay**.

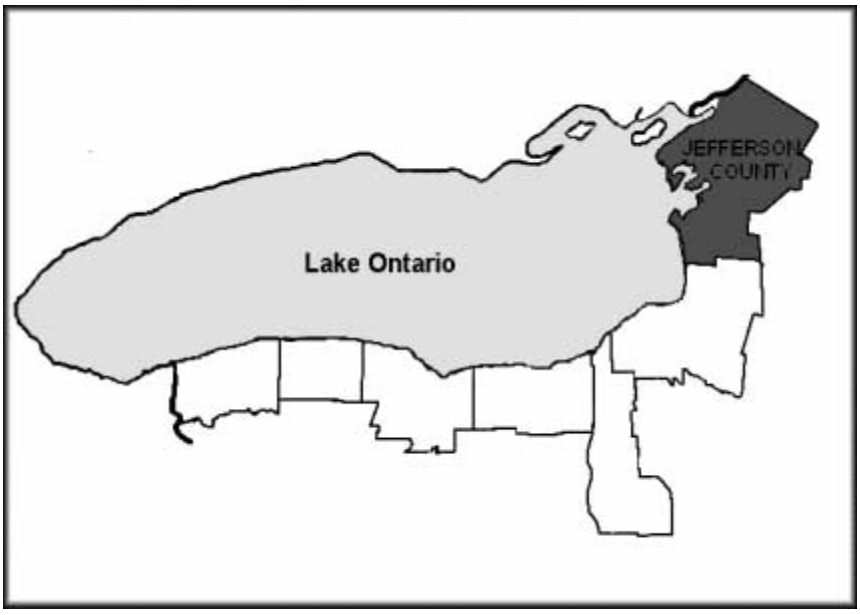
Fish stocks of **Little Sodus Bay** are impaired due to the general fish advisory for Lake Ontario. However, fish propagation and spawning in **Little Sodus Bay** are also considered impaired because of the ecologic condition of the **Bay**. The **Bay** is naturally thermally stratified during the summer. The high productivity of algae and weeds in the **Bay** caused by the excessive amount of nutrients entering from the watershed causes the deeper cold waters of the **Bay** to become devoid of oxygen during the summer and autumn. This lack of oxygen in the deeper waters of the hypolimnion stresses propagation of some fish species that would normally spawn in the **Bay**.

Nonpoint sources of nutrients and soil to the **Bay** are many. To combat failing on-site septic systems and discharge of graywater, waste water from washing machines and sinks, a Septic System Management Program is in place requiring pumping septic tanks every two years with an inspection program focusing on curbing leaking septic systems. In addition, dye tests were performed to eliminate any graywater discharge. Storm sewers carry urban runoff containing nutrients, sediment and coliforms into Voughts Creek which empties into the south end of **Little Sodus Bay**. The existence of fecal coliform bacteria have been documented by the County Health Department in culvert pipes near Route 104A, Belle Avenue and storm drains from Fairhaven Village. Because of high coliform counts in the past, the Village of Fair Haven has been under a New York State Department of Environmental Conservation Consent Order for polluting **Little Sodus Bay**.

Weeds Choking Boat Slips – August 2000

Jefferson County

With the St. Lawrence River to the north and Lake Ontario to the west, **Jefferson County** has an abundance of marshes, creeks and embayments utilized for boating, fishing and bird watching. In general, the area near the lakeshore is experiencing considerable development. County records indicate that 5,455 summer homes exist that are mostly on or near the lakeshore. The Village of Sackets Harbor features a Battle of 1812 historic site.



Major embayment marshes and embayments include **Lakeview Marsh**, **El Dorado** wetlands complex, **Dexter Marsh**, **North** and **South Sandy Pond**, **Henderson Bay**, **Black River Bay** and **Chaumont Bay**. Tourism is an important component of the **Jefferson County** economy. The bays are popular with recreational boaters and provide the county's best facilities for sailboats. Much of the county's charter boat fishing industry is concentrated in **Henderson Harbor**. Nearly 16,000 boats are registered by New Yorkers as being used in **Jefferson County**. The County has 3,823 boat slips and 66 marinas with about one third of the capacity located on Lake Ontario and the rest on the St. Lawrence River. Specializing in trout and salmon, many professional fishing guides and a charter sailing operation work out of the County's Ontario harbors.

In the extensive marsh complexes, bird watching is another tourist attraction bringing visitors from throughout the northeast during migration periods. Both the Nature Conservancy and the Audubon Society have identified the freshwater dune and marsh system found in the southern portion of **Jefferson County** as a Biodiversity Investment Area and as an Important Bird Area. Important birds include migrating songbirds, raptors, and shorebirds, breeding and migrating water birds and rare species such as the Black Tern, Northern Harrier and the Common and Caspian Tern**.** The extensive dune system and sheltered littoral areas found here are rare in New York's coastal waters. The barrier beaches are unique and play an integral role sheltering the marshes from prevailing winds, buffering water level fluctuations in nesting areas for birds and providing a refuge for concentrations of waterfowl during spring and fall. The abundance and diversity of birds occurring in this area are rarely equaled anywhere else on Lake Ontario.

The Embayments and Water Quality

Embayments, marshes, and ponds along the eastern Lake Ontario shore of **Jefferson County** are formed by a ridge or sand dune on the landward side of the beach, creating a barrier between the lake and inland areas. The barrier extends over 17 miles from the City of Oswego in Oswego County into **Jefferson County** forming several barrier beach embayments of which the 2400-acre **North Sandy Pond** is the largest. **North** and **South Sandy Ponds**, located in Oswego County (see Oswego County), comprise one of the largest coastal bay ecosystems on Lake Ontario.

Dexter Marsh is a 2,000 acre, relatively undisturbed, bay-head wetland complex located at the northeast end of **Black River Bay** that is recognized as a National Landmark by the U.S. Department of Interior. The lack of protective barrier beaches allows the marsh vegetation to be buffeted by rigorous wave action, making this area somewhat unique among Great Lakes Coastal marshes.

El Dorado Beach and **Black Pond** wetlands (750 acres) are relatively undisturbed and located in the northwestern corner of the Town of Ellisburg. The 3,400 acre **Lakeview Marsh** is located in the west and southwest portion of the Town of Ellisburg and consists of a five-mile long barrier beach, freshwater marshes and ponds. These embayment marshes are important spawning, feeding, and resting area for hundreds of migrant shorebirds, waterfowl and wading birds. Besides being known as a fish spawning and nursery area, these embayment marshes support sizeable populations of several fur bearing species including muskrat, beaver, raccoon and mink. Bird watching is by the far the greatest use of this area, attracting visitors from throughout central New York during migration periods.

Henderson Bay, located south of Point Peninsula, is a four-mile long bay of Lake Ontario. Recently, the New York State Department of Environmental Conservation has documented the discharge of inadequately treated sewage into **Henderson Bay** from the Hamlet of Henderson Harbor. In addition, failing on-site sewage systems around the **Bay** contribute pathogens and

nutrients that lead to excessive macrophyte growth, increased oxygen demand of the water and, in general, a decrease in water quality and aesthetic beauty of **Henderson Bay**. The NYS Department of Health has concluded that that use of the Bay waters for drinking water supply and swimming are stressed due to these pollutants.

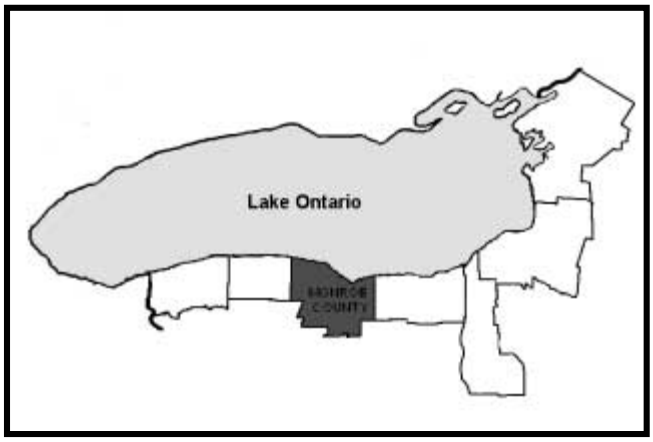
Public bathing is the primary impairment of **Chaumont Bay,** a 9000 acre embayment, with fish consumption, boating and aesthetic values either impaired or stressed. Recreational boating and swimming are restricted by algal blooms and excessive weed growth. Nutrients from direct discharges of sewage into **Chaumont Bay** occurs but failing and inadequate on-site septic systems are thought to be the primary sources of nutrients. There are currently several tiers of linear shoreline development and continuing pressure insures that water quality will not improve without remedial action. The Village of Chaumont plans to install a new Waste Water Treatment Plant in the future.

Black River and **Black River Bay** are at the far eastern end of Lake Ontario. The use of these waters for drinking water by the Town of Watertown and Sackets Harbor are impaired by turbidity and suspended solids during periods of high spring flows of the river. Causes often cited for this impairment problem include failing and inadequate on-site septic systems, streambank erosion, agricultural activity in the Towns of Rutland and Champion, runoff from the Fort Drum Military Reservation and snow removal and dumping into the river. In addition, a few hazardous waste sites located along the banks of the Black River are also possible sources of PCBs contributing to the fish consumption impairment.

El Dorado Preserve of the Nature Conservancy

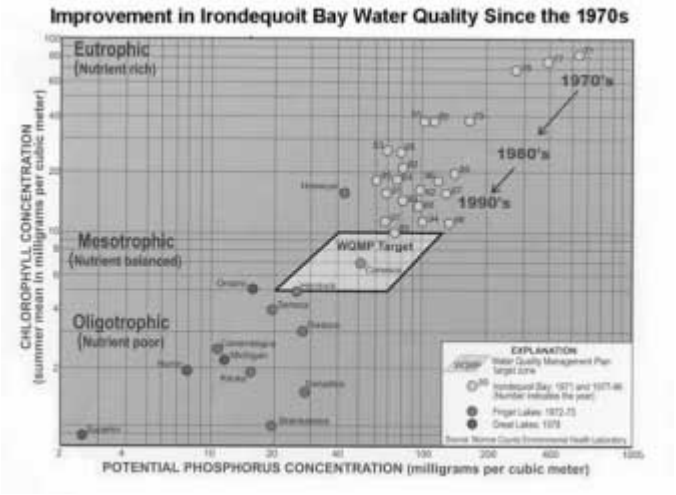
Monroe County

With the population of the Greater Rochester Area exceeding 1 million, it is not surprising that **Monroe County's** embayments and streams, as well as the waters of Lake Ontario, are popular with recreational boaters, bird watchers, fishermen and simply people walking their shores. Yacht clubs, marinas, and boat launches are concentrated in the embayments with the **Genesee River** (>1000 boat slips) and **Irondequoit Bay** (770 slips) having the most followed by **Braddock Bay** (541 slips) and **Sandy Creek** (227 slips) in western Monroe County. During the annual salmon Lake Ontario fishing derby, Irondequoit Bay, the Genesee River, and Sandy Creek are listed as the eighth, ninth and thirteenth most popular sites to launch watercraft in New York.



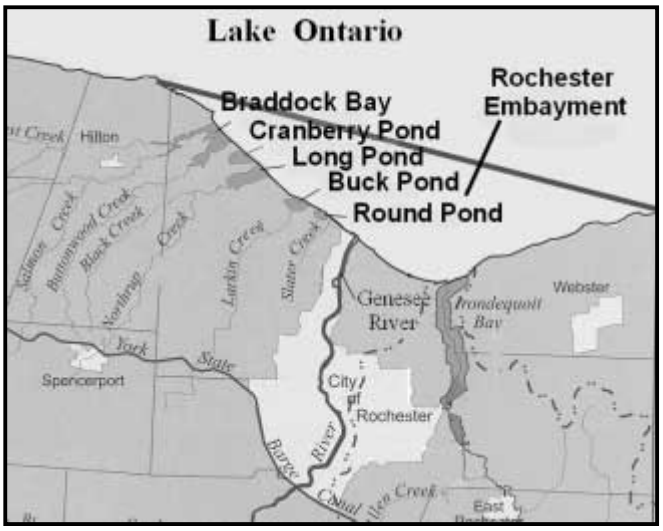
The Embayments

Irondequoit Bay is essentially a large lake (4.2 mile long and 0.6 mile wide) separated from Lake Ontario by a sandy barrier beach at its north end. Much of the west shore has been developed for residential and commercial use. The bay receives drainage from a largely urban/suburban area and in the 1960s was considered to be over productive or hypereutrophic due to several major sewage treatment plants discharging directly into the bay. Monroe County has aggressively developed and implemented watershed plans that have eliminated direct discharge from sewage treatment plants, sealed bottom sediments with alum to reduce phosphorus inputs, and reduced nonpoint and point source phosphorus loading from the watershed. As a result, algae abundance as chlorophyll has decreased measurably since the 1970s and is close to reaching target levels. This is a good example of what sustained target funding can accomplish in restoring an impaired, polluted ecosystem.



The **Braddock Bay Fish and Wildlife Management Area** is a large (2500 acres), shallow water (<10 feet deep) bay-marsh complex that includes the land and waters of **Braddock Bay**, **Cranberry Pond**, **Long Pond** and **Buck Pond**. The complex and its location on the south shore of Lake Ontario provide excellent waterfowl nesting and resting and feeding habitats; it is a remarkable spot for observing the spring migration of birds of all types, but especially raptors. In 1987, over

106,000 of 15 species of raptors were counted in the annual winter/spring survey. Unlike **Buck** and **Round Ponds** and **Braddock Bay**, the shorelines of **Cranberry** and **Long Ponds** are completely developed with permanent homes.



The **Genesee River** originates in Potter County, Pennsylvania, 15 miles south of the New York State border. A major tributary to Lake Ontario, the **Genesee River** flows north for 157 miles draining a watershed of approximately 2500 square miles. Several wastewater plants discharge into the Genesee River. These include Eastman Kodak's industrial waste treatment plant and several wastewater treatment plants upstream and south of Monroe County. Although the combined sewer of the City of Rochester carries both urban runoff and sewage to the Van Lare Treatment Plant prior to release into Lake Ontario, the **Genesee River** also carries urban and rural runoff from cities and productive farmlands before emptying into the **Rochester Embayment**. The **Rochester Embayment** is an area of Lake Ontario formed by the indentation of the Monroe County shoreline between Bogus Point and Nine Mile Point.

Sandy Creek and its drowned river mouth have two major branches that originate in Orleans County and empty into Lake Ontario 22 miles west of the City of Rochester in Monroe County. Several marinas, a yacht club, and a NYSDEC launch ramp exist at this popular boating and fishing area. **Yanty Creek** marsh, a large and significant protected wetland, exists just upstream from the mouth of the creek at Hamlin Beach State Park.

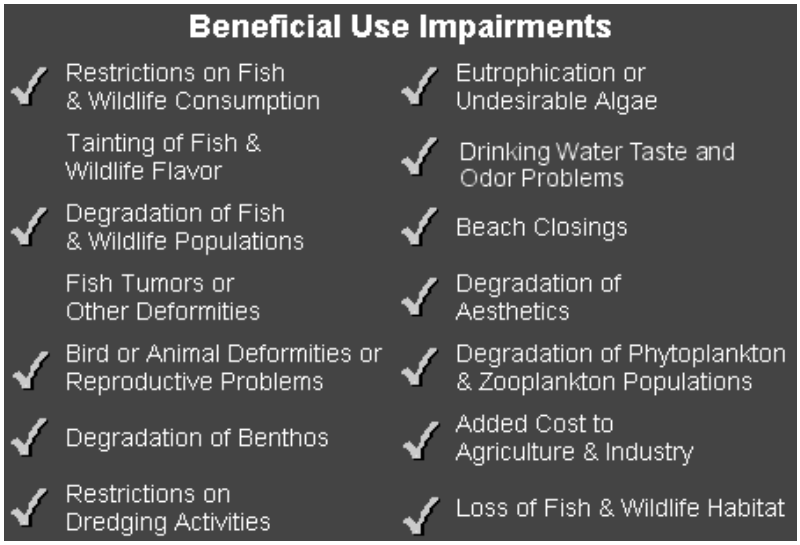
Water Quality Issues

Irondequoit Bay was considered hypereutrophic prior to the reduction of phosphorus inputs to the bay by elimination of wastewater treatment plant discharges and sealing of the bottom sediments with alum. While the Bay's trophic state is approaching a mesotrophic condition, the Bay is still characterized as highly productive, or eutrophic, with deep organic sediments and a generally dense algal crop from early May to mid October. These conditions can make the use of **Irondequoit Bay** less attractive for multiple forms of recreational use.

Twelve of fourteen potential use impairments are confirmed for the **Rochester Embayment.** These range from consumption restrictions of Lake Ontario fish due to PCBs, mirex and dioxin, to lakewide drinking water taste and odor problems. The sources include agricultural and residential use, inactive hazardous waste sites, contaminated sediments, air deposition and Lake Ontario itself. Progress to date has included the construction of a Combined Sewer Overflow (CSO) to collect and treat combined sewage before it enters the **Embayment**. NYSDEC is developing pollution prevention regulations to require implementation of Toxic Chemical

Reduction Plans for facilities that generate certain amounts of hazardous wastes or toxic chemicals.

Within the **Rochester Embayment**, a number of water quality issues affect the **Genesee River**. Routine dredging to support commercial and recreational boat traffic causes turbidity problems and releases pollutants stored in river sediments. While recent studies indicate a healthy fishery, sediment toxicity and elevated heavy metals are documented in some areas. The impact of considerable municipal and industrial point discharges have been significantly reduced by the consolidation and upgrading of area sewage treatment plants. Also, problems from combined sewer overflow have been significantly reduced. Large storage tunnels have been built that collect and store excess water during storm events until it can be treated. Remaining major impacts to the Rochester Embayment are also from nonpoint sources located in the upper and central portions of the watershed, such as stream bank erosion and agricultural runoff which result in high levels of phosphate, coliform bacteria, turbidity, and sediment.



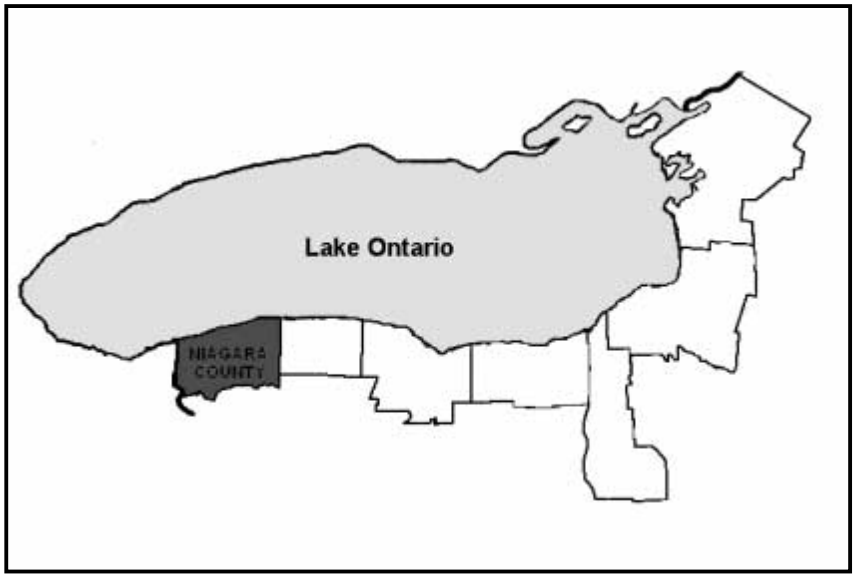
Based on stream phosphorus loading and chlorophyll data from **Long Pond** in 1989 and 1994, **Long Pond's** waters are considered to be hypereutrophc. That is to say, **Long Pond** is a very productive body of water due to a high nutrient loading from the watershed and its shallow basin. The high loading of nutrients is partially attributed to non-point sources within the watershed and point sources, such as the Spencerport Sewage Treatment Plant. The Spencerport Treatment Plant releases advanced secondary sewage effluent into Northrup Creek, a tributary of **Long Pond**.

Sandy Creek is reported to be moderately polluted. High amounts of phosphorus - 7.2 tons of phosphorus annually - are lost from the **Sandy Creek** watershed to Lake Ontario. Along the lower three miles of the stream, distinct ravines characteristic of erosion occur. Soil lost from the watershed is deposited in the creek smothering historic fish spawning sites, while phosphorus, a limiting factor to plant and algae, contributes to an overabundance of weeds and algae and enhances the cultural eutrophication of both the creek and nearshore zone of Lake Ontario. For example, during the summer of 2000, large rafts of dying *Cladophora,* a filamentous algae, were observed in **Sandy Creek** similar to those observed in Pultneyville Harbor in Wayne County.

Water quality of **Yanty Creek** is considered good. However, the physical existence of the marsh east of **Yanty Creek** is threatened by high water levels of Lake Ontario eroding the barrier beach separating the marsh from Lake Ontario.

Niagara County

From early spring through December, Lake Ontario offers a great diversity of exciting sport and recreational opportunities. Fish in the 20- to 40-pound range are caught by deep trolling from down-rigger equipped boats from vessels launched from harbors in **Niagara County**. Wilson Harbor (**Twelvemile Creek**) and **Eighteenmile Creek** (Olcott) are the headline-grabbing Lake Ontario hot spots with a good share of the honors going to the lower **Niagara River** where it enters the lake. In fact, surveys show that in 1994, the coast of Lake Ontario from the **Niagara River** to Golden Hill State Park was the most popular fishing area for trout and salmon during the Empire State Lake Ontario Derby. **Eighteenmile Creek** itself is one of the most popular fishing streams in western Lake Ontario primarily due to major spawning runs for salmon. During a brief four-day fishing derby in May 1994, surveys indicate services supporting the fishing derby earned revenue of 1.3 million dollars - the highest for the seven coastal counties.



Niagara County's shoreline embayments/drowned river mouths are of ecological and historical importance. Embayments and river creeks are Class I wetlands important for spawning and as nursery areas for fish and birds. A significant coastal wildlife zone also borders **Eighteenmile Creek** between the Route 18 bridge at Olcott and the dam at Burt. The **Niagara River** is designated as an Important Bird Area, while Fort Niagara and Golden Hill Creek Lighthouse, as well as Native American sites, are of historical interest to tourists. All the rivers/embayments are the primary spawning sites of forage fish supporting the food base of the Lake Ontario sport fishery for salmon and trout.

The Embayments/Drowned River Mouths

The **Niagara River** is a 38 mile long water way that connects Lake Erie and Lake Ontario and is the largest river entering Lake Ontario. Before flowing over Niagara Falls and emptying into Lake Ontario, the waters of the Niagara drains about 265,00 square miles encompassing much of the north central United States and south central Canada, including four of the five Great Lakes. Within New York State, the river drains about 2,300 square miles. In the **Lower Niagara River**, 14 charter boat services operate for sport fishing, and two marinas are on the Lower Niagara River. **Lower Niagara River** serves as a popular sail boating, recreational boating and fishing area, unique and separate from Lake Ontario. The **Niagara River** serves as

a drinking water source, fishing grounds, vacation spot, electricity generator and, in general, generates millions of tourism dollars providing employment for thousands.

The watersheds of **Eighteenmile Creek** and **Twelvemile Creek** have a total drainage of about 93 and 61 square miles, respectively. Most of the land in the basin is relatively flat agricultural and rural residential with most of the industry concentrated in the City of Lockport.

Located at the mouth of the **Twelve** and **Eighteenmile Creeks** are Wilson and Olcott Harbors – main staging areas for the **Niagara County** sport fishing industry offering launch and berthing services that serve as the gateway to Lake Ontario for recreational boating and sport fishing. Five marinas and 25 charter boat services for Lake Ontario fishing exist at Olcott and Wilson Harbors. Most of the land bordering Olcott Harbor is occupied by marine-related commercial enterprises with marine docking facilities occupying extensive water areas in the harbor.

Olcott Harbor at Eighteenmile Creek

Water Quality Issues

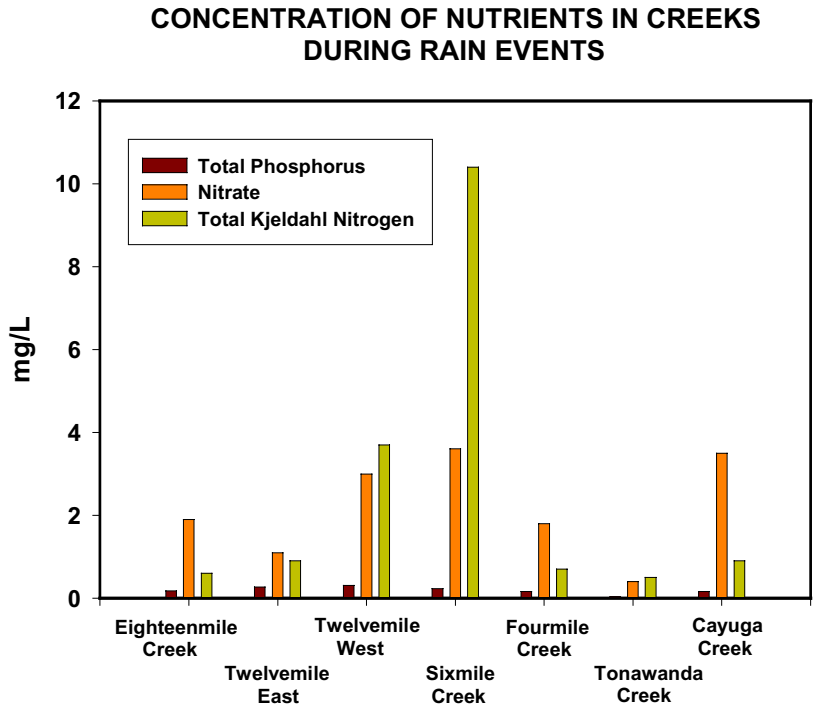
The water quality at the **Niagara River** at Fort Niagara has been rated as poor due primarily to the fish consumption advisory and other concerns about impairments to the fishery. However, the slightly impacted macroinverebrate community and low number of parameters of concern in the water column are more indicative of a fair or even a good rating according to the 1993-94 Biennial Report of the Niagara River-Lake Erie Drainage Basin. The most significant water quality problems in the **Niagara River** Watershed are related to priority organics contamination from inactive hazardous waste sites and embayments sediments. Analysis of water column samples showed phenolic compounds and lead to be parameters of concern. Because of these concerns, the **Niagara River** has been designated an Area of Concern for which a Remedial Action Plan (RAP) has been developed.

Under the **Niagara River** Toxics Management Plan, 18 persistent toxic chemicals or "priority toxics" were identified. As of 1995, the daily loading of the 18 priority toxics have been reduced by 99% in Canada. None of the ten chemicals targeted for 50% reduction was detected at any of the 15 facilities sampled in 1995. On the American side of the River, NYSDEC and

EPA estimate a reduction of 80% of the potential inputs into the **Niagara River** by 1999. A revised remediation target calls for all of the sites to be completed by 2003. Estimated cost for remediation is at least $327 million up to 1998.

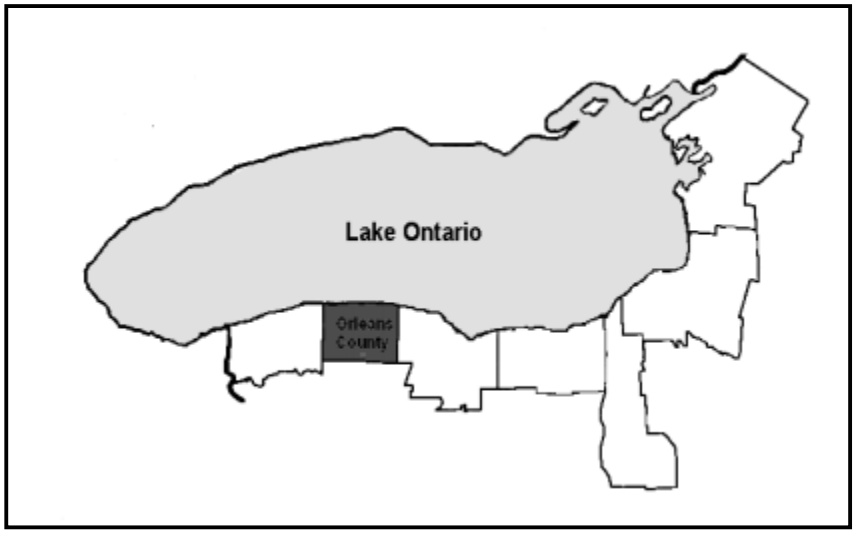
Eighteenmile Creek, with access to Lake Ontario, is the second largest creek in **Niagara County**. **Eighteenmile** Creek is polluted by past industrial and municipal discharges, the disposal of waste and the use of pesticides. Fishing is impaired by PCBs and dioxins found in the flesh of various game fish. The health of the benthos is impaired by PCBs and metals in the creek sediments. Bird and animal health is likely impaired by PCBs, dioxins, DDT and its metabolites, and dieldrin found in fish flesh. Contaminated sediments in **Eighteenmile Creek**, inflow from the past discharge of contaminants into the NYS Barge Canal, and as yet to be determined source of PCBs between Olcott Street and North Transit Road, are certain sources of pollutants. Other sources have been identified as potential sources because the contaminants causing impairments are known to exist, but the link between the source and the impairment has not been clearly established. Because of these concerns, **Eighteenmile Creek** has been designated an Area of Concern for which a Remedial Action Plan (RAP) has been developed.

Twelvemile Creek is entirely within **Niagara County**. Large areas of the north portion of the County are in agriculture and may be losing large amounts of nutrients and soil to **Twelvemile** and **Eighteenmile Creeks** causing cultural eutrophication of the embayments. The Niagara County Soil and Water Conservation District has recently begun to determine nutrient and soil losses from the **Twelvemile** and **Eighteenmile Creeks**. Preliminary data from one hydrometeorlogical event suggest losses of phosphorus, nitrate and possibly organic nitrogen from the **Twelvemile** and **Sixmile Creeks** watersheds are high.



Orleans County

There are some who claim that the home to the most plentiful, large and diverse populations of trout and salmon in the world exists in the embayments of the drowned river mouths of Orleans County. Orleans County has three main watersheds draining into Lake Ontario: **Oak Orchard Creek**, **Johnson Creek** with headwaters in Niagara County and **Sandy Creek** which empties into the lake in Monroe County. Where they enter Lake Ontario, **Johnson** and **Oak Orchard Creeks** are drowned river mouths, river basins flooded by the waters of the lake and have slow-moving waters analogous to an embayment providing protected waters suitable for recreation and leisure.



The sport fishing industry is king here. The Pacific salmon and brown trout begin coming into the rivers in mid-September. The salmon weigh in at 10 to 30 pounds and are present through October. Prime steelhead fishing begins in the winter and continues through the spring. From Point Breeze, where **Oak Orchard Creek** enters Lake Ontario, eleven fishing guide and charter boats services are offered for salmon fishing. In fact, Point Breeze/Oak Orchard was the fourth most popular launch site in New York State for the 1996 trout and salmon derbies. Surveys have demonstrated that the Orleans County shoreline is the fifth most popular stretch of shoreline on Lake Ontario for derby fishing.

The Embayments

It is a misconception that all recreation is focused on Lake Ontario. **The rough, unpredictable waters of Lake Ontario are often the second choice for boaters and fishermen. These embayments are separate entities or ecosystems distinct in biology, ecology, usage by people and have distinct problems that are unique to them.** Freshwater resources have historically played an instrumental role in community development and economic sustainability along the Lake Ontario shoreline. Orleans County is not an exception. The water resources in the County play an important role in the economy, have aesthetic value and provide diverse opportunities for those who enjoy the resource directly. A major thrust of the County's tourism industry is predicated on the availability of high quality water resources and angling opportunities in nearshore Lake Ontario and its tributaries. In addition, a major goal of the U.S. Fish and Wildlife Service is the restoration of stream habitat that would allow the natural reproduction of native Lake Ontario fish species, such as the Atlantic salmon in

Johnson Creek. However, with over 65% of land use devoted to agriculture in the County, it must be recognized that agriculture has a major economic impact in Orleans County. The two major generators of income, agriculture and water-based recreation are tied together though. Loss of important resources, such as soil and nutrients, from a watershed is of concern, not only to the landowner, but also of concern to aquatic-based resources dependent or high water quality and pleasing aesthetic values essential to the sport fishing industry and tourism in general. Remediation and protection of these resources depends largely on the identification of both the cause and effect of elements likely to reduce their economic and social value.

Point Breeze on Oak Orchard Creek

Water Quality Issues

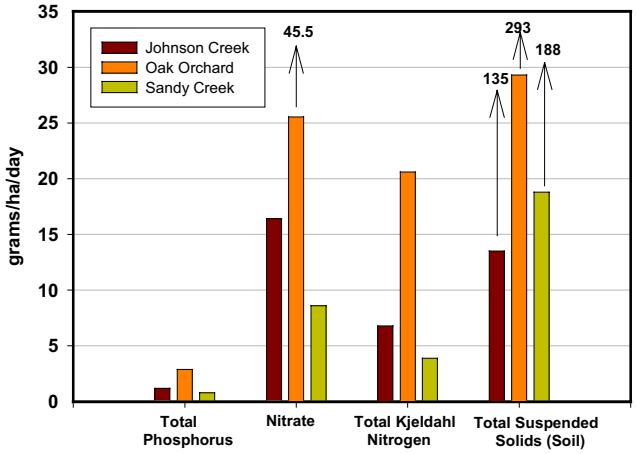
The New York State Department of Environmental Conservation lists **Johnson** and **Oak Orchard Creeks** fishing as threatened, while **Oak Orchard** aesthetics are considered stressed. Several Inactive Hazardous Waste Disposal sites exist in these watersheds that are likely to be affecting the down-stream embayments of **Oak Orchard** and **Johnson Creeks**. For example, there is widespread contamination by DDT, DDE, DDD and PAHs and arsenic near Lyndonville, NY, by an Inactive Hazardous Waste Disposal Site. The surface water drains through the landfill into a storm sewer into a wetland and finally reaches **Johnson Creek** – a significant fish habitat. Similarly, an old warehouse in Ridgeway, NY, was used as a manufacturing and storage facility for many different agricultural chemicals most notably arsenic-based pesticides. There is concern that contamination of the nearby **Oak Orchard Creek** has occurred. Arsenic contamination of groundwater in this area is more than 24 times higher than groundwater standard of 25 ppb.

Sailing on Oak Orchard Creek

Sixty five percent or 164,736 acres of Orleans County is farmland producing fruit, vegetables, grain, hay and livestock. In the daily operation of this agriculture land, herbicides, pesticides, fertilizer, and petroleum products are used, sometimes misused, thus causing or potentially causing nonpoint pollution. Orleans County has approximately 50 dairy operations, 30 livestock operations, four villages with treatment facilities, seventeen hamlets, plus several trailer parks (many with poor septic systems), urban runoff, landfills, road side and stream bank erosion - all adding to nonpoint pollution problems.

Recognizing that one of the major threats to the vital economics of the embayments of Orleans County was nonpoint sources of pollution, the Orleans County Soil and Water Conservation District through the Water Quality Coordinating Committee (WQCC) has monitored **Oak Orchard**, **Johnson** and **Sandy Creeks** to determine the amount of nutrient loss from the watershed. Importantly, the sampling design included automated, continuous, daily gauging of stream depths and automated event sampling stations allowing accurate measurement of discharge and nutrient and sediment loss from the watersheds during both event and nonevent conditions.

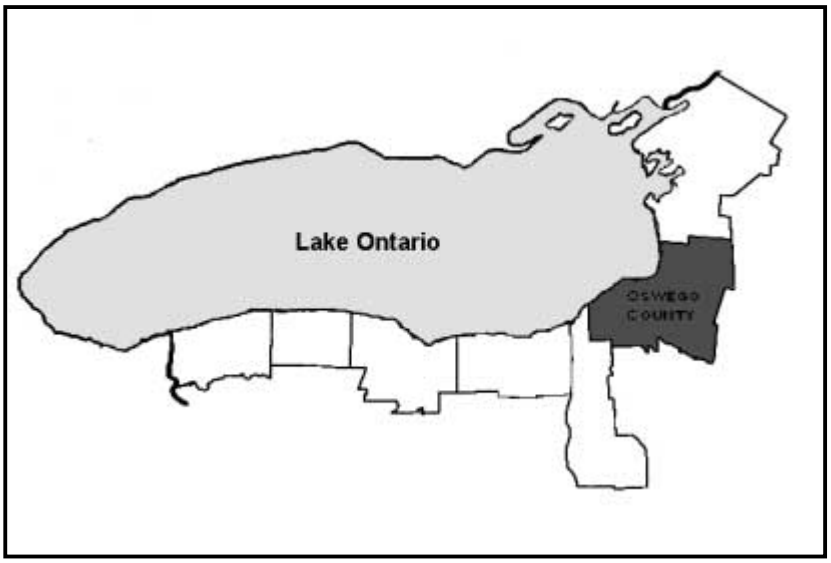
Compared to the other watersheds in New York State, Oak Orchard Creek, Johnson Creek and **Sandy Creek** **are moderately polluted.** They are not as pristine as completely forested watersheds or as polluted as streams receiving partially treated discharge from a sewage treatment plant. **Large amounts of an essential nutrient, phosphorus, which limits algae and weed growth, was being lost from these watersheds**. Sixty-two tons of phosphorus (56,056 kg), approximately 113 pounds of phosphorus per day, were lost from the combined **Oak Orchard Creek**, **Johnson Creek** and **Sandy Creek** watersheds. **Soil loss was excessive especially during meteorological events.** Over 57% (3900 metric tons) of this soil lost was from the **Oak Orchard** watershed. **Johnson Creek** (87.7%) and **Sandy Creek** (74.9%) lost most of their soil during precipitation events. These high losses from the watershed during precipitation events strongly suggest erosive losses from agriculture. Soil loss from a watershed is deposited in creeks and embayments smothering historic fish spawning sites, while phosphorus, a limiting factor to plant and algae, contributes to an overabundance of weeds and algae and enhances the cultural eutrophication of both the embayments and nearshore zone of Lake Ontario.



Soil and Nutrient Loss from Orleans County Watersheds

Oswego County

Three major embayments, **North Sandy Pond**, **South Sandy Pond**, and **Oswego Harbor**, and three major rivers, **Oswego River**, **Salmon River** and **Little Salmon River** provide calm, protected waters suitable for recreation and leisure. **Sandy Pond**, the **Salmon River** and especially **Oswego Harbor** and **River** are the focal points of the tourism industry in Oswego County. The **Salmon River** alone generated 15 million dollars annually from water-based tourism along 48 miles of shoreline in the 1980s. Surveys have demonstrated that the Wayne, Cayuga and Oswego County shoreline are the most popular stretches of shoreline for derby fishing. The shorelines of the embayments and rivers are generally heavily developed and include marinas, restaurants, beaches, summer and permanent homes, and public access areas.



Oswego and Jefferson County's shoreline embayments are of ecological importance. Along Lake Ontario's eastern shore is a 17-mile stretch of sand dunes, wetlands, woodlands, ponds and creeks known as the Eastern Lake Ontario Dune and Wetland area. Reaching from the mouth of the **Salmon River** north to the outlet of Black Pond, the area supports a diversity of plants and wildlife. Five state-owned or managed properties offer access for outdoor recreation: Deer Creek Wildlife Management Area, Sandy Pond Beach Natural Area, Lakeview Marsh, Southwick Beach State Park and Black Pond Wildlife Management Area. The United States Fish and Wildlife Service is proposing to designate areas of the shoreline critical habitat for the piping plover (*Charadrius melodus*) – an endangered species. The lower 17 miles of the **Salmon River** have been declared significant because they make up the largest coldwater tributary of Lake Ontario. Large numbers of Coho and Chinook salmon and brown trout migrate from Lake Ontario into the **Salmon River** to spawn each fall, and steelhead migrate into the river during the fall and early spring.

The Ponds and Rivers

Oswego River Harbor is the largest of the Oswego County's embayments. A deep water harbor of refuge, this artificial embayment is a multiple use resource. Along the shoreline are hydro-electric generating facilities, commercial storage facilities, locks to accommodate canal navigation, charter docks, a marina, restaurants and suppliers and services for recreational harbor users. A large abundance of wintering waterfowl utilize the **Oswego Harbor** each year.

Tourism and the popular sport fishery are vital to the area's economy. The Harbor is a safe haven for international commercial shipping from Lake Ontario and offers a connection to the Erie Canal by the Oswego River Canal. In 1998, Oswego Harbor was one of the most preferred boat launch site for the Empire State Lake Ontario (ESLO) Trout and Salmon Derby and the Lake Ontario County (LOC) Trout and Salmon Derby in 1998. **Oswego Harbor** and the 11/2-mile segment of the **Oswego River** below the Varick Dam has been designated to be a significant Coastal Fish and Wildlife Habitat by the New York State's Coastal Zone Management Program.

The **Salmon River** and **Little Salmon River** area are well known for their excellent salmonid fishing, valued over $10 million in 1989. A state record Chinook salmon weighing 47 pounds was caught in 1991 in this river. In 1988, the **Salmon River** ranked fifth in angler use in the state with an estimated 59,000 anglers. This is a multiple use area! Selkirk Shores State Park, located in the **Salmon River** estuary, had over 263,000 visitors in 1985-86, who spent over $3.9 million dollars. A significant resource for the area dependent on good quality water is the **Salmon River** Hatchery at Altmar. This hatchery provides a significant portion of the stocked salmon to the Lake Ontario fishery

As with **Great Sodus Bay** in **Wayne County** and **Irondequoit Bay**, the quiet, protected waters of **North** and **South Sandy Ponds** provide a recreation experience similar to smaller lakes. These ponds are embayments formed by the eastern Lake Ontario sand dunes that form a ridge on the landward side of the beach, creating a barrier between the lake and inland areas. The Barrier extends over 17 miles from Oswego into Jefferson County forming several barrier beach embayments of which the 2400-acre **North Sandy Pond** is the largest adding 11.4 miles of shoreline. **North** and **South Sandy Ponds** comprise one of the largest coastal bay ecosystems on Lake Ontario. The extensive dune system and sheltered littoral areas found here are rare in New York's coastal waters. The barrier beaches at **North Sandy Pond** are

unique and play an integral role sheltering the pond from prevailing winds, buffering water level fluctuations in nesting areas for birds and providing a refuge for concentrations of waterfowl during spring and fall. The abundance and diversity of birds occurring in this area are rarely equaled anywhere else on Lake Ontario.

Although a connection to Lake Ontario exists, **North Sandy Pond** supports intensive recreational activities and intensive shorefront residential development including a commercial campground and several marinas. Tax revenues in 1998 suggest approximately $65,000 per year is spent just in the relatively small **Sandy Creek** area for hotel accommodations.

Water Quality Issues

Unlike the deeper, offshore waters of Lake Ontario that over the last decade have steadily improved in water quality, the **Oswego County Embayments** have not had measurable improvement in water quality. As a result of the phosphorus abatement program and the resultant reduction in algal populations, the major improvements in Lake Ontario water transparency have not translated into measurable improvements in water quality for the bays and harbors of Oswego County.

This is despite a decade of effort of many concerned people. The **Oswego River** and **Harbor** is one of the 43 Areas of Concern designated in the Great Lakes Basin. An Area of Concern (AOC) is a place where significant pollution problems have been identified as impairing the beneficial uses of the water body. Impairments include restrictions of fish and wildlife consumption, degradation of fish and wildlife populations and eutrophication of the harbor.

Oswego Harbor

Municipal sewage discharges, combined sewer overflows and agricultural runoff in the basin pour nutrients into the waters, causing nuisance plant growth or eutrophication of the embayment. Pollutants of concern in the Oswego AOC are PCBs, dioxin, phosphorus, mercury, mirex and photomirex and octachlorostyrene. Sediments contain moderately polluted levels of phosphorus.

The Oswego County Soil and Water Conservation District seeks to reduce nonpoint and point source loading of nutrients into **North and Sandy Pond**. Both ponds have an overabundance of nutrients and are the likely cause of the overabundance of aquatic weeds in the water. Aquatic

vegetation forms large mats of weeds restricting recreational usage of the area. In places, the water milfoil (*Myriophyllum spicatum*) mats are so thick and dense that navigation is restricted and motor boat water intakes are often clogged causing serious damage to engines. In addition, algae blooms, an overabundance of microscopic plants, become so prevalent that a thick green slime occurs on the surface water from June through October. As these algae die, bacteria decompose them and produce foul odors, a decrease in oxygen in the water and promote possible fish kills. Aesthetically this is not pleasing nor is this situation a positive force for economic development through recreation or for home owners on these bays.

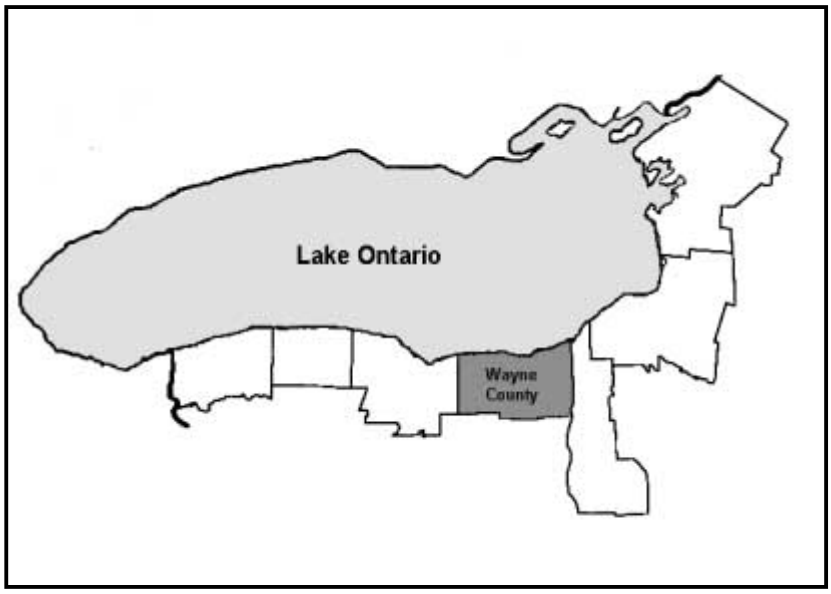
The limnological literature is quite clear on the causes of this unwanted overabundance of aquatic weeds and microscopic plants – an excess amount of nutrients or fertilizers are entering the water. **Cultural eutrophication of these bays has resulted in poor water quality including lack of clarity, high algal abundance and high weed abundance that ultimately decreases the aesthetic appeal of these waters to year-round residents and to the tourism industry**. Marinas and beaches become clogged with macrophytes or weeds inhibiting boat traffic, bathing and even fishing. At both **North** and **South Sandy Ponds** nutrients from agriculture run-off, septic system failures, "gray water" discharge, and lawn run-off are believed to be major sources of nutrients. As much as 186,000 gallons of discharge per day from hotels, campgrounds, restaurants, etc. are released each day into Sandy Creek. The construction of municipal sewers in the **Sandy Pond** watershed would alleviate some of the water quality problems. As with Wayne County, remediation efforts are limited by the lack of funds to address the large ecological, remediation and restoration problems that exist.

In the **Salmon River,** fishing is impaired by the consumption advisory to eat no smallmouth bass due to mirex, chlordane and PCB contamination. Any activity that would substantially degrade water quality, increase temperature or turbidity, reduce flows or alter water depths may adversely affect the fish and wildlife resources in this area. On the **Little Salmon River,** nutrients from on-site wastewater treatment systems in the hamlet of Texas and along the shoreline are one cause of excessive weeds in natural shallow areas.

Fishing the Oswego River

Wayne County

Blessed with four major embayments and an extra 30 miles of shoreline distinct from Lake Ontario, **Great Sodus Bay**, **East Bay**, **Port Bay** and **Blind Sodus Bay** provide calm, protected waters suitable for recreation and leisure. These large bays, especially **Great Sodus Bay**, are the focal points of the tourism industry in Wayne County. **Great Sodus Bay** alone generates an estimated 17 million dollars annually from water-based tourism. Surveys have demonstrated that the Wayne, Cayuga and Oswego County shoreline are the most popular stretches of shoreline for derby fishing. The shorelines of these embayments are heavily developed and include marinas, restaurants, beaches, summer and permanent homes, and public access areas.



Wayne County's shoreline embayments are of ecological importance containing over 6,807 acres of protected wetlands and host to over 36 species of aquatic plants including three species of protected aquatic plants (e.g., American Lotus) and the protected softshell turtle. All the bays are the primary spawning sites of forage fish supporting the food base of the Lake Ontario sport fishery for salmon and trout.

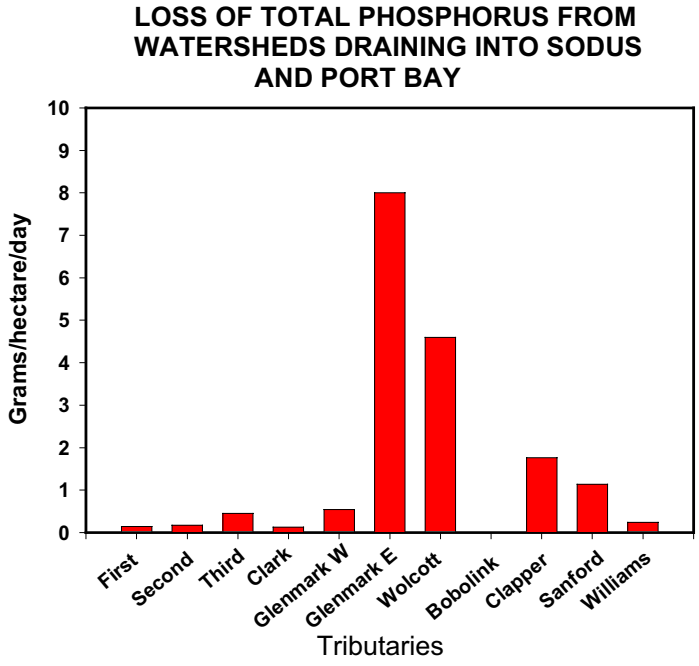
Bays and Harbors

At the outlet of **Salmon Creek** is **Pultneyville Harbor**, which supports a 100 boat marina and a yacht club. **Great Sodus Bay** is the largest of the Wayne County's bays at 4.4 miles in length and 2.4 miles wide. A deep water harbor of refuge, this bay boasts 12 marinas, 13 waterfront restaurants, two public access sites, one public beach and a local sailing school. In 1998, Sodus Bay was the number one boat launch site for the Empire State Lake Ontario (ESLO) Trout and Salmon Derby and the Lake Ontario County (LOC) Trout and Salmon Derby in 1998. **Port Bay,** with access to Lake Ontario, is the second largest bay in Wayne County. A large protected wetland exists on the southern portion of the bay. The shoreline is completely developed with summer homes. **East Bay** and **Blind Sodus Bay** are smaller, shallower bays. **East Bay** has a maximum depth of only 8 feet, while **Blind Sodus Bay**, the smallest of the bays, has a maximum depth of 14 feet. The shorelines of the smaller bays are lined with summer and increasingly with permanent year-round residences.

As with **Great Sodus Bay**, the quiet, protected waters of these bays provide a recreation experience similar to smaller lakes. Although a connection to Lake Ontario exists, it is a misconception to believe that all recreation is focused on Lake Ontario. The rough, unpredictable waters of Lake Ontario are often the second choice for boaters, water skiers, swimmers, sailors and fishermen. These large embayments are separate entities or ecosystems distinct in biology, ecology, usage by people and have distinct problems that are unique to them.

Water Quality Issues

Wayne County's embayments suffer from accelerated eutrophication, primary as a result of nonpoint sources of pollution. Enhanced aquatic plant growth, benthic anoxia and intense algae blooms are common and are symptoms of stressed ecosystems. Studies of Wayne County watersheds demonstrate that in many cases hundreds of tons of sediments, nitrogen and phosphorus are regularly washed from the surface of the land into embayments stimulating production of algae and aquatic weeds. Over a decade of study has demonstrated that Wolcott Creek entering **Port Bay** and Glenmark Creek entering **Great Sodus Bay** are the major sources of phosphorus and soil to these bays. **Through a process known as "Segment Analysis", some of the local sources of pollution have been identified and remediated.** Although significant efforts to reduce nonpoint and point source loading of nutrients by the Wayne County Soil and Water Conservation District in conjunction with



the Wayne County Water Quality Coordinating Committee and other local agencies are evident, improvements in water quality of embayments do not parallel those observed in the offshore waters of Lake Ontario. Remediation efforts are limited by the lack of funds to address the large ecological problems that exist. All of the Wayne County bays have similar water quality problems.

All of the Wayne County bays suffer from cultural eutrophication; that is, the excessive growth of microscopic plants and weeds caused by enhanced amounts of nutrients from the watersheds. Increased shoreline development and the lack of peripheral sewer systems contribute to this problem. At **Port Bay**, effluent from the Village of Wolcott Sewage Treatment Plant, which legally discharges high levels of limiting nutrients directly to the bay, plays a major role in the excessive algal blooms, low transparency and poor water quality of this bay.

In the deeper **Port** and **Great Sodus Bays**, cultural eutrophication is the cause of benthic anoxia or a lack of oxygen in the sediments. Benthic anoxia often extends into the water above the sediments reducing oxygen in the bottom waters precluding the establishment of cold water fisheries once prevalent in these waters. Anoxia in bottom waters also allows the release of the limiting nutrient phosphorus, which further stimulates plant growth in a process known as self-fertilization. Cultural eutrophication of these bays has resulted in poor water quality including lack of clarity, high algal abundance and high weed abundance that ultimately decreases the aesthetic appeal of these waters to year-round residents and to the tourism industry. Marinas and beaches become clogged with macrophytes or weeds inhibiting boat traffic, bathing and even fishing.

Similar to the embayments in Wayne County, **Pultneyville Harbor** on **Salmon Creek** in the Town of Williamson suffers from eutrophication and weed growth.

Excessive Growth of Water Chestnut, an Exotic Species in Great Sodus Bay

What Are The Relevant Agencies? Agencies That Can Help!

Many federal and state programs and agencies have committed resources to Great Lakes issues. A short list includes the USEPA (United States Environmental Protection Agency), NYSDEC (New York Department of Environmental Conservation), IJC (International Joint Commission), LaMP (Lakewide Management Plan), SWCD (Soil and Water Conservation Districts), RAP (Remedial Action Plans), SOLEC (State of the Lakes Ecosystems Conference), Niagara River Toxics Management Plan, Pure Waters Program, Phosphorus Abatement Program, FL-LOWPA (Finger Lakes - Lake Ontario Watershed Protection Alliance), New York Sea Grant Institute, etc. Through these programs and agencies, an enormous amount of activity has occurred on **Lake Ontario**. Much of this activity has focused on the open waters of **Lake Ontario** and on Areas of Concern. All of these activities will continue to be important in the future. Successful outcomes, such as the tremendous improvement in water quality in Lake Ontario due to the phosphorus abatement program, the **Niagara River** toxics cleanup and the improvements of **Irondequoit Bay** due to nutrient control, are evident. **These successes are notable and substantial.** However, the ubiquitous nutrient enrichment problem, scientifically termed cultural eutrophication, associated with the embayments of the **North Coast** of New York State, has not been the focus of concerted attention. **After decades of study, planning and effort, a large number of the bays, ponds, creeks, rivers and harbors of the North Coast of New York are still suffering from poor water quality**.

Each summer, the public demands action on the cleanup of rivers, creeks, embayments and harbors of the **North Coast**. County agencies respond by seeking funding for restoration projects from various state and federal agencies. Although programs addressing various types of pollution do exist, these funding programs are either highly competitive for similar projects for the entire nation, if federally funded, or are underfunded to address the water resource issues in New York State, if state funded. Funding proposals, adequate to begin even small restoration projects, are routinely denied. Reasons for these rejections range from the site is not economically and/or ecologically important from a state or national perspective to the funding program does not direct funding toward nutrient or watershed issues that directly affect embayments. Perhaps each embayment by itself is not important enough economically or ecologically. **Taken together, the embayments of the Lake Counties are ecologically important to the open waters of Lake Ontario and represent a major economic resource in upstate New York.**

What Is Required To Get The Job Completed?

This **Embayment Initiative** documents the problems and opens the dialogue on the creation of a more broad-based and adequately funded program targeted at improving water quality of the **Lake Ontario** embayments and tributaries of the **North Coast** of New York. The program should include funding for applied research to determine the causes of degraded water quality, where unknown, and importantly to provide the necessary funding for remedial or best management practices to actively reduce sources of pollution, whether point or nonpoint in the watershed. To successfully start and complete a project of this magnitude, a major commitment in several areas, including education, funding, planning and implementation, is required. A concerted effort, such as the successful remediation programs for the **Niagara River** and **Lake Ontario**, is warranted to improve environmental conditions of the embayments. Refocusing of

current programs and enhancement of funding sources would benefit the ecologically unique and economically important water resources of the embayments of the **North Coast**. Furthermore, any improvements in embayment water quality and habitat ultimately improve the entire **Lake Ontario** ecosystem. Such a program could be administered through the existing agencies such as FL-LOWPA, which has a history of success in dealing with upstate watershed issues.

A Strategy

The following is a suggested strategy to begin the process of restoring the embayments of the **North Coast** of New York. Initially, a regional meeting bringing together Planning Departments, Water Quality Committees, Soil and Water Conservation District personnel, regional academic scientists and federal and state agencies is suggested. Most importantly, federal and state legislators need to be brought into the discussion. The goal would be to bring together the affected parties, to educate each other on common problems, and to develop a strategy to develop funding for sources for the restoration of embayment water quality.

A group, such as the Bay Initiative Committee, could organize the meeting with funds from FL-LOWPA. A one- or two-day meeting is suggested with this report serving as the starting point. Every effort should be made to involve the print and video media. The following questions should be addressed at the meeting.

1. **What are the problems and what do the counties require to get their problems resolved?**
   A presentation by each lake county on what the problems are and their limitations in solving these problems is suggested. This should not simply be a list of water quality problems but an attempt at tying together economic, ecologic and tourism issues that derive from the water quality problems. Perhaps a representative from each county's tourism board and/or Chamber of Commerce should participate.
2. **What do existing federal and state programs have to offer?**
   Targeted representatives from EPA and NYSDEC and other agencies should explain existing programs on restoration of water quality in embayments and rivers, including the likelihood that substantial funding support can and will be targeted to improve conditions in the Lake Ontario embayments.
3. **How can new sources of funding be developed to fund the embayment initiative?**
   All participants should meet in a session led by the county and state planners to develop a strategy for securing funding. Other discussion could include: Is this a state or federal issue or both? Are "member items" adequate for the embayment initiative? Is legislation necessary to achieve this goal? What existing resources can be pooled and refocused on the embayments?

Keynote Speaker: A well-known "champion" of Great Lakes issues should be invited as a guest speaker and asked to respond to the **Bay Initiative** report.

Based on the results of this meeting, the Coordinating Committee and FL-LOWPA could work with Great Lakes' legislators to refocus current programs and to develop new strategies for the protection and the restoration of water quality of the economically important water resources identified in the Lake Ontario Embayment Initiative.

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Photos and Graphics

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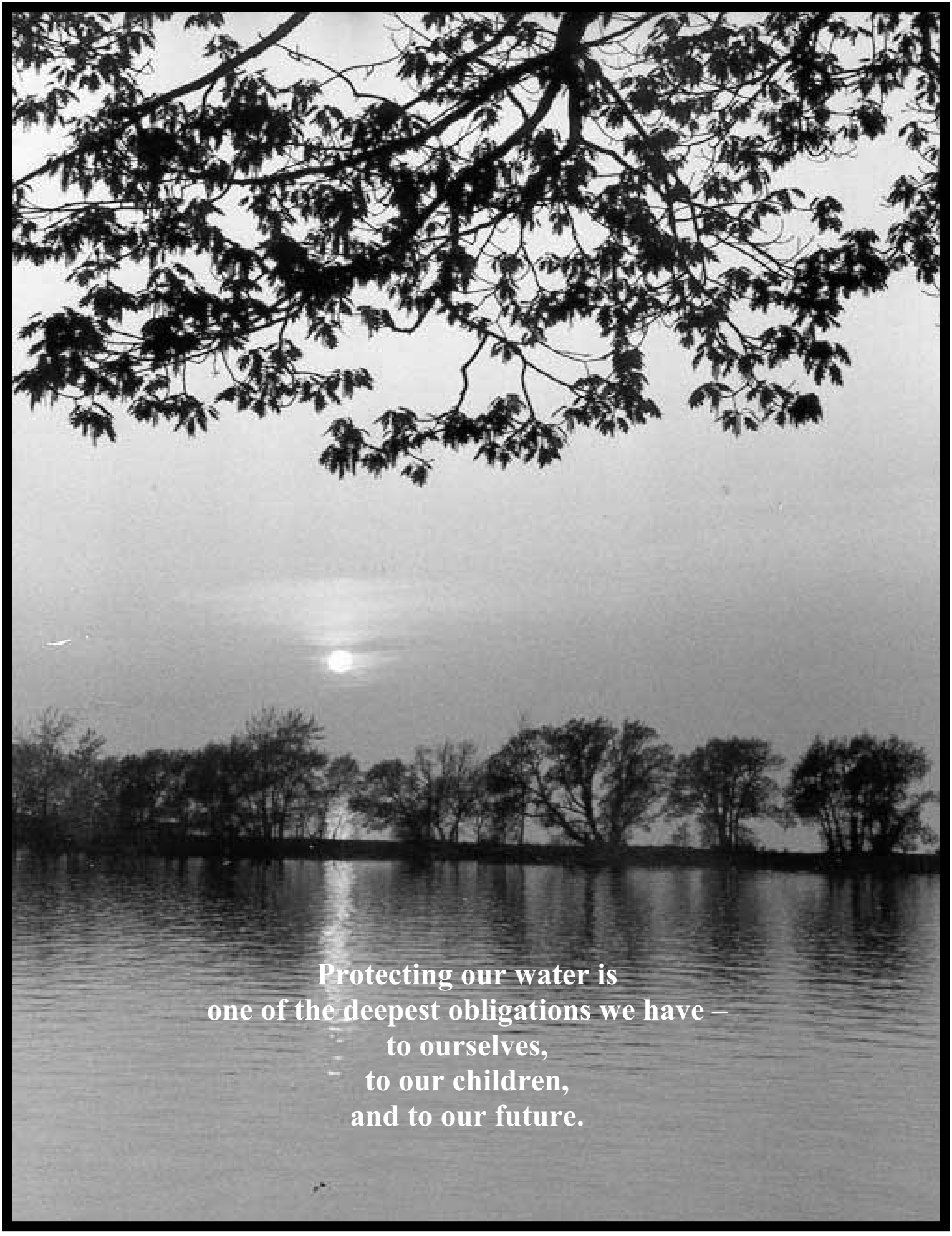
Protecting our water is
one of the deepest obligations we have –
to ourselves,
to our children,
and to our future.