

Chapter 3



Iroquois National Wildlife Refuge

Refuge Resources

- Physical Environment
- Biological Environment
- Socioeconomic Environment
- Historical Picture
- Refuge Administration
- Refuge Public Use
- Finding of Appropriateness of a Refuge Use
- Compatibility Determinations

Chapter 3 Refuge Resources

Physical Environment

Iroquois Refuge was established in 1958 and encompasses 10,828 acres of open water, emergent marsh, forested wetland, upland forest, grassland, and shrubland. The refuge lies within the rural towns of Alabama (Genesee County) and Shelby (Orleans County) of western New York.

The physical environment, expressed through climate, geology, topography, and soils, explains much about the patterns and distribution of biological diversity. These patterns describe natural divisions, called biophysical regions or ecoregions. Organizing the physical environment into ecoregions helps us understand, conserve, and manage wildlife and biodiversity. Ecoregions are relatively large geographic areas of land and water defined by common climate, geology, and vegetation patterns. The Nature Conservancy (TNC) classified New York into seven ecoregions. Iroquois Refuge is in the Great Lakes Ecoregion (map 3-1), a region formed during the last glacial advance 14,000 years ago and characterized by gently rolling, low level landscapes and flat lake plains (NYSDEC 2005).

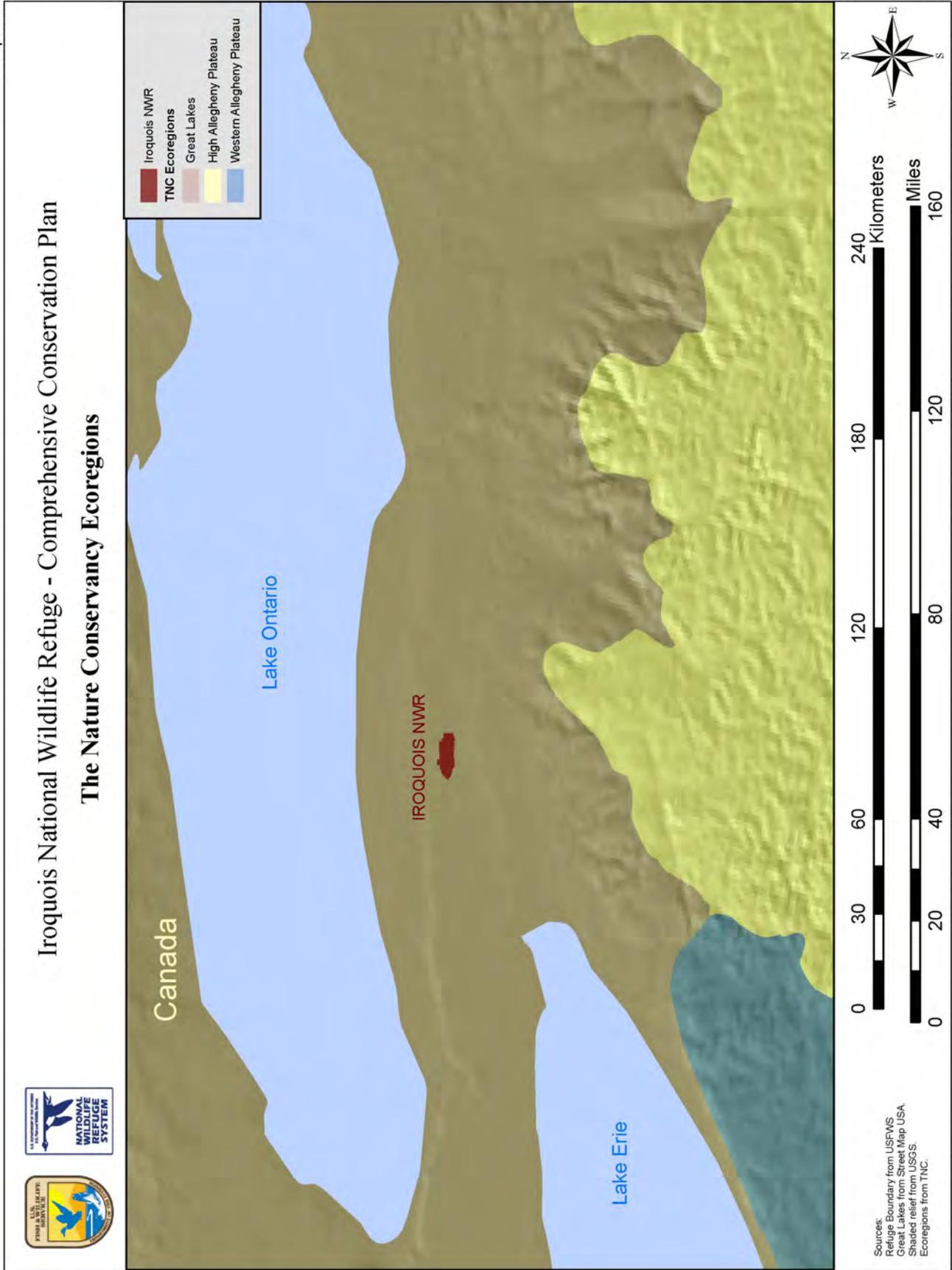


Blue Jay

The refuge lies within the 173,975-acre Oak Orchard watershed which is within the Southwest Lake Ontario (SWLO) Basin, a subwatershed of the Great Lakes watershed (map 1-2 and 1-7).

Iroquois Refuge, Oak Orchard WMA, and Tonawanda WMA together form the 19,000-acre Tonawanda-Iroquois-Oak Orchard Wetland Complex (map 1-3). The Complex is primarily wetland habitat consisting of emergent marsh, forested wetland, wet meadow, and shrub wetland, interspersed with areas of grassland and upland hardwood forest. The Complex is an Audubon designated Important Bird Area (IBA) and a New York State designated Bird Conservation Area (BCA), providing nesting and migration

Map 3-1



habitat for a large number of birds including waterfowl, marsh birds, grassland birds, bald eagle, cerulean warbler, and prothonotary warbler (NYSDEC 2005).

Bird Conservation Region

Iroquois Refuge lies within BCR 13, the Lower Great Lakes/St. Lawrence Plain (map 1-5). BCR 13 encompasses the vast, low-lying lake plain region surrounding Lake Erie and Lake Ontario, the St. Lawrence River Valley, low-lying regions between the Adirondack Mountains and the Laurentian Highlands, and upper regions of the Hudson River Valley. In addition to providing important lakeshore habitats and associated wetlands, this region was originally dominated by a mixture of oak-hickory, northern hardwood, and mixed-coniferous forests. Nearly 95 percent of the original habitat types have been lost and the landscape is now dominated by agriculture with interspersed wetlands and remnant forest stands. The BCR plays a critical role in providing important staging and migrating habitat for birds during the spring and fall migration (Hartley 2007).

Regional Conservation Lands and Land Use Patterns

Iroquois Refuge lies within Partners in Flight (PIF) Physiographic Area 15 (map 1-6). Unlike most other physiographic areas in the northeast U.S., roughly 74 percent of the land area in Area 15 is in agricultural production (Dettmers and Rosenberg 2003). According to the U.S. Environmental Protection Agency (EPA) land classification, the land cover in the SWLO Basin is 64 percent agricultural, 26 percent deciduous forest, 12 percent mixed forest, 4 percent developed, and 3 percent other (NYSDEC 2005) (table 3-1 and map 3-2). Agricultural crops in the vicinity of Iroquois Refuge are dominated by soybeans, corn, and wheat; onions are grown in the low lying muck soils. As described above, Iroquois Refuge joins with Oak Orchard and Tonawanda WMAs to create the Tonawanda-Iroquois-Oak Orchard Complex encompassing 19,000 acres of State and Federal conserved lands. The Tonawanda Indian Reservation covering approximately 7,000 acres lies adjacent to Tonawanda WMA and southwest of Iroquois Refuge (map 1-3).

Table 3-1 Land Cover within the Southwest Lake Ontario Basin of New York

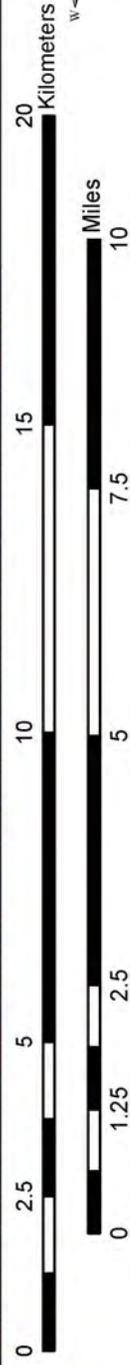
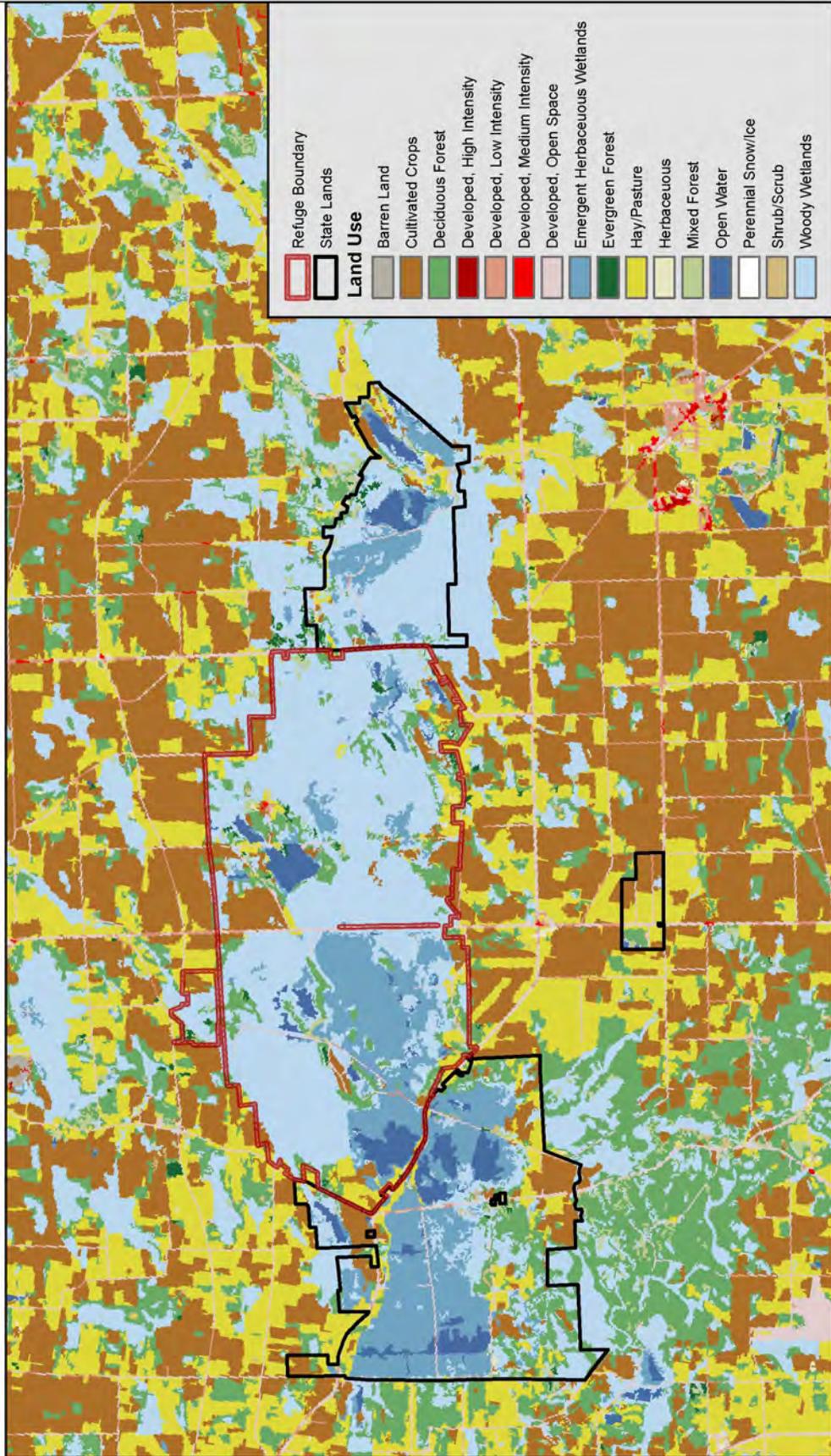
Land Use Classification	Percent Cover
Row Crops	39.02
Deciduous Forest	26.31
Pasture/Hay	16.08
Mixed Forest	12.38
Low Intensity Residential	1.96
Parks, Lawns, Golf Courses	1.03
Water	0.83
High Intensity Commercial/Industrial	0.64
Evergreen Forest	0.60
Wooded Wetlands	0.49
High Intensity Residential	0.39
Emergent Wetlands	0.14
Barren; Quarries, Strip Mines, Gravel Pits	0.12

Climate

The weather in the Great Lakes watershed is influenced by the location and size of each lake, air masses from other regions, and the location within a large continental landmass. Each lake acts as a heat sink, absorbing heat when the air is warm and releasing it when the air is cold. This results in more moderate

Map 3-2

Iroquois National Wildlife Refuge - Comprehensive Conservation Plan Regional Land Use



Sources:
 Land Use from USGS
 Iroquois NWR Boundary from USFWS
 State lands from State of NY.

temperatures at nearshore areas than other locations at similar latitudes. The influence of external air masses varies seasonally. In the summer, the region is influenced mainly by warm humid air from the Gulf of Mexico, whereas in winter the weather is influenced more by Arctic and Pacific air masses (USEPA and Government of Canada 1995).



Bird habitat on the refuge

The weather around Iroquois Refuge is relatively cool and wet. High temperatures range from an average of 28.6°C (83.4°F) in August to -1.2°C (29.9°F) in February. Average annual precipitation is 94.0 cm (37.0 in). Snowfall is moderately high with an annual average of 168.4 cm (66.3 in). Much of this snow is provided by moisture absorbed into the atmosphere as cool westerly winds travel across the warmer water of Lake Erie. Winds are moderate to high due to the flat, open character of this part of New York (USFWS 2002).

Climate Change

Climate change is defined as a change in the state of the climate characterized by changes in the mean and/or the variability of its properties persisting for an extended period, typically decades or longer (IPCC 2007a). The change in climate has been attributed to the increase in carbon dioxide (CO₂) and other greenhouse gases in the Earth's atmosphere, due in large part to human activities such as fossil fuel burning, agriculture, and land use change. In January 2001, the U.S. Department of the Interior issued

Secretarial Order No. 3226 requiring Federal agencies under its direction that have land management responsibilities to consider potential climate change impacts in long range planning endeavors. In September 2009, Secretarial Order No. 3289 updated the earlier order with organizational changes to enable fulfillment of planning requirements.

There is consensus among the scientific community that global climate change will lead to significant impacts across the U.S. These impacts include sea-level rise adding stress to coastal communities and ecosystems (Wigley 2004). The effect of climate change on wildlife and habitats is expected to be variable and species specific, with a predicted general trend of ranges shifting northward. Uncertainty about the future effects of climate change requires refuge managers to use adaptive management (e.g., adjusting regulations, shifts in active habitat management, or changing management objectives) to maintain healthy ecosystems in light of unpredictability (Inkley et al. 2004). Refuge managers can plan and respond to changing climate conditions. A few recommendations include managing for diverse and extreme weather conditions (e.g., drought and flood); maintaining healthy, connected, genetically diverse wildlife populations; and protecting coastal wetlands to accommodate sea level rise (see Inkley et al. 2004 for more recommendations). Well maintained coastal wetlands help to keep inland wetlands healthy.

In western New York climate change is predicted to have a large impact on all facets of life. From agricultural and rural communities to industry and the economy, climate change will shape the way that people live and ecosystems change far into the future. Annual average temperatures, heavy rainstorms and winter and spring precipitation are all predicted to increase. Temperatures may increase by 5 to 12 °F in winter and by 5 to 20 °F in the summer, but will affect the nighttime temperatures more than the daytime temperatures. Although the amount of precipitation may not change, the time of year in which the precipitation will occur will change with an increase in the winter and a decrease in the summer. This will occur in part as the duration of the Great Lake's ice cover will decrease. All of these predicted changes will contribute to major climate changes in western New York by the end of the century (Kling, et al. 2003).

Hydrology

Watershed Level Hydrology

The refuge lies entirely within the 173,975-acre Oak Orchard watershed. The region encompassing Iroquois Refuge is characterized by gently rolling land with 0 to 6 percent slopes. Refuge elevations range from 185 to 198 m (610 to 650 ft) above sea level. Oak Orchard Creek is the largest river in Orleans County, and is one of ten major tributaries in the Great Lakes Ecoregion of New York. Oak Orchard Creek enters the refuge from the east, meanders northwest, and exits to the north, eventually emptying into Lake Ontario (USFWS 2002, map 1-2). The Creek begins north of Batavia in Genesee County at an elevation of 850 feet. It flows northeast through Elba, then turns and runs west through Oakfield and Alabama. The Creek then runs north through the towns of Shelby, Ridgeway, and Carlton in Orleans County before entering Lake Ontario at Point Breeze at an elevation of 245 feet (Zollweg et al. 2005). Oak Orchard Creek also serves as the main outlet channel for waters that drain from the Elba mucklands: a highly productive agricultural region.

A Dolomite limestone outcrop in Shelby Center forms a natural restriction in the Creek approximately in the center of the watershed. Upstream of this restriction Oak Orchard Creek drops only 30 feet in 25 miles forming the shallow flooded basin that is now the Tonawanda-Iroquois-Oak Orchard Wetland Complex. Lewiston Road runs along a height of land that separates Oak Orchard watershed from the Tonawanda watershed (Carroll 2001).

Oak Orchard Creek is within the SWLO Basin which covers 2.2 million acres in western and central New York (map 1-7). The basin stretches across the State from north to south and includes three major sub-watersheds: West Lake Ontario, Lower Genesee, and Upper Genesee. The basin has a highly diverse landscape covering several ecological zones and includes a wide variety of vegetative cover, wildlife habitat, and land use. Although grasslands were historically found in the basin, there are no lands in the basin currently classified by the EPA as natural grasslands. The northern portion of the Basin is primarily an agricultural region with scattered forest stands, diverse and extensive wetlands, and is generally flat. The largest river in the basin is the Genesee River, which originates in Pennsylvania and drains into Lake Ontario near Rochester, New York. Mt. Morris Dam was built in 1952 by the U.S. Army Corp of Engineers to provide flood control; this splits the Genesee into two major sub-watersheds (Upper and Lower Genesee). The Erie Canal passes through the northern part of the basin, in turn affecting water quality and quantity (NYSDEC 2005).

The SWLO Basin is part of the 290,000 square-mile Great Lakes watershed (map 1-7), the largest freshwater ecosystem in the world. Iroquois Refuge is in the southeastern corner. The watershed includes all tributary streams and inland lakes that are hydrologically connected to the five Great Lakes: Superior, Michigan, Huron, Erie, and Ontario. Together these lakes hold 20 percent of the world's supply of surface freshwater and 95 percent of the U.S. supply. The climate and hydrology of the Great Lakes create unique environmental conditions that support a diversity of species and communities. The glacial and cultural histories have also had significant influence on the presence and distribution of biodiversity in this region (TNC 2000).

Local Level Hydrology

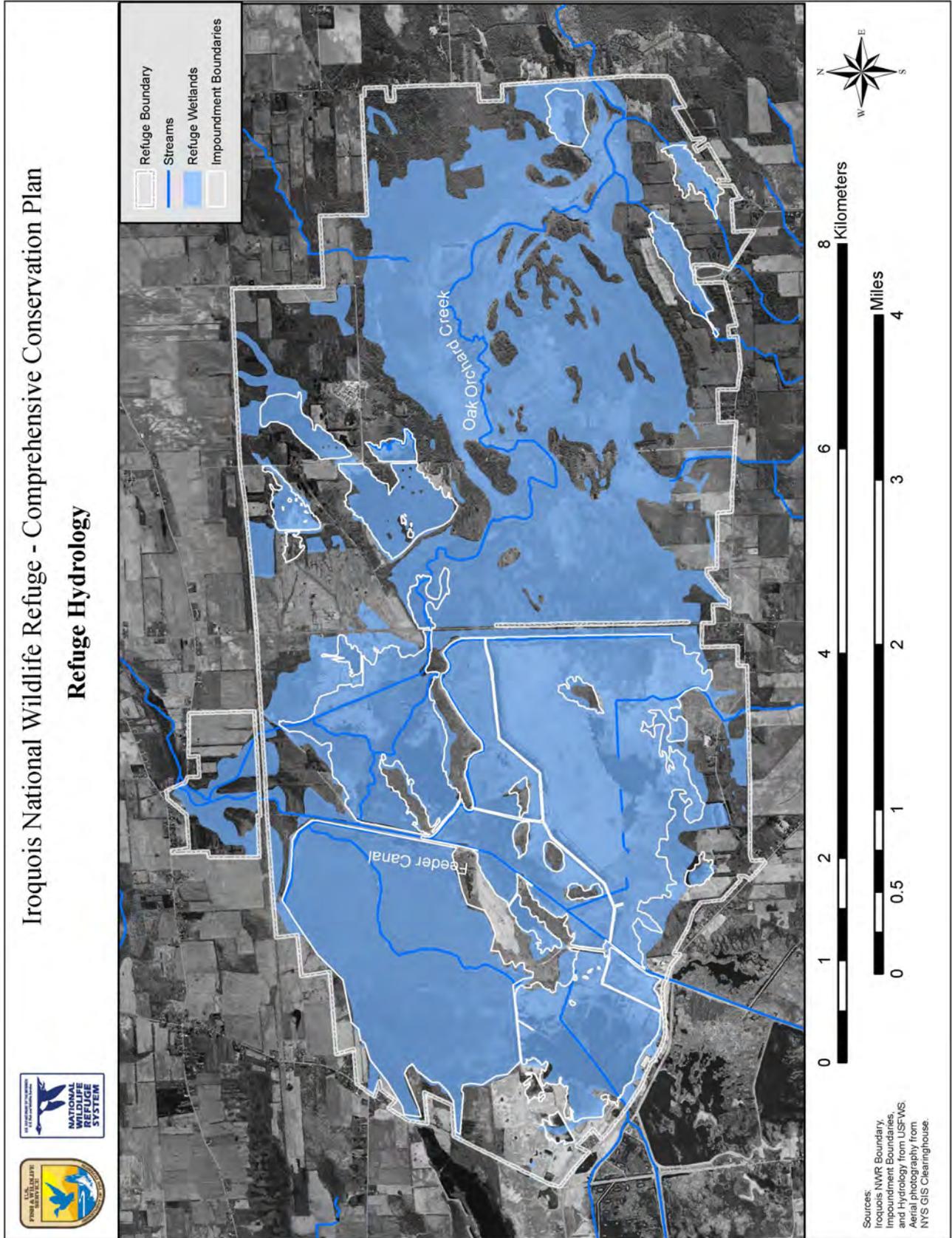
At a local scale, the refuge is supported by an important hydrological system comprised of natural and man-made waterways in which materials and energy are transferred. Some of these waterways, such as the Oak Orchard Creek, constitute an important ecological component to the refuge by connecting biologically diverse food webs that provide important habitat features for wildlife (map 3-3).

Prior to European settlement, the refuge area contained several thousand acres of emergent marsh and forested wetland that were flooded continuously or periodically throughout the year. After agricultural development, the refuge area contained approximately 5,000 acres that normally were inundated in the spring, but mostly dry by fall, making all but the wettest areas suitable for farming. Impoundments were developed after the refuge was established and this allowed some degree of water level management which resulted in nearly 4,000 acres of manageable wetlands. Manipulating water levels mimics natural wetland dynamics, rejuvenates wetland substrate, controls undesirable vegetation as well as flooding on neighboring lands, and maintains a continuous flow in Oak Orchard Creek (USFWS 2002).

Geology

The Earth has experienced several glacial periods; the last, known as the Pleistocene Ice Age, began about 2 million years ago. Glaciers advanced and retreated over time as temperatures fluctuated. The most recent period to affect portions of New York was the Wisconsin Glaciation. A one-mile thick sheet of ice, known as the Laurentide Ice Sheet, covered the region until its retreat northward. This ice sheet was gone from northern New York by about 10,000 years ago (Smith 1985). As the glacier retreated it left behind piles or layers of sediments, rocks, and other debris, known as glacial drift. These surficial deposits over bedrock include two types: glacial till and glacio-fluvial. Glacial till is a mixture of sand, silt, clay, and rock ground up by the glacier and dropped as it retreated. It covers most of this region. Glacio-fluvial drift develops from the transport, sorting, and deposit of material by flowing glacial meltwater. Larger gravels and stones settle out at higher gradients, while finer silts, sands, and clays settle out as the waters slow at valley bottoms (Sperduto and Nichols 2004).

Map 3-3





Center Marsh at Iroquois National Wildlife Refuge

After glacial ice retreated from the Oak Orchard watershed, lake deposits, mucklands, and stream alluvium filled-in some of the low-lying areas (Zollweg et al. 2005).

At the end of the last glacial period much of western New York was under glacial Lake Tonawanda. Genesee and Orleans Counties were completely covered by the last glacial advance. This Lake extended from the Niagara River east 50 miles to the current town of Holley and was in a shallow basin bounded to the north by the Niagara escarpment and to south by the Onondaga escarpment. These escarpments are limestone cliffs that rise a few hundred feet above the Huron Plain. Lake Tonawanda waters drained north spilling through several notches in the Niagara escarpment. These outlet streams formed waterfalls and over time, eroded deep gorges. The erosion continually lowered the level of the Lake so that eventually the only remaining outlet was the Niagara River that created Niagara Falls. Shallow pools and swamps were left behind in the poorly drained areas of the plain as the lake level receded, creating the wetland conditions visible on Iroquois Refuge and the surrounding WMAs (Carroll 2001).

South of Iroquois Refuge, Route 77 (Lewiston Road) follows a ridge of glacial till that is likely the remains of a glacial moraine. A moraine is accumulations of glacial debris left behind when the glacier “halted” before continuing to recede. Sand hills in the area were originally formed as sandbars in Lake Tonawanda or by wind deposits on the beaches as the lake receded (Carroll 2001).

The majority of the soils on the refuge came from one or more combinations of four lake sources including glacial till, silt deposits in glacial lakes, decaying vegetation, and erosion (USFWS 2000c). The Natural Resources Conservation Service (NRCS; formerly the Soil Conservation Service) prepared a Soil and Water Conservation Plan for Iroquois Refuge in 1964 that classified 74 soil types in 9 general associations. The NRCS also prepared soil surveys of Genesee and Orleans Counties in 1969 and 1977, respectively. By 1977 the soil classification system and some soil names had changed, so the description

of soils on Iroquois Refuge relies mostly on the Orleans County soil survey. Only broad soil types are shown (table 3-2 and map 3-4).

Table 3-2 Soils Mapped for Iroquois Refuge

Soil Association	Origin	Habitats
Excessively Well Drained	Glacial till plains	Upland forests, shrublands, and grasslands
Well Drained	Sandy deltaic and glaciolacustrine sediments	Upland forests, shrublands, and grasslands
Moderately Well Drained	Glacial till plains, mainly on drumlins and recessional moraines	Upland forests, shrublands, and grasslands
Somewhat Poorly Drained	Silty or clayey glaciolacustrine sediments and glacial lake modified till plains	Forested wetlands and wet meadows
Poorly Drained	Silty or clayey lacustrine sediments and sandy deltaic and glaciolacustrine sediments	Forested wetlands
Very Poorly Drained	Organic deposits	Emergent marsh, forested wetlands, and bogs

From the United States Department of Agriculture (USDA) Soil Conservation Service 1969 (Genesee County) and 1977 (Orleans County) Soil Surveys.

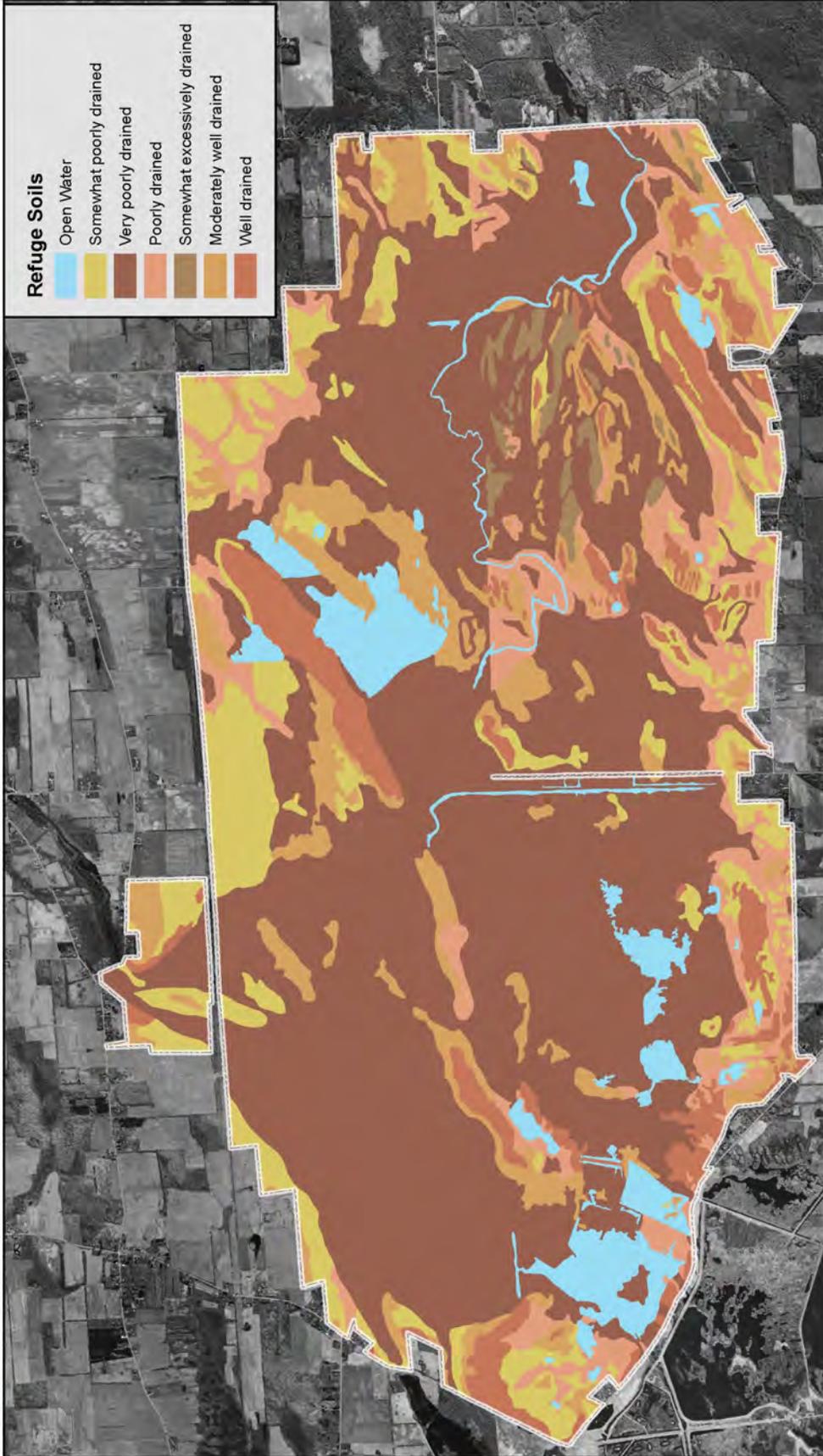


Swallow Hollow Trail within the forested area on refuge.

Map 3-4

Iroquois National Wildlife Refuge - Comprehensive Conservation Plan

Refuge Soils



Sources:
Soils from NRCS
Aerial Photo from NYS
GIS Clearinghouse
Refuge Boundary
from USFWS

Air Quality

There are several primary sources of pollution that come from Genesee County that could have an impact on the refuge. Sources for air, land, and water pollution come from the U.S. Gypsum Company Plant in Oakfield, the Batavia Power Plant, and Lapp Insulator. Pollution includes excess of carbon monoxide, nitrogen oxide, sulfur dioxide, volatile organic compound emissions, and diesel soot from highway traffic and off-road heavy equipment being used for construction and agriculture. Other contamination sites on the National Priority list are the Batavia Landfill, Lehigh Valley Railroad, and Byron Barrel & Drum (Epodunk 2008a, <http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=22474>).

There are several primary sources of pollution that come from Orleans County that could have an impact on the refuge. Sources for air, land, and water pollution come from New York State Albion and Orleans Correctional Facilities, Bayex Inc., F&H Metal Finishing Company, and the Western New York Energy Ethanol Plant. Pollution includes excess of carbon monoxide, nitrogen oxide, sulfur dioxide, volatile organic compound emissions, as well as diesel soot from highway traffic and off-road heavy equipment being used for construction and agriculture. Other contamination sites on the National Priority list are Diaz Chemical Corporation and FMC Corporation (Dublin Road Landfill) (Epodunk 2008b, <http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=22492>). Table 3-3 provides NYS and Federal standards for air quality.

Water Quality

Under the 1972 Clean Water Act, waters designated as 303(d) do not meet water quality standards that states, territories, and authorized Tribes have set for them. Oak Orchard Creek has been listed as a 303(d) impaired water body. Sampling in Oak Orchard Creek since 1997 has shown that valuable soil and excess nutrients are eroding and being transported through the watershed and deposited in the nearshore regions of Lake Ontario. Water samples have been analyzed for total phosphorus (TP), soluble reactive phosphorus (SRP), nitrate + nitrite ($\text{NO}_3 + \text{NO}_2$), total Kjeldahl nitrogen (TKN), total suspended solids (TSS), and sodium from deicing (Na). During 2008, the annual discharge of soil and nutrients from Oak Orchard Creek averaged 827,608 m^3/day and was within 10 percent of the levels documented in 1997/98 and 1998/99. Peak discharge occurred in the spring and secondarily in July. This level of discharge into Lake Ontario creates a plume of sediments and nutrients that can extend up to 10 km out into the lake from the mouth of Oak Orchard Creek. To manage nutrient and soil losses from the watershed, a total maximum daily loading (TMDL) may be required for Oak Orchard Creek in the future to meet the water quality standards of the Clean Water Act (Makarewicz and Lewis 2009).

A significant contribution to water quality issues in both Genesee and Orleans County is animal waste from farm animals. Variables associated with animal waste include the total number of animals, the volume and weight of waste being generated, nutrient levels (nitrogen and phosphorus) in the waste, and the amount of nitrogen that escapes into the atmosphere. Inorganic nitrogen predominately occurs as either ammonia (NH_3) or nitrate (NO_3) and is usually the limiting nutrient in marine ecosystems. A limiting nutrient is one which "limits" or controls the growth of primary producers (i.e., algae and other plants). Under conditions of nitrogen limitation, increases in nitrogen from any source can result in rapid and excessive increases in algal growth. When these algae die the bacteria responsible for decomposition consume dissolved oxygen in the water column. A massive "bloom" of algae can cause a severe drop in the level of dissolved oxygen, the result being that not enough oxygen is left for fish, crabs, and other animals to breathe. The nitrogen in animal waste goes through many conversions and much of it can be volatilized or lost to the air, as ammonia (NH_3). Ammonia volatilization occurs while the waste is still in the barn and the fans used for ventilation pump the nitrogen-laden air to the external atmosphere. Further volatilization occurs from the lagoon, or other holding surfaces, once the waste is transported. Finally, the process of spraying onto a field also causes loss of ammonia to the atmosphere. Animal waste also

contains a significant amount of phosphorus, a nutrient which often limits algal growth in freshwater systems and has the same effects as increased levels of nitrogen.

Table 3-3 Ambient Air Quality Standards New York State and Federal Standards

Pollutant	Avg. Period	Federal Air Quality Standards				New York State Standards ¹	
		Primary Standard		Secondary Standard		Level	Statistic
		Level ³	Statistic ²	Level	Statistic		
Carbon Monoxide	8-hour	9 ppm	Maximum	None		9 ppm	Maximum
	1-hour	35 ppm	Maximum			35 ppm	Maximum
Lead ⁴	Quarterly Average	1.5 µg/m ³	Maximum	Same as Primary		None	
Nitrogen Dioxide	Annual	0.053 ppm	Arithmetic Mean	Same as Primary		0.05 ppm	Arithmetic Mean
Total Suspended Particulates (TSP) ⁵	12 consecutive months	None		None		75 µg/m ³	Geometric Mean
	24-hours	260 µg/m ³	Maximum	150 µg/m ³	Maximum	250 µg/m ³	Maximum
Particulate Matter (PM ₁₀) ⁶	24-hour	150 µg/m ³	Maximum	Same as Primary		None	
Particulate Matter (PM _{2.5})	Annual	15 µg/m ³	Arithmetic Mean	Same as Primary		None	
	24-hour	35 µg/m ³ ⁷	3 year avg	Same as Primary			
Ozone ⁸	8-hour (2008 std)	0.075 ppm	3 year avg	Same as Primary		None	
	8-hour (1997 std)	0.08 ppm	3 year avg	Same as Primary		0.08 ppm	Maximum
	1-hour	0.12 ppm	Not Applicable in NYS	Same as Primary		0.12 ppm	Maximum
Sulfur Dioxide	Annual	0.03 ppm	Arithmetic Mean	None		0.03 ppm	Arithmetic Mean
	24-hour	0.14 ppm	Maximum			0.14 ppm	Maximum
	3-hour	None		0.5 ppm	Maximum	0.50 ppm	Maximum
Hydrocarbons (non-methane)	3-hour (6-9 am)	None		None		0.24 ppm	Maximum

Footnotes (source: NYSDEC 2008a, <http://www.dec.ny.gov/chemical/8542.html>)

1. New York State also has standards for beryllium, fluorides, hydrogen sulfide, and settleable particulates (dustfall). Ambient monitoring for these pollutants is not currently conducted.
2. All maximum values are concentrations not to be exceeded more than once per calendar year. (Federal 1 Hour Ozone Standard not to be exceeded more than 3 days in 3 calendar years).
3. Gaseous concentrations for Federal standards are corrected to a reference temperature of 25°C and to a reference pressure of 760 millimeters of mercury.

4. Federal standard for lead not yet officially adopted by New York State, but is currently being applied to determine compliance status.
5. New York State also has 30, 60, and 90-day standards as well as geometric mean standards of 45, 55, and 65 $\mu\text{g}/\text{m}^3$ in Part 257 of NYCRR. While these TSP standards have been superseded by the above PM_{10} standards, TSP measurements may still serve as surrogates to PM_{10} measurements in the determination of compliance status.
6. Federal standard for PM_{10} not yet officially adopted by NYS, but is currently being applied to determine compliance status.
7. Federal standard was changed from 65 to 35 $\mu\text{g}/\text{m}^3$ on December 17, 2006. Compliance with the Federal standard is determined by using the average of 98th percentile 24 hour value during the past 3 years, which cannot exceed 35 $\mu\text{g}/\text{m}^3$.
8. Former NYS standard for ozone of 0.08 PPM was not officially revised via regulatory process to coincide with the Federal standard of 0.12 PPM which is currently being applied by NYS to determine compliance status. Compliance with the Federal 8 hour standards is determined by using the average of the 4th highest daily value during the past 3 years - which cannot exceed 0.084 PPM or 0.075 PPM, effective May 27, 2008.

Noise

Ambient noise levels on and around the refuge are generally similar to other rural locations in western New York. The presence of high and low-speed roadways scattered throughout the refuge results in some traffic noise being within hearing distance of many refuge areas. Off-refuge noise such as farm machinery also adds to noise levels on the refuge. Noise generated from refuge operations, such as heavy equipment used for habitat management, adds to noise levels but is usually of short duration (one to a few days) and for a short time on those days (1 to 8 hours). Noise levels at any time in any area are influenced by the type of noise being generated, wind speed and direction, and the type of habitat and topography separating the listener from the source of the noise. There are still some areas on the refuge (e.g., along Oak Orchard Creek east of Sour Springs Road) that are sufficiently buffered from most noise sources to allow the visitor to remain relatively undisturbed.

Visual Resources

The refuge and neighboring State lands represent the largest contiguous land area in northwestern New York that is nearly free of agricultural and urban development. For many western New Yorkers seeking an aesthetically pleasing landscape to visit, the refuge offers their best opportunity within a days drive. The interspersed of forested wetlands and uplands, shrublands, grasslands and marshes provides a picturesque backdrop for outdoor recreation activities. The abundance and diversity of wildlife associated with these habitats significantly enhances the outdoor experience. When visited in the fall of the year, the pallet of natural color provided by a variety of tree species makes this area one of the most aesthetically pleasing spots to visit in western New York.

Some refuge activities may detract from the aesthetics in the short term. Maintenance of roads, water management infrastructure (e.g., culverts, dikes, water control structures), and recreational infrastructure (e.g., kiosks) often causes a short-term disturbance to some areas. These areas are generally along roadways and parking areas, which are already of a disturbed nature. Habitat management activities (e.g., mowing grasslands and shrublands) may reduce aesthetics for a slightly longer period, but are usually no longer noticeable after one growing season.

Biological Environment

Habitat Types

The relatively flat terrain of Iroquois Refuge supports open water, emergent marsh, forested wetlands, upland forests, shrublands, and grasslands (map 3-5 and table 3-4). Wetlands are the dominant habitat type on the refuge.

Table 3-4 Habitat Types on Iroquois Refuge

Habitat Type	Acres
Emergent Marsh	2,582
Open Water	823
Forest (upland and wetland)	4,817
Shrubland	971
Grassland	1,186
Plantations	203
Developed Area	248
TOTAL	10,828

Wetlands

In the mid-1990s New York was estimated to have approximately 2.4 million acres of wetlands. The Lake Plains and the Adirondack regions of New York have the greatest percentage of the State's wetlands. Approximately 75 percent of wetlands in the Lake Plains region are forested. The remaining wetlands include 14 percent shrub, 8 percent emergent marsh and 3 percent open water (NYSDEC 2008b, <http://www.dec.state.ny.us/website/dfwmr/habitat/fwwprog3.html>, <http://www.dec.state.ny.us/website/dfwmr/habitat/fwwprog3.html>). Historically the area surrounding Iroquois Refuge had more extensive wetlands than what currently exist. Wetland loss and degradation have occurred through draining, channelization, and other manipulations, primarily for agriculture.

Impounded Wetlands - The refuge has 19 freshwater impoundments encompassing about 4,000 acres of wetland habitat (table 3-5). The goal of the refuge's water management program is to provide high quality wetlands that provide optimal stopover and breeding habitat for waterfowl, waterbirds, and bald eagles. This program requires the manipulation of water levels to provide high-energy plant and invertebrate foods and structural habitat diversity for feeding, resting, and breeding waterfowl and other migratory birds (USFWS 2005b).

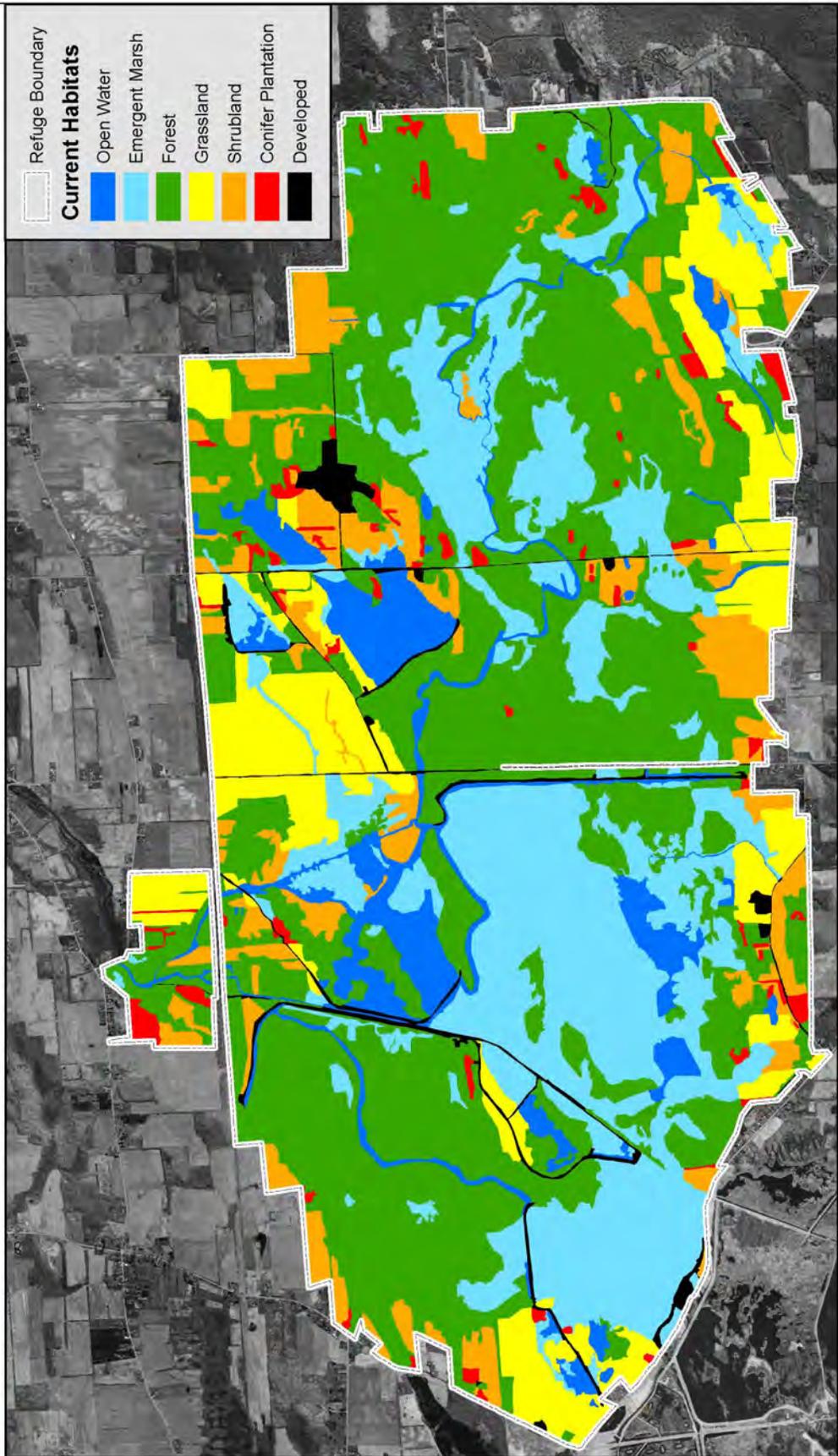
Impoundments are drawn down approximately every 5 years on a rotation that ensures only a few pools are drained each year. This periodic draining of the marsh mimics a drought in a natural marsh and allows the re-growth of vegetation. Drawdowns also give refuge staff a chance to make needed repairs to dikes and water control structures.

Natural Emergent Marsh - Most natural (unimpounded) emergent marsh habitat on the refuge is located along Oak Orchard Creek, east of Sour Springs Road. There are no control structures regulating the water level of the Creek in this area; the only constriction is Sour Springs Road itself and transient beaver dams. During flood events and as a result of beaver activity the water in the Creek will back up beyond the existing emergent marsh and a small distance further into the floodplain.

Map 3-5

Iroquois National Wildlife Refuge - Comprehensive Conservation Plan

Current Habitat Conditions



Sources:
 Refuge Boundary from USFWS.
 Habitat Types from
 NYS Natural Heritage
 Aerial Photos from NYS GIS
 Clearinghouse.

0 1 2 3 4

Miles

0 2 4 6 8

Kilometers

Table 3-5 Impoundments on Iroquois Refuge

Impoundment	Year Impounded	Acres
Mohawk Pool South*	2006	939
Mohawk Pool North*	2006	190
Mohawk Pool West*	2006	235
Seneca Pool	1968	935
Oneida Pool	1977	770
Cayuga Pool	1969	365
Cayuga Sub-Impoundment	1986	45
Ringneck Marsh	1969	172
Center Marsh	1969	84
Long Marsh	1965	69
Swallow Hollow Marsh	prior to refuge establishment	54
Knowlesville Marsh	1966	46
Schoolhouse Marsh	1967	40
O'Brien Marsh	2003	18
Olsen South	1991-92	15
Olsen North	1991-92	10
Galaxy Marsh	1965	10
Schoolhouse Moist Soil Unit	1991	10
Sutton's Marsh	1965	23
TOTAL		4,030

*Mohawk Pool was originally created in 1974 and encompassed 1,370 acres. In 2006 it was split into three sub-impoundments to facilitate habitat management and water manipulation.

Forested Wetland - Red and silver maple and green ash are the primary tree species in the 3,297 acres of forested wetlands (bottomland hardwoods) on the refuge. Second growth mature trees more than 75 years old dominate most of this habitat. About 1,000 of these acres are contained in Seneca Pool; an impoundment originally built and managed as a green tree impoundment. This pool is a red maple/green ash swamp that, when still managed as a green tree impoundment, was routinely flooded to provide deeper water habitat at different times of the year to coincide with the needs of certain wildlife species. Long periods of managed flooding stressed and killed mature trees and prevented germination and survival of seeds and seedlings. Due to this negative effect on the forested wetland habitat, the pool level is now allowed to fluctuate with the level of Oak Orchard Creek. Fluctuating with the creek level reduces the amount of water in this pool and limits the amount of water stress put on the trees, while still providing wetland habitat throughout spring migration. This pool provides a large contiguous tract of forested wetland habitat managed for species such as the wood duck and cerulean warbler.

Oak Orchard Creek Marsh National Natural Landmark - The refuge contains the 523-acre Oak Orchard Creek Marsh NNL (map 1-4). The marsh encompasses a pristine stretch of the sluggish and meandering creek that varies in width from 20 to 150 feet. The surrounding terrain is low and flat and shows the effects of annual flooding. Broad-leaved cattail grows in marshy areas at the bends in the creek. Buttonbush and water willow are common shrubs along the creek edges, accompanied by a diversity of other plant species including red osier dogwood, white dogwood, swamp rose, purple nightshade, watercress, water hemlock, swamp milkweed, lizards tail, cardinal flower, broad-fruited bur reed, and forget-me-nots. A forested swamp dominated by silver maple with some green ash, swamp white oak and slippery elm with a dense understory of sensitive fern borders the creek channel (Vogelmann 1972).

When this landmark was established in 1974 it also included the 15-acre Milford Posson Research Natural Area (see Uplands Section below).

Uplands

Approximately 56 percent of the upland habitat on the refuge is maintained in an early succession stage either as grassland or shrubland. These units are maintained through a variety of techniques including mowing, haying, burning, disking, planting, hydro-axing, and chemical treatment. Burning of grassland fields typically occurs between April 1 and May 31. Fall burns are also possible, but are generally avoided as they do not adequately control undesirable vegetation. Mowing and haying are conducted after mid July to allow for completion of nesting cycles while still putting stress on undesirable vegetation during the active growing season. Hydro-axing of shrub units occurs in summer or winter depending on habitat objectives, ground conditions, and availability of machinery.

Grasslands - Refuge grasslands are a mix of managed warm and cool season fields and unmanaged forbdominated fields. Switchgrass, smooth brome, and goldenrod dominate the grasslands. Grasslands are currently managed using a combination of mowing, chemical spraying, and prescribed burns to control unwanted vegetation and to maintain nesting habitat for grassland nesting birds like sedge wren, Henslow's sparrow, grasshopper and vesper sparrow, mallard and blue-winged teal. Haying, conducted through a cooperative farming program, is also used as a grassland management tool (USFWS 2002). Approximately 450 acres of upland habitat have been planted to warm season grasses (primarily switchgrass, big bluestem, and indiagrass) and succession is suppressed to maintain these units (USFWS 2000c).

Shrublands - The refuge shrublands are very diverse from location to location with the most common species present being dogwoods (red paniced, red osier, and silky). Other species include honeysuckle (Tartarian and Bella), buckthorn, Russian olive, multifora rose, and viburnum. Many of the shrublands on the refuge have matured to a stage where they are moving from shrubland to forest habitat. Shrublands provide important habitat for many wildlife species and add diversity to the landscape. The refuge is identifying those shrubland areas that would be best kept as shrubland management units and those areas that would be better left to revert to forests.

Forest - Northern hardwoods (beech, sugar maple, yellow birch, and hemlock) and Allegheny hardwoods (black cherry, tulip poplar, and white ash) comprise the 1,520 acres of upland forest found on the refuge. These types are rarely distinct from one another and tend to blend together with other species such as hickories, butternuts, and red or white oak. Much of the upland forest on the refuge is in second growth. Current forest management includes creation of early succession habitat and maintenance of mature forest through natural processes. Most management will favor the development of old growth stands to provide essential wildlife habitat for many species of wildlife.

Conifers are not a large component of the forest types on the refuge. Found in association with other northern hardwoods, the Eastern hemlock and white pine are the only native conifers on the refuge. Other conifers found on the refuge where planted during the 1960s and 1970s. Species planted include white and Norway spruce and red, Austrian, and Scotch pines. These conifers are found in small scattered stands ranging from less than 1 acre to as much as 20 acres in size and include roughly 200 acres total.

Research Natural Areas - The Service cooperates with many other agencies and organizations to establish and preserve a diverse, representative network of plant and animal communities of different ecological types, managing each in a natural state for research purposes. Research Natural Areas are intended to represent the full array of North American ecosystems including biological communities, habitats and

phenomena, and geological and hydrological formation and conditions. They are areas where natural processes are allowed to predominate with little or no human intervention (USFWS 2009b, <http://www.fws.gov/Refuges/whm/wilderness.html>).

Iroquois Refuge has a single RNA: the Milford Posson. This RNA is a small 15 acre upland forest near the Oak Orchard Creek Marsh (map 1-4). This site supports a good example of an old age stand of northern hardwoods and eastern hemlock growing on a narrow ridge that rises 6 to 8 feet above the surrounding wetland. Eastern hemlock, beech, yellow birch, and sugar maple are the dominant trees. The larger hemlocks and beeches have trunk diameters greater than 30 inches and heights greater than 70 feet. These trees are 150 to 200 years old. Hop hornbeam, ironwood, red oak, and red elm also grow in the overstory; witchhazel and maple-leaved viburnum are typical in the understory along with spicebush in the wetter areas. A diverse groundcover includes spinulose wood fern, New York fern, Jack-in-the-pulpit, Canada mayflower, bellworts, foamflower, wild sarsaparilla, Indian cucumber root, partridgeberry, and goldthread.

Fish and Wildlife

Iroquois Refuge was established as a nesting, resting, and migration area for migratory birds and resident wildlife, particularly waterfowl. Management of refuge habitats is designed to provide the best possible habitat for migratory waterfowl and waterbirds, while also benefitting several other wetland wildlife species. Following is a brief discussion of the different groups of wildlife that occur on the refuge. For a more detailed list of species that inhabit the refuge see appendix D.

Birds

Iroquois Refuge has a great variety of avian species that range from small, ruby-throated hummingbirds to our national symbol, the bald eagle. For centuries, birds have used the refuge area for resting and feeding during their annual migrations between Central and South America and the northern U.S., Canadian and arctic breeding grounds. Over 266 different species of birds have been observed on the refuge since its inception, with 122 of these known to nest on the refuge. The refuge has long been considered an important migratory stopover area for mallard, blue-winged teal, ring-necked duck, and wood duck. Other migrant species that utilize the refuge during spring, summer, or fall include American bittern, least bittern, great blue heron, egrets, black-crowned night heron, swans, geese (Canada, snow, and white-fronted), red-tailed hawk, sora, sandhill crane, American woodcock, common snipe, brown thrasher, warblers, sparrows, eastern meadowlark, and bobolink, just to name a few. Waterfowl are most abundant in the spring with counts of ducks and geese averaging more than 120,000. There are several resident bird species (species that do not migrate) on the refuge including bald eagle, ring-necked pheasant, ruffed grouse, wild turkey, woodpeckers, and nuthatches.

Iroquois Refuge provides important waterfowl nesting and brood rearing habitat; in some years over 6,000 ducklings and 1,500 goslings have been produced on the refuge. This productivity has declined in recent years as the habitats have matured. The most common waterfowl nesting species are wood duck, resident Canada geese, mallard, and blue-winged teal (USFWS 2002).

Seven species of wading birds (bitterns, herons and egrets) use the refuge. Great blue heron is the most common; a heron rookery on the refuge supports nearly 400 nests. American and least bitterns also nest on the refuge. Bitterns are relatively common on the refuge but are inconspicuous (USFWS 2002). The least bittern is State-listed as threatened and both species are identified as “species of greatest conservation need” by the NYSDEC (NYSDEC 2005). The American and least bitterns were the focus of two research projects on the refuge (Lor 2000, Bogner 2001). Lor (2000) found nesting densities of least bitterns to be 1 nest per 18 acres of emergent marsh, which was much higher than was previously

recorded for the area. Both studies found hemi-marsh to be the preferred habitat for nest site selection (USFWS 2002). Other nesting species on refuge wetlands that are also on the “greatest need” list include black tern and pied-billed grebe.

Iroquois Refuge is one of four sites in New York with exceptional numbers of cerulean warblers recorded during the Cerulean Warbler Atlas Project conducted from 1997 to 2000. This warbler is among the highest priority landbirds for conservation in the U.S. based on a small total population size and a significant decline (-4.2 percent per year since 1966) in the Breeding Bird Survey trend throughout its range (Rosenberg et al. 2000). The cerulean warbler occurs in riparian, forested wetlands, and Iroquois Refuge has the third highest concentration of these birds in New York.

Prior to the 1950s more than 70 pairs of bald eagles nested in New York State and by the 1960s only one active nest remained. This decline was caused by habitat loss and the bio-accumulation of organochlorine pesticides (DDT and dieldrin) in fish, the primary food source for eagles. The use of pesticides which contained DDT or dieldrin were banned in 1972, and shortly thereafter the number of successful eagle nests started to increase steadily. In the 1970s New York led the national recovery of the bald eagle by ‘hacking’ young wild birds into new artificial nest sites. From 1976 to 1980, 23 young eagles were hacked at Montezuma Refuge, 90 miles to the east of Iroquois Refuge. After two released birds successfully nested in 1980, the hacking program expanded to three more sites including Oak Orchard WMA, adjacent to Iroquois Refuge. A pair of bald eagles has nested on Iroquois Refuge each year since 1986 and a second pair started nesting in 2001. The hacking program ended in 1985 as statewide eagle numbers continued to increase. In 1998, bald eagle numbers across the U.S. were high enough to allow them to be upgraded from the Federal endangered species list to the Federal threatened species list. On August 9, 2007 bald eagles were removed from the Federal list of threatened and endangered species and no longer require protection under the Endangered Species Act. Bald eagles remain protected under the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act. The Eagle Act prohibits anyone from “taking” bald eagles. Among other actions, “take” includes disturbance of bald eagles (USFWS 2007b).

Mammals

The refuge supports a diversity of mammal species that contribute to the ecological, economic, and aesthetic value of western New York. The white-tailed deer is the largest mammal that resides on the refuge and can be observed year round. Eastern cottontail rabbit, gray, red and flying squirrel, woodchuck, raccoon, skunk, red and gray fox, coyote, muskrat, mink, otter, opossum, weasel, and beaver are mid-sized mammals that serve as both predators and prey in refuge plant and animal communities. Small mammalian residents include meadow vole, white-footed and deer mouse, shrews, and moles. These small animals are a primary food source for many larger animals. The refuge provides habitat for little brown, big brown, and red bats which serve as an important natural control of insects.

Reptiles and Amphibians

Reptiles and amphibians are important species in the ecological communities of Iroquois Refuge. The refuge has not conducted a systematic inventory of all reptiles and amphibians. However, studies focusing on different suites of species were conducted and anecdotal information regarding the presence of various species has been recorded. From these sources, 23 amphibian and reptile species were identified to occur on the refuge and another six species were found adjacent to the refuge and are likely to occur here as well. Snake species include northern brown snake, eastern garter snake, smooth green snake, northern water snake, northern redbelly, black rat, and eastern milk snake. Painted, softshell, and snapping turtles inhabit wetland environments. Frog and toad species include leopard frog, green frog, wood frog, grey

tree frog, northern spring peeper, and American toad. Several salamander species are fairly common and can be found in dark moist environments, such as under decaying logs or thick leaf litter.

Invertebrates

Invertebrates are abundant on the refuge and play an integral role in maintaining the ecological balance of several refuge ecosystems. The refuge has not yet conducted a systematic inventory of all invertebrate species.

Fish

Fishery resource assessments were conducted on selected areas of the refuge in 1993 and again in 1997, documenting 16 species of fish (USFWS 2002). Fish species include northern pike, largemouth bass, yellow perch, black crappie, pumpkinseed, and brown bullhead. During July to October 2009, staff from the Lower Great Lakes Fish and Wildlife Conservation Office completed a qualitative assessment of the fish communities occurring on the refuge. This was to support the development of a long-term management plan for the fisheries resources at the refuge. Eighteen species of fish were collected during the survey with bluegill and pumpkinseed being the most common collected species. Other common species included brown bullhead, black crappie, and common carp. Species found in at least two waterbodies were golden shiner, green sunfish, northern pike, white crappie, white sucker, and yellow perch. Banded killifish, brook stickleback, goldfish, johnny darter, largemouth bass, central mudminnow, and a hybrid sunfish were only collected in one single waterbody. A comparison of species collected in 2009 versus 1993 is found in table 3-6.

**Table 3-6 Fish Species Collected at Iroquois Refuge During 2009 and 1993 Assessments
(Species Listed in Order of 2009 Abundance)**

Common Name	Scientific Name	2009	1993
Bluegill	<i>Lepomis macrochirus</i>	336	X
Pumpkinseed	<i>Lepomis gibbosus</i>	118	X
Common carp	<i>Cyprinus carpio carpio</i>	36	X
Goldfish	<i>Carassius auratus</i>	32	X
Brown bullhead	<i>Ictalurus melas</i>	31	X
Largemouth bass	<i>Micropterus salmoides</i>	30	X
Brook stickleback	<i>Culaea inconstans</i>	30	
Central mudminnow	<i>Umbra limi</i>	29	X
Green sunfish	<i>Lepomis cyanellus</i>	22	
Northern pike	<i>Esox lucius</i>	9	X
White crappie	<i>Pomoxis annularis</i>	8	
Black crappie	<i>Pomoxis nigromaculatus</i>	6	X
Yellow perch	<i>Perca flavescens</i>	3	X
White sucker	<i>Catostomus commersoni</i>	2	X
Golden shiner	<i>Notemigonus cyssoleucas</i>	2	X
Banded killifish	<i>Fundulus diaphanous</i>	1	X
Johnny darter	<i>Etheostoma nigrum</i>	1	
Sunfish (hybrid)	<i>Lepomis (cyanellus x gibbosus)</i>	1	
Grass pickerel	<i>Esox americanus</i>	0	X
Bluntnose minnow	<i>Pimephales notatus</i>	0	X
Tadpole madtom	<i>Noturus gyrinus</i>	0	X

Invasive Species

Several invasive plant and animal species inhabit the refuge. Plants include purple loosestrife, several honeysuckle species, multiflora rose, garlic mustard, common reed, buckthorn, black swallowwort, autumn olive, oriental bittersweet, and Eurasian milfoil. The most invasive animal species on the refuge is the common carp which destroys wetland vegetation and causes high turbidity in refuge wetlands. European starling, house sparrow, and rock pigeon all nest on the refuge and compete with native species for nest sites. Other invasive wildlife species occurring on the refuge include feral ducks, mute swan, feral and free-roaming cats, and Norway rat.

Threatened and Endangered Species

No Federal-listed endangered species are known to occur on the refuge. For many years the bald eagle was the primary endangered species upon which the refuge focused its efforts. Due to successful conservation efforts the bald eagle is now listed in the least concern category. Two active eagle nests currently occur on the refuge and two other active nests are on the nearby State WMAs; one each on Oak Orchard and Tonawanda.

The Karner blue butterfly was listed as federally endangered in 1992. Its historical range included savanna/barren ecosystems in 12 states from Minnesota to Maine and in the province of Ontario. The lupine flower is a critical component for Karner blue habitat. Lupines grow primarily on sandy soils within oak and pine savanna/barrens communities. In New York, the Karner blue butterfly was once common. The Tonawanda Potential Recovery Unit is one of two units that could form a geographic connection between eastern and western populations (USFWS 2003). Iroquois Refuge and Tonawanda WMA are also being considered for Karner blue reintroduction if a minimum of 100 acres of suitable habitat can be developed. Planting of lupines on the refuge and Oak Orchard began in 1995-96.

Other federally threatened or endangered species that once occurred in western New York and that could again occur on the refuge given current or potential habitats include bog turtle, Hine's emerald dragonfly, and eastern Massasauga rattlesnake (candidate species). Table 3-7 identifies species that are listed as endangered or threatened at the State level.

Table 3-7 State Listed Species Occurring on Iroquois Refuge

Common Name	Scientific Name	Status
Golden Eagle	<i>Aquila chrysaetos</i>	S-E
Peregrine Falcon	<i>Falco peregrinus</i>	S-E
Black Tern	<i>Chlidonias niger</i>	S-E
Short-eared Owl	<i>Asio flammeus</i>	S-E
Loggerhead Shrike	<i>Lanius ludovicianus</i>	S-E
Pied-billed Grebe	<i>Podilymbus podiceps</i>	S-T
Least Bittern	<i>Ixobrychus exilis</i>	S-T
Bald Eagle	<i>Haliaeetus leucocephalus</i>	S-T
Northern Harrier	<i>Circus cyaneus</i>	S-T
King Rail	<i>Rallus elegans</i>	S-T
Upland Sandpiper	<i>Bartramia longicauda</i>	S-T
Common Tern	<i>Sterna hirundo</i>	S-T
Sedge Wren	<i>Cistothorus platensis</i>	S-T
Henslow's Sparrow	<i>Ammodramus henslowii</i>	S-T

S-E = State Endangered, S-T = State Threatened

Based on the information compiled and analyzed in the fish and wildlife section above we are able to identify and list resources of concern and the habitats that support these resources. Table 3-8 provides a summary of these resources of concern for Iroquois Refuge.

Table 3-8 Iroquois Resources of Concern Based on Priority Habitats

High Priority Habitat Types	Resources of Concern	Other Benefiting Species
Freshwater Impoundments: emergent marsh and open water Streams and associated emergent marsh (un-impounded)	American and least bitterns, black tern, pied-billed grebe, Virginia rail, American black duck, blue-winged teal, mallard, Northern pintail, Atlantic-Southern James Bay Canada goose, least sandpiper, pectoral sandpiper, semipalmated sandpiper, Wilson’s snipe, and bald eagle	Sora, black-crowned night heron, king rail, common tern, osprey, canvasback, and greater yellowlegs
Forested Wetlands	Wood duck and cerulean warbler	Prothonotary warbler, Baltimore oriole, rusty blackbird, northern flicker, bats, and river otter
Moderate Priority Habitat Types	Resources of Concern	Other Benefiting Species
Vernal pools	Wood frog, blue-spotted and Jefferson salamanders	Other obligate amphibian species
Grasslands	Bobolink, grasshopper sparrow, and Henslow’s sparrow	Eastern meadowlark, horned lark, and sedge wren
Shrublands	Field sparrow, blue-winged warbler, and golden-winged warbler	Brown thrasher, song sparrow, willow flycatcher, black-billed cuckoo, and American woodcock
Upland Forest	Wood thrush, black-billed cuckoo, cerulean warbler, and American woodcock	Rose-breasted grosbeak and scarlet tanager

Rare Plants and Significant Ecological Communities

The New York Natural Heritage Program tracks rare species and significant ecological communities in the State. The program provided a list of the rare plants and significant ecological communities known to occur on or near the refuge (appendix D). Two rare plants and three ecological communities have been documented on the refuge in recent history: smooth bur-marigold (State threatened), Georgian bulrush (State endangered), deep emergent marsh, hemlock-northern hardwood forest, and beech-maple mesic forest.

Socioeconomic Environment

Population Demographics

While the population in New York has grown slightly, the region surrounding Iroquois Refuge has actually declined from 2000 to 2009. Table 3-9 provides census information reflecting population trends in New York, Genesee and Orleans County, and the towns of Alabama and Shelby (US Census 2009, www.census.gov).

Table 3-9 Population Demographics 2000-2009

Area	2000 Population	2009 Population
State of New York	18,976,457	19,541,453
Genesee County	60,370	57,868
Orleans County	44,171	42,051
Town of Alabama	1,881	1,823
Town of Shelby	5,420	5,169

Economics of Genesee County

The median household income in Genesee County in 2008 was \$49,133. Genesee County's economy is based on agriculture, tourism, recreation, and industry. Many businesses cater to recreational interests and tourists including campgrounds, businesses that support fishing and other outdoor sporting and recreation activities, and motels. Federal and State lands that support outdoor recreation and other public uses include Darien Lakes State Park, Oak Orchard and Tonawanda WMA, John White WMA, Carleton Hill WMA and Iroquois Refuge. Commercial industrial parks are slowly but steadily growing.

Agriculture is the primary land use. Genesee County covers 495 square miles; of this, water covers 1 square mile. High quality land is considered Genesee County's greatest asset. The diversity of soils and climate conditions attracted the early settlers who carved out homes and farms, developing Genesee County into one of the richest agricultural regions in New York State. Genesee County has the highest percentage of classified farmland in the State and 3 of the top 100 vegetable farms in the country. Genesee County is fourth in agriculture sales within New York State. Crops include corn (22,215 acres), wheat (10,689 acres), soybeans (4,507 acres), vegetables (25,381 acres), and orchards (116 acres). The fertile muck soil in Elba has made Genesee one of the principal counties in the nation for growing beets and onions. Genesee County also ranks fifth in snap bean production. Dairy farming is the leading commodity in the county. Fifty percent of all cattle on farms are devoted to milk production. There are many farm stands and farmer's markets providing fresh vegetables, fruits, and flowers. The average revenue generated each year from agricultural produce in Genesee County is \$215,410 per farm; the average annual expense is \$168,571 per farm (Epodunk 2008a, <http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=22474>).

The Genesee County Agricultural and Farmland Protection Board developed a Protection Plan in concert with the County Departments of Planning and Real Property Tax Services, the Genesee County Soil and Water Conservation District, Cornell Cooperative Extension of Genesee County, the Agricultural Development Associates, the American Farmland Trust, and Peter J. Smith and Company. The plan is intended to preserve the agricultural land resource, direct development away from farming areas, and to support the economic contributions of agriculture and related businesses. The project was initiated to maintain and protect agriculture as Genesee County's largest industry and predominant land use. The primary objective of the project was to develop a plan that would focus on agricultural land preservation techniques and, perhaps most importantly, on the long-term economic viability of the agricultural industry in Genesee County. The plan development process was based on the premise that farm profitability is the

fundamental element of agricultural protection. The Genesee County Agricultural and Farmland Protection Plan was officially adopted by the Genesee County legislature on November 14, 2001 and approved by the NYS Department of Agriculture and Markets on April 8, 2002 (Genesee County 2008, <http://www.co.genesee.ny.us/dpt/planning/agfarmboard.html>).

Economics of Orleans County

The median household income for Orleans County in 2008 was \$46,220. Like Genesee County, the economy of Orleans County is based on agriculture, tourism, recreation, and industry. Many businesses cater to recreational interests and tourists including campgrounds, fishing and other sporting goods and services, motels, and bed and breakfast establishments. Federal and State lands that support outdoor recreation and other public use include Oak Orchard State Marine Park, Oak Orchard and Tonawanda WMA, Lakeside Beach State Park, and Iroquois Refuge. Commercial industry is slowly but steadily growing.

Orleans County covers approximately 817 square miles; land covers 391 square miles and water covers 426 square miles. The high proportion of water is due to the extension of the Orleans County line north into Lake Ontario. Orleans County is on the southern shore of Lake Ontario and the Erie Canal passes from east to west through the center. Agriculture is the primary land use. In 2005, 87 percent of farms were in operation. Milk production is lower in Orleans County compared to Genesee County; only 34 percent of all cattle on farms are milk cattle. Crops include corn (23,175 acres), wheat (11,387 acres), soybeans (16,393 acres), vegetables (18,443 acres), and orchards (5,928 acres). Land is Orleans County's greatest asset. The area was once fitted to agriculture, and when the fever of land speculation had abated and the timber of the section had been removed enough to open wide areas, farming became the leading industry. Grains, particularly wheat, were the main crops and were very profitable until the Erie Canal opened import of wheat from other states. This required farmers to explore other crops; potatoes, coarse grains, and livestock were explored as options to replace wheat. Then, in 1845, a concerted effort was made to capitalize on the climate and soil of Orleans County that makes it particularly adapted to growing fruit. Apple orchards became successful with increased experience in cultivation, grafting, and improved varieties of apples. The apple crop is now one of the most important in the County. The average revenue generated each year from agricultural produce in Orleans County is \$136,739 per farm; the average annual expense is \$110,505 per farm (Epodunk 2008b, <http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=22492>).

The Empire Zone Program was created to stimulate economic growth through a variety of tax incentives, helping to attract new businesses and enable existing businesses to expand and create more jobs. Since Orleans County was designated as an Empire Zone in 2002, there have been 11 zone-certified businesses established employing 1,762 people. These businesses have invested over \$12.5 million. The Western New York Energy Ethanol Plant opened in 2008 in Orleans County. It created 58 new jobs and is projected to purchase approximately six million bushels of corn each year from local upstate farmers. In addition to ethanol, the facility will produce two byproducts that will be marketed for sale: carbon dioxide, which is used for beverage carbonation and freeze drying, and distiller's dried grains, a high-protein livestock feed that is well-suited for New York's dairy industry (WNY Energy 2008, <http://www.wnyenergy.com/show/?id=97>).

Contributions to Local Economy

The contribution of Iroquois Refuge to the local economy is multifaceted. The refuge contributes directly to the local economy through shared revenue payments. The Federal Government does not pay property tax on refuge lands; instead it makes annual payments to respective municipalities based on a maximum of 0.75 percent of the fair market value of refuge lands as determined by an appraisal every 5 years. The

actual amount distributed each year varies based on Congressional appropriations, land acquisition, and the annual sale of refuge goods and products (hay) and Special Use Permits that contribute directly to the revenue sharing account.

The refuge contributes to the local economy by providing valuable recreational opportunities for local residents and attracting tourists and travelers into the area. Public ownership requires little in the way of services from municipalities, yet provides valuable recreational opportunities for local residents. A 2006 national survey of hunting, fishing, and wildlife watching showed that 87.5 million people age 16 and older participated in outdoor recreational activities and spent over \$122 billion per year. Within the State of New York (total population of 19,306,183) 4 million people spent over \$3,570,000 on wildlife-related recreation (USDOJ 2006). These statistics represent a significant contribution to New York's economy and highlight the strong connection New York residents and non-residents have to the land and wildlife.

The refuge is popular for big and small game hunting, waterfowl and turkey hunting, fishing, and wildlife observation. Increasing numbers of birdwatchers, photographers, naturalists, hunters, and anglers are drawn to the refuge each year. Refuge visitors contribute to the local economy through the purchase of goods and services such as gas, food, hunting and fishing related gear, equipment repair services, clothing, and lodging. The refuge budget provides to the local economy through staff salaries and the purchase of goods, supplies, and services from local businesses.

Trapping is a very small factor in the local economic picture and is pursued on a limited basis at the refuge. Trapping is focused on those animals that are causing infrastructure or management problems related to wildlife management activities. Raccoons, muskrats, and beavers are some of the mammals trapped. Trappers are typically local and purchase food, gas, and other supplies to conduct their work. The pelts are usually sold to large fur houses and their profits directly benefit the trappers who in turn spend it in the local economy. Other economic uses on the refuge include haying. In an effort to economically maintain an average of 160 acres per year of grassland as open herbaceous habitat for migratory birds and other animals, the refuge has cooperative haying agreements with local farmers. The farmers pay the refuge a fee to harvest native grasses and forbs from refuge grasslands each year.

Historical Picture

Native People

Native people have lived along the shores of the Great Lakes for over 10,000 years, fishing, raising crops, and using rivers for transportation (USEPA 1998). The Seneca Indians, one of the five tribes of the Haudenosaunee Confederation, meaning "people of the Longhouse," commonly called Iroquois, thrived on the region's bounty of fish and wildlife. The other Confederation Tribes were the Mohawk, Oneida, Onondaga, and Cayuga. Until the early 1700s, the Iroquois lived and traveled from New England to the Mississippi River as far south as Tennessee. By the mid-1700s their main territory was centered on New York State. Centuries after Lake Tonawanda drained leaving behind swamps and pools, the Seneca began to drain the swamp and clear some of the forests for farming and garden plots near their villages (USFWS 2008b, <http://www.fws.gov/northeast/iroquois/>). The Iroquois Nation lost rights to most of their lands during the Revolutionary War. Today, there are two Seneca Reservations in New York and one reservation of the Seneca – Cayuga in Oklahoma (Holland Land Office 2009, <http://www2.pcom.net/cinjod/historian/index.html>).

European Settlement

Europeans did not settle northwestern New York extensively until after the American Revolution in the late 1700s. Rivers and lakes offered transportation routes and the mixed hardwood forest supported a logging industry. To the first European settlers in the early 19th century the remaining clusters of oak trees were reminiscent of an orchard so they named the area "Oak Orchard Swamp." Settlers expanded artificial drainage of the swamp to improve logging and farming operations. Much of the virgin swamp timber was logged. The rich black soils of the swamp enticed settlers to implement many drainage attempts as early as 1828. Plagued by high costs and a cycle of muck fires and floods, the outcome was marginal at best. By the 1930s, residents noticed a sharp decline in the once plentiful wildlife and made plans to protect the dwindling swamp from further development (USFWS 2002).

In 1958, Oak Orchard Refuge was established within the historic Oak Orchard Swamp, locally referred to as "the Alabama Swamp." The refuge was renamed Iroquois Refuge in 1964 to avoid confusion with the neighboring Oak Orchard State WMA.

The Erie Canal

Iroquois Refuge is located seven miles south of the Erie Canal and bears the mark of early canal development. The Erie Canal, first proposed in 1808, was completed in 1825 linking the Hudson River in the east to Lake Erie in the west. The Erie Canal was enlarged between 1836 and 1862 to 70 feet wide and seven feet deep to handle larger boats (up to 240 tons) and more traffic. In 1903, the Erie Canal was enlarged again with the construction of the "Barge Canal", consisting of the Erie Canal and three main branches -- the Champlain, the Oswego, and the Cayuga and Seneca Canals (Sadowski 2008, www.eriecanal.org).

The Feeder Canal

The Feeder Canal was dug during the period from 1823 to 1825 to divert water from Tonawanda Creek to Oak Orchard Creek to supply more water to the Erie Canal. The Feeder Canal was abandoned around 1910 and was later plugged at Tonawanda Creek. Until that time, various changes were made to the Feeder Canal including rebuilding of dams, widening, deepening, and installing higher gates. The Feeder Canal was lower in elevation than the surrounding wetlands and it acted as a drainage ditch dramatically lowering the water level in the "Alabama Swamps" (Carroll 2001). The Feeder Canal, now defunct, runs between two large pools on Iroquois Refuge and is mostly flooded and incorporated into Mohawk Pool (map 3-4).

The 1900s to Present

By the end of the 19th century, less than 20 percent of the original forest remained in the region and today the forest cover still remains low (less than 25 percent) with agriculture dominating the landscape (Dettmers and Rosenberg 2003). Over time the agricultural lands have changed in composition and declined in diversity with a shift toward row crop monoculture and a consolidation of smaller farms into larger monocultures. This led to a loss of grassland, woodland, hedgerow, and other edge habitats across the agricultural landscape (NYSDEC 2005).

Approximately 50 percent of the SWLO Basin pre-colonial wetlands are thought to be gone (USEPA 1998). That loss may be as high as 60 percent to 90 percent in the intensely urban shoreline areas of Lake Ontario. Emergent marsh along the lakeshore declined significantly since the early 1900s. While the amount of open water and forested wetlands increased in the 1980s, the acreage of shrub swamp, and emergent marsh declined during the same period. Perhaps as a result of declining emergent marsh habitat, marsh-nesting birds in the SWLO Basin appear to be declining. Of 34 fish species that occur in the

SWLO Basin and use emergent marsh as a critical habitat, 12 are in decline, three are extirpated from the basin, and 13 are of unknown status (NYSDEC 2005).

The major environmental stressors in the SWLO Basin are related to human land use including changes in agricultural practices and increases in residential, industrial, and commercial development. While the human population in the basin has not increased significantly in the last 50 years, an increasing percentage of the basin is being developed creating “sprawl” and fragmenting once contiguous blocks of habitat. Improved treatment of municipal and industrial waste has resulted in improved water quality in aquatic habitats. However, non-point source pollution including toxic contaminants and sediment, invasive species, altered hydrology, and degradation of riparian areas continue to degrade aquatic systems (NYSDEC 2005).

Since the 1800s, more than 140 exotic aquatic organisms of all types including plants, fish, algae, and mollusks have become established in the Great Lakes (NYSDEC 2005). More than one-third of the organisms were introduced in the past 30 years, coinciding with the opening of the St. Lawrence Seaway. Exotic/invasive species and diseases in the SWLO Basin that pose a significant threat to fish and wildlife species of concern include:

- Exotic zooplankton: spiny waterflea and fish hook waterflea
- Rusty crayfish
- Common carp
- Ruffe
- Sea lamprey
- Alewife
- Round gobies
- Zebra mussels/quagga mussels
- Purple loosestrife
- Common reed
- Eurasian water milfoil
- Curly-leaf pondweed
- Flowering rush
- Mute swan
- Type E botulism

Refuge Cultural and Historical Resources

Cultural resources are archaeological sites, sacred sites, historic structures, and museum property such as art, archaeological artifacts, and scientific collections. As previously discussed, the refuge was Seneca territory until the late 1700’s and early 1800’s when Europeans began settling here. The land was actively farmed for over 100 years before becoming a refuge, but little disturbance has occurred to archaeological sites other than from plowing. There are no significant historic period structures on the refuge. However, its rich history can be explored through the museum collection housed at refuge headquarters which contains more than 2,800 objects. Within the museum, nearly 2,000 objects are classified as archaeology; the remaining objects are categorized between art, history, documents, botany, zoology, paleontology, and environmental samples.

In 1992 the Service contracted with SJS Archaeological Service, Inc. to conduct an overview survey of the entire refuge to determine the archaeological sensitivity of various landforms. This effort included a geomorphologic study and limited archaeological sampling in a variety of locations. The refuge currently contains 101 recorded archaeological sites: 24 pre-Contact Native American sites and 77 historic period

ones. The overview survey identified 20 pre-Contact Native American sites and 21 historic period sites. The remaining pre-Contact and historic period sites were found through a combination of archival research and a number of smaller scale archaeological surveys performed for various habitat restoration projects. Pre-Contact sites recorded on the refuge have generally not had enough research to determine their dates of occupation. The few that can be dated by the style of artifacts discovered or carbon testing of charcoal appear to date from the Late Archaic (3,500 to 5,000 years ago) to just prior to European contact, but earlier sites and 17th and 18th century ones may exist. Pre-Contact stone artifacts are principally of local chert. Chert is a coarse type of siliceous rock (similar to flint or chalcedony) and the primary raw material used for the manufacture of tools including projectile points (spear and arrowheads), drills, knives, and scrapers.

Historic period sites are generally 19th century farmsteads, but one is more unusual: the Alabama Sour Springs Hotel or Spring House, made famous by the “Acid Water.” Eight springs were discovered in the early 1800’s. Three of these springs were acid, one was sulphur, one magnesia, one iron, and one gas (used to light gas burners). The principal spring was called Sour Springs. It was believed by doctors and professors that drinking the acid water was useful for chronic diseases, especially those of the digestive organs, weakness, and debility. Bottles manufactured by Lockport Glassworks in Lockport, New York, were filled with acid water and transported all over the U.S. The hotel was constructed in 1848 by J. C. Colton and Thomas W. Olcott. It included 37 rooms for guests, a large ballroom on the third floor and verandas on three sides. In 1849, approximately 25,000 bottles of acid water were sold for 25 cents each. The hotel closed shortly after the start of the Civil War (1865) and converted into a farmstead home. In 1912 it was struck by lightning and burned to the ground. The Sour Springs site was mapped and excavated in 1974 to 1975 by the Youth Conservation Corps. Nothing remains of the hotel today.

Two sets of rare eastern elk antlers were unexpectedly recovered from the refuge during the construction of wetland subimpoundments in 2004. One set of antlers was attached to a partial skull which had split down the middle; the associated lower mandibles were also recovered. The second pair is smaller and lacks the mandibles. Survey maps from the mid-1800s as well as early refuge planning maps show the area in which the remains were found to have standing water. Locals confirmed that that particular area had never been drained or farmed. Thus, the remains were well preserved in the thick muck-soil layer. Analyses of radiocarbon, sediment, and DNA samples indicate a 95 percent probability that the antlers are between 9,130 and 9,500 years old. No archaeological material was found with them. The refuge is saving DNA and sediment samples for future analysis. The larger set of antlers was sent to the Buffalo Museum of Science for preservation to display at a future date.

Refuge Administration

Step-down Management Plans

Step-down management plans are an important component of refuge management. These detailed plans serve as guiding documents for the daily operation of the refuge. Step-down management plans differ from CCPs in that they provide more detail relative to refuge management subjects (e.g., habitat management, public use, fire, safety) or groups of related subjects. In many cases, step-down management plans will serve as an implementation tool that describes specific strategies and schedules for meeting CCP goals and objectives. In some cases, step-down plans provided the general framework for developing the CCP. The referenced plans in table 1-3 are currently utilized or will be developed in support of the goals and objectives set forth in this document.

General Administration

Many administrative functions support the operation and maintenance of the refuge. These include payroll, accounting, budgeting, procurement, acquisition, contracting, and planning. With the downsizing of both regional office and refuge staff, many duties have shifted from the regional office to the field, and Erie Refuge is now administratively joined with Iroquois Refuge.

Refuge infrastructure includes buildings, water control structures, dikes and roadways; these require regular maintenance and repair. There are also overlooks, trails, signs, parking areas and boundaries that are maintained. Maintenance of some of these facilities has fallen behind due to an inadequate level of staffing and funding.

Work Force and Budget

The ultimate success of the refuge in carrying out its mission depends on staffing patterns (table 3-10) and funding levels.

Table 3-10 Current Staffing at Iroquois Refuge

Position	Status
Refuge Manager	1.0 FTE
Wildlife Refuge Specialist	1.0 FTE
Wildlife Biologist	1.0 FTE
Visitor Services Manager	1.0 FTE
Automotive Mechanic	1.0 FTE
Administrative Support Assistant	1.0 FTE

FTE – Full Time Equivalent

Annual budget appropriations vary from year to year, depending on the Service's overall budget and how the refuge's needs and requests rank regionally and nationally with other refuges. Table 3-11 summarizes budget levels from 2004 to 2010, with an average annual budget of approximately \$800,000.

Table 3-11 Refuge Budgets 2004-2010

Fiscal Year	Salaries/Operations	One-Time Project Funds	Fees	Fire	Total
2004	\$628,775	\$357,580	\$284	\$7,500	\$985,105
2005	\$523,849	\$42,112	\$1,760	\$7,400	\$575,121
2006	\$597,425	\$332,649	\$1,578	\$0	\$931,652
2007	\$673,879	\$82,684	\$839	\$2,847	\$760,249
2008	\$618,660	\$96,388	\$1,026	\$13,069	\$729,134
2009	\$645,384	\$87,804	\$8,126	\$3,401	\$744,715
2010	\$671,199	\$202,684	\$9,675	\$0	\$883,558

Facilities and Maintenance

Iroquois Refuge facilities include the refuge headquarters and adjoining visitor contact station, maintenance shop, hunter check station and three cold storage buildings that include the Williams Barn, Building #17, and a divided shed for storage of flammable liquids and grain. There are also three houses owned and maintained by the refuge; one refuge house is scheduled for demolition. There are above ground, uncovered fuel tanks as well. The maintenance staff is responsible for the upkeep of all these facilities.

The refuge staff and volunteers maintain informational kiosks, gravel parking areas, trails, overlooks, hunting and fishing access points, the Feeder Canal road, and a paved parking area for the visitor contact station. Refuge personnel, with help from volunteers, are responsible for four nature trails; refuge signage including informational, interpretational, and regulatory signs; lawn maintenance at the headquarters and shop; and lawn and garbage maintenance at overlooks and refuge houses. Maintaining gravel parking lots and roads often requires significant time and effort, especially after spring floods.

The staff manages 19 water impoundments as shown in table 3-5. These impoundments are enclosed by 18 different dike systems and 30 water control structures to manipulate and control water levels. Maintaining these impoundments, dikes, and water control structures are handled by the maintenance staff and volunteers.

Volunteers

The refuge is fortunate to have a dedicated group of individuals who voluntarily assist the refuge in various ways. Eighty six volunteers provided over 7,000 hours of volunteer time to refuge activities in 2008 (table 3-12). These volunteers assisted with environmental education programs and outreach events, conducted wildlife and habitat surveys, provided visitor services, banded birds, managed habitats and species, and carried out general maintenance tasks. In addition to helping the refuge achieve its objectives and strategies, this group of volunteers serves as an important link with the community at large, promoting refuge messages and garnering support for the Refuge System.

Table 3-12 Volunteer Hours 2003-2008

	2003	2004	2005	2006	2007	2008
Number of Volunteers	27	30	30	30	30	86
Hours Contributed	3,498	3,035.5	3,381	4,756	4,349.5	7,086

Refuge Public Use

Visitor Services

Providing recreational opportunities and educating and interpreting the unique natural features of the refuge for visitors are important elements of the Service’s mission and the goals and objectives of the refuge. In the Improvement Act of 1997, six wildlife-dependent recreational uses were designated as priority public uses on national wildlife refuges. These are hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation. These six uses, when compatible with the refuge purpose, are the focus of the refuge’s public use activities. All six recreational uses are offered at Iroquois Refuge. In 2006, Region 5 identified hunting and interpretation as two “Areas of Emphasis” for Iroquois Refuge to help direct staff time and budget dollars.

Iroquois Refuge receives a moderate and increasing level of public use with an average of 43,000 visits per year (FY 2008). Visitors are welcomed year-round to the visitor contact station located at refuge headquarters. The visitor contact station provides brochures and fact sheets about the refuge, birds, mammals, trails and overlooks, hunting and fishing. There are wildlife exhibits and a live feeds from the American kestrel and the pond camera. Volunteers and staff are available to answer questions, record reports of unique sightings, and operate the Flyway Nature Store.

Hunting

Hunting is a popular form of wildlife recreation in New York State; over 500,000 State residents and more than 50,000 nonresidents purchase hunting licenses on an annual basis. According to the NYSDEC,

about 85 percent of the State is private property and where most hunting occurs. While most private property is posted against trespass, many landowners will give permission for access. New York also provides abundant opportunities to hunt on public lands such as WMA's, State forests, and refuges. Whether on private or public land, hunting is closely regulated by the NYSDEC and hunters must complete a mandatory hunter education course to obtain a hunting license.

Hunting is permitted on portions of the refuge in accordance with State and Federal seasons and regulations. Special arrangements to accommodate persons with disabilities can be made by contacting the refuge manager. The refuge provides opportunities for hunting big game, upland game, waterfowl, and other migratory game birds. Informational fact sheets about hunting and trapping on Iroquois Refuge are updated to reflect periodic changes to the program.

Hunting programs on the refuge promote understanding and appreciation of natural and cultural resources and their management; hunters have been the primary supporters of the refuge since its creation in 1958. Hunting is also an integral part of a comprehensive wildlife management program. Hunting programs on the refuge are administered in consultation and in cooperation with New York State and with State regulations. The Service has several objectives for refuge hunting programs:

- promote public understanding of, and increase public appreciation for, America's natural resources;
- manage wildlife populations at optimum levels; and
- provide opportunities for quality recreational and educational experiences.

The Service defines a quality hunting experience on a national wildlife refuge as one that

- maximizes safety for hunters, trappers, and other visitors;
- encourages the highest standards of ethical behavior in taking or attempting to take wildlife;
- is available to a broad spectrum of the hunting public;
- contributes positively to, or has no adverse affect on, population management of resident or migratory species;
- reflects positively on the individual refuge, the Refuge System, and the Service;
- provides hunters un-crowded conditions by minimizing conflicts and competition among hunters;
- provides reasonable challenges and opportunities for taking targeted species under the described harvest objective established by the hunting and trapping program;
- minimizes the reliance on motorized vehicles and technology designed to increase the advantage of the hunter over wildlife;
- minimizes habitat impacts;
- creates minimal conflict with other priority wildlife-dependent recreational uses or refuge operations; and
- incorporates a message of stewardship and conservation in hunting opportunities.

Refuge visitors participate in hunting big and small game, waterfowl, and other migratory birds in designated areas. Dogs can be used when hunting small game and migratory birds. While the refuge currently does not hold any special hunts, opportunities are provided to hunters with disabilities. There are "no hunting zones" associated with trails, overlooks, and all buildings and facilities on the refuge.

Waterfowl Hunting

Mallard, wood duck, northern pintail, Canada goose, green-winged teal, and American wigeon are the most common waterfowl harvested on the refuge. Waterfowl hunting is permitted in Mohawk, Oneida, and Cayuga Pools as well as other areas from designated hunt stands. Hunt stands are generally accessed on foot from associated parking areas. Hunters must stay within 100 feet of their assigned hunt stand marker unless actively pursuing a crippled bird. The refuge maintains one accessible hunt stand for use by persons with disabilities. Approximately 35 hunt stands may be available each year although the actual number is occasionally lower due to the water conditions in the waterfowl hunt areas. Waterfowl hunting is permitted on Tuesdays, Thursdays, and Saturdays during the first split of New York State's regular waterfowl season. The season ends when the first split closes or when gun deer season starts (the third Saturday in November), whichever comes first. The refuge holds a youth only hunt day on the first Sunday of the State's waterfowl season. The hunt is limited to 25 youth hunters who must attend an orientation prior to hunting.

Hunt times are legal start (one half hour before sunrise) to 12:00 P.M.(noon). Hunters must check out no later than 1:00 P.M. Permits are issued through a random drawing at 5:00 A.M. at the permit station. Hunters for opening day and the first two Saturdays are selected in a pre-season, random drawing. On all other hunt days any eligible hunter may participate in the drawing. Permit fees are \$10.00 on Saturdays and \$5.00 on Tuesdays and Thursdays. Up to three hunters may share a permit. Holders of a Golden Age Passport or America the Beautiful Senior Pass receive 50 percent off. Waterfowl hunters must possess and use at least 6 decoys and are limited to possessing no more than 20 approved non toxic shells while afield. All persons hunting waterfowl on the refuge must hold a valid Federal Migratory Bird Conservation Stamp, a New York State hunting license, Waterfowl Identification Certificate of Completion, and be registered with the Federal Harvest Information Program (HIP). Waterfowl hunting seasons and bag limits are determined by the NYSDEC within Federal guidelines following a series of task force meetings. Dates are generally set by August. The refuge receives between 300 and 400 waterfowl hunter visits per year with total harvest varying based on the number of stands available (table 3-13). Duck harvest in New York State for the years spanning 1999-2007 was approximately 204,900 birds/year. Goose harvest in New York State for the years spanning 1999-2007 was approximately 117,500 birds/year (table 3-14). Refuge harvest for ducks during the same time span was 768 birds/year. Refuge harvest for geese during the same time span was 33 birds/year (table 3-15).

Table 3-13 Waterfowl Hunters on Iroquois Refuge During Years 2003-2007

Type	2003	2004	2005	2006	2007	Fees	
Waterfowl Hunt	473	467	517	211	322	Tuesday/Thursday	\$5*
						Saturday	\$10*
						*Fee is halved for people with Golden Age/Senior/Access Pass	
Youth Waterfowl Hunt	21	20	22	18	16	No fee	

Table 3-14 Historical Waterfowl Harvest 2003-2007, New York State Totals

Duck Species	2003	2004	2005	2006	2007
Mallard	88,900	85,379	79,593	83,448	92,049
Domestic Mallard	853	870	704	738	714
Black Duck	19,985	15,438	23,714	20,973	22,656
Mallard x Black Duck Hybrid	1,280	2,174	2,426	1,699	1,249
Mottled Duck	0	0	0	0	0
Gadwall	2,062	1,522	2,113	2,215	1,606
Wigeon	3,272	2,609	2,896	6,572	4,817
Green-winged Teal	14,153	10,654	11,583	14,327	17,215
Blue-winged/ Cinnamon Teal	996	1,087	2,035	443	1,160
Northern Shoveler	711	290	1,017	369	892
Northern Pintail	2,631	1,884	2,191	2,954	2,587
Wood Duck	21,265	20,439	21,444	16,468	25,510
Redhead	356	870	1,800	665	3,211
Canvasback	569	580	313	148	446
Greater Scaup	6,330	2,392	2,896	3,766	4,192
Lesser Scaup	4,267	1,957	2,348	3,397	4,014
Ring-necked Duck	4,338	4,856	3,365	4,579	2,943
Goldeneyes	9,743	5,581	8,531	6,277	7,849
Bufflehead	13,442	8,118	9,079	7,606	13,468
Ruddy Duck	71	145	391	74	357
Long-tailed Duck	3,157	6,195	4,638	5,531	10,646
Eiders	585	0	497	357	0
Scoters	3,858	4,905	3,065	3,212	4,154
Hooded Merganser	3,129	2,029	2,974	2,068	2,497
Other Mergansers	5,547	5,726	5,009	3,914	4,371
Other Ducks	0	0	78	0	0
Total Duck Harvest	211,500±11%	185,700 ± 8%	194,700±10%	191,800±10%	228,600±14%
Goose Species	2003	2004	2005	2006	2007
Canada Goose	96,750	109,305	119,980	113,856	138,122
Snow Goose	3,712	4,460	8,821	6,799	10,078
Blue Goose	237	0	0	164	0
Ross's Goose	0	0	0	82	0
White-fronted Goose	0	0	0	0	0
Brant	10,400	5,834	4,700	3,400	4,800
Other Geese	0	0	0	0	0
Total Goose Harvest	111,100±10%	119,600±11%	133,500±10%	124,300±11%	153,000±17%

From Service waterfowl harvest estimates by year

<http://www.fws.gov/migratorybirds/reports/HuntingStatistics/Migratory%20bird%20hunting%20activity%20and%20harvest%20during%20the%202006%20and%202007%20hunting%20seasons%20-%20Preliminary%20Estimates.pdf> (Service 2008c)

Table 3-15 Iroquois Refuge Waterfowl Harvest 2003-2007

Duck Species Composition	2003	2004	2005	2006	2007
Mallard	257	295	326	64	235
Black Duck	26	13	20	3	44
Mallard x Black Duck Hybrid	1	1	0	0	0
Northern Pintail	51	45	61	17	16
American Wigeon	60	51	61	79	17
Green-winged Teal	215	115	304	19	191
Blue-Winged Teal	7	12	4	2	1
Wood Duck	24	22	71	4	132
Northern Shoveler	11	2	6	7	2
Hooded Merganser	2	9	6	2	1
Gadwall	11	4	11	19	3
Bufflehead	1	0	1	2	0
Ringneck Duck	7	2	16	3	1
Scaup sp.	0	0	1	5	0
Canvasback	0	0	0	1	0
Ruddy Duck	1	0	1	0	1
Merganser sp.	3	4	0	0	0
American Coot	0	0	0	1	0
Total Duck Harvest	677	575	889	228	644
Goose Species Composition	2003	2004	2005	2006	2007
Canada Goose	20	62	66	13	6
Total Goose Harvest	20	62	66	13	6

Small Game Hunting

The refuge receives approximately 370 small game hunter visits per year (table 3-16). Refuge small game species may be taken from October 1 through the end of February and include squirrel, fox, opossum, raccoon, weasel, ruffed grouse, and coyote during their respective seasons. Hunting is in accordance with New York State hunting laws. The NYSDEC sets the season dates annually. From 2004 to 2008, all hunters were required to obtain a free daily permit from one of five self-service kiosks before hunting on the refuge. At the end of the hunt day hunters must return the harvest report section of the permit. That changed in 2009 with the implementation of standardized hunting forms for the entire Refuge System. Hunters were then just required to obtain a hunting permit which they were able to maintain for the entire hunting season. All hunters using a shotgun must use approved non-toxic shot. For added safety during New York State's regular firearms deer season and muzzleloader deer season, all hunters must wear a minimum of 400 square inches of solid-colored hunter orange clothing or material in a conspicuous manner on head, chest, and back.

Table 3-16 Permits Issued for Upland Small Game Hunting on Iroquois Refuge During Years 2003-2008

Type	2003	2004	2005	2006	2007	Fees
Small Game	339	408	382	352	287	No Fee; daily permit required

Grouse harvest for hunters participating in New York's statewide Grouse Hunting Log program steadily increased from 597 to 909 between 2004 and 2007. This program records grouse harvest and flush rates from a sample of grouse hunters across the State. In the refuge's ecozone (the Lake Plains) grouse harvest was 13 in 2004, 14 in 2005, 28 in 2006, and 23 in 2007. Compared to the six other State ecozones, the Lake Plains region had the lowest grouse harvest in all 4 years. Refuge grouse harvest between 2003 and 2007 totaled seven birds (table 3-17).

Table 3-17 Grouse Harvest 2004-2007, New York State

Region	Number Grouse Harvested				
	2003	2004	2005	2006	2007
Iroquois Refuge	1	1	3	0	2
Lake Plains Ecozone	No data	13	14	28	23
New York State	No data	597	725	870	909

From NYSDEC Grouse Hunting Log Results: <http://www.dec.ny.gov/animals/45727.html> (NYSDEC 2009a)

Migratory Bird Hunting (Non-Waterfowl)

Migratory bird hunting activity on the refuge is light. The refuge receives approximately 12 migratory bird hunter visits per year. Game birds including woodcock, snipe, and rail may be taken within their respective seasons, and are managed as part of the small game hunt on Iroquois Refuge. Hunting is in accordance with New York State hunting laws. The NYSDEC sets the season dates annually. From 2004 to 2008, all hunters were required to obtain a free daily permit from one of five self-service kiosks before hunting on the refuge. At the end of the hunt day hunters must return the harvest report section of the permit. That changed in 2009 with the implementation of standardized hunting forms for the entire Refuge System. Hunters were then just required to obtain a hunting permit which they were able to maintain for the entire hunting season.

All hunters using a shotgun must use approved non-toxic shot. For added safety during New York State's regular firearms deer season and muzzleloader deer season, all hunters must wear a minimum of 400 square inches of solid-colored hunter orange clothing or material in a conspicuous manner on head, chest, and back. All areas east of Sour Springs Road, except for no hunting zones, are open for woodcock, snipe, and rail hunting. All persons hunting migratory birds on the refuge must hold a valid New York State hunting license and be registered with the Federal Harvest Information Program (HIP).

The Eastern United States average American woodcock harvest for 1999 through 2007 was 87,600 birds. American woodcock harvest in New York State averaged 9,400 birds between 1999 and 2007. Refuge woodcock harvest average for 2002-2008 was 2.9 birds per year.

Rail harvest in New York State was relatively low between 1999 and 2007. The highest harvest year was 2005 with approximately 700 birds taken. In 2000 and 2003, zero birds were taken. Less than 50 birds were harvested in 2001, 2002, and 2004 annually. In 1999, 2006, and 2007, approximately 500 total birds were harvested. Rail harvest on the refuge between 2002 and 2007 was zero.

Big Game Hunting

White-tailed deer and wild turkey are the only big game species legally hunted on the refuge. In the State of New York wild turkey are considered a small game species. The refuge is open to hunting of white-tailed deer during the State's bow, muzzleloader, and gun (regular) seasons. Hunting is in accordance with New York State hunting laws. The NYSDEC sets the season dates annually. From 2004 to 2008, all hunters were required to obtain a free daily permit from one of five self-service kiosks before hunting on the refuge. At the end of the hunt day hunters must return the harvest report section of the permit. That

changed in 2009 with the implementation of standardized hunting forms for the entire Refuge System. Hunters were then just required to obtain a hunting permit which they were able to maintain for the entire hunting season.

For added safety during New York State’s regular firearms deer season and muzzleloader deer season, all hunters must wear a minimum of 400 square inches of solid-colored hunter orange clothing or material in a conspicuous manner on head, chest, and back. Permanent tree stands are prohibited. Temporary, portable tree stands in accordance with State regulations are acceptable and must be removed at the end of the day. Hunters with disabilities may obtain a refuge access pass to park off road in one of two designated parking areas. Once hunters have the pass, use of the parking areas is on a first come, first served basis.

The refuge receives over 3,000 deer hunter visits per year (table 3-18). Total deer harvested from the refuge each year between 2003 and 2007 ranged from 150 to 223 animals annually (table 3-19).

Table 3-18 Permits Issued for Deer Hunting on Iroquois Refuge During Years 2003-2008

Type	2003	2004	2005	2006	2007	Fees
Deer	2,928	2,984	2,983	3,533	4,063	No Fee; daily permit required

Table 3-19 Historic Deer Harvest, State of New York (NY) and Iroquois Refuge

Year	Adult Male		Fawn Male		Adult Female		Fawn Female		Unknown	Total	
	NY	Refuge	NY	Refuge	NY	Refuge	NY	Refuge	Refuge	NY	Refuge
2007	104,451	86	21,096	26	76,367	64	17,227	21	25	219,141	222
2006	96,569	46	18,336	28	60,102	67	14,101	23	6	189,108	150
2005	89,015	47	16,373	31	61,179	78	13,647	18	11	180,214	185
2004	88,733	47	21,022	27	80,196	55	18,455	12	14	208,406	155
2003	107,533	57	26,883	28	94,376	90	24,296	27	21	253,088	223

State data from NYSDEC historic deer harvest (<http://www.dec.ny.gov/outdoor/42246.html>) (NYSDEC 2009b)

Currently, turkey hunting is permitted in the spring only. Hunters must submit an application and a \$5.00 processing fee to be entered into a random drawing for 50 available permits. The permits are good for the entire month of May, except for the first Sunday, which is reserved for the Youth Hunt. The entire refuge, except no hunting zones, is open to turkey hunting. Turkey hunters must turn in a harvest report, whether they hunted or not, by June 7. Failure to do so will deny them the opportunity to enter the drawing the following year. The refuge holds a Youth Hunt Day on the first Sunday in May. The hunt is limited to 25 youth hunters who must attend an orientation prior to hunting (table 3-20). Hunting is in accordance with New York State hunting laws. The NYSDEC sets the bag limits and other regulations annually.

The refuge receives approximately 150 turkey hunter visits per year. Statewide spring turkey harvest numbers between 2003 and 2007 averaged approximately 30,000 turkeys. Orleans County harvested a total of 1,058 turkeys between 2003 and 2007. Genesee County harvested a total of 1,483 turkeys between 2003 and 2007. The refuge’s total turkey harvest for the same time span was 22 birds (table 3-21).

Table 3-20 Permits Issued for Turkey Hunting on Iroquois Refuge, 2003-2007

Type	2003	2004	2005	2006	2007	Fees
Spring Turkey Hunt	50	50	50	50	50	Yearly entry fee: \$5
Youth Turkey Hunt	5	6	11	3	2	No fee

Table 3-21 Spring Turkey Harvest, State of New York and Iroquois Refuge, 2003-2007

Region	2003	2004	2005	2006	2007
Iroquois Refuge	8	4	3	1	6
Genesee County	322	372	226	286	277
Orleans County	266	212	151	198	231
State Total	36,800	26,300	24,910	27,745	35,625

State data from NYSDEC spring turkey harvest (<http://www.dec.ny.gov/outdoor/30420.html>) (NYSDEC 2009c)

Trapping

Upland and marsh trapping are allowed on the refuge in accordance with New York State hunting laws. The NYSDEC sets the trapping seasons and bag limits annually. Each year, the refuge issues up to 50 trapping permits for each type of trapping (table 3-22). Upland trapping permits include raccoon, opossum, weasel, red fox, gray fox, skunk, and coyote. There is no fee for upland trapping permits. Marsh trapping permits include muskrat, beaver, and mink. There is a \$50.00 fee for marsh trapping permits. Trapping permits are issued on a first come first serve basis until trapping seasons start or all of the permits have been issued, whichever comes first. Trappers must comply with all special conditions in the permit regarding trap locations and checking traps. Trappers must turn in a monthly trapping report whether they trapped or not. Failure to do so denies them the privilege of trapping the following year. The number of trappers actively engaged in trapping in a given year is partially dependant on the fur market.

Table 3-22 Permits Issued for Trapping on Iroquois Refuge, 2003-2008

Type	2003-04	2004-05	2005-06	2006-07	2007-08	Fees
Marsh Trapping	13	17	10	13	21	\$50 per year
Upland Trapping	17	18	13	15	17	No fee

The refuge received anywhere from 149 to 366 marsh trapping visits and 41 to 251 upland trapping visits per year between 2003 and 2008. Table 3-23 shows the harvest of animals by year for the refuge.

Table 3-23 Trapping Harvest by Species on Iroquois Refuge, 2003-2008

Species	2003-04	2004-05	2005-06	2006-07	2007-08
Muskrat	837	1,568	1,494	1,908	498
Mink	24	26	30	26	20
Raccoon	38	68	61	34	11
Red Fox	22	17	18	10	8
Gray Fox	0	0	0	1	1
Opossum	85	52	24	26	0
Beaver	2	1	0	0	4
Skunk	15	20	5	2	1
Weasel	0	1	1	0	0
Coyote	4	0	0	0	1
Total	1,027	1,753	1,633	2,007	544

Fishing

New York State has a diversity of fish species and many great fishing opportunities. Over the past 7 years close to one million fishing licenses have been sold annually (NYSDEC 2008c). The only data available for license sales in the vicinity of the refuge are from Orleans County in 1997 and between 1999 and 2001. In 1997, 13,501 licenses were sold and the number of annual sales averaged 12,625 for 1999 to 2001 (NYS Sea Grant 2009).

Fishing is a traditional outdoor pastime deeply rooted in America's natural heritage. Fishing is also a legitimate and appropriate public use on wildlife refuges. Regulations permitting fishing on refuges are, to the extent practicable, consistent with State fish and wildlife laws, regulations, and management plans. Service objectives for fishery programs on refuges are to

- effectively maintain healthy and diverse fish population resources through the use of scientific management techniques;
- promote public understanding of, and increase public appreciation for, America's natural resources and the Service's role in managing the Refuge System;
- provide opportunities for quality recreational and educational experiences; and
- minimize conflicts between anglers and other visitors.

The Service defines a quality fishing experience on a national wildlife refuge as one that

- maximizes safety for anglers and other visitors;
- causes no adverse impact on populations of resident or migratory species, native species, threatened and endangered species, or habitat;
- encourages the highest standards of ethical behavior in regard to catching, attempting to catch, and the releasing of fish;
- is available to a broad spectrum of the public that visits, or potentially would visit, the refuge;
- provides reasonable accommodations for individuals with disabilities to participate in refuge fishing activities;
- reflects positively on the Refuge System;
- provides uncrowded conditions;
- creates minimal conflict with other priority wildlife-dependent recreational uses or refuge operations;
- provides reasonable challenges and harvest opportunities; and
- increases visitor understanding and appreciation for the fisheries resource.

Fishing accounts for a moderate part of the refuge's visitor activity each year (approximately 1,900 visits), especially in the summer and early fall. The refuge strives to enhance fishing opportunities by maintaining appropriate fishing areas and habitat that supports a diverse fish population. The most sought-after fish species include northern pike, bass, bullhead, yellow perch, and crappie. Other species that are caught include pumpkinseed, carp, and bluegill. While no refuge permits are required, fishing at Iroquois Refuge requires a valid State fishing license. The NYSDEC publishes fishing seasons and limits annually.

The refuge provides a fact sheet pertaining to fishing which includes information on open and closed areas and other refuge-specific regulations. Bank fishing is permitted along Oak Orchard Creek where it passes under Route 63, Sour Springs Road, and Knowlesville Road. Anglers may access Oak Orchard Creek by canoe or other un-motorized boats between Knowlesville Road and Route 63. The most popular fishing area is Ringneck Marsh where fishing is permitted year round from the dike on the west side and from Sour Springs Road. Ice fishing is allowed December 1 through the end of February (conditions permitting) on Ringneck Marsh. Fishing areas are also open to frogging by club, hand, spear or hook during State seasons. Firearms are not allowed in the taking of frogs.

Wildlife Observation and Photography

Wildlife observation, including the observation of plants and other natural features, is the single most popular recreational use of the refuge. The refuge is a designated watchable wildlife site with numerous overlooks that include Cayuga, Schoolhouse, Ringneck, and Mallard. In addition to overlooks, Iroquois Refuge has several maintained trails including Kanyoo, Onondaga, Swallow Hollow, and Feeder Road. Refuge staff and volunteers conduct refuge tours and walks for schools and civic groups. The refuge partners with the Buffalo Audubon Society to offer public nature opportunities including bird walks, owl prowls, canoe tours, and woodcock walks.

The refuge receives more than 28,000 visits on the trails and overlooks each year. The majority of refuge visitors come during the spring, early summer and fall months to take advantage of favorable trail conditions and opportunities for viewing annual spring and fall bird migrations and enjoy the brilliance of New York's fall foliage. The refuge receives nearly half its annual visitation during the months of March and April. Refuge trails and roads are used during the winter months when snow conditions are conducive to cross-country skiing or snowshoeing.

The Service defines a quality wildlife observation experience on a national wildlife refuge as one that has the following attributes:

- Observations occur in a primitive setting, using safe facilities and provide an opportunity to view wildlife and its habitat in a natural environment.
- Observation facilities or programs maximize opportunities to view the spectrum of wildlife species and habitats of the refuge.
- Observation opportunities, in conjunction with interpretive and educational opportunities, promote public understanding of and increase public appreciation for America's natural resources and the role of the Refuge System in managing and protecting these resources.
- Viewing opportunities are tied to interpretive and educational messages related to stewardship and key resource issues.
- Facilities blend with the natural setting, station architectural style, and provide viewing opportunities for all visitors, including persons with disabilities.
- Design of observation facilities minimize disturbance to wildlife while facilitating the visitor's views of the spectrum of species found on the refuge.
- Observers understand and follow procedures that encourage the highest standards of ethical behavior.
- Viewing opportunities exist for a broad spectrum of the public.
- Observers have minimal conflict with other priority wildlife-dependent recreational uses or refuge operations.

Environmental Education, Interpretation, and Outreach

Environmental education, interpretation, and outreach are important tools that refuge staff uses to inform and remind the public about refuge issues and opportunities, such as bird migrations, seasonal habitat changes, and special events. The refuge provides slide shows, leads interpretive tours and hikes, creates educational exhibits, conducts activities and contests that offer hands-on learning opportunities, provides demonstrations and workshops, writes educational articles, and gives informational interviews. There are 6 interpretive kiosks and 16 panel/signs on the refuge to enhance visitor education and enjoyment. Over 2,700 people are reached through the refuge's environmental education and interpretation efforts annually. This includes both on and off-site, activities and does not count media or Web site hits.

Refuge education, interpretation, and outreach programs focus on assisting youth and adults with becoming more environmentally literate and action oriented. Five primary functions provide the framework for these goals: creating environmental awareness, knowledge, values, skills, and action. Environmental education is provided primarily to elementary and middle school students to augment classroom study. Through a partnership with Canisius College and the Canisius Ambassadors for Conservation, the refuge accommodated over 2,000 students in 2009. Additional students were taught offsite at school conservation field days, in classroom programs and at Earth Day celebrations.

Interpretation is a more informal method of teaching directed at casual audiences, such as individuals or families, who take part in programs on their own initiative rather than as part of a structured program. Interpretative programs often focus on awareness and knowledge in a fun and thought-provoking manner. Refuge outreach consists of communication with the public using a variety of methods. Refuge outreach goals aim to build a stronger base of public understanding, appreciation, and support of the refuge, Refuge System, and Service trust resources beyond that portion of the American public that visits the refuge. The refuge Web site (www.fws.gov/northeast/iroquois) provides access to refuge information including visitor opportunities, special events, nature programs, wildlife, and management.

Refuge staff recognizes the critical link between public awareness of environmental issues and effective stewardship of the refuge, the Refuge System, and Service trust resources. Currently, refuge education, interpretation, and outreach programs focus on the following five audiences:

- Congress
- Conservation Organizations
- Communities surrounding the refuge, with a focus on school-age children and their educators, landowners, and local residents
- Communications media
- Corporations

The "100 by 100" campaign was developed to increase public awareness of the Refuge System by its 100th birthday which occurred on March 14, 2003.

Environmental education, interpretation, and outreach activities and tools the refuge utilizes include

- the annual Spring Into Nature celebration;
- slide shows;
- guided hikes highlighting major refuge themes and wildlife;
- National Fishing and Boating Day events;

- Earth Day activities;
- print and broadcast media, including the refuge’s web page;
- volunteer programs, including the Refuge Friend’s group;
- publications; and
- over 20 interpretative kiosks and signs.

Education, interpretation and outreach efforts at Iroquois Refuge focus on three general themes and their priority messages:

1. Iroquois Refuge
 - The refuge is a “good neighbor.”
 - The refuge is an enduring asset to the community.
 - The refuge is a Federal land base managed by the Service.
2. The Refuge System
 - Refuges are part of a national system comprising the world’s largest collection of land and water managed specifically for wildlife.
 - Refuges are national treasures.
 - Refuges are places where wildlife comes first.
3. Service Trust Resources
 - The refuge emphasizes management of threatened and endangered species.
 - The refuge is committed to providing resting, nesting, and feeding habitat for waterfowl, other migratory birds, and bird species of concern).
 - The refuge employs an ecosystem management approach with a focus on restoration and management of diverse wetlands, shrublands, grasslands, and biological diversity.

Finding of Appropriateness of a Refuge Use

The six wildlife-dependent recreational uses discussed above (hunting, fishing, wildlife observation, photography, environmental education, interpretation) and the harvesting of fish and wildlife under State regulations have been administratively determined to be appropriate public uses of refuges, including Iroquois Refuge. All other existing and proposed uses must be evaluated by the refuge manager. The refuge manager must file a “Finding of Appropriateness of a Refuge Use” for each existing use that does not fall under the categories listed above, and each time a new use is proposed. When refuge managers find a use is appropriate, the use then must be determined to be compatible before it is allowed on the refuge. If it is determined that an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If it is determined that a new use is not appropriate, the refuge manager will deny the use and a compatibility determination will not be required. The Appropriate Refuge Use Policy clarifies and expands on the Compatibility Policy, which describes when refuge managers should deny a proposed use without determining compatibility. Table 3-24 shows Appropriate Determinations conducted for Iroquois Refuge. Appendix B provides additional information about the Appropriate Refuge Uses Policy.

Table 3-24 Appropriateness Determinations

Appropriateness Determination	Appropriate	Not Appropriate
Haying	X	
Jogging and Bicycling	X	
Walking and Hiking	X	
Cross-country Skiing and Snowshoeing	X	
Furbearer Management	X	
Berry, Fruit and Nut Collecting		X
Commercial Forest Management	X	

Compatibility Determinations

Refuge managers must decide and determine if each public use is compatible with the purpose for which the refuge was established by writing a Compatibility Determination. Public uses on national wildlife refuges fall into two categories: priority uses and secondary uses. Priority uses, as defined by Congress, include hunting, fishing, wildlife observation, photography, environmental education and interpretation. All other public uses on the refuge are considered secondary uses. A list of Compatibility Determinations for the refuge is shown in table 3-25 and the entire written compatibility determination provided in appendix B. Priority uses are reviewed every 15 years and secondary uses are reviewed every 10 years.

Table 3-25 List of Activities Determined Compatible on the Refuge

Compatibility Determination	Priority Uses	Secondary Uses
Hunting	X	
Fishing	X	
Wildlife Observation	X	
Wildlife Photography	X	
Interpretation	X	
Environmental Education	X	
Furbearer Management		X
Walking and Hiking		X
Cross Country Skiing/Snowshoeing		X
Jogging and Bicycling		X
Commercial Forest Management		X

Activities not allowed on the refuge

There are several activities that are not compatible with the purpose of the refuge and therefore are not allowed on refuge lands. These include snowmobiling, all-terrain vehicle (ATV) use, biking on trails (biking is allowed on Feeder Road), walking dogs off a leash, picking plants, camping, horseback riding, and campfires, just to list a few.