2.4 ECOLOGY

2.4.1 TERRESTRIAL ECOLOGY

The terrestrial ecology of the the Nine Mile Point Unit 3 Nuclear Power Plant (NMP3NPP) construction area was characterized in a series of field studies conducted over a one-and-a-half year period extending from December 2006 to July 2008. Additionally, previous site studies conducted in the late 1970s were consulted. The field studies include a flora survey, a faunal survey, and a wetlands delineation. The subsections below summarize relevant information from each of these studies and provide other data on existing terrestrial ecology in accordance with the guidance in NUREG-1555 (NRC, 1999a).

A topographic map of the site is provided as Figure 2.3-1.

2.4.1.1 Terrestrial Habitats

The flora survey covers each plant community type (terrestrial habitat type) observed on the NMP3NPP site in 2006 - 2008. A map of the plant community types is presented in Figure 2.4-1, and each plant community type is briefly discussed below.

The NMP3NPP site lies in a transitional area between boreal forest to the north and northeastern hardwood forest to the south, but the proximity of Lake Ontario appreciably moderates the climate, and has a significant effect on the floral and faunal associations of the region. The climax community of the coastal zone is a deciduous forest with an extensive herbaceous ground cover. Two basic ecosystems are present in the coastal zone: wetlands and upland areas. The wetlands generally result from disruption of drainage caused by the drumlin topography of the region, and generally consist of shallow ponds, shrub swamps, wood swamps, and intermittently wet bottomland-like forests. Much of the original mature forest land of region was cleared in the past for farming, but a great deal has since been abandoned. As such, the uplands are mostly second-growth communities in a variety of successional stages.

The flora survey characterized the plant community types (terrestrial habitat type) on the NMP3NPP site. Surveys associated with the wetland delineations were conducted in 2006 and 2007, and additionally surveys assessing general terrestrial ecology and potential for the presence of threatened or endangered species were conducted in 2008. Table 2.4-1 provides a list of the areas in the NMP3NPP terrestrial study area related to each vegetation cover type. A map of the plant community types is presented in Figure 2.4-1, and each plant community type is briefly discussed below.

Lawns and Developed Areas (Yellow Hatching in Figure 2.4-1) - Lawns and developed areas are present in the northern most part of the site, surrounding the existing Training Center and Nuclear Learning Center. Plantings around these buildings appear to consist primarily of local, native species. Additional areas that are mowed regularly throughout the growing season are present along the access road leading to these two buildings, on the south side of the meteorological tower, and the ball field area to the north of the existing guard house. These lawn-like areas consist of typical cool season grass species including tall fescue and blue grass and common broadleaf weeds, including white clover, bradleaf plantain, and dandelion.

Infrequent Mowed Areas (Purple Hatching in Figure 2.4-1)- The area around the meteorological tower and the adjacent ball field area appear to be mowed on an irregular basis during the growing season. This mowing regime allows more ground cover structure to develop than is found in the lawn areas, but prevents these areas from succeeding into a true old-field community. Common species in this area include orchard grass and wild carrot.

Old Field (Dark Blue Hatching in Figure 2.4-1)- There are two areas with an old field cover type. The old lay down area south of Lake Road does not appear to be maintained. However, because much of it is highly disturbed, including areas of graveled roadway and similarly barren surfaces, it has remained in a largely herbaceous cover type instead of succeeding to a woody cover type. There is a sizeable area of seed-rich, old-field successional vegetation comprised chiefly of wild carrot, small white aster, canada goldenrod, cypress spurge, spotted knapweed, and hawkweeds.

The on-site portion of the existing transmission line corridor that runs due south of NMP Unit 2 to Miner Road is maintained to prevent tall woody growth from encroaching upon the lines and towers. The undulating topography along the corridor creates a variety of moisture levels, and thereby contributes to the diversity of plant species found along the right-of-way (ROW). Vegetation in the transmission line corridor is dominated by grasses, including orchard grass, and a number of non-native forbs, such as birdsfoot trefoil, vetches, mugwort, wild carrot, sheep sorrel, cypress spurge, and clovers. Other abundant species in the ground cover include blackberry, grape, field horsetail, and goldenrods and asters. Shrubs occur in scattered patches and dominate the vegetation in lower moister areas. Shrub species observed include silky dogwood, arrowwood, common juniper, autumn olive, staghorn sumac, bush honeysuckle, blackberry, choke cherry, and willow. Shrubs and saplings of quaking aspen and cottonwood also occur in a few patches along the corridor.

Successional Hardwood Forest (Orange Hatching in Figure 2.4-1)- Forested uplands and relatively dry fringes of wetlands in the northern and central portions of the NMP3NPP site contain a vegetative community that has been modified from its pre-existing state due to the former agricultural use of the land. These areas are characterized by an overstory that includes trees and saplings of the commercial orchard species apple and sweet cherry. Other tree species, typical of successional northern hardwoods occur in the overstory, including sugar maple, ash, aspen, red oak, red maple, black cherry, and paper birch. Dominant species in the tree canopy include sugar maple, ash, and red oak. The thorny shrub hawthorn, which is typically found in areas of former pasture, is abundant in the sapling and shrub layers. Other species occurring in the shrub layer include common buckhorn, chock cherry, and dogwood. Vines of grapes and poison ivy are common in these areas, and poison ivy and woody seedlings tend to dominate the herbaceous layer. The trees within this cover type were observed to have an average diameter at the breast height (dbh) of approximately 10 in (25.4 cm) or less and a maximum dbh height of 31 in (78.7 cm). The largest trees were observed along the edge of a wetland area south of Lake Road.

Beech Maple Mesic Forest (Red Hatching in Figure 2.4-1)- Forested uplands in the northwestern and southern portions of the site are characterized by northern hardwood forest, with a vegetative community dominated by sugar maple, with varying amounts of American beech and eastern hop hornbeam in the tree and sapling layers. Other overstory species include red oak, white and green ash, and black cherry. The shrub layer is relatively sparse and includes sugar maple and American beech. The herbaceous layer is sparse and patchy and is generally dominated by poison ivy and by seedlings of sugar maple and other woody species.

North of Lake Road, this forest type contains mostly young trees, with an average dbh of approximately 7 in (17.8 cm) and a maximum dbh of 20 in (50.8 cm). Although this area appears to have been cleared recently, it does not show signs of past agricultural use. The portion of this forest type located south of Lake Road contains larger trees, with an average dbh of 12 in (30.5 cm) and a maximum dbh of 22 in (55.9 cm).

Beech Maple Rich Mesic Forest (Green Hatching in Figure 2.4-1)- a variation of the forest type described above was observed in the southeastern portion of the NMP3NPP site, south of the shooting range. At this location the understory was observed to contain the following herbaceous species, which are generally indicative of rich woods: blue cohosh, trillium, northern lady fern, and baneberry. This forested area was observed to contain trees with an average dbh of 12 in (30.5 cm). Some large mature trees were observed within this area, including a red oak with a dbh of approximately 38 in (96.5 cm).

Forested Wetlands (Purple on Figure 2.4-1)- Wetlands are common throughout the site, and the most common type of wetlands are forested wetlands. Most wetland areas appear to have been cleared at the same time the upland areas were cleared for agricultural use, and the forest growth in the wet areas appears to be roughly the same age class as the regenerating upland areas. Throughout the NMP3NPP site, the forested wetlands are dominated by green ash, with lesser amounts of red maple and hawthorn also present in the overstory. The shrub layer includes highbush blueberry, sweet pepperbush, winterberry, and dogwoods. Species observed in the herbaceous layer include cinnamon fern, skunk cabbage, jewelweed sphagnum moss, and goldthread. Included within the area of forested wetlands is a vernal pool.

Shrub scrub wetlands (Yellow on Figure 2.4-1)- Shrub scrub wetlands are the second most common type of wetlands on the NMP3NPP site, and occur in the existing transmission line corridor, where vegetation management maintains the habitat in an early successional stage. Common species present in these wetlands include alder, dogwoods, highbush blueberry, sweet pepperbush, spicebush, arrowwood, green ash, winterberry, willows, common elder, buttonbush, and meadowsweet. The herbaceous layer typically contains sensitive fern, cinnamon fern, sphagnum moss, sedges, rushes, and grasses.

Forested/Shrub-Scrub Wetlands (Light Brown on Figure 2.4-1)- There are two wetlands on the NMP3NPP site located on the eastern side of the site, south of Lake Road, and combine the characteristics of the forested and shrub-scrub wetlands.

Emergent Wetlands (Light Green on Figure 2.4-1)- Emergent wetlands are present on the NMP3NPP site and are predominately located within the corridor of the existing transmission line. The emergent vegetation present in these wetland areas is mostly dominated by persistent herbaceous species, including common reed and cattails. Other herbaceous species occurring in these areas include sedges, rushes, grasses, blue flag iris, pickerelweed, arrow arum, smart weed, arrowhead, and arrowleaf tearthumb.

Open Water Wetlands (Light Blue on Figure 2.4-1) - A single area of open water wetland is present on the NMP3NPP site, located south of the old lay-down area south of Lake Road. This open water supports fish and lined by a narrow fringe of cattails in some places.

Open Water/Emergent Wetlands (Blue-Green on Figure 2.4-1)- There is one small isolated area of open water/emergent wetland located on the southeastern edge of the old ball field north of Lake Road and is likely man-made. It is predominately open water but also contains some emergent vegetation, including pickerelweed.

Most lands on the NMP3NPP site support the above described habitats, with the exception of the developed areas (Light-Blue Hatching on Figure 2.4-1) and the shoreline. Both paved and dirt roads are present on the NMP3NPP site, with natural vegetation extending nearly to the road's edge in most cases. The Lake Ontario shoreline is a narrow margin of cobbles of various sizes and upland vegetation types are within 10 ft (3 m) of the water's edge in most places.

2.4.1.2 Important Terrestrial Species and Habitats

NUREG-1555 (NRC, 1999a) defines important species as: 1) species listed or proposed for listing as threatened, endangered, candidate, or of concern in 50 CFR 17.11 and 50 CFR 17.12 (CFR, 2007a), by the U.S. Fish and Wildlife Service, or the state in which the project is located; 2) commercially or recreationally valuable species; 3) species essential to the maintenance and survival of rare or commercially or recreationally valuable species; 4) species critical to the structure and function of local terrestrial ecosystems; or 5) species that could serve as biological indicators of effects on local terrestrial ecosystems. Floral and faunal surveys that document observations made on the NMP3NPP site from December 2006 to July 2008 are summarized herein.

Table 2.4-2 lists each species and habitat identified as important for the NMP3NPP site and surrounding area according to the criteria in NUREG-1555 (NRC, 1999a). Each species deemed an important species is discussed in more detail below.

The need for specific surveys for species meeting the first criteria under NUREG-1555 was based on an analysis of that species' likelihood to be present on the NMP3NPP site, which is summarized in Table 2.4-3.

Table 2.4-3 lists all special-status species known to occur in Oswego County, as well as those species deemed to be of concern in other NRC-sponsored permit applications for projects in and around the NMP3NPP vicinity. Sources considered to develop the list of special status species known to occur in Oswego County consisted of the 1985 New York Breeding Bird Atlas the 2005 New York Breeding Bird Atlas the New York Herpetological Atlas Project, the Nine Mile Point Unit 2 ER-OLS, the NYSDEC's Natural Heritage Program data base, and the USFWS New York Field Office website. Sources considered to develop the list of species deemed to be of concern in and around the NMP3NPP vicinity in other NRC-sponsored permit applications consisted of the Applicant's Environmental Report - Operating License Renewal Stage, Nine Mile Point Nuclear Station, Nine Mile Point Unit 2 ER-OLS, and the James A. Fitzpatrick Nuclear Power Plant License Renewal.

2.4.1.2.1 Mammals

Two mammal species present on the NMP3NPP site meet the NUREG-1555 [NRC, 1999] criteria as an important species, including white-tail deer (Odocoileus virginianus) and the beaver (Castor canadensis).

2.4.1.2.1.1 White-tailed Deer

White-tail deer are present throughout the NMP3NPP site and meet the criteria of an important species as defined by NUREG-1555 (NRC, 1999) as a recreationally valuable species that is commonly hunted in New York State. Over 3000 deer were harvested in Oswego County in 2006 (NYSDEC, 2007c).

Population Abundance and Distribution

White-tail deer were observed in all upland habitats on the NMP3NPP site during the 2008 faunal surveys. Deer were observed in groups of two to six individuals, and deer sign, including tracks and heavily browsed shrubs, were common throughout the site. The NYDEC estimated that in 2006, there were 3.3 deer/square mile (8.6 deer/km square) in Wildlife Management Unit 7A, which includes the Town of Scriba (NYSDEC, 2007d).

Habitat Requirements

White-tail deer are large herbivorous mammals that favor fragmented brushy woods interspersed with abandoned fields and thickets. They are highly adaptable to any setting where there is sufficient browse, including suburban settings.

Life History

Rutting season extends from late September through February, with a peak in November. Gestation takes between 200 and 210 days. Does reproduce only once a year, in May or June, and usually produce one fawn the first year, but may produce twins or even triplets in the following years, if food is plentiful. Fawns remain in hiding for their first weeks of life, then follow their mothers as they forage. Fawns are weaned between the ages of four and eight months, but begin to graze before this time. They lose their white spots in the fall. Males reach puberty at around 18 months, and begin growing their first set of antlers in the spring following their birth. Deer are more social in winter and in areas where snow depths can be restrictive, such as western New York State, they congregate in areas that provide shelter, usually coniferous forest stands with a southern exposure. Deer tend to disperse and become more solitary in spring.

Population Dynamics

Natural predators in New York historically included large carnivores such as wolves and mountain lions, neither of which is currently present. Currently, regulated hunting is the primary source of mortality for deer in New York. Lack of natural predators, a decrease in the number of hunters, and land use changes that create abundant browse (abandonment of farmland; forest fragmentation due to development) have resulted in high white-tail deer populations throughout much of the northeast, including western New York State. Because none of these conditions is likely to change in the near future, white-tail deer populations are expected to remain high in the region.

2.4.1.2.1.2 Beaver

Beaver sign is present throughout the wetland areas of the NMP3NPP site, and this species meets the criteria of important as defined by NUREG-1555 as a species that shapes the structure and function of the ecosystem.

Population Abundance and Distribution

Beaver are common and widespread throughout North America, including the Northeast. No beaver or active beaver dams were directly observed on-site during any of the field studies. However, beaver-cut trees and beaver-browsed twigs were observed in and around wetlands both north and south of Lake Road.

Habitat Requirements

Beavers modify existing water bodies surrounded by woody vegetation to meet their habitat needs. Once established, beaver ponds are shifting mosaic of habitats, with a mix of open water and vegetated habitats dependent on pond age and available substrate and nutrients. Beavers eat the leaves, bark, and twigs of nearly all types of woody vegetation from fall to spring, with a preference for aspen where available. In the summer months, a variety of non-woody plants are eaten, including aquatic succulents, algae, fleshy rootstocks, and herbaceous upland species. Because beavers live in groups and will eat many plants in their entirety, this species has the ability to decimate its food sources in a relatively short time, and food shortage is generally the primary factor affecting colony longevity.

Life History

Mating is monogamous and breeding occurs January-March. Gestation is thought to be 105-107 days. Litter size ranges from one to nine, with three or four being typical, and there is one litter per year. In most cases, the young disperse from their family group in late winter or early spring, at an age of almost two years. Survival of the young can be up to 95 percent in untrapped populations. Females normally first give birth on or near their third birthday, and may remain productive for up to at least ten years, though only a few live that long. Males generally first breed at an age of about 21 months. The primary source of mortatliy for beavers are human induced, including trapping and roadkill.

Population Dynamics

Most unexploited populations have a low mortality rate (5 to 7 percent) and can grow quickly in areas with abundant resources. However, beavers will abandon an area when they have depleted all the food resources within a reasonable distance of their pond. Re-colonization of a area will occur when the woody vegetation has regenerated sufficiently to again provide adequate food resources.

2.4.1.2.2 Birds

Four avian species known to be present at the NMP3NPP site meets the definition of important, according to NUREG-1555 (NRC, 1999) They are Pied-billed Grebe (Podilymbus podiceps), Osprey (Pandion haliaetus), Golden-winged Warbler (Verminvora chrysoptera), and Grasshopper Sparrow (Ammodramus savannerum). Each of these species was observed in a single, localized area, as depicted in Figure 2.4-1.

2.4.1.2.2.1 Pied-billed Grebe

The Pied-billed Grebe is a state threatened species, and a single individual was observed in the open water wetlands east of the transmission line ROW, on the southern part of the NMP3NPP site.

Population Abundance and Distribution

During the breeding season this species is found throughout New York State in low numbers, with concentrations on the Lake Ontario Plain and in the St. Lawrence Valley. It is a documented breeder in the Oswego area, and although this species generally migrates south during the winter, it is also documented to spend the winter on open water portions of the Oswego River. This species is found throughout North America, but is not abundant any where and is even less common in the Northeast.

Habitat Requirements

Pied-billed Grebes inhabit quiet marshes, marshy shorelines of ponds, shallow lakes, or marshy bays and slow moving streams with sedgy banks or adjacent marshes. Breeding marshes typically have a 50/50 combination of emergent vegetation and open water, as grebes avoid dense emergent vegetation. As long as the structural requirements are met, the type of vegetation in the marsh is unimportant. Preferred water depths for nesting range from 10 to 20 inches (25 to 50 cm). Grebes set up breeding territories most commonly in wetlands impounded by beavers or humans, and individual pairs appear to favor wetlands of between 1.5 -17.0 acres (0.6 - 7.0 ha) over very large or small wetlands.

Life History

In the Northeast, Pied-billed Grebes usually arrive from their wintering grounds in the southern U.S. to their nesting grounds by early March, shortly after ice out. Courtship commences in early

April with nesting activity initiated by mid-April. Nesting Pied-billed Grebes are highly territorial, limiting the number of pairs that can nest in a given wetland. This species may be single or doubled brooded and lays from two to ten eggs/brood, usually six to eight. The young are precocial, making their first successful catches of food (fish, insects) at 10-12 days post-hatching and they are capable of flight only 35 days after hatching. The diet of this species is dominated by crayfish, insects, and small fish.

Population Dynamics

The population dynamics of this species is not well understood, but chick mortality appears to be high, and adults are also preyed upon by a variety of predators. Pied-billed Grebes must be at least one year of age before they begin to breed. Currently, this species' population is reported to be steady or increasing throughout North America, although the increases are not statistically significant.

2.4.1.2.2.2 Osprey

Osprey are listed as a state species of special concern, and a pair is currently nesting on one of the transmission line towers located within corridor for the proposed new access road. 2008 is the second consecutive year that a pair of ospreys has been present at this nest.

Population Abundance and Distribution

Ospreys breed throughout the state of New York, reaching their highest densities on Long Island, in the Finger Lakes Region, and in the Adirondack Mountains. Historically, ospreys were common through out the Northeast wherever habitat was suitable, but populations declined through the 1950s and 1960s due to DDT-induced eggshell thinning, which severely reduced their reproductive success. Since the ban of DDT in New York in 1971, and in the rest of the country in 1972, the population has made a comeback. Listed "Endangered" by the State in 1976, osprey was up-graded to "Threatened" in 1983, and then moved from "Threatened" to "Special Concern" in 1999.

Habitat Requirements

Ospreys prey exclusively upon fish. Therefore, this species generally makes its home along shorelines, including the ocean, lakes, rivers, and large wetlands. Osprey will build nests on any substantial structure that has good visibility and access to hunting habitat, including dead trees, rock outcrops, buildings, buoys, electric towers, pier pilings, and man-made platforms. Osprey nests are a bulky mass of sticks, and may be reused and added to year after year, resulting in a structure that can be up to five feet (1.5 m) in diameter and two to seven feet (0.6 to 2.1 m) thick. Ospreys are notoriously opportunistic in their choice of nesting structure, and unless directly harassed, are generally tolerant of human activity.

Life History

The North American breeding population of Osprey winters from southern Central America, to as far south as the equator. In the fall of their first year, young Ospreys migrate to wintering areas and remain there until they are two years old, at which time they return to natal areas. Breeding pairs generally return to previous nest sites unless the nest was destroyed between breeding seasons. In the Northeast, breeding pairs arrive back at their nest sites in April and eggs are laid between 10 to 30 days after arrival. Clutch size is usually about 3 eggs. Males and females share incubation duties but the female does the majority while the male mainly provides food during this stage of the breeding cycle. Eggs hatch in 35 to 43 days. Young fledge at around 50 to 55 days. Family units may remain together for an additional 10 to 20 days prior to migration. Unlike other raptor species, ospreys are not highly territorial and can

be quite tolerant of one another. In locations with adequate food and nesting structures, osprey populations can be relatively dense and they may nest in loose colonies.

Population Dynamics

Osprey populations throughout North America, including New York, appear to be steady or increasing. On average, just over 50 percent of Ospreys die in their first year of life. About 10 to 15 percent of adults die each year, giving an average adult life expectancy of six to ten years, and therefore a pair of Ospreys must produce, on average, 0.8 young each year, for a population to remain stable. Current reproductive rates in the northeast appear to be above this break-even number.

2.4.1.2.2.3 Golden-winged Warbler

The Golden-winged Warbler is a state species of special concern, and a male was detected singed on five different occasions over three days in the same location on-site. These repeated detections suggest a breeding territory.

Population Abundance and Distribution

Golden-winged Warblers nest throughout the upper mid-west, western New York, Western New England, and Appalachians. This species is declining in the northeastern U.S., while increasing in the northern and northwestern portions of its range where farmland abandonment and clear cutting is common. The western New York population currently appears to be declining.

Habitat Requirements

Golden-winged Warblers occupy a wide variety of early successional or disturbed habitats including abandoned farmland, shrubby fields, successional forest, pine barrens, conifer plantings, abandoned strip mines, clear cuts, utility right of ways, alder swamps, tamarack bogs, and beaver wetlands. The common features of these habitats are patches of dense herbaceous growth and shrubs, as well as scattered trees within the territory and, often, a forested perimeter. Nests are often located along the shaded edge of a field, usually on the ground at the base of a cluster of leafy plant material such as a tussock of grass or sedge.

Life History

The Golden-winged Warbler is a neotropical migrant, wintering from central Guatemala and northern Honduras southward to northern and western Venezuela and western Columbia. This species arrives on the breeding grounds in early May and depart for the wintering grounds in mid-September. It builds an open-cup nest on or just above ground level where it lays 3-6 eggs. Incubation lasts 10-11 days and nestlings typically fledge in about 10 days. The Golden-winged Warbler's diet consists primarily of insects, especially moths and their pupae, winged insects, caterpillars, and spiders.

Population Dynamics

The Golden-winged Warbler is declining in the northeastern U.S., while increasing in the northern and northwestern portions of its range where farmland abandonment and clear cutting is common. The decline may be due, in part, to a loss of shrubland habitat. In addition, this decline correlates with the range expansion of the Blue-winged Warbler into the range of the Golden-winged Warbler. The northward expansion and resultant zone of overlap has led not only to increased competition, but also to widespread interbreeding between the Golden-winged and Blue-winged warblers. Because of this wide-spread hybridization, populations of pure Golden-winged Warblers may soon disappear after the arrival of the Blue-wings.

2.4.1.2.2.4 Grasshopper Sparrow

The Grasshopper Sparrow is a state species of special concern, and a male was detected singing on two different occasions over three days in the same location on-site.

Population Abundance and Distribution

Like other North American grassland birds, the Grasshopper Sparrow has been undergoing a steady population decline since the mid-1960s throughout the U.S., and has become rare in the Northeast. In New York, this species is uncommon, and occurs mostly in the western part of the state where suitable habitats are more likely to be present.

Habitat Requirements

Grasshopper Sparrows nest in dry, upland grasslands where the cover is composed of short native bunch grasses with minimal litter cover, patches of bare ground, scattered forbs, and short shrubs. Fence posts and shrubs are used as song perches. Bare ground is important as both adult birds and young tend to run instead of fly to escape predators and search for food. Although individual territories are smaller, Grasshopper Sparrows generally require breeding sites of at least 30 acres (12 ha) of suitable habitat and prefer sites greater than 100 acres (40.5 ha) in size.

Life History

The Grasshopper Sparrow is a neotropical migrant, wintering from Florida to central America. This species arrives on the breeding grounds in mid-April and depart for the wintering grounds in mid-September. It builds an open-cup nest where it lays 3-6 eggs. Incubation lasts 11-12 days and nestlings typically fledge in about nine days. In the northern part of its range it is probably singled-brooded. However, it will frequently re-nest after nest failure, and if unsuccessful in previous attempts, may re-nest 3-4 times during the breeding season. The Grasshopper Sparrow's diet consists primarily of insects, and to a lesser degree, seeds.

Population Dynamics

The population dynamics of this species is not well understood. Current declines of the species are due in part to habitat loss, but may also be linked to other causes.

2.4.1.2.3 Reptiles and Amphibians

Two species of amphibian, the northern leopard frog (Rana pipiens) and the pickerel frog (R. palustris) meet the important species criteria under NUREG 1555 (NRC, 1999) and are potentially present on-site. Although these two congeners clearly represent separate species, they have similar biologies and will be considered simultaneously in the following discussion.

2.4.1.2.3.1 Northern Leopard Frog and Pickerel Frog

Because of their sensitivity to pollutants and other sources of environmental change, frogs are widely accepted as indicators of ecosystem health.

Population Abundance and Distribution

Both the northern leopard frog and the pickerel frog are currently common on and around the NMP3NPP site. High rates of calling were observed during the spring 2008 surveys of the terrestrial environment in all on-site wetlands suitable for breeding.

Habitat Requirements

Both of these species use just about any water body with good water quality and vegetated edges that provide cover, including ditches, quiet streams, and ponds. In summer they are commonly found in wet meadows, fields, and forest edges, and may wander up to two miles from water. They breed in a variety of permanent wetlands, including marshes, bogs, and ponds. Northern leopard and pickerel frogs overwinter in the mud at the bottom of permanent water bodies.

Life History

Northern leopard and pickerel frogs emerge from hibernation in late March and early April, and begin the breeding season immediately. Eggs are laid from March through May, and take from two to three weeks to hatch into tadpoles, which then transform into frogs from July through September. It may take up to three years for these frogs to reach sexual maturity. While tadpoles eat algae and vegetarian detritus, the diet of adult frogs is comprised mostly of terrestrial insects, but may also include snails, small crayfish, and aquatic insects.

Population Dynamics

Pickerel frogs are wide spread and common throughout their range in northeastern North America, and as long as their habitats remain stable, their populations appear to remain stable as well. Historically, the northern leopard frog has had a similar distribution; however, this species is currently undergoing a decline across its range due to unknown factors, and while it remains widespread, it is no longer common, and has even disappeared from many previously occupied habitats. Where resident, both species tend to be relatively abundant and adult frogs are an important prey item for many species, including by snakes, turtles, other frogs, herons and other wading birds, mink, raccoon, and otters. Eggs and tadpoles are preyed upon by a variety of aquatic animals including dragonfly larva, crayfish, and fish.

2.4.1.2.4 Insects

There are no insect species identified at the NMP3NPP site that meet the criteria of an important species under NUREG 1555 (NRC, 1999).

2.4.1.2.5 Plants

Plant species at the NMP3NPP site meet the criteria of an important species under NUREG 1555 (NRC, 1999) based on their importance to the structure and function of the local terrestrial ecosystem include Green Ash (F. pennsylvanica), Sugar Maple (Acer saccharum), American Beech (Fagus grandifolia), Silky Dogwood (Cornus amomum), and Poison Ivy (Toxicodendron radicans). In addition, the following species, which are listed by the New York Natural Heritage Program as Expoitably Vulnerable (NYNHP, 2007), were observed at the site: trillium (Trillium spp.), baneberry (Actaea spp.), ground cedar (Diphasiastrum sp.), and various native fern species. No State or Federally Endangered or Threatened plant species were identified on the site. Important plant species identified at the site are described below.

2.4.1.2.5.1 Green Ash

Green Ash is a dominant overstory tree over much of the site, in both upland and wetland areas. This species is a tall, moderately-fast growing deciduous tree that usually predominates in wetter areas. Although considered a pioneer species, Green Ash persists as a component of many late successional forest cover types. Green Ash is a key contributor to the overall structure and ecological function of the plant communities at the NMP3NPP site. Because much of the surrounding lands have undergone a similar history of agricultural development

and abandonment, Green Ash is likely to be a component of the forest cover throughout the surrounding area.

2.4.1.2.5.2 Sugar Maple

Sugar Maple is a dominant species in much of the naturally forested upland areas of the site. It is a medium- to large-sized tree that tolerates heavy shade. Sugar Maple affects the overall structure and ecological function of the plant communities at the NMP3NPP site by forming a dense canopy and by enriching the soil with its nutrient-rich leaves, which tend to reduce soil acidity and increase mineral content. It is commercially valuable for its maple syrup, maple sugar, and lumber. Maple seeds provide food to a number of wildlife species, including red-breasted nuthatches, purple finches, grosbeaks, squirrels, and mice. Sugar Maple may serve as a biological indicator of ecosystem stability, given its tendency to occur as a dominant species in late successional/maturing forests.

2.4.1.2.5.3 American Beech

American Beech is a slow-growing, very shade tolerant tree. It is an important component of the naturally forested upland areas at the site, and dominates the overstory and/or understory in areas of Beech-Maple Mesic Forest and Beech-Maple Rich Mesic forest along with Sugar Maple. This species occurs in a northern hardwood climax forest, typically in association with Sugar Maple, Yellow Birch, and Eastern Hemlock; and therefore, may serve as a biological indicator of ecosystem stability. Beechnuts provide important food for various bird and mammal species, including Blue Jay, Wild Turkey, Eastern Chipmunk, and squirrels.

2.4.1.2.5.4 Silky Dogwood

Silky Dogwood is a dominant shrub species in many of the wetland areas at the site. It is a large deciduous shrub that tends to form thickets. This species provides cover for wildlife and produces berries in late summer, which are consumed by various bird species, including migrating songbirds. The twigs provide an important source of winter browse for deer and rabbits.

2.4.1.2.5.5 Poison Ivy

Poison Ivy is an important component of the groundcover throughout the site. It also occurs as a tall woody vine. Given its abundance and density, it is a key contributor to the overall structure and ecological function of the plant communities at the site. Numerous bird species feed on the berries produced by this plant including Ruffed Grouse, Yellow-rumped Warbler, and Northern Flicker. The twigs are browsed by rabbits and deer during the winter. Browsed areas typically respond with vigorous new growth in the spring, resulting in dense carpets of this plant.

2.4.1.2.5.6 Trillium

Scattered trillium were observed within the Beech-Maple Rich Mesic Forest cover type at the site. Trillium species are considered to be Expoitably Vulnerable by the State of New York, and therefore likely to become threatened in the near future in the state, given existing trends. Trillium tend to be often found in forested areas with rich soils. They bloom in the early spring, before trees have leafed out, to take advantage of the higher light levels at that time. Trillium may be considered to be a biological indicator of ecosystem stability, given its tendency to occur in rich, undisturbed, forested areas.

2.4.1.2.5.7 Baneberry

The baneberries are another herbaceous species group that occurs in rich woods and are considered Expoitably Vulnerable in the State of New York. Like trilliums, they may also be considered to be a biological indicator of ecosystem stability. A few baneberry plants were observed within the Beech-Maple Rich Mesic Forest cover type at the site.

2.4.1.2.5.8 Ground Cedar

In the state of New York, all native clubmosses are considered Expoitably Vulnerable. A small patch of one clubmoss species, ground cedar, was observed in a relatively dry, open area within the existing transmission line corridor.

2.4.1.2.6 Native Fern Species

With the exception of Bracken Fern (Pteridium aquilinum), Hay-Scented Fern (Dennstaedtia punctilobula), and Sensitive Fern (Onoclea sensibilis), all native fern species in the State of New York are considered Expoitably Vulnerable. Clumps of Expoitably Vulnerable ferns were observed to be scattered throughout the site. In general, native ferns may be considered to be biological indicators of ecosystem stability, given their tendency to occur in undisturbed areas. Expoitably Vulnerable fern species observed at the site include: Cinnamon Fern, Interrupted Fern (Osmunda claytoniana), Royal Fern (Osmunda regalis), Christmas Fern (Polystichum acrostichoides), Lady Fern (Athyrium filix-femina), woodfern (Dryopteris spinulosa complex), and Marsh Fern (Thelypteris palustris)). Cinnamon Fern, Interrupted Fern, and Royal Fern occur within the forested wetlands of the Study Area. Christmas Fern and Lady Fern were observed within the Beech-Maple Rich Mesic Forest cover type. Woodfern was observed in various upland areas of the site, including locations within Successional Hardwood Forest and within Beech-Maple Mesic Forest. Marsh Fern was encountered in one of the wetland areas within the transmission line corridor.

2.4.1.2.7 Habitats

The only class of habitats on the NMP3NPP site that meets the criteria of important under NUREG 1555 (NRC, 1999) are wetlands. The location of the onsite wetlands are depicted in Figure 2.4-1. A wetland delineation was conducted on site in July, August and September 2007 using routine on-site procedures as specified in the US Army Corps of Engineers Wetlands Delineation Manual (NYSDEC, 2007c). Three types of wetland were identified in the NMP3NPP project area meet the standard for protection under Federal and/or State regulations. Based on the USACE's accepted classification system (USFWS, 1979) the on-site wetlands are designated as forested, open water/emergent, forested/scrub shrub, scrub shrub, and emergent. Forested wetland types are the most common type and distributed throughout the site, with the exception of the existing transmission line corridor, where vegetation management maintains scrub-shrub vegetation. Open water wetlands are present both north and south of Lake Road.

There are no designated critical terrestrial habitats for endangered species in the vicinity of the NMP3NPP site. However, four areas outside of, but close to, the NMP3NPP site are identified as other types of important habitats (Figure 2.4-2). Directly adjacent to the eastern boundary of the southern portion of the site is large, NYSDEC regulated wetland complex. This large and diverse area of wetland habitat is hydrologically connected to many if not all the on-site wetlands south of Lake Road, and provides hunting opportunities for the osprey pair nesting on the NMP3NPP site, as well as habitat for a diverse range of species. Teal Marsh, designated as a Significant Coastal Fish and Wildlife Habitat by the NYSDOS Division of Coastal Resources, is located approximately 3.5 miles (5.6 km) west of NMP3NPP on the Lake Ontario shore. The nearshore area of Lake Ontario between the Salmon River and the City of Oswego is designated

by NYSDEC to be significant waterfowl habitat. This area is an important non-breeding waterfowl winter concentration area used primarily by diving ducks. Finally, a rich shrub fen, identified as a Rare Natural Community by the NY NHP, is located approximately four miles south of the NMP3NPP site and approximately 0.5 miles (0.8 km) west of the transmission corridor.

2.4.1.3 Habitat Importance

White-tail Deer: White-tailed deer are habitat generalists but tend to favor areas at the edge of forests. Because of their ability to adapt to a variety of habitats, their populations are not generally sensitive to localized habitat changes. Loss of habitat to construction of NMP3NPP will result in a small decrease in the carrying capacity of the local habitat, but should not have any significant impact on the population of white-tailed deer within the vicinity of the NMP3NPP site.

Beaver: Beaver are adaptable to a wide variety of habitat conditions, so long as water and woody plants are available to provide food and cover. Habitat changes that remove one or both of these components will cause beaver to abandon an area. Construction of NMP3NPP will result in the loss of good quality beaver habitat, as a mix of forest, wetlands, and streams will be lost. However, wetlands and forests are abundant in the vicinity of the NMP3NPP site and although construction of NMP3NPP will result in a decrease in the carrying capacity of the local habitat for beaver, this should cause no significant impact to the population of beaver in the vicinity of the NMP3NPP site.

Pied-billed Grebe: This species was identified as present on the NMP3NPP site in an area that will not be subject to direct impacts from the construction of NMP3NPP. However, the construction delivery track and new access road will cross wetlands and waterways that are hydrologically connected to the wetland where the grebe was observed, and the potential for indirect impacts exists. Appropriate design of all wetland and water way crossings will prevent long term indirect effects due to altered hydrology, and best management practices during construction will prevent short-term indirect effects due to erosion or siltation. Therefore, there should be no loss of habitat for this species as a result of NMP3NPP construction.

Osprey: Osprey nest anywhere there are suitable nest structures, there is a sufficient prey bases, and they are not harassed. Ospreys tend to return and reuse nests from previous years. An active nest is currently located with the corridor of the proposed access road, and will be subject to disturbance during construction. The resident birds are likely to be displaced by active construction. However, they may return and acclimate to the activity associated by the new road, if the disturbance level created by roadway operations is relatively low, so long as road construction does not materially alter either the nest site or the food resources (adjacent wetlands) that initially attracted the birds.

Golden-winged Warbler: This species is currently undergoing a population decline due to habitat loss. The habitat patch occupied by this warbler on-site will be eliminated by project construction. However, potentially suitable habitat for breeding Golden-winged Warblers exists in other locations on-site, primarily within the transmission line ROW. Most migratory avian species return to the same locations to breed each year. The individuals using the eliminated habitat patch are likely to relocate to other suitable habitat area in the vicinity of the site after construction commences, and the overall impact of the habitat lost to NMP3NPP construction is unlikely to have any significant impact on the Golden-winged warbler population in Lake Ontario Plain.

Grasshopper Sparrow: This species is currently undergoing a population decline in the Northeast, due to a loss of habitat. The potential habitat for Grasshopper Sparrows on-site is marginal due to its size, and will be eliminated during construction of NMP3NPP. Although no structures are proposed within this area, it is likely to be used as a staging area during construction, and remain otherwise unsuitable for grasshopper sparrows post-construction. However, because of its sub-optimal size, the loss of this small habitat patch is unlikely to have any significant impact on the Grasshopper Sparrow population in Lake Ontario Plain.

Northern Leopard and Pickerel Frogs: These two species of frog depend on permanent aquatic habitats for over-wintering and reproduction, and also use adjacent terrestrial habitats extensively during the summer months. Development of NMP3NPP will result in the loss over-wintering and breeding areas that are significant to local frog population. If construction of NMP3NPP creates negative changes in water regime, water quality, or upland habitat quality that extend beyond the foot print of the project area, the populations losses to these two species could be commensurately larger.

Plants: All of the plant species identified as important to the structure and function of the local ecosystem at the NMP3NPP site (i.e., Green Ash, Sugar Maple, American Beech, Silky Dogwood, and Poison Ivy) are common in the local and regional area. Therefore, impacts to these plants at the NMP3NPP site will not jeopardize the survival of any of theses species, and losses of these plants will be minor relative to their abundances in surrounding areas.

Trillium, baneberry, ground cedar, and native ferns are considered Expoitably Vulnerable due to concerns about over collection. Impacts to these plants at the NMP3NPP site will contribute to existing population declines of these species in the state. Ground Cedar is unlikely to be impacted by the NMP3NPP project because it was observed within the existing transmission line corridor. However, native ferns, which were observed throughout the site, and trillium and baneberry, which were observed in small numbers in limited areas of the site, will likely be impacted.

2.4.1.4 Disease Vector and Pest Species

A disease vector is an organism (commonly an insect) that carries disease agents (commonly bacteria or fungi) to a receptor host, which can be man, domestic or wild animals, or crops or wild plants. No known disease vector species appear to be common at the NMP3NPP site. Non-native invasive plant species are present at low levels throughout the NMP3NPP site in 2008. Species observed included phragmites, multiflora rose, Japanese knotweed, and European buckthorn.

Phragmites is present in at least five wet areas throughout the site. This species is capable of vigorous vegetative reproduction and often forms dense, nearly monotypic stands. Although some phragmites stands are of genotypes native to North America, most large stands of phragmites in North America today are considered to be of non-native genotypes. A substantial stand of Japanese knotweed (Fallopia japonica) is present at the beginning of the access road that leads to the old ball field located north of the guard house. This species is an aggressive non-native invasive, and occurs mostly in areas with a history of soil disturbance, such as along the sides of roadways and trails. Where it occurs, it develops dense monotypic stands that exclude all other species. Multiflora rose (Rosa multiflora), and European buckthorn, two additional non-native species that also have the potential to form dense stands, are also present on the site, with the rose generally present in low amounts along forest edges throughout the site, and the buckthorn present in some of the shrub-scrub wetlands in the southern portion of the site.

2.4.1.5 Wildlife Travel Corridors

Wildlife tends to move across landscapes using distinct corridors of favorable habitat. Wildlife tends to move across landscapes using distinct corridors of favorable habitat. At the local scale, the NMP3NPP site does offer a riparian connection between the substantial wetland complex located to the south and the wetlands located on-site. This allows wetland-dependent species to move between these two habitat features. Additionally, even species not dependent on wetlands per se often travel along riparian corridors and the water courses on-site likely act as a travel way for a variety of local species moving about their immediate home ranges. However, the position of the NMP3NPP site relative to other features of the surrounding landscape makes it unlikely that the habitat on-site functions as an important wildlife corridor beyond the local scale. The site is bordered to the east by the existing units, and to the north is Lake Ontario. Neither of these two features are passable by terrestrial wildlife species, and have the effect of making the Unit 3 area a "dead end" from a regional perspective.

2.4.1.6 Existing Natural and Man-Induced Ecological Effects

Upland portions of the site are still recovering from a long history of crop cultivation, pasturage, orchard management and the like, as are relatively dry portions of the site's wetland. As a result of this historic disturbance, the forest cover on-site is not typical for the region, but it does provide suitable habitat for all native species likely to be present. There is no evidence that the NMP3NPP construction area has been subjected to any substantial recent natural environmental stresses such as insect or disease outbreaks or storm damage.

2.4.1.7 Ongoing Ecological and Biological Studies

The only ecological or biological investigations performed on the NMP3NPP within the last 5 years were the surveys described herein. Those studies are now complete.

2.4.1.8 Regulatory Consultation

The New York Natural Heritage Program (NYNHP), operated by the New York Department of Environmental Services, was consulted for information on known occurrences of Federally-listed and State-listed threatened, endangered, or special status species and critical habitats (NYSDEC, 2008b). Additionally, the USFWS NY Field Office's website (USFWS, 2008) was consulted for a listing of all species with federal status known to occur in Oswego County. Subsequent to the check of the website, contact was made with USFWS NYFO personnel, regarding the status of bog turtles in the vicinity of NMP3NPP.

Additional consultations with USFWS will be required as part of the project's permitting phase, as well as the requirements of the Fish and Wildlife Coordination Act of 1958 and the Migratory Bird Treaty Act.

2.4.1.9 Off-site Transmission and Access Corridors

There are no new off-site transmission or access corridors associated with the construction and operation of NMP3NPP.

2.4.2 AQUATIC ECOLOGY

2.4.2.1 Aquatic Habitats

2.4.2.1.1 Freshwater Bodies On-site

Freshwater bodies at the NMP3NPP site are described in Section 2.3.1. A topographic map is provided as Figure 2.3-1. A site description in a separate wetlands field trip report (UniStar, 2007) divides the site into the wetlands and water bodies north of Lake Road and those south of Lake Road. The topography of both areas was created by past glaciations leaving a mixture of glacial till over bedrock. The landscape was previously cleared for agriculture and grazing but is now mainly forested. However, former construction support areas and a shooting range exist south of Lake Road while an abandoned playing field and a meteorological tower are present in the northern section. Additionally an extensive transmission line corridor runs through both areas.

Palustrine forested and scrub-shrub wetlands were the most common wetlands on the site and small streams conveying surface water discharge drained to the north and west. Wetlands from both sites drain mainly into Lakeview Creek, which flows into Lake Ontario. North of Lake Road, a small pond, potentially manmade, is located at the northeast corner of the abandoned baseball field. A small intermittent stream flows east from the baseball field to a beaver pond located south of the meteorological tower (UniStar, 2007). An intermittent stream flows west from the beaver pond eventually reaching Lake Ontario by filtering through the rocky shoreline. South of Lake Road the unnamed stream flows northwest through the site crossing Lakeview Road south of Lake Road and is dammed in several locations by beaver activity, creating larger pools. A small pond, the remnant of a rock quarry, is located south of the former construction support area and the current shooting range (UniStar, 2007).

The US Fish and Wildlife Service did not list any of the area in the vicinity of NMP3NPP as critical habitat and no aquatic species are federally listed under the Endangered Species Act that might be found in the area except as transient individuals. New York State Department of Environmental Conservation (NYSDEC) stated that no aquatic species listed as endangered, threatened, or as a species of concern were known to be located in the area and no critical habitats for aquatic species were listed (NMP, 2004).

The watershed draining the NMPNS property is divided into Subareas A, B, C and D (Figure 2.3-1). Water bodies inside subarea A, C, and D were sampled during June 2008. In Subarea A, surveys to evaluate the habitat, benthic macroinvertebrate and fish assemblages of Lakeview Creek were conducted (Figure 2.4-3). Sampling methods followed the 1989 and 1999 US EPA Rapid Bioassessment Protocols developed for low-gradient non-tidal streams. The quarry pond in Subarea A was also sampled for fish (Figure 2.4-3). In the intermittent stream in Subarea D, seine sampling for fish was conducted in the pond located in the vicinity of the meteorological tower. Seine samples were also conducted at the drainage stream located in Subarea C.

At each sampling station water quality measurements in the form of dissolved oxygen (mg/l), water temperature (^{0}C), and specific conductivity (μS/cm) were taken.

The following are summaries of results of surveys for Lakeview Creek and on-site ponds.

2.4.2.1.1.1 Lakeview Creek

Lakeview Creek, located in the Central Lowlands Physiographic Province, is defined by the New York State Department of Environmental Conservation (NY DEC) as a class C stream, listed as

most suited for fishing and also capable of supporting fish and wildlife propagation. Approximately 9531.0 linear feet (2905.0 m) of Lakeview Creek runs through the proposed NMP3NPP site, 932.0 linear feet (284.3 m) of which projected to be modified by the project. The NMP3NPP property surrounding Lakeview Creek is primarily forested although the southern portion, along a power line right-of-way, is open field and brush with heavy vegetation along the stream bank. This perennial stream and its tributaries flow into Lake Ontario making it accessible for spawning by migratory lake fish as well as potential nursery habitat for young fish.

On 24 - 26 June 2008 Normandeau Associates, Inc. collected benthic macroinvertebrate samples from Lakeview Creek in the vicinity of NMP3NPP. A second un-named tributary located on the property of the adjacent James A. Fitzpatrick (JAF) Nuclear Generating Station, referred to as the JAF Stream, was selected as a reference.

This study was conducted to establish a baseline evaluation of the habitat quality and macroinvertebrate community residing in Lakeview Creek using the methods from the 1989 and 1999 US EPA Rapid Bioassessment Protocols (USEPA, 1989 and USEPA, 1999). This data is necessary for compliance with guidelines set forth in NUREG-1555 and Regulatory Guide 4.2 of the Nuclear Regulatory Commission (NRC) regarding the construction of a new nuclear generating station.

Data were collected from four locations on Lakeview Creek and from two on the JAF Stream. Sample locations were numbered 1 through 4, beginning with NMP SITE - 1 furthest upstream. Each was also identified according to the predominant substrate type present, either cobble or sand. The reference stations at JAF were designated: JAF - COBBLE and JAF - SAND.

The JAF Stream selected as a reference for this study is similar in size and character to Lakeview Creek. The stream is also a tributary to Lake Ontario but is not hydrologically connected to Lakeview Creek. The JAF Stream is also listed as a class C waterway by the NYSDEC. The stream corridor is entirely forested in the vicinity of the sampling areas.

All sampling and analyses were conducted according to "Rapid Bio-assessment Protocols for Use in Streams and Rivers" (USEPA, 1989), and "Rapid Bio-assessment Protocols for Use in Wadeable Streams and Rivers" (Barbour, 1999).

The RBP habitat assessment produces scores that rate habitat from poor and marginal to sub-optimal and optimal. The habitat scores for Lakeview Creek sites provided a rating of 149-166 (optimal/sub-optimal) (Table 2.4-6) and the macroinvertebrate community was relatively free of habitat constraints. A viable, taxonomically rich macroinvertebrate community exists in Lakeview Creek dominated by facultative and tolerant species. The amphipod Crangonyx sp. and isopod Caecidotea sp. were the dominant species found during sampling. The Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa were poorly represented at the sites, possibly due to low dissolved oxygen levels within the stream.

Sampling was also conducted to evaluate the fish assemblage existing in Lakeview Creek. Field sampling followed the protocols set forth by the 1989 and 1999 US EPA Rapid Bioassessment Protocols (USEPA, 1989, Barbour, 1999).

Five species of fish were present in Lakeview Creek (Table 2.4-7). Differences in species and abundance between sampling reaches were evident. The Sites 1, 2, and 3 contained three to four species and between 30 and 81 fish/100 m compared to the Site 4 sample which consisted of a single central mudminnow (Umbra limi). Most of the species identified are tolerant or

medium tolerant of disturbed or degraded habitats with the exception of rainbow trout (Oncorhynchus mykiss), which is considered intolerant of poor conditions (Barbour, 1999).

Rainbow trout was the only important fish species identified on site during June 2008 although in the 2007 wetlands characterization a dead adult Chinook salmon (Oncorhynchus tshawytscha) as well as an adult rainbow trout were observed in this stream. Young of the year (YOY) rainbow trout were found at two stations in Lakeview Creek during June 2008 sampling (Table 2.4-7). One rainbow trout parr (1+) was found outside of a sampling station, providing evidence of continued survival in the stream. The dead adult Chinook salmon and rainbow trout, coupled with the identification of juvenile rainbow trout during June 2008 sampling presents the potential of Lakeview Creek as spawning habitat for adults and nursery and feeding habitat for juvenile salmonids. No juvenile Chinook salmon was found in Lakeview Creek in June of 2008 and as both species are still maintained primarily by stocking it is unlikely that this stream provides a major contribution to the overall Lake Ontario population.

2.4.2.1.1.2 Other On-site Water Bodies

Three other areas were sampled for fish outside of Lakeview Creek. The pond south of the construction laydown area and the shooting range in Subarea A contained a population of largemouth bass (Micropterus salmoides) (Figure 2.4-3). This pond is probably the remnant of an abandoned quarry and has no inlets or outlets. It is likely that these fish were planted within the pond and have persisted. No federal or state protection beyond the NYSDEC fishing regulations for black bass has been deemed necessary for this species.

The pond south of the meteorological tower in Subarea D was part of the intermittent stream north of Lake Road (Figure 2.4-3). Two species, the western grass pickerel (Esox americanus vermiculatus) and the central mudminnow, were found in this pond (Table 2.4-8). These fish are common and no federal or state protection is provided.

The drainage stream in Subarea C originates on the JAF property and runs along the property line shared with NMP, eventually crossing under a construction laydown site and terminating at Lake Ontario (Figure 2.4-3). Similar to Subarea D, seine sampling at this site produced western grass pickerel and central mudminnow. One pumpkinseed sunfish (Lepomis gibbosus) was also identified during sampling.

The water quality of these ponds was similar in temperature but very different in dissolved oxygen and specific conductivity (Table 2.4-9). Two species, central mudminnow and western grass pickerel, found in the pond south of the meteorological tower and in the Subarea C site are capable of surviving in ponds exhibiting high temperatures and low dissolved oxygen, especially the central mudminnow with its ability to breathe air. The higher dissolved oxygen levels recorded in the quarry pond could explain the continued persistence of largemouth bass in this water body (Table 2.4-9).

2.4.2.1.1.3 Wetlands

Wetlands in the site were described based on field surveys conducted in early July, late August, and early September of 2007. Twenty wetland areas were identified within the NMP3NPP site. Five wetlands, labeled A through E, are located north of Lake Road while 15 wetlands, labeled AA-YY, are located south of Lake Road. The wetlands on both sides of the road are similar, made up primarily of pallustrine forested wetlands and to a lesser degree, scrub-shrub wetlands. South of Lake Road, near where it intersects with Lakeview Road, is a section of semi-permanently inundated wetlands unique to the site. Wetlands in this area are a result of poorly drained soils and groundwater seeps and intermittent flows are common. Wetland

areas A through E drain north and west along the intermittent stream eventually draining through a cobble berm into Lake Ontario. Wetlands south of Lake Road, AA-YY, also drain north and west towards Lake Ontario. These wetlands drain into Lakeview Creek, a tributary of Lake Ontario that runs north and west across the NMP3NPP site south of Lake Road.

An assessment of wetland functions and values for the NMP3NPP site are provided in Table 2.4-4. North of Lake Road, Wetlands A and B comprised the largest delineated wetlands. These sections also had the greatest number of functions and values, Wetland A having eight functions and values with five of them considered principal and Wetland B having nine functions and values with six of them considered principal. South of Lake Road the most functions and values are found in delineated Wetlands EE/FF, TT/YY, and UU/VV. All of these areas had at least eight functions and values associated with them, including fish and shellfish habitat as a principal function as portions of Lakeview Creek are included in these wetlands.

2.4.2.1.2 Lake Ontario

2.4.2.1.2.1 Importance of the Lake as a Resource

Lake Ontario, with an area of 7,340 mi^2 (18,960 km^2) and a volume of 393 mi^3 (1,638 km^3), is the smallest and easternmost of the Great Lakes. The Lake is bordered by the State of New York to the south and the Canadian province of Ontario to the north. Approximately 80% of the water flowing into Lake Ontario comes from Lake Erie via the Niagara River with the other 20% coming from precipitation and other tributaries. The majority of Lake Ontario's water flows into the St. Lawrence River, which feeds into the Atlantic Ocean (NMP, 2004). Lake Ontario's fishery is a valuable commodity, used by both Canada and the United States. In the United States, along with a limited commercial fishery, the sport fishery for salmonids alone is estimated to have been worth $71 million in 1996 (Connelly et al., 1997 in Mills, 2005). Human-induced change has been a constant factor in Lake Ontario's recent history. Pollution, overfishing, habitat and water quality degradation, and introduced and invasive species have all affected, and continue to affect, the species community and the health of the ecosystem (NYSDEC, 2005).

2.4.2.1.2.2 Review of Key Data Sources

Key data sources of information on Lake Ontario are found with the following Federal, State, and private organizations:

- The New York State Department of Environmental Conservation (NYSDEC) provided information regarding the life history and distribution of important species located in the vicinity of NMPNS, including those of species considered endangered, threatened, and of special concern. Information regarding the status of the sport fishery, native fish recovery plans, and ecosystem status were found in the Lake Ontario Annual Report, 2005. Information from the NYSDEC was used to support the designation of important species.

- The United States Fish and Wildlife Service (USFWS) provides the current list of species listed under the Endangered Species Act (ESA).

- The Great Lakes Fisheries Commission (GLFC) was created from US/Canadian Convention of Great Lakes Fisheries in 1955 and coordinates fisheries research, sea lamprey (Petromyzon marinus) control and facilitates cooperation between various private, state, provincial, federal, and tribal agencies. The GLFC was a source of

information on ecological and fish community changes in Lake Ontario from a cooperative effort of US and Canadian government agencies.

- The NOAA Fisheries Office of Science and Technology provides commercial landing data for the New York State portion of Lake Ontario.

- The United States Geological Service (USGS) Great Lakes Science Center provides historical and biological data about invasive species of fish and invertebrates that have become established in the Great Lakes.

- Lake Ontario Management Unit (LOMU) is one of the three Canadian Great Lakes Branch units. The LOMU provides information on Canadian commercial landings, recreational catch, contaminant monitoring, and restoration efforts in Lake Ontario as well as ongoing research and trends occurring in Canadian waters.

- Lake Ontario Lakewide Management Plan (LaMP) is a cooperative effort from private, state, provincial and federal agencies addressing the overall ecosystem heath of Lake Ontario as agreed during the Great Lakes Water Quality Agreement meeting in 1987. Issues considered important are: eliminating critical pollutants, resolving current impairments, and addressing biological and physical problems created by human activities.

- Lake Ontario Lower Aquatic Foodweb Study (LOLA) was initiated by LaMP and the GLFC to better understand the impact of 30 years of human activity on Lake Ontario's ecosystem. LOLA is a cooperation of government agencies, colleges, and universities from both Canada and the United States.

2.4.2.1.2.3 Overall Condition of the Lake Ontario Ecosystem

The condition of the Lake Ontario ecosystem continues to change. In the 1960s overfishing, cultural eutrophication, pollution, and introduced species threatened the native assemblages in the lake. Concern over these conditions led to the Great Lakes Water Quality Agreement in 1974, sea lamprey control measures, and the large scale stocking of Pacific salmonids (Oncorhynchus spp.) to control overabundant alewives (Alosa pseudoharengus) and rainbow smelt (Osmerus mordax). These measures led to a gradual decline in phosphorus levels and eventual trend toward oligotrophication in Lake Ontario, the reemergence of top predators, and a decline in alewife and rainbow smelt populations by the mid 1980s (Mills, 2006). Additionally, the introduced salmon became a multi-million dollar sport fishery. Despite improvements, pollution in nearshore areas continues to be an issue and recently introduced Ponto-Caspian invasives such as the zebra mussel (Dreissena polymorpha), quagga mussel (Dreissena bugensis), and the round goby (Neogobius melanostomus) represent new threats to the ecosystem.

Continually changing conditions make future trends for Lake Ontario difficult to determine. Recent research shows the following results:

Water Quality - Water quality has improved in most areas since the enactment of the Great Lakes Water Quality Agreement in 1972. Overall, Lake Ontario's trend of oligotrophication continues. Total phosphorus levels have been reduced to below target levels although nitrite, nitrate, and silica levels continue to increase, most likely from agricultural and land use sources (Mills, 2006). Additionally, persistent, bioaccumulative and toxic chemicals (PBTs) have accumulated in the Lake's sediments from multiple generation points (LaMP, 2006). Water clarity, due to the continuing oligotrophication and the introduced zebra and quagga mussels

continues to increase. The water quality in coastal areas of Lake Ontario remains in poor condition. Increased blue green algal blooms and aquatic weeds are a result of increased water clarity. Erosion, habitat destruction, and invasive species also continue to contribute to the current condition of coastal regions (Mills, 2006).

Habitats and Lower Food Web - Currently, Lake Ontario's ecosystem is seeing a nutrient shift from the pelagic to the benthic zone. Benthic zebra and quagga mussels became widely distributed in the 1990s (Mills, 2006) and have redistributed nutrients to the benthic zone that might otherwise be available to pelagic organisms. Decreased nutrient levels have reduced the amount of phytoplankton and zooplankton biomass in the water column, which in turn has reduced the food resources available to alewives and rainbow smelt.

Benthic Organisms - The increase in exotic zebra and quagga mussels has been connected to the virtual disappearance or severely reduced populations of deep water amphipods, Diporea spp., an important prey species for several members of the fish community. These amphipods are now virtually gone from depths where they were once most common (98-285ft) (30-90m) (Mills, 2006). A dominant nearshore species, Gammarus fasciatus has become more abundant thus far with the expansion of Dreissenid mussels (LaMP, 2006).

Phytoplankton and Zooplankton - Reductions of pollutants and nutrient levels, especially phosphorus, have led to a decrease in phytoplankton and zooplankton biomass levels in the 1980s to more historically low and stable levels. However, with increased redistribution of nutrients to the benthic zone, levels of phosphorus in the water column offshore began to decline beginning in 1955 and have continued to decline to below target levels of 10 µg/L (10 ppb) (Mills, 2006). This could result in the increased importance of the microbial loop, where bacteria and other picoplankton recycle nutrients and provide additional energy to zooplankton and higher components of the food web (Mills, 2005). Embayments in Lake Ontario, unlike the nearshore and offshore waters, still show signs of human induced eutrophication (LaMP, 2006).

Fish and Shellfish - Currently changing conditions within Lake Ontario have led to the increase and reemergence of some species as well as the decline of others. As the Lake has becomes more oligotrophic over the past three decades, the abundance of alewives and several warm water species has declined (NYSDEC, 2005). The decrease in alewife populations has been accompanied by increases in native forage fish such as threespine stickleback (Gasterosteus aculeatus) and emerald shiner (Notropis atherinoides) as well as the reemergence of the deepwater sculpin (Myoxocephalus thompsoni), thought by some to be extirpated from Lake Ontario (Mills, 2005). Additionally, ongoing Atlantic salmon (Salmo salar), lake trout (Salvelinus namaycush) and lake sturgeon (Acipenser fulvescens) restoration plans and continued stocking of brown trout (Salmo trutta) and pacific salmonids are contributing to the to the current status of the fish community (NYSDEC, 2005). There is no recorded recreational or commercial harvest of shellfish in Lake Ontario (NMFS, 2008)

2.4.2.2 Identification of Important Aquatic Species

NUREG-1555 (NRC, 1999a) defines important species as: 1) species listed or proposed for listing as threatened, endangered, candidate, or of concern in 50 CFR 17.11 and 50 CFR 17.12 (CFR, 2007a), by the U.S. Fish and Wildlife Service, or the state in which the project is located; 2) commercially or recreationally valuable species; 3) species essential to the maintenance and survival of rare or commercially or recreationally valuable species; 4) species critical to the structure and function of local terrestrial ecosystems; 5) species that could serve as biological indicators of effects on local terrestrial ecosystems; or 6) species capable of blocking or bio-fouling the cooling water intake system or causing other significant problems.

A list of species considered important in the project area was compiled based on these criteria and summarized in Table 2.4-5. A single species may meet more than one of the six criteria.

Species Under Special Protection - Threatened, Endangered, or Candidate Species: Any species that is known to occur or could occur in the Lake Ontario or near the NMP3NPP site that is afforded special protection under the federal Endangered Species Act, or under the equivalent State of New York law, is defined as an important species.

Commercially Harvested Species: Finfish and shellfish that rely on habitat in the vicinity of the NMPNS site during any life stage, and are commercially harvested to a substantial degree, are considered important resources.

Recreational Target Species: Finfish and shellfish that rely on habitat in the vicinity of the NMP3NPP site during any life stage, and are preferentially taken by recreational anglers or trappers to a substantial degree are considered important resources.

Keystone Species: Any species that is essential to maintaining the structure and function of the estuarine ecosystem in the vicinity of the NMP3NPP site will be identified as important.

Indicator Species: A species whose abundance, distribution, or condition is known or believed to be a reliable predictor of the status of another species of interest is considered an important species.

Nuisance Species: A species on site or in the vicinity capable or blocking or bio-fouling the cooling water intake system or causing other significant problems associated with plant operation.

2.4.2.2.1 Description of Important Species

Each important species is described in terms of the following parameters, which provide a context within which site-related effects may be measured and interpreted:

- Critical life support (natural history) requirements, including spawning areas, nursery grounds, food habits, feeding areas, wintering areas, and migration routes (including maps)
- Temporal and three-dimensional spatial distribution and abundance, especially in the discharge area and receiving water body (including maps)
- Seasonal catch data (location, volume, and value) for commercially and recreationally important species
- Existing stressors and adverse effects not related to the proposed project

2.4.2.2.2 Threatened or Endangered Species

No fish species in the project area are currently listed under the U.S. Endangered Species Act although five species of fish possibly occurring in the vicinity of NMP3NPP are listed as endangered, threatened, or as a species of concern by the State of New York. The deepwater sculpin and round whitefish (Prosopium cylindraceum) are listed as endangered, the lake sturgeon and lake chubsucker (Erimyzon sucetta) is listed as threatened, and the redfin shiner (Lythurus umbratilis) is a species of concern. None of the above species were captured in the

most recent gill net sampling (April through September 2006) or impingement sampling (April through August 2006) at NMP3NPP (EA, 2007).

2.4.2.2.2.1 Deepwater Sculpin

The deepwater sculpin is a glacial relict species inhabiting all of the Great Lakes and other deep lakes in North America created by the retreating glaciers. This species is generally found in waters between 240-299 ft (73-91 m) where temperatures remain below 46°F (8°C) (Smith, 1985). The deepwater sculpin feeds on insects and crustaceans found in the deep areas of lakes. Spawning in Lake Ontario is thought to occur during summer or fall although it has been reported to occur during all seasons in other lakes. Larvae exist in the hypolimnion after hatching and even when older, adults rarely leave the deep regions (Becker, 1983). Considered abundant in Lake Ontario in the 1920s, the deepwater sculpin was last documented in U.S. waters there in 1942. The fish was thought to be extirpated from Lake Ontario but was rediscovered in 1998 trawling surveys conducted by the USGS and NYSDEC. Deepwater sculpin continued to be captured in subsequent surveys conducted in 2005 and the population appears to be increasing in Lake Ontario (NYSDEC, 2005).

The reasons for population decline and resurgence are unknown although there is evidence that the reduction in numbers of alewives (Alosa pseudoharengus) and rainbow smelt (Osmerus mordax), which prey on deepwater sculpin eggs, and benthic predators may be a factor in the population rebound. The deepwater sculpin is presently listed as endangered by the State of New York, which continues to monitor and track the population (NYSDEC, 2008a)

2.4.2.2.2.2 Round Whitefish

The round whitefish ranges across the northern regions of North America and is found throughout Alaska east to Hudson Bay and south to the northeastern U.S., including all of the Great Lakes except Lake Erie. Similar to the lake whitefish (Coregonus clupeaformis), the round whitefish is a generalist feeder. They move in large schools along the shoreline and consume insects, mollusks, crustaceans, fish, and fish eggs off the lake bottom. Round whitefish can reach a length of 22 in (56 cm) although 8-12 in (20-30 cm) is the average size range for this species. Lakes are the preferred habitat throughout most of its range, although in some northern parts of it range, it inhabits rivers and brackish water. Usually it is found in cold water, generally at depths of around 150 ft (46 m) (Smith, 1985). Prior to spawning, mature adults migrate to shallow water, river mouths, and even up rivers several miles to spawning grounds. Spawning occurs in late November and December over cobble, gravel, or other silt free substrates. Eggs hatch in the spring and fry can be found amidst the rocks and gravel of the spawning grounds (Becker, 1983).

Although round whitefish continue to exist in Lake Ontario's Canadian waters, they have become rare in New York. The last recorded capture in New York waters occurred in 1942. The reasons behind the decline of round whitefish is not clear although habitat degradation, competition by other species, predation, and overharvesting are all though to be contributors. Currently, the round whitefish is protected under the New York endangered species act and harvest and possession are illegal. (NYSDEC, 2008a).

2.4.2.2.2.3 Lake Sturgeon

The lake sturgeon is the largest native fish inhabiting Lake Ontario. The overall range of the lake sturgeon includes lakes and large rivers in the Mississippi River drainage as well as Hudson Bay and the Great Lakes basins. The preferred habitats for adult lake sturgeon include clean sands, gravel, and rock in shallow water. Lake sturgeon forage on the bottoms of rivers and lakes, consuming insects and benthic invertebrates and fish (Smith, 1985). The lake sturgeon is

a long lived species, potentially reaching ages of up to 150 years and lengths of up to 7 ft (213 cm). Consequently, these fish are also slow to mature. The average age of maturation for males and females are 8-12 years and 24-26 years respectively. Additionally, lake sturgeon may only spawn every two to nine years, leaving potentially large portion of mature adults out of the spawning population in any given year (Becker, 1983).

Spawning occurs over cobble or gravel between April and June when water temperatures reach 50-59°F (10-15°C). Adults migrate to spawning areas and congregate in deep pools. A typical spawning event involves one female and up to several males. Eggs hatch in five to 10 days and the young sturgeon grow quickly, reaching four to five inches (10 to 13 cm) by the end of their first growing season (Becker 1983).

Initially, lake sturgeon in the Great Lakes were considered a nuisance because they damaged fishing gear set for more commercially viable species. By the 1880s, however, the commercial value of sturgeon for meat, caviar, skin, oil, and isinglass led to increased catches throughout the Great Lakes and to declines throughout their range (Smith, 1985). Habitat destruction and the damming of rivers, which denied access to spawning grounds, also contributed to the continuing decline of many lake sturgeon populations.

Currently, lake sturgeon is state listed as endangered, threatened, or species of concern in 19 of the 20 states it is known to inhabit. In New York, the lake sturgeon is listed as threatened and the NYSDEC is currently monitoring existing lake sturgeon populations and attempting to restore populations to tributaries of the St. Lawrence River and Lake Ontario (NYSDEC, 2008a). Lake sturgeon have been captured in warm water fishery assessments conducted by the NYSDEC in nine of 11 years between 1994 and 2005 suggesting a possible increase in population (NYSDEC, 2005).

2.4.2.2.2.4 Lake Chubsucker

The lake chubsucker ranges from Virginia to Florida, west to Texas and up the Mississippi drainage to the Great Lakes. In the Great Lakes basin, the lake chubsucker has been found in Wisconsin and southern Michigan across to the southern shore of Lake Ontario.

The lake chubsucker inhabits clear lakes and slow moving streams with associated with large amounts of standing aquatic vegetation. While tolerant of low dissolved oxygen levels, the lake chubsucker is apparently intolerant of fast current, turbid or silty water (Becker, 1983). These fish are generalists, feeding on benthic insects, mollusks, diatoms, and algae. Spawning is thought to occur between March and July with broadcast spawning occurring over vegetation. The eggs hatch in approximately one week and the young grow quickly, consuming crustaceans and insects (Becker, 1983) (Smith, 1985).

In Lake Ontario the lake chubsucker has been found along the southern shoreline in embayments although none have been documented since 1975. One was captured during surveys conducted at the mouth of the Salmon River, about 5 miles (8 km) east from NMP3NPP in 1975 (NMP, 1984) Reasons as to why the lake chubsucker populations have declined in New York waters are unknown. Currently listed as a state threatened species, the NYSDEC continues to search for the lake chubsucker in areas it previously inhabited (NYSDEC, 2008a).

2.4.2.2.2.5 Redfin Shiner

The redfin shiner is found in the Mississippi drainages north to the Great Lakes. These fish are short lived, rarely exceeding three years, and attains a size of approximately 1.8 in (45 mm). The redifin shiner is a habitat generalist known to inhabit small to medium streams from

headwaters to bays. In Lake Ontario, only the western portions are still known to have rivers and streams with populations of redfin shiner (NYSDEC, 2008a). The redfin shiner was listed as one of the fishes collected at NMP3NPP during 1975 (NMP, 2004). These fish are also generalist feeders, consuming both insects and algae (Becker 1983) (Smith, 1985).

The redfin shiner spawns between late April and August over nests of sunfish (Lepomis sp.) and is apparently stimulated to spawn by secretions from the nesting sunfish. Young of the year redfin shiner reach approximately 1.2 in (30 mm) by the end of their first summer (Becker 1983). The extent of the redfin shiner's decline in New York is unknown. It was last found in Tonawanda Creek and the Niagara River in 1977, and Johnson Creek in 1999 and 2000 (NYSDEC, 2008a).

2.4.2.2.3 Harvested Fish

Twelve species of fish that are caught either commercially or recreationally in Lake Ontario are considered important to the project area as shown in Table 2.4-5.

2.4.2.2.3.1 Yellow Perch

Yellow perch (Perca flavescens) are found across a large portion of the northern US and Canada, including all of the Great Lakes. In general, yellow perch are a shallow water schooling fish. At NMPNS, sampling between 1972 and 1981 indicated yellow perch were found most commonly in waters between 16 and 30 ft (5 and 9 m) and were most abundant there between July and September (NMP, 1984). They are generalist predators, feeding on crustaceans, insects, and fish from both benthic and pelagic zones. Spawning takes place between April and May in waters ranging from 45 to 52°F (7 to 11°C) over a variety of substrates. Yellow perch in tagged in the vicinity of NMP3NPP (1972-1976) moved to the east end of Lake Ontario where they overwintered and likely spawned the following spring, returning to NMP3NPP later in the summer (NMP, 1984). Yellow perch eggs hatch in approximately eight to 10 days and fry spend up to a month in the upper portion of the water column feeding on zooplankton. After reaching about 1 in (25 mm), the juvenile perch relocate to the lake bottom (Becker, 1983).

In addition to being an important component of the recreational fishery, there is a commercial fishery for yellow perch in both the Canadian and US regions of Lake Ontario although catches on the Canadian region tend to be much larger. The Canadian catch, at 222,609 lbs (100,974 kg) in 2006 (LOMU, 2006), is greater than the US catch, which was only 6,354 lbs (2,882kg) ($11,590) in 2005 (NMFS, 2008). Yellow perch commercial catches in US waters have fluctuated dramatically in the last 30 years. The highest catch totals in US waters occurred in 1986 when 220,713 lbs (100,113 kg) of yellow perch were landed at a value of $166,217. Since 1987 the commercial harvest of yellow perch has not exceeded 100,000 lbs (45,359 kg)(NMFS, 2008).

Overall, yellow perch abundance in Lake Ontario has declined over the past 30 years. Catches from NYSDEC Eastern Basin Assessments indicated yellow perch catch per unit effort (CPUE) decreased from 45 fish per net gang in the late 1970s to 2.2 fish per net gang in 1988. Yellow perch abundance has remained stable since then, and increased abundance of young perch in the 1990s was thought to be indicative of potential recovery. However, increased mortality of the 0-2 age classes appeared to have negated the effect of increased spawning success (NYSDEC, 2005).

One of the factors associated with the decline and recovery of yellow perch in Lake Ontario is predation by alewives and cormorants. Increased yellow perch abundance in the late 1970s appeared to be linked to a major die-off of alewives, which are a major predator of yellow perch larvae (Mills, 2005). However, alewife populations rebounded in the 1980s, possibly causing a

decrease in yellow perch. Increased predation by cormorants in the 1990s is also thought to be a factor in the continued suppression of yellow perch in Lake Ontario despite a currently declining alewife population (Mills, 2005).

Yellow perch ranked seventh in abundance (25 captured) in gill net sampling from April through September 2006 in 10-15 ft (3-5 m) of water and only one was captured from July through September 2006 in 30-35 ft (9-11 m) of water near NMP3NPP (EA 2007). Yellow perch ranked eleventh in abundance (20 captured) in impingement sampling at NMP3NPP from April through August 2006 (EA, 2007).

2.4.2.2.3.2 Brown Bullhead

The brown bullhead (Ictalurus nebulosus) inhabits the eastern United States and southern Canada including all the Great Lakes. The bullhead is a habitat generalist, usually found in warm ponds and lakes and slow moving streams and rivers with plentiful aquatic vegetation. In general, it is known to be tolerant of high turbidity, low dissolved oxygen, high temperatures, and high carbon dioxide levels. The brown bullhead is also a generalist feeder foraging almost always at night. All benthic invertebrates, fish, as well as some vegetative material are potential prey (Becker, 1983) (Smith, 1985).

Spawning occurs in May and June in southern parts of its range and as late as July in northern areas as water temperatures approach 81°F (27°C). Females build nests in sand, gravel, or mud and the eggs are defended by one or both of the parents. Young are guarded in the nest area by the parents for up to 10 days after hatching at which point they are abandoned (Becker, 1983).

Brown bullhead are captured commercially in both the US and Canada. In Canadian waters, bullheads accounted for 77,955 lbs (80,719 kg) in 2006 (LOMU, 2006) while the commercial catch for US waters in 2005 was 1,040 lbs (472 kg) valued at $2,079 (NMFS, 2008). Brown bullhead catches between 1971 and 1994 regularly ranged from 20,000-70,000 lbs (9,072-31,751 kg). In 1995, the commercial catch in U.S. waters fell to 13,166 lbs (5,972 kg) and has not been over 20,000 lbs (9,072 kg) since (NMFS, 2008).

Brown bullhead were abundant during the late 1970s and mid 1980s in Lake Ontario but populations have been declining over the last 30 years (NYSDEC, 2005). While little information on the factors behind this decline is available, the changing conditions within the Lake towards oligotrophication may be a factor.

2.4.2.2.3.3 Chinook Salmon

The natural range of the chinook salmon in North America includes the Pacific Ocean and the coastal rivers from northern California to Alaska. In the Great Lakes, chinook salmon were introduced initially in the late 1800s with little success (Fuller, 2008). In 1969 chinook salmon were again introduced to Lake Ontario to help control alewife and rainbow smelt populations as well as providing a sport fishery in a Lake where major salmonid predators had all but disappeared.

Chinook salmon are anadromous in their native range. They are spawned in freshwater streams and rivers where they live as juveniles for up to several years. Eventually these juveniles undergo smoltification and migrate downriver into the Pacific Ocean where they will feed for three years before returning to their natal streams to spawn. Chinook salmon are cold water fish and prefer water temperatures between 55 - 63°F (13-17°C) (Benhke, 2002). Aquatic and

terrestrial invertebrates are the primary food source for stream juveniles while a diet made up of primarily fish is consumed by chinook salmon in the Great Lakes (Becker, 1983).

Spawning occurs in the fall, usually in late August and September in New York. Females build nests over coarse gravel and males compete for mating opportunities. Chinook salmon are semelparous, meaning all reproducing adults die after the spawning run is complete. Fertilized eggs hatch in the spring and young, after initially schooling, and become solitary until they migrate out to the lake (Becker, 1983)

Chinook salmon are the largest and most popular salmonid sport fish in Lake Ontario and are an important component of the recreational harvest. The greatest catch occurred in 1986 when 224,000 adult chinook salmon were estimated to have been harvested (Mills, 2005). Since then, harvest numbers have declined due to a reduction in stocking that began in 1993 (Mills, 2005). The 2005 harvest estimate for chinook salmon was just over 69,000 fish, around 63% of the total salmon catch. Chinook salmon accounted for 1.8 million of 3.45 million salmonids stocked in Lake Ontario in 2005 (NYSDEC, 2005). Presently, there is limited natural reproduction in the tributaries of Lake Ontario and the vast majority of chinook salmon are raised in hatcheries and stocked (NYSDEC, 2005).

Size of harvested chinook salmon and growth of fish returning to hatcheries were near record lows in 2005, likely due to the declining preyfish populations (NYSDEC, 2005).

Two Chinook salmon were captured in gill net sampling in 10-15 ft (3-5 m) of water off NMP3NPP between April and September 2006 (EA, 2007). One chinook salmon was collected in impingement sampling at NMP3NPP between July and September 2006 (EA, 2007).

2.4.2.2.3.4 Coho Salmon

Similar to the Chinook salmon, the coho salmon (O. kisutch) was introduced to the Great Lakes in 1968 to control alewife and rainbow smelt populations as well as providing a sport fishery (Stewart, 2002). Coho salmon are also a Pacific Coast native ranging from central California to Alaska in North America.

Like all salmonids, coho salmon are a cold water fish, preferring temperatures between 44 to 58°F (7-14°C). Typically, terrestrial and aquatic invertebrates are the main food source for juveniles in streams while alewives and rainbow smelt are prey for coho salmon in the Lake (Smith, 1985). Also like other members of the Oncorhynchus genus, coho salmon in the Great Lakes continue to exhibit a migratory life cycle, spending one year after hatching in streams and usually 18 months in Lake Ontario before returning to spawn in rivers and streams (Smith, 1985). While there has been some documented natural reproduction in the Great Lakes, the fishery is dependent on hatchery reared fish. Spawning runs usually take place between September and October in rivers and streams over gravel (Becker, 1983).

Coho salmon in the Great Lakes are part of a multi million dollar sport fishery although their importance in that fishery is less than other salmonids. Stocking of coho salmon reached a peak in the late 1980s and early 1990s when over 800,000 were stocked in 1988 and 1992, however a management review resulted in decreased salmonid stocking in Lake Ontario. A total of 254,000 coho salmon were stocked in 2005 (NYSDEC, 2005). Harvest estimates from the 2005 New York State boat fishery survey were just over 5,600 fish or 5.2% of the total salmonid harvest. The recent harvest estimates were down from the 1980s, when harvest estimates for coho salmon were generally at or over 15,000 fish (NYSDEC, 2005).

One coho salmon was captured in gill net sampling in 10-15 ft (3-5 m) of water off NMP3NPP between April and September 2006 (EA, 2007).

2.4.2.2.3.5 Rainbow Trout

Rainbow trout were first stocked in Lake Ontario in 1876. In the 1960s, when other Pacific salmon were being introduced to control alewives, there were already naturalized spawning populations in several Lake Ontario tributaries (Smith, 1985).

The native range of rainbow trout occurs from Mexico to Alaska in North America. It has been widely introduced worldwide, however, and many areas, including the Great Lakes, now contain naturalized rainbow trout populations. Unlike most Pacific salmon, where the majority of populations are diadromous, rainbow trout stream resident and diadromous populations are both common. Lake-run fish generally spend at least one year in rearing streams prior to moving into Lake Ontario (Benkhe, 2002). These fish also will return to streams and rivers for spawning. In streams, rainbow trout generally consume aquatic and terrestrial invertebrates and fish; in the Lake, fish are the main component of their diet (Benkhe, 2002).

Spawning for rainbow trout is unusual as it occurs in the spring, usually between April and May when water temperatures range from 50 to 60°F (10-16°C) (Smith, 1985). Females dig out redds in the gravel and males compete for mates.

Rainbow trout are an important component of the salmonid sport fishery in Lake Ontario. Despite the fact that naturalized runs exist in Lake Ontario, stocking of rainbow trout has occurred regularly and increased since the 1970s. In 1972, 107,000 rainbow trout were stocked in Lake Ontario and by 1980, the number was up to 1.1 million fish (Stewart, 2002). From 1981 through 2005, between 570,000 and 1.3 million rainbow trout were stocked in the Lake (NYSDEC, 2005). In 2005, rainbow trout were the third most commonly caught salmonid with an estimated harvest of 7,557 fish (NYSDEC, 2005).

Three rainbow trout were captured in gill nets set in 10-15 ft (3-5 m) of water in April through September 2006 near NMP3NPP and two rainbow trout were captured in impingement sampling in April through August 2006 (EA 2007).

2.4.2.2.3.6 Atlantic Salmon

Atlantic salmon are a native species to Lake Ontario that was extirpated by the late 1800s by overfishing and habitat destruction. Stocking as a means of restoring self-sustaining populations and providing another species of salmon for the Lake Ontario sport fishery has maintained the presence of this fish in this portion of its historic range (Stewart, 2002).

Juvenile Atlantic salmon spend between two and three years in streams before migrating into Lake Ontario where they will spend the next one to two years. In streams, these fish consume aquatic and terrestrial invertebrates while those salmon in the lake consume fish. Spawning occurs in October and November where females dig a redd and males compete for the right to mate. Atlantic salmon are considered iteroparous, meaning adults may spawn more than once, and adults generally return to Lake Ontario after spawning (Smith, 1985) (Benkhe, 2002).

The status of Lake Ontario Atlantic salmon differs from the viewpoint of New York and Ontario. In New York, efforts to restore self sustaining populations were started in 1983 but changed in 1996 to emphasize a trophy fishery. In Ontario, however, emphasis continues to be concentrated on restoring populations to the Lake's tributaries (Stewart, 2002). Presently, harvest in US waters is small. In 2005, a catch of less than 300 fish (15 harvested) was estimated

despite the current stocking of between 50,000 to 300,000 fish between 1991 and 2005 (NYSDEC, 2005).

2.4.2.2.3.7 Brown Trout

The brown trout are a native fish of Europe and Asia that has been successfully introduced world wide. Brown trout have been introduced in all of the Great Lakes and naturally reproducing populations are present in Lake Ontario tributaries although the majority of lake fish are a result of stocking (Stewart, 2002). Similar to rainbow trout, brown trout can be migratory or can live entirely within stream, rivers, and lakes. Brown trout were typically present year round in the vicinity of NMP3NPP (NMP, 1984). In streams, brown trout feed mainly on aquatic and terrestrial invertebrates when small and fish and larger food items as they grow (Smith, 1985). Lake-run fish feed extensively on fish in the Great Lakes.

Brown trout spawn in the fall, usually October and November. Females dig redds and males compete for mates. Eggs hatch in late winter or early spring and fry grown quickly, reaching up to four inches (10 cm) by the end of the first growing season (Smith, 1985).

Brown trout are an important part of the Lake Ontario sport fishery and an estimated 22,785 fish were harvested in US waters in 2005 (NYSDEC, 2005). Stocking levels were decreased after 1993 but have remained between 350,000 and 500,000 fish since (NYSDEC, 2005).

Brown trout ranked sixth in abundance (26 captured) in gill net sampling in 10-15 ft (3-5 m) of water from April through September 2006 and fourth in abundance (6 captured) in gill net sampling in 30-35 ft (9-11 m) of water from July through September near NMP3NPP (EA, 2007).

2.4.2.2.3.8 Lake Trout

Lake trout are a native species of Lake Ontario that all but disappeared due to pollution, overfishing, increased sea lamprey predation, and Early Mortality Syndrome (EMS), a condition of thiamine deficiency afflicting the young of salmonids feeding on alewives, rainbow smelt that are species with high levels of the enzyme thiaminase (LaMP, 2006).

Lake trout are the most widely distributed salmonid in North America, ranging from New York to Alaska, including all the Great Lakes. Young lake trout feed on zooplankton, opossum shrimp (Mysis relicta), and other aquatic invertebrates until they are large enough to consume fish. Historically, the diet of adult lake trout in Lake Ontario consisted mainly of native whitefish, minnows, and sculpins but alewives and rainbow smelt became increasingly important as they increased and native fish populations declined (Behnke 2002).

Spawning occurs in November and December in the Great Lakes over substrate ranging from gravel to boulders. Lake trout do not construct redds like other salmonids, instead females release eggs over the chosen spawning substrate (Behnke, 2002). Eggs hatch in approximately four months and young remain on the spawning grounds for another month before moving into deeper water (Smith, 1985). Lake trout are a long lived species, up to 60 years or more, and do not mature until six or seven years of age (Smith, 1985).

Attempts were made to restore lake trout to Lake Ontario as early as the 1950s and 1960s. The project failed and was abandoned until sea lamprey control began in the early 1970s. Since then, the stocking of lake trout rose to more than 2 million fish annually between 1985 and 1995 until a stocking policy change reduced the numbers to 500,000 (Stewart, 2002). Naturally-spawned lake trout have been captured in NYSDEC 2005 annual survey and survival appears to be continuing to adult age. However, no new year-classes have been captured in

2005, and the ratio of length to weight in adults captured was low, indicating poor fish health. Total harvest is also down, only 4,181 fish were taken in 2005 (NYSDEC, 2005).

Two lake trout were captured in gill net sampling in 30-35 ft (9-11 m) of water from July through September 2006 near NMP3NPP (EA, 2007).

2.4.2.2.3.9 Walleye

Walleye occupy a large portion of the US and Canada, including the Great Lakes. The preferred habitat of adult walleye is in large lakes and rivers. Walleye make spawning runs up rivers or to shoals in lakes just after ice out in the spring. Spawning substrate varies, but the water is usually between 35 and 44oF (2 and 7°C) and less than four feet (1.2 m) deep (Smith, 1985). Walleye broadcast spawn eggs that are initially adhesive, attaching to any substrate they touch.

Walleye young initially feed on small crustaceans and other aquatic invertebrates. As they grow, they gradually consume larger invertebrates and fish (Smith, 1985).

In Lake Ontario, walleye are considered one of the dominant species found in nearshore waters (Stewart, 1999). Walleye are a component of the commercial catch in Canada and an important recreational sport fish in Canada and the United States. Commercial catch in Canada during 2006 was 11,203 lbs (5082 kg) (LOMU, 2006). The NYSDEC annual report in 2005 determined Walleye were the only common warm water species to show a significant increase in CPUE over 30 years of sampling although recent abundance estimates are well below the 1993 peak. In 2005, 104,258 walleye were stocked in Lake Ontario (NYSDEC, 2005).

2.4.2.2.3.10 Smallmouth Bass

Smallmouth bass (Micropterus dolomieui) are native to the north central United States and southern Canada, including all of the Great Lakes. They can be found in cool water lakes, ponds, stream and rivers although in most lakes and ponds they are generally associated with rocky shorelines (Smith, 1985). At NMPNS, smallmouth bass were captured mainly in waters between 16 and 39 ft (5 and 12 m) and almost always on the bottom (NMP, 1984). Catch rates in the summer were higher than those of the fall or spring sampling (NMP, 1984).

Spawning occurs in the spring, when water temperatures are between 62 and 65°F (17 and 18°C). Nests are built over sand or gravel by males and the young, after hatching, are guarded for up to a month (Becker, 1983). Young initially feed on invertebrates, moving to a more diverse diet that increasingly includes fish as they grow larger.

In Lake Ontario, smallmouth bass were the most commonly harvested fish between 1995 and 2003 according to the NYSDEC boat fishing census (NYSDEC, 2005). In 2005, the harvest was estimated to be 32,816 fish, down from previous years. Abundance has declined in the eastern basin of Lake Ontario over the past 30 years, although smallmouth bass continue to be the most commonly caught fish in the NYSDEC boat census (NYSDEC, 2005). Recent strong year classes and continued declines in abundance have coincided with increases in cormorant populations on Lake Ontario (NYSDEC, 2005).

Smallmouth bass ranked second in abundance (125 captured) in gill net sampling at depths of in 10-15 ft (3-5 m) from April through September 2006, and first in abundance (58 captured) in sampling at depths of 30-35 ft (9-11 m) from July through September 2006 near NMP3NPP (EA 2007). Smallmouth bass ranked fifth in abundance (160 captured) in impingement sampling between April and August 2006 at Nine Mile Point Station (EA, 2007).

2.4.2.2.3.11 White Bass

White bass (Morone chrysops) are the only temperate bass of the family Moronidae native to the Great Lakes. Its range includes a large portion of the central United States and parts of southern Canada and northern Mexico (Smith, 1985). In the Great Lakes it is mainly confined to Lakes Michigan, Erie, and Ontario. White bass are a lake species, found often in large schools (Smith, 1985).

Spawning usually occurs in May in the Great Lakes, when water temperatures range from 55 to 60 °F (13 to 16°C) and sand, gravel, cobble, or rock is the preferred spawning substrate along lake shorelines or more commonly in the lower reaches of tributaries (Becker, 1983). Eggs hatch quickly, generally within two days, and young remain in shallow water.

Young feed primarily on small invertebrates while adults are more generalist feeders (Smith, 1985) (Becker, 1983). Little information exists on the number of white bass captured in the Lake Ontario recreational fishery, and the lack of records suggests it is not a major component. White bass were a component of the US commercial fishery as late as 1996, although it only accounted for 5 lbs (2 kg) ($4). The largest take of white bass occurred in 1973 with a total harvest of 1,568 lbs (711 kg) and the typical take rarely exceeded 200 lbs (91 kg), showing that white bass have never been a large component of the Lake Ontario commercial fishery.

2.4.2.2.3.12 White Perch

White perch (Morone americana) are a native of the Atlantic Coast between New Brunswick, Canada and South Carolina. They were most likely introduced into Lake Ontario by the canal system linking the Hudson River to the Great Lakes. By 1959, seven years after being found in the Bay of Quinte, Ontario Canada, they had become a major component of the fish assembly there (Smith, 1985).

White perch spawn between May and June most commonly when waters range from 64 to 68°F (18 to 20°C). Eggs hatch in less than a week and young grow quickly, feeding on mostly small invertebrates (Smith, 1985). Adult white perch are generalist feeders, consuming invertebrates, fish eggs, and fish. At NMPNS, white perch were most abundant in waters between 16 and 30 ft (5 and 9 m) and most commonly found near the bottom (NMP, 1984).

In the United States, commercial landings between 1971 and 1987 ranged from 18,763 lbs to 84,989 lbs (8,511 to 38,550 kg) (NMFS, 2008). Landings between 1988 and 1994 declined to between 11,000 lbs and 20,000 lbs (4,990 and 9,072 kg) and after 1994, catches dropped rapidly. The final recorded white perch commercial landing in US waters was 442 lbs (191 kg) for $221 in 2001 (NMFS, 2008). White perch continues to be fished commercially in Canada where 9,992 lbs (4,532 kg) were landed in 2006 (LOMU, 2006). Overall, white perch abundance has declined in Lake Ontario since the late 1970s. Slight increases have been seen during the in the eastern basin since 1995, but the population is still a much reduced compared with the abundances from the 1970s (NYSDEC, 2005).

Four white perch were captured in gill net sampling at depths of in 10-15 ft (3-5 m) from April through September 2006, and one white perch was captured in sampling at depths of 30-35 ft (9-11 m) from July through September 2006 near NMP3NPP (EA, 2007).

2.4.2.2.4 Keystone/Indicator Species

Two species of fish, the alewife and rainbow smelt are important prey components in the pelagic food web of Lake Ontario. Additionally, the abundance of these species may directly affect the abundance of other species and the health of the sport fishery. Currently, both

species appear to be in low abundance and stressed by increased predation and changing Lake conditions.

2.4.2.2.4.1 Alewife

Alewives may be a native component of the Lake Ontario aquatic fauna as there were no manmade barriers between the Lake and the Atlantic Coast. Whether this is true or whether the alewife was introduced via the Erie Canal in 1819, the loss of major predators and the overfishing of major competitors allowed the population of alewives to increase dramatically in Lake Ontario (Smith, 1985). Alewives feed on various zooplankton, eggs, and small aquatic invertebrates. This includes the planktonic larvae of yellow perch and other fish. Sampling between 1973 and 1981 in the vicinity of NMP3NPP showed alewives were most abundant in the spring and summer, where they utilize the shoreline during the spawning season (NMP, 1984). Spawning occurs between June and July in Lake Ontario over various substrates in shallow water.

Uncontrolled populations of alewives in the Great Lakes resulted massive die-offs and Lake Ontario shorelines were occasionally covered in dead fish. In an attempt to control populations, Pacific salmon were introduced in the late 1960s. These stockings increased as it became valuable as a sport fishery until in the late 1980s and early 1990s populations of alewives decreased dramatically. Salmon stockings were decreased, but the other changes in Lake Ontario are also affecting the population of alewives. The continuing oligotrophication of the Lake has led to a decrease in the amount of zooplankton biomass and abundance, and the introduction of Dreissena spp. has shifted more of the nutrients potentially available to pelagic zooplankton to the benthic zone (Mills, 2005).

The most recent abundance reports in 2005 suggest that populations of alewives are currently 57% lower than the long term mean (NYSDEC, 2005). While large year classes (as in the 2005 class) may increase abundance temporarily, changing lake conditions and food availability will most likely keep populations of alewives at lower levels than in the 1980s and 1990s (NYSDEC, 2005). Decreased abundance in alewives has led to poor condition in many salmonids that depend on them as a primary food source. However, it is also thought that the decrease in abundance of alewives has led to the reemergence in abundance of other fish that may have been competitors. It may also be responsible for the increase in species whose larvae are heavily preyed on by alewives (NYSDEC, 2005).

Alewife were the most abundant fish (252 captured) in gill net sampling at depths of in 10-15 ft (3-5 m) from April through September 2006 near NMP3NPP (EA, 2007). Only three were captured in gill net sampling at depths of 30-35 ft (9-11 m) from July through September 2006. Alewife ranked first in abundance in impingement sampling at NMP3NPP (2,584 captured) in April through August 2006 (EA, 2007).

2.4.2.2.4.2 Rainbow Smelt

Rainbow smelt are an anadromous fish indigenous to the East Coast from Canada to the Mid-Atlantic States including some landlocked populations in New England and Canada. They were introduced to the Great Lakes region several times before becoming established in the early 20th century. Rainbow smelt may have been a rare part of the native species assemblage of Lake Ontario but the increase in abundant populations occurred with the decline of native Coregonidae spp. (Smith, 1985).

Spawning occurs in February or March when water temperatures are between 40 and 48°F (4 and 9°C). Smelt run up streams and rivers from Lake Ontario to spawning grounds at night,

usually returning to the lake during daylight hours (Smith, 1985). Eggs develop in about 30 days and fry are carried downstream. Young smelt feed on algae and small invertebrates and eventually on larger crustaceans or even fish as they grow larger (Becker, 1983).

Smelt are usually found at depths of 59 to 85 ft (18 to 26 m) in the water column unless moving inshore during the spawning season (Becker, 1983). During sampling at NMPNS, rainbow smelt were abundant in surface and bottom gillnets and generally found throughout the waters in the vicinity (NMP, 1984).

A commercial fishery for rainbow smelt began in the 1950s, soon after the establishment of large spawning runs. The last recorded commercial catch in US waters consisted of one lb (0.5 kg) in 1993 and 14 lbs (6 kg) in 1982. The last substantial catch occurred in 1979 when 10,400 lbs (4,717 kg) worth $2,288 was landed (NMFS, 2008). Along with alewives, rainbow smelt are also an important food source for the warm and cold water sport fishery. Year class strength usually alternates between weak and strong in Lake Ontario and the smelt's ability to recover from low abundance makes it unlikely that they will suffer a population collapse (NYSDEC, 2005). The lack of larger adults in the population does suggest that there is significant pressure from stocked and naturally reproducing predators (NYSDEC, 2005).

Rainbow smelt ranked sixth in abundance (81 captured) in impingement sampling at NMP3NPP in April through August 2006 (EA, 2007).

2.4.2.2.4.3 American Eel

The American eel is a catadromous species, living in fresh or brackish water until maturity and then migrating to the Sargasso Sea for spawning. After hatching, young eels migrate back to freshwater habitats in Greenland, North, and South America over the course of a year. Generally, males remain close to coastal areas, often in brackish water while females range far inland into the United States and Canada, including the Great Lakes. The entire eel population in Lake Ontario and its tributaries consists of females. They will remain in freshwater for as long as 14 years before leaving (LaMP, 2006).

The American eel lives a variety of habitats including estuaries, headwater streams, rivers, ponds and lakes. The diet of a small eel consists mainly of invertebrates while a larger eel consumes fish and large crustaceans (Smith, 1985)

In Lake Ontario and its tributaries, the American eel was abundant and a top predator of the nearshore food web (LaMP, 2006). The eel population in Lake Ontario went from high numbers from the 1960s through the 1980s to very low in the 1990s and it is thought that recruitment to the St. Lawrence River and Lake Ontario had almost ceased (Mills, 2005). The 2006 report from the LOMU stated that the abundance of American eel migrating up the St. Lawrence River was 2% of the record highs in the 1980s. While the causes of this abrupt decline are uncertain, over-fishing, dams, habitat degradation, and climate change are all likely to be contributors (Mills, 2005). While once an important component of the United States commercial fishery in Lake Ontario, the last recorded catch was 1,937 lbs (879 kg) worth $1,294.00 in 1996 (NMFS, 2008). The Canadian commercial fishery was closed in 2004 and the sport fishery in 2005 (LOMU, 2006).

The Americian eel is considered an important component of the Lake Ontario biodiversity by LaMP although despite current regional population declines, it was not determined necessary to provide federal protection under the Endangered Species Act (USFWS, 2007).

One American eel was captured in impingement sampling at NMP3NPP in April through August 2006 (EA, 2007).

2.4.2.2.5 Harvested Invertebrates

No invertebrates are harvested in the vicinity of NMP3NPP.

2.4.2.2.6 Nuisance Species

2.4.2.2.6.1 Zebra Mussels

Zebra mussels (Dreissena polymorpha) were first discovered in Lake Ontario in 1989. Native to the Caspian Sea and Ural River, this species was most likely introduced to the Great Lakes by the discharge of ballast water containing adults or larvae (Benson, 2008a). Expansion in the Great Lakes occurred quickly as zebra mussels were spread through inadvertent transportation by boats and barges as well as through the planktonic veliger stage that drifts in the Lake's pelagic zone before sinking and attaching to hard substrate (Benson, 2008a).

Zebra mussels affect Lake Ontario as an efficient grazer, decreasing the amount of phytoplankton in the water and shifting nutrients to the benthic zone (NMP, 2004). Additionally, these mussels can cover all hard bottom substrates, in densities of up to 7.53 x 106 per ft^2 (700,000 per m^2)(Benson, 2008a). The expansion of these mussels is also associated with the decline of many native benthic mollusks and crustaceans, most notably the amphipod Diporea.

Economically, zebra mussels have had a negative impact. It is estimated that Dreissenid mussels have cause an estimated $500 million a year in economic damages in the Great Lakes (LaMP, 2006). Zebra mussels can colonize the inside of intake pipes, constricting the diameter by two thirds and decreasing pumping ability (Benson, 2008a).

2.4.2.2.6.2 Quagga Mussels

Quagga mussels (Dreissena bugensis) are native to the Dneiper River drainage and were introduced to the Great Lakes by ballast discharge containing adults or larvae (Benson, 2008b). Quagga mussel colonization in the Great Lakes began in the early 1990s where, similar to zebra mussels, they spread quickly through transportation of adults and drifting veligers (Benson, 2008b).

Unlike zebra mussels, the quagga mussel has the ability to colonize any substrate and additionally have been found in much deeper water. Quagga mussels have now replaced zebra mussels in the majority of benthic areas in Lake Ontario (Mills, 2006) and have been found in waters over 200 ft (61 m) deep, further endangering the remaining Diporea in their last refuge in the deepest regions of the Lake.

The bio-fouling capabilities of quagga mussels appear to be comparable to that of zebra mussels.

2.4.2.2.7 Other Important Resources

In addition to the fish and invertebrates already mentioned, submerged aquatic vegetation and plankton are considered important resources in the project area.

2.4.2.2.7.1 Submerged Aquatic Vegetation

The eutrophic conditions of the 1960s and 1970s led to increased growth of the filamentous green algae Cladophera. Large mats of dead algae washed up and rotted on shorelines causing sanitary and aesthetic problems (NYS, 2006). Reductions in nutrient loading, specifically phosphorus, led to a 50% decline in Cladophera and phytoplankton biomass between 1972 and 1982 (NYS, 2006).

The effects of continued oligotrophication of Lake Ontario were amplified by the introduced dreissenid mussels, decreasing available nutrients and increasing light penetration into the water column (NMP, 2004). These conditions have led to resurgence in submerged aquatic vegetation, especially Cladophera, in nearshore and embayment areas. Two embayments in Lake Ontario, Sodus and Chaumont Bay, saw increases of 42% and 200% in submerged aquatic vegetation (SAV) between 1972 and 2002 (Zhu, 2007).

The importance of SAV in Lake Ontario is as an indicator and a resource. Although algal blooms in Lake Ontario are a sign of nutrient loading, SAV is also an important habitat resource in nearshore areas. Submerged aquatic vegetation provides protection and nursery areas for aquatic invertebrates and fish (NMP, 2004).

Figure 2.4-4 shows the location of the proposed intake and discharge facilities where the SAV and general aquatic habitat were evaluated. Although Cladophora was present, no vascular SAV was identified in the areas surrounding the proposed intake and discharge sites during dive surveys conducted by Normandeau Associates, Inc during June 2008 (Normandeau, 2008).

2.4.2.2.7.2 Plankton (Phytoplankton and Zooplankton)

The term plankton refers to organisms of the open water that drift on currents. Phytoplankton are plants or algae that manufacture their own food using nutrients in the water. Zooplankton are animals that generally consume phytoplankton. A small but significant component of the plankton consists of bacterial cells.

In Lake Ontario, plankton provides the food supply for most fish directly or indirectly. Plankton are short-lived and highly responsive to both positive and negative environmental changes. As such, plankton are useful indicators of overall environmental quality. Phytoplankton abundance is a means of determining the overall productivity of the Lake and of nutrient loading while zooplankton are predictors of near-term fisheries abundance. Most species of fish rely on zooplankton as either juveniles or adults. The size of zooplankton and their abundance can also be used as an indication of prey fish abundance.

The overall of future status of phytoplankton and zooplankton in Lake Ontario is difficult to determine as invasive species and changing water quality parameters continues to alter the ecosystem, determining the carrying capacity and composition of the plankton community. Research presented in LaMP, LOLA, and the GLFC show the following trends in the plankton community of Lake Ontario.

Overall primary production is decreasing as Lake Ontario is undergoing the process of oligotrophication and introduced zebra and quagga mussels continue to shift nutrients to the benthic zone. Seasonal photosynthesis declined by 30% between 1972 and 1992.

- The phytoplankton community in the 1990s consisted mainly of species generally associated with oligotrophic conditions. These have replaced the previous community of phytoplankton from the 1970s that was associated with eutrophic conditions.

- In some inshore areas studied in 1998, zebra mussel filtering was depleting phytoplankton by as much as 90% and that inedible species of phytoplankton were becoming a greater component of the community.

- During the 1970s under more eutrophic conditions, netplankton (> 7.9×10^{-4} in) (>20 µm) were presumed to be the main contributors to primary production. In the 1990s, the majority of primary production had shifted to nanoplankton (7.9×10^{-4} - 7.9×10^{-5} in) (2-20 µm) and picoplankton (< 7.9×10^{-5} in) (<2 µm).

- The microbial loop may be becoming a more important means of energy transfer to zooplankton as overall productivity and production of phytoplankton of the Lake declines with reduced nutrient loads.

- Zooplankton abundance has declined from high levels in the early 1980s to lower, stable levels from the late 1980s through 1995. Abundance measured in 2003 was the lowest on record for this period. This limits the capacity of the offshore fishery.

- Exotic zooplankton Bythotrephes longimanus and Cercopangis pengoi are increasing in Lake Ontario. The effect that these zooplankton predators will have on the Lake Ontario food web is currently unknown.

Relationships among various components of the plankton are complex, and difficult to predict. Phytoplankton productivity is tied to the nutrient loading but high or low zooplankton abundance could be a result of nutrient levels or predator abundance. Offshore and coastal areas of Lake Ontario also display differences in ecosystem dynamics. While conditions in offshore areas of Lake Ontario continue to become oligotrophic and water quality improves, nearshore areas continue to be negatively affected by human activities (Mills, 2006). Continuing environmental changes are likely to affect the composition and abundance of plankton in Lake Ontario. An increased human population, potentially leading to greater nutrient loading, erosion, and habitat disturbance along the shoreline of Lake Ontario, as well as the effect created by invasive species and the continuing oligotrophication of the Lake are likely to be major influences on the future of the ecosystem.

2.4.2.2.7.3 Benthic Community

A scientific dive team assessed the benthic community at the proposed locations of the discharges and the intake through still photography and quantitative suction sampling in June 2008. At each of the discharge, intake, and a references locations, the dive team swam eight 50-foot (15.2 m) transects radially out from the central location. At each location, quantitative suction samples were taken at the origin of the transects, and at 25 feet (7.6 m) and 50 feet (15.2 m) along each of the transects for a total of 17 samples at each location. Benthic samples were collected divers by scraping all the material from a 0.25 m2 quadrat placed on the substrate and suctioning the material with an air lift through a 0.03 inch (0.79 mm) mesh bag. Benthic organisms collected were identified to the lower practical taxon.

As the divers swam along the transects they stopped every 10 feet (3.0 m) and recorded their observations as the presence of SAV, aquatic invertebrates, and fish. Still photographs were taken of the substrate at the origin of the transects and at 10 feet (3.0 m), 20 feet (6.1 m) and 50 feet (15.2 m) for a total of 25 photographs are each location.

The quagga mussel (Dreissena bugensis) was the dominant benthic organism at the intake and discharge locations and a nearby reference site. Quagga mussels made up 78% of the organism at the reference site, 69% at Intake A, 70% at Intake B, and 87% at the discharge site. Two

oligochaete taxa, Limnodrilus sp., and Nais bretscheri, made contributions of less than 0.4% to 9% of the total taxa. The midge larvae, Pseudochironomus sp. contributed 1% to 6% to the total species composition. These benthic taxa are generally considered to be pollution tolerant organisms, and are not indicators of any habitat of significant value. Observations by divers during the collection of these samples indicated that the round goby (Neogobius melanostomus) was the dominant fish species encountered. The round goby is an introduced invasive species in the Great Lakes and is native to the Caspian and Black Seas.

2.4.2.2.8 Habitat Importance

Lakeview Creek provides habitat for fish and aquatic insects in the vicinity of NMPNS. The stream was evaluated as providing optimal/sub-optimal habitat for the species residing in Lakeview Creek (Table 2.4-6). The fish species identified in Lakeview Creek and the on-site ponds are common and not protected as threatened or endangered by the federal or state government, with the exception of rainbow trout which are regulated on the state level as a sport fish. Rainbow trout is an important species due to its value as a recreational sport fish and the presence of YOY and parr within Lakeview Creek emphasize the potential of this stream as nursery and juvenile feeding habitat.

Lake Ontario is an important habitat for many aquatic species some of which are protected by the State of New York. However, the FWS determined that no critical habitat existed in the vicinity of NMP3NPP and only a waterfowl overwintering area was listed by the State of New York. Additionally, the only federal or state protected species determined to be potentially present in the vicinity of NMP3NPP were most likely transient individuals. Biological sampling in the vicinity of NMP3NPP has not captured of any protected species since a single redfin shiner in 1975.

The impact on unprotected important species is likely to be small. The only important spawning species likely to be present are alewives, which are known to move into the nearshore areas off NMP3NPP in the spring. Relatively few of the commercial or harvested species residing in Lake Ontario are impinged on a yearly basis, suggesting that there is not a large number of these species residing in the area. Impingement and entrainment records show that the alewife, three spine stickleback, and rainbow smelt make up the majority of the species captured during sampling and that this is generally a minor component of the overall population.

2.4.2.2.8.1 Other Preexisting Environmental Stresses

The Lake Ontario ecosystem is threatened by pollution and habitat degradation, introduced species, and artificial lake level management. While pollution control and decreased phosphorus levels have decreased offshore, nutrient loading from erosion, agriculture, and population centers continue to affect nearshore areas. Additionally, introduced vertebrates and invertebrates continue to expand in Lake Ontario, affecting the structure of the food web and nutrient distribution. As these changes are ongoing, it is difficult to determine the extent of change and ultimately how it will affect Lake Ontario's aquatic ecosystem.

Section 2.4.2.1.2.3 includes information on the types of stresses that organisms have experienced.

Lakeview Creek has been determined to be free of habitat constraints and has a viable, taxonomically rich macroinvertebrate community

2.4.2.3 Transmission and Access Corridors

New transmission lines and access corridors from NMP3NPP will connect with the existing transmission infrastructure in place via three new lines. These lines will originate from a new switchyard located south of Lake Road and west of the existing transmission lines. While the new transmission lines and access corridor will cross designated wetlands, it is not projected to have any impact on aquatic species as the cross designated wetlands only contain surface water seasonally. These conditions are not optimal habitat for fish and aquatic macroinvertebrates. The functions and values associated with these wetlands included wildlife habitat, but nothing indicating that the construction, operation and maintenance of the transmission system would affect aquatic species.

2.4.3 REFERENCES

Barbour, 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. 1999. Barbour, M.T., J.Gerritsen, B.D. Snyder, and J.B. Stribling.

Becker, 1983. The Fishes of Wisconsin. The University of Wisconsin Press. 1983, 1053 pages. G.C. Becker. Website: http://www.seagrant.wisc.edu/greatlakesfish/becker.html Date accessed: Feb. 22, 2008.

Behnke, 2002. Trout and Salmon of North America. The Free Press. New York, New York. 2002, 359 pages. R.J. Behnke.

Benson, 2008a. Dreissena polymorpha. USGS Nonindigenous Aquatic Species Database, Gainsville, FL. 2008. A.J. Benson, and D. Raikow. Website: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=5. Date accessed: Mar. 17, 2008.

Benson, 2008b. Dreissena rostriformis bugensis. USGS Nonindigenous Aquatic Species Database, Gainsville, FL. 2008. Benson A.J., M.M. Richerson and E. Maynard. Website: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=95. Date accessed: Mar. 17, 2008.

CFR, 2005. Title 50, Code of Federal Regulations, Endangered Species Act, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12, November 2005

CFR, 2007. Title 50, Code of Federal Regulations, Part 600, Magnuson-Stevens Act Provisions, Subpart 10, Definitions, 2007.

Connelly, 1997. New York Statewide Angler Survey 1996. Report 1: Angler Effort and Expenditures. NYSDEC. 1997. 108 p. in Mills, 2005. A Synthesis of Ecological and Fish Community Changes in Lake Ontario, 1970-2000. Great Lakes Fish. Comm. Tech.Rep. 67. 2005. E.L Mills, J.M. Casselman, R. Dermott, J.D. Fitzsimons, G. Gal, K.T. Holeck, J.A. Hoyle, O.E. Johannsson, B.F. Lantry, J.C. Makarewicz, E.S. Millard, I.F. Munawar, M. Munawar, R. O'Gorman, R.W. Owens, L.G. Rudstam, T. Schaner, and T.J. Stewart.

EA, 2007. Entrainment, Impingement, Ichthyoplankton and Gill Net Sampling at Nine Mile Point Nuclear Station. Interim Report. Prepared for Constellation Generation Group. 2007. EA Engineering, Science, and Technology Inc.

ENSR, 2008. Wetland Investigation Report: Nine Mile Point Facility. Oswego, New York. April, 2008. ENSR Corporation.

Fuller, 2008. Oncorhynchus tshawytscha. USGS Non Indigenous Aquatic Species Database, Gainesville, FL. 2008. P. Fuller, and G. Jacobs. Website:http://nas.er.usgs.gov/queries/GreatLakes/SpeciesInfo.asp?NoCache=3%2F18%2F2008+1%3A41%3A17+PM&SpeciesID=920&State=&HUCNumber=4150200.

Kraft, 2006. Inland Fishes of New York (online). Version 4.0. Department of Natural Resources, Cornell University, and the New York State Department of Natural Resources. 2006. C.E. Kraft, D.M. Carlson, and M. Carlson. Website: http://fish.dnr.cornell.edu/nyfish/fish.html#speciesdescription, Date accessed: Feb. 22, 2008.

LaMP, 2006. Lake Ontario Lakewide Management Plan Status, U.S. Environmental Protection Agency, Website: http://www.epa.gov/glnpo/lakeont/2006/LO2006.pdf, Date accessed: April, 2006.

LOMU, 2006. Lake Ontario Fish Communities and Fisheries: 2006 Annual Report of the Lake Ontario Management Unit. 2006, Chapter 4, pages 37-42.

Mills, 2005. A Synthesis of Ecological and Fish Community Changes in Lake Ontario, 1970-2000. Great Lakes Fish. Comm. Tech.Rep. 67. 2005. E.L Mills, J.M. Casselman, R. Dermott, J.D. Fitzsimons, G. Gal, K.T. Holeck, J.A. Hoyle, O.E. Johannsson, B.F. Lantry, J.C. Makarewicz, E.S. Millard, I.F. Munawar, M. Munawar, R. O'Gorman, R.W. Owens, L.G. Rudstam, T. Schaner, and T.J. Stewart.

Mills, 2006. Status of the Lake Ontario Food Web in a Changing Ecosystem: The 2003 Lake Ontario Lower Aquatic Food Web Assessment (LOLA). Final Report for Developing the Next Generation of Great Lakes Lower Food Web Assessment Tools. 2006. E.L. Mills, R. Dermont, M. Munawar, S. Millard, O. Hohannsson, and L. Rudstam. Website accessed: http://www.epa.gov/glnpo/lakeont/lola/index.html.

NMFS, 2008. United States Lake Ontario Commercial Fish Landings: 1971-2005. 2008. National Marine Fisheries Service. Website: http://www.st.nmfs.noaa.gov/pls/webpls/MF_GL_LANDINGS.RESULTS. Date accessed: Feb. 18, 2008.

NMP, 1984. Nine Mile Point Unit 2 ER-OLS. Niagara Mohawk. March, 1984.

NMP, 2004. Applicant's Environmental Report - Operating License Renewal Stage. Nine Mile Point Nuclear Station. Docket nos. 50-220 and 50-410. License nos. DPR-63 and NPF-69.

NRC, 1999. Standard Review Plans for Environmental Reviews for Nuclear Power Plants, NUREG-1555, Nuclear Regulatory Commission, October 1999.

NRC, 2008. Generic Environmental Impact Statement for the License Renewal of Nuclear Plants, Supplement 31 Regarding James A. Fitzpatrick Nuclear Power Plant. Jan, 2008.

NYSDEC, 1999. New York State Amphibian and Reptile Atlas Project [Internet]1990 - 1998, New York Department of Environmental Conservation, Website: http://www.dec.ny.gov/animals/7140.html, Date Accessed April 22, 2008.

NYSDEC, 2006. New York State Department of Environmental Conservation. 2005. Lake Ontario Annual Report, New York Department of Environmental Conservation.

NYSDEC, 2007. New York State Breeding Bird Atlas [Internet]. 1980 - 1985. Release 1.0. Albany, updated 2007 Jun 6, New York Department of Environmental Conservation, Website: http://www.dec.ny.gov/animals/7312.html Date Accessed May14, 2008.

NYSDEC, 2007b. New York State Breeding Bird Atlas 2000 [Internet]. 2000 - 2005. Release 1.0. Albany, updated 2007 Jun 11, New York Department of Environmental Conservation, Website: http://www.dec.ny.gov/animals/7312.html, Date Accessed May 12, 2008.

NYSDEC, 2007c. 2006 New York State Deer Take by Town and County, New York Department of Environmental Conservation.

NYSDEC, 2007d. 2006 New York State Deer Take by Wildlife Management Unit, New York Department of Environmental Conservation.

NYSDEC, 2008a. List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State, New York Department of Environmental Conservation, Website: http://www.dec.ny.gov/animals/7494.html, Date accessed: Feb. 28, 2008.

NYSDEC, 2008b. Letter from New York Natural Heritage Program to George Wrobel of Unistar Nuclear Energy, dated May, 14, 2008.

Smith, 1985. The Inland Fishes of New York State. New York State Department of Environmental Conservation. 1985, 522 pages. C.L. Smith.

Stewart, 1999. Fish-community Objectives for Lake Ontario. Great Lakes Fish. Comm. Spec. Pub. 99-1. 1999, 56 pages. T.J. Stewart, R.E. Lange, S.D. Orsatti, C.P. Schneider, A. Mathers, and M.E. Daniels.

Stewart, 2002. Lake Ontario Salmonid Introductions 1970 to 1999: Stocking, Fishery, and Fish Community Influences. 2002. T.J. Stewart, and T. Schaner. Web site: http://www.glfc.org/lakecom/loc/mgmt_unit/01_ch12.pdf.

USACE, 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1, U.S. Army Corps of Engineers (USACE) Waterways Experiment Station. Vicksburg, MS.

USFWS, 1979. Classification of Wetlands and Deepwater Habitats of the United States, FWA/OBS-79/31. Cowardin, L.M., Carter, V., Golet, F.D., and LaRoe, E.T.

USFWS, 2007. United States Fish and Wildlife Service. 2007. News Release: Endangered Species Act Protection for American Eel Not Needed. Web address: http://www.fws.gov/news/NewsReleases/showNews.cfm?newsId=73C49E66-CA1E-2EC5-22EBD499912EC3E3. Accessed Mar. 27, 2008.

USFWS, 2008. Oswego County Federally Listed Endangered and Threatened Species and Candidate Species. Website: http://www.fws.gov/northeast/nyfo/es/CountyLists/OswegoDec2006.htm Date accessed: Feb. 28, 2008.

USEPA, 1989. United States Environmental Protection Agency (US EPA). 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish. US EPA (EPA.444-89-001), Washington, DC.

USEPA 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Zhu, 2007. Quantification of Historical Changes of Submerged Aquatic Vegetation Cover in Two Bays of Lake Ontario with Three Complementary Methods. J. Great Lakes Res. Volume 33, 2007, pages122-135. G. Zhu, D.G. Fitzgerald, S.B. Hoskins, L.G. Rudstam, C.M. Mayer, and E.L. Mills.

Table 2.4-1—NMP3NPP Terrestrial Resources Study Area - Vegetation Cover Type

Vegetation Cover Type	Number of Areas On-site	Total Cover Type Area On-site	
		Acres	Hectares
Uplands			
Developed	6	32.4	13.1
Lawn	7	51.6	20.9
Infrequent Mowed Area	4	12.7	5.1
Old Field	6	114.1	46.2
Successional Hardwood Forest	14	91.3	37.0
Beech-Maple Mesic Forest	10	101.7	41.2
Beech-Maple Rich Mesic Forest	1	8.6	3.5
Total Uplands		**412.4**	**167.0**
Wetlands			
Forested (PF01)*	10	113.0	45.7
Scrub-shrub (PSS1)	8	30.2	12.2
Forested/Scrub-shrub (PF01/PSS1)	2	5.3	2.1
Emergent Persistent (PEM1)	4	8.7	3.5
Open Water (POW)	1	0.6	0.3
Open Water/Emergent Non-persistent (POW/PEM2)	1	0.1	0.1
Uncharacterized Wetlands	8	10.3	4.2
Total Wetlands		**168.2**	**68.1**
Unclassified Habitat			
Total Unclassified Habitat	1	**29.2**	**11.8**

Notes:

Locations of vegetation cover types are shown on Figure 2.4-1.
* - Includes an approximately 0.1 acre (0.04 hectare) forested vernal pool.

Table 2.4-2—Important Terrestrial Species and Habitats

(Page 1 of 3)

Name	CommonName	Description	Location	Rationale
		Mammals		
Ododocoileus virginianus	White-tailed deer	Large, herbivorous mammal. Favors forest edge habitat. Game species.	Observed in all habitats in the NMP3NPP site area. Likely to common in the surrounding landscape	Recreationally valuable species
		Birds		
Podilymbus podiceps	Pie-billed Grebe			State species of special concern
Pandion haliaetus	Osprey	Picivorous raptor, known to build nests on man-made structures, including transmission line towers.	Active nest on transmission line tower near southern boundary of site.	State species of special concern
Vermivora chrysoptera	Golden-winged Warbler			State species of special concern
Ammodramus savannerum	Grasshopper Sparrow			State species of special concern
		Reptiles and Amphibians		
Rana pipiens	Northern leopard frog	Amphibian, overwinters and breeds in quite, permanent water bodies, ranges away from water in summer. Declining throughout its range.	Observed in all wetland areas that appear to hold water throughout the year	Biological indicator
Rana palustris	Pickerel frog	Amphibian, overwinters and breeds in quite, permanent water bodies, ranges away from water in summer. Common throughout its range	Observed in all wetland areas that appear to hold water throughout the year	Biological indicator
		Insects		
None				
		Plants		
Fraxinus pennsylvanica	Green Ash	Deciduous tree	Dominant tree in wetlands	Ecosystem Critical
Acer Saccharum	Sugar Maple	Deciduous tree	Dominant tree in successional uplands and in Beech-Maple Forest and in Beech-Maple Rich Mesic Forest	Ecosystem Critical, Biological Indicator, Commercially Valuable
Fagus grandifolia	American Beech	Deciduous tree	Dominant tree in successional uplands and in Beech-Maple Forest and in Beech-Maple Rich Mesic Forest	Ecosystem Critical, Biological Indicator
Cornus amomum	Silky Dogwood	Deciduous shrub	Common in understory in wetlands	Ecosystem Critical

Table 2.4-2—Important Terrestrial Species and Habitats

(Page 2 of 3)

Name	CommonName	Description	Location	Rationale
Toxicodendron radicans	Poison Ivy	Woody vine/ground cover	Common ground cover and vine throughout the NMP3NPP	Ecosystem Critical
Trillium	Trillium	Herbaceous plant	Scattered in Beech-Maple Rich Mesic Forest	State Protected, Biological Indicator
Actaea	Baneberry	Herbaceous plant	Scattered in Beech-Maple Rich Mesic Forest	State Protected, Biological Indicator
Diphasiastrum	Ground Cedar	Clubmoss/Lycopod	One patch observed in exisiting transmission line corridor	State Protected
Osmunda cinnamomea	Cinnamon Fern	Fern	Scattered in wetland areas	State Protected, Biological Indicator
Osmunda claytoniana	Interrupted Fern	Fern	Scattered in wetland areas	State Protected, Biological Indicator
Osmunda regalis	Royal Fern	Fern	Scattered in wetland areas	State Protected, Biological Indicator
Polystichum acrostichoides	Christmas Fern	Fern	Scattered in Beech-Maple Rich Mesic Forest	State Protected, Biological Indicator
Athyrium filix-femina	Lady Fern	Fern	Scattered in Beech-Maple Rich Mesic Forest	State Protected, Biological Indicator
Dryopteris spinulosa complex	Woodfern	Fern	Scattered in upland areas	State Protected, Biological Indicator
Thelypteris palustris	Marsh Fern	Fern	Few observed in exisiting transmission line corridor	State Protected, Biological Indicator
		Habitats		
Forest Wetlands		Dominated by green ash, with red maple and hawthorn.	Throughout NMP3NPP site	Wetland, some parts regulated by NYDEC
Scrub-shrub Wetlands		Composed of a mix of alder, dogwood species, high bush blue berry, winterberry holly, willow species, and European buckthorn.	Associated predominately with the existing transmission line corridor, likely as a result of vegetation management practices	Wetland some parts regulated by NYDEC
Open Water-Emergent Wetlands		Dominated by Common Reed.	Located along western edge of existing transmission line corridor	Wetland some parts regulated by NYDEC
NYDEC Regulated Wetlands Complex		Diverse wetland with forest, shrub scrub and open water habitats	Directly adjacent to eastern boundary of NMP3NPP	Wetland, regulated by NYDEC

Table 2.4-2—Important Terrestrial Species and Habitats

(Page 3 of 3)

Name	CommonName	Description	Location	Rationale
Teal Marsh		Predominantly scrub-shrub and forested wetland, with two intermittent streams, scattered shallow water areas, small wooded islands, and a highly irregular edge.	3.5 miles (5.6 km) west of NMP3NPP on the Lake Ontario shore	Wetland; designated as a Significant Coastal Fish and Wildlife Habitat by the NY DOS Division of Coastal Resources
Lake Ontario, Near-shore Open Water		An open water area important to non-breeding waterfowl, hosting winter concentrations of diving ducks.	The near-shore area of Lake Ontario between the Salmon River and the City of Oswego	NYSDEC designated waterfowl habitat.
A Rich Shrub Fen		a shrub fen vegetation supported by a calcareous ground water sources	Approximately four miles south of the NMP3NPP site and approximately 0.5 miles (0.8 km) west of the transmission corridor	Recognized by the NY NHP as a Rare Natural Community

Table 2.4-3—Special status species know to occur in Oswego County, or noted as a species of concern in other NRC sponsored documents describing the environmental conditions in and around Nine Mile Point

(Page 1 of 6)

Species	Status[1]	Habitat Requirements	Extant or Historic Occurrences in NMP3NPP Vicinity	Habitat Suitability on NMP3NPP site	Surveys Conducted? Why or Why Not?	Likelihood of Occurrence Determination
Vertebrates						
Indiana Bat Myotis sodalis	F-E S-E	Mature trees with loose bark for roosting, near forest openings for foraging, caves or old mines for hibernation.		Low - NMP3NPP site is dominated by second growth forest with few overly mature trees. There are no known hibernacula in Oswego County.	No, limited amount of suitable roosting habitat.	Low
Piping Plover Charadrius melodus	F-E S-E	Open shorelines with wide sandy beach areas for nesting and foraging.		Low - shore line of project area is narrow and armored with cobbles.	No, no suitable habitat on-site.	Low
Bog Turtle Clemmys muhlenbergii	F-T S-E	Wetlands with cool, shallow, slow-moving water, soft muck soils, and tussock-forming vegetation; usually open, early successional habitats such as wet meadows or open calcareous bogs dominated by sedges or sphagnum moss.		Low - most on-site wetlands are dominated by dense woody vegetation and the few emergent wetlands are dominated by phragmites.	No, little or no suitable habitat on-site.	Low
Golden Eagle Aquila chrysaetos	S-E	Extensive unforested landscapes fro hunting; prefers cliffs for nesting.		Low - but open areas in powerline corridor could provide temporary foraging in migration.	No - present in migration only, if at all.	Low
Peregrine Falcon Falco peregrinus	S-E	Cliffs or tall, main-made structures for nesting; habitats with large bird populations for hunting.		Low - foraging opportunities are extensive, but nesting opportunities restricted to current power plant facilities, which likely lack suitable nest sites and/or are to loud/active to provide a suitable nesting site.	No - present in migration only, if at all.	Low
Loggerhead Shrike Lanius ludovicianus	S-E	Grasslands interspersed with scattered trees and shrubs that provide nesting and perching.		Moderate - powerline corridor provides suitable, but not ideal habitat, due to the amount of shrubby cover present.	Yes - general breeding season bird surveys conducted.	Low
Black Tern Childonias niger	S-E	Wetlands, such as lake shallows and marshy ponds, with a high interspersion of open water and emergent vegetation.		On-site wetlands are unsuitable, but the large wetland complex to the east of the transmission corridor may provide suitable habitat.	Yes - general breeding season bird surveys conducted.	Low

Table 2.4-3—Special status species know to occur in Oswego County, or noted as a species of concern in other NRC sponsored documents describing the environmental conditions in and around Nine Mile Point

(Page 2 of 6)

Species	Status[1]	Habitat Requirements	Extant or Historic Occurrences in NMP3NPP Vicinity	Habitat Suitability on NMP3NPP site	Surveys Conducted? Why or Why Not?	Likelihood of Occurrence Determination
Short-eared Owl Asio flammeus	S-E	Extensive unforested landscapes fro hunting and nesting.		Low - open habitats on site do not meet size requirements; powerline corridor may provided temporary foraging in migration	No - present in migration only, if at all.	Low
Eastern Massasauga Sistrurus catenatus	S-E	Wet, lowland habitats, including bogs, swamps, marshes and floodplains, which provide open sunny areas with elevated hummocks for basking as well as shaded areas for retreat	Not known to occur in Oswego County	Low - distribution of this species in New York is apparently restricted to a few well-known, well studied populations in the western part of the state, including one in Onondaga County, near the border of Oswego County.	No - NMP3NPP is not within the known range of this species	Low
Pied-billed Grebe Podilymbus podiceps	S-T	Wetlands with intricate shorelines, and a mix of open water and emergent or shrub scrub vegetation	Confirmed breeder 2004	Moderate - most on-site wetlands are unsuitable, but the large wetland complex to the east of the powerline corridor may provide suitable habitat.	Yes - general breeding season bird surveys conducted.	Present (breeding not confirmed)
Least Bittern Ixobrychus exilis	S-T	Dense marshes, with a preference for cattail and scirpus species, but will also use areas with a brushy component..		Moderate - most on-site wetlands are unsuitable, but the large wetland complex to the east of the powerline corridor may provide suitable habitat.	Yes - general breeding season bird surveys conducted.	Low
Bald Eagle Haliaeetus leucocephalus	S-T	Aquatic and shoreline habitats that provide foraging opportunities (fish, waterfowl) and tall, unobstructed perches for hunting and nesting.		Low - Lake Ontario provides hunting opportunities but there are few suitable hunting perches or nesting sites along the lake shore.	No - present in migration only, if at all.	Low
Northern Harrier Circus cyaneus	S-T	Open fields and emergent marshes with limited to no woody vegetation.	Confirmed breeder, 1976	Low - open habitats present on site are too small or to brushy, bur powerline corridor may provide temporary foraging in migration.	No - present in migration only, if at all.	Low
Upland Sandpiper Bartramia longicauda	S-T	Open fields with low grasses and little to no woody vegetation.		Low - open habitats present on site are to small or to brushy, bur powerline corridor may provide temporary foraging in migration	No - present in migration only, if at all.	Low
Common Tern Sterna hirundo	S-T	Extensive water bodies for foraging, shorelines for nesting.		Low - Lake Ontario shoreline does not provide suitable nesting habitat, but the lake itself may provided temporary foraging in migration.	No - present in migration only, if at all.	Low

Table 2.4-3—Special status species know to occur in Oswego County, or noted as a species of concern in other NRC sponsored documents describing the environmental conditions in and around Nine Mile Point

(Page 3 of 6)

Species	Status[1]	Habitat Requirements	Extant or Historic Occurrences in NMP3NPP Vicinity	Habitat Suitability on NMP3NPP site	Surveys Conducted? Why or Why Not?	Likelihood of Occurrence Determination
Sedge Wren Cistothorus platensis	S-T	Wetlands with damp ground but little standing water, and containing sedges, grasses, rushes, scattered shrubs, and other emergent vegetation, but not cattails.		Low - most wetlands on site are forested or have a dense shrub-scrub cover type.	Yes - general breeding season bird surveys conducted.	Low
Henslow's Sparrow Ammodramus henslowii	S-T	Tall, dense grasslands with a well-developed litter layer, standing dead vegetation, and little to no woody species, <250 acres in size.		Low - open habitats on site do not meet structure or size requirements.	Yes - general breeding season bird surveys conducted.	Low
Timber Rattlesnake Crotalus horridus	S-T	Deciduous closed, canopy forests with rugged terrain including open, rocky ledges.	Not known to occur in Oswego County	Low - topography of site is flat and devoid of any prominent rocky structure.	No - no suitable habitat.	Low
Small-footed Bat Myotis leibii	S-SC	Forested landscapes, especially with ridgelines and rocky outcrops for roosting. Loose bark of old trees may also be used for roosting, and wetlands may be important for foraging.		Low - topography of site is flat and devoid of any prominent rocky structure; cover type is largely second growth forest with few overly mature trees.	No - lack of suitable habitat.	Low
Common Loon Gavia immer	S-SC	Lakes and large ponds with limited submerged aquatic vegetation, marine coastlines.		Low to moderate - no nesting opportunities on site, but Lake Ontario provides foraging opportunities for migrants.	No - present in migration only, if at all.	Low
American Bittern Botaurus lentiginosus	S-SC	Wetlands dominated by tall emergent vegetation and a high cover-water interspersion, including shorelines, swamps, and wet meadows; at least 2.5 ha in size for nesting.		Low - the wetlands on-site are generally forested or shrub-scrub.	Yes - general breeding season bird surveys conducted.	Low
Osprey Pandion haliaetus	S-SC	Lakes, large ponds and wetlands, and marine coastline for foraging; large stable structures with a clear view of surroundings for nesting.	Currently breeding on site; nesting first observed in 2007	High - transmission line towers provide ideal nesting habitat and Lake Ontario as well as surrounding open water wetlands provide ample hunting opportunities.	Yes - general breeding season bird surveys conducted.	Present (breeding confirmed)

Table 2.4-3—Special status species know to occur in Oswego County, or noted as a species of concern in other NRC sponsored documents describing the environmental conditions in and around Nine Mile Point

(Page 4 of 6)

Species	Status[1]	Habitat Requirements	Extant or Historic Occurrences in NMP3NPP Vicinity	Habitat Suitability on NMP3NPP site	Surveys Conducted? Why or Why Not?	Likelihood of Occurrence Determination
Red-shouldered Hawk Buteo lineatus	S-SC	Mature deciduous or mixed deciduous-conifer forests and swamps; nests are oftern placed near natural openings.		Moderate to high - NMP3NPP site contains ample forested wetlands, but with few natural openings.	Yes - general breeding season bird surveys conducted.	Low
Sharp-shinned Hawk Accipiter striatus	S-SC	Breeds in mature softwood and mixed woods, winters in all types of wooded habitats.	Probable breeder, 1976 and 1985	Low - forest on-site is sufficiently mature, but has only a small softwood component.	Yes - general breeding season bird surveys conducted.	Low
Cooper's Hawk Accipiter cooperii	S-SC	Breeds in all types of forests with closed canopies, often near edges; winters in all types of wooded habitats.	Confirmed breeder, 1976; probable breeder, 1985	Moderate - closed canopy forest is the dominant cover type on-site.	Yes - general breeding season bird surveys conducted.	Low
Common Nighthawk Chordeiles minor	S-SC	A variety of open habitats, including shrub-steppe, grassland, agricultural fields, clear-cuts, and burns, with abundant flying insects and open gravel surfaces for nesting.		Low to Moderate - Old lay down area adjacent to firing range provides ideal nesting habitat, but is limited in size.	Yes - general breeding season bird surveys conducted.	Low
Red-headed Woodpecker Melanerpes erthrocephalus	S-SC	Open woodland, especially with beech or oak, other open situations with scattered trees, parks, cultivated areas and gardens.	Probable breeder, 1985	Moderate - the high proportion of edge habitats on-site proved potentially suitable habitat.	Yes - general breeding season bird surveys conducted.	Low
Horned Lark Eremophila alpestris	S-SC	Bare to sparsely vegetated ground with little to no woody vegetation.		Low to Moderate - old lay down area adjacent to firing range provides potentially suitable habitat, but is limited in size.	Yes - general breeding season bird surveys conducted.	Low
Cerulean Warbler Dendroica cerulea	S-SC	Mesic to wet mature deciduous forest, with a closed to partly open canopy and usually an open understory. Bottomlands, particularly floodplains, are favored.	Present in vicinity 1976, probable breeder, 2004	Moderate to high - mature, mesic forests are common on-site, but the understory tends to be well developed.	Yes - general breeding season bird surveys conducted.	Low
Golden-winged Warbler Vermivora chrysoptera	S-SC	Wet or dry habitats with patches of herbs and shrubs, sparse tree cover, and a wooded perimeter.	Present in vicinity 1976, probable breeder, 2004	High - power line corridor maintenance practices provide suitable habitat.	Yes - general breeding season bird surveys conducted.	Present

Table 2.4-3—Special status species know to occur in Oswego County, or noted as a species of concern in other NRC sponsored documents describing the environmental conditions in and around Nine Mile Point

(Page 5 of 6)

Species	Status[1]	Habitat Requirements	Extant or Historic Occurrences in NMP3NPP Vicinity	Habitat Suitability on NMP3NPP site	Surveys Conducted? Why or Why Not?	Likelihood of Occurrence Determination
Vesper Sparrow Pooecetes gramineus	S-SC	Sparsely vegetated areas with patches of bare ground, low vegetation, and scattered shrubs or saplings, usually dry and well drained.		Low - portions of the old lay down are near firing range may meet structural requirements, but is limited in size.	Yes - general breeding season bird survey conducted.	Low
Grasshopper Sparrow Ammodramus savannarum	S-SC	Grasslands with short- to medium-height bunch grasses interspersed with patches of bare ground, a shallow litter layer, scattered forbs, and few shrubs, > 100 acres.		Low - open habitats on site do not meet structure or size requirements.	Yes - general breeding season bird surveys conducted.	Present
Jefferson Salamander Ambystoma jeffersonianum	S-SC	Vernal pools and adjoining forest, usually associated with rocky slopes and ample deadfall.	Not known to occur in Oswego County	Low - vernal pools present on site, but forest floor structure is sub-optimal	Yes - egg mass and larva surveys.	Low
Blue-spotted Salamander Ambystoma laterale	S-SC	Vernal pools and other wetland types lacking fish, and adjoining forest.		Moderate - vernal pools present on site and additional, fish free-pools may be available within wetlands at southern end of site.	Yes - egg mass and larva surveys.	Moderate
Spotted Turtle Clemmys guttata	S-SC	Clean, shallow, slow moving bodies of water with muddy or mucky bottoms and some aquatic and emergent vegetation.		Moderate - wetlands are common on-site, but most are forested or shrub scrub.	Yes - searches for basking turtles in April and June	Low
Wood Turtle Clymmes inscupta	S-SC	Soft-bottomed streams and rivers with well developed riparian zones and undisturbed surrounding uplands		Low - water courses on site are small and lack soft bottoms and well developed riparian zones.	Yes - searches for basking turtles in April and June	Low
Plants						
Angled Spikerush Eleochris quadrangulata	S-E	Pools and pond margins.		Low to moderate - most wetlands on-site are forested or shrub-scrub, but some open wet areas are present.	Yes - rare plant surveys conducted in mid July.	Low
Blunt Spikerush Eleocharis ovata	S-E	Open wet habitats.		Low to moderate - most wetlands on-site are forested or shrub-scrub, but some open wet areas are present.	Yes - rare plant surveys conducted in mid July.	Low

Table 2.4-3—Special status species know to occur in Oswego County, or noted as a species of concern in other NRC sponsored documents describing the environmental conditions in and around Nine Mile Point

(Page 6 of 6)

Species	Status[1]	Habitat Requirements	Extant or Historic Occurrences in NMP3NPP Vicinity	Habitat Suitability on NMP3NPP site	Surveys Conducted? Why or Why Not?	Likelihood of Occurrence Determination
Slender Bulrush Scirpus heterochaetus	S-E	Basic swamps and pond margins.		Low to moderate - most wetlands on-site are forested or shrub-scrub, but some open wet areas are present.	Yes - rare plant surveys conducted in mid July.	Low
Hart's-tongue fern Asplenium scoiopendrium	F-T, S-T	Areas underlain by dolomitic limestone with high humidity, e.g., near streams or waterfalls, shade, and moist soil.	Not known to occur in Oswego County	Low - no suitable soils on site.	No - not known to occur in Oswego County	Low
Northern Running Pine Lycopodium complanatum	S-E	Moist to dry forests, usually coniferous, with rocky slopes and sandy openings, low to mid-elevations.		Low - cover on site is predominantly deciduous.	Yes - rare plant surveys conducted in mid July.	Low
Christmas Fern Polystichum acrostichoides	V	Dry to moist woods.	Common in Oswego County	Moderate - historic land use at NMP3NPP may have eliminated some common woodland species form the site.	Yes - rare plant surveys conducted in mid July.	Present
New York Fern Thelypteris noveboracensis	V	Moist woods in filtered light	Common in Oswego County	Moderate - historic land use at NMP3NPP may have eliminated some common woodland species form the site.	Yes - rare plant surveys conducted in mid July.	Low
Trillium Trillium spp.	V	Moist to dry deciduous woodlands, forest edges.	Common in Oswego County	Moderate - historic land use at NMP3NPP may have eliminated some common woodland species form the site.	Yes - rare plant surveys conducted in mid July.	Present

Note:

1 F=Federal; S= State; E=Endangered; T= Threatened; SC=Special Concern, V=Vulnerable to over collecting

Table 2.4-4—Summary of Functions and Values for Assessment Area

Function or Value	Wetland Assessment Area																		
	A	B	C	D	E	AA	BB	CC	DD	EE/FF	HH	JJ/WW	KK	MM	PP/QQ	RR	SS	TT/YY	UU/VV	XX
Groundwater Recharge	X	1			1					1		1		X	X			X	1	X
Flood/Flow Alteration	1	1								1		1				X		X	1	X
Fish/Shellfish Habitat	X	X								1		X					X	1	1	
Sediment/Toxicant Reduction	1	1								1		X						1	1	X
Nutrient Removal	1	1								1		1				X		X	1	X
Production Export	X	X																	1	
Sediment/Shoreline Stabilization	1	1								X								1		
Wildlife Habitat	1	1	X	X	1	X	1	1	X	1	X	1	X	1	1	X	1	1	1	1
Recreation																				
Educational/Scientific Value																				
Uniqueness/Heritage		X															X	X	X	
Visual Quality/Aesthetics										X		X							X	
Endangered Species Habitat																				

Notes:

1 = indicates presence of primary function or value
X = indicates presence of function or value

Table 2.4-5—Important and Nuisance Species Located in the Vicinity of NMP3NPP

(Page 1 of 2)

Species (Scientific name)	Commercially Harvested	Recreational Target	Keystone Species	Indicator Species	Nuisance Species
New York State Endangered, Threatened, and Special Concern Species					
round whitefish (Prosopium cylindraceum)[1]					
deepwater sculpin (Myoxocephalus thompsoni)[1]					
lake sturgeon(Acipenser fulvescens)[2]					
lake chubsucker (Erimyzon sucetta)[2]					
redfin shiner (Lythurus umbratilis)[3]					
New York State Harvested Fish					
yellow perch (Perca flavescens)	X	X			
brown bullhead (Ictalurus nebulosus)	X	X			
chinook salmon(Oncorhynchus tshawytscha)		X			
coho salmon(Oncorhynchus kisutch)		X			
rainbow trout (Oncorhynchus mykiss)		X			
Atlantic salmon(Salmo salar)		X			
brown trout (Salmo salar)		X			
lake trout (Salvelinus namaycush)		X			
walleye(Sander vitreus)		X			
smallmouth bass (Micropterus dolomieui)		X			
white perch(Morone americana)		X			
white bass (Morone chrysops)		X			
Keystone/Indicator Species					
alewife (Alosa pseudoharengus)			X		
rainbow smelt (Osmerus mordax)			X		
American eel (Anguilla rostrata)			X		
Nuisance Species					
Zebra Mussel (Dreissena polymorpha)					X
Quagga Mussel (Dreissena bugensis)					X

Table 2.4-5—Important and Nuisance Species Located in the Vicinity of NMP3NPP

(Page 2 of 2)

Species (Scientific name)	Commercially Harvested	Recreational Target	Keystone Species	Indicator Species	Nuisance Species
Other Important Resources					
Submerged Aquatic Vegetation (SAV)			X	X	
Phytoplantkon and Zooplankton			X	X	

Note:

[1]NYS Endangered Species
[2]NYS Threatened Species
[3]NYS Species of Special Concern

Table 2.4-6—Rapid Bioassessment Survey Results for Lakeview Creek

Parameter	Site			
	1	2	3	4
Total Number of Individual Macroinvertebrates	2,393	1,913	1,012	3,040
Total Number of Macroinvertebrate Taxa	42	41	38	43
Overall Habitat Rating*	161	166	151	149

*Habitat Ratings:

0-47 = Poor
60-100 = Marginal
113-153=Sub-optimal
166-200 = Optimal

Table 2.4-7—The Species and Number of Fish/100 m Collected in Sites 1 through 4 of Lakeview Creek

	Site									
	1		2		3		4		Total	
Species	Fish #	Fish/100 m	Fish #	Fish/100 m	Fish #	Fish/100 m	Fish #	Fish/100 m	Fish #	Fish/100 m
Western grass pickerel	1	1	0	0	0	0	0	0	1	1
Central mudminnow	43	47	2	2	1	1	1	1	47	51
White sucker	10	11	13	14	61	67	0	0	84	92
Rainbow trout	0	0	12	13	10	11	0	0	22	24
Lake chub	0	0	0	0	2	2	0	0	2	2
Creek chub	0	0	0	0	0	0	0	0	0	0
Brook stickleback	0	0	0	0	0	0	0	0	0	0
Total	**54**	**59**	**27**	**30**	**74**	**81**	**1**	**1**	**156**	**171**

Table 2.4-8—Fish Species Captured or Observed in On-Site Water Bodies Other Than Lakeview Creek

Species	Subarea A: Quarry Pond	Subarea D: Near Meteorological Tower	Subarea C: Drainage Ditch Pool
Western grass pickerel		5	2
Central mudminnow		6	1
Pumpkinseed sunfish			1
Largemouth bass	~ 30		

Table 2.4-9—Water Quality Measurement Taken at NMPNS

Sites	Dissolved Oxygen (mg/l)	Water Temperatue (°C)	Specific Conductivity (Us)
NMP Site 1	3.01	22.2	295.4
NMP Site 2	7.3	21.3	287.3
NMP Site 3	7.2	20.1	166.1
NMP Site 4	6.5	22.2	298.4
NMP Subarea A: quarry pond	10.21	24.4	246.2
NMP Subarea D: Existing Meteorological Tower	3.1	27.7	1867.0
NMP Subarea C: Drainage Ditch Pool	4.2	25.9	2119.0

Figure 2.4-1—Rare Species Location

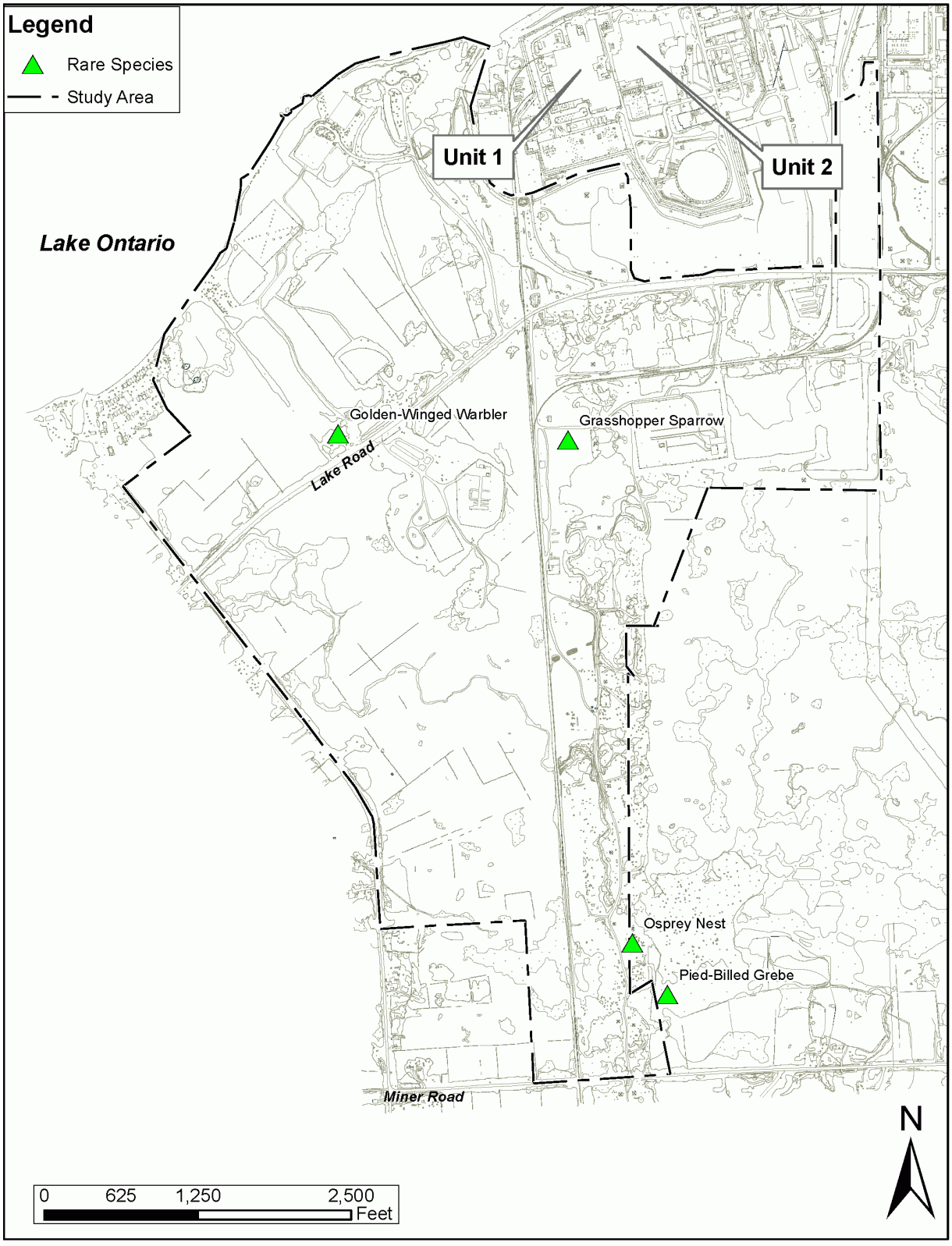


Figure 2.4-2—Important Terrestrial Habitats Within 6 mi (10 km) of NMP3NPP

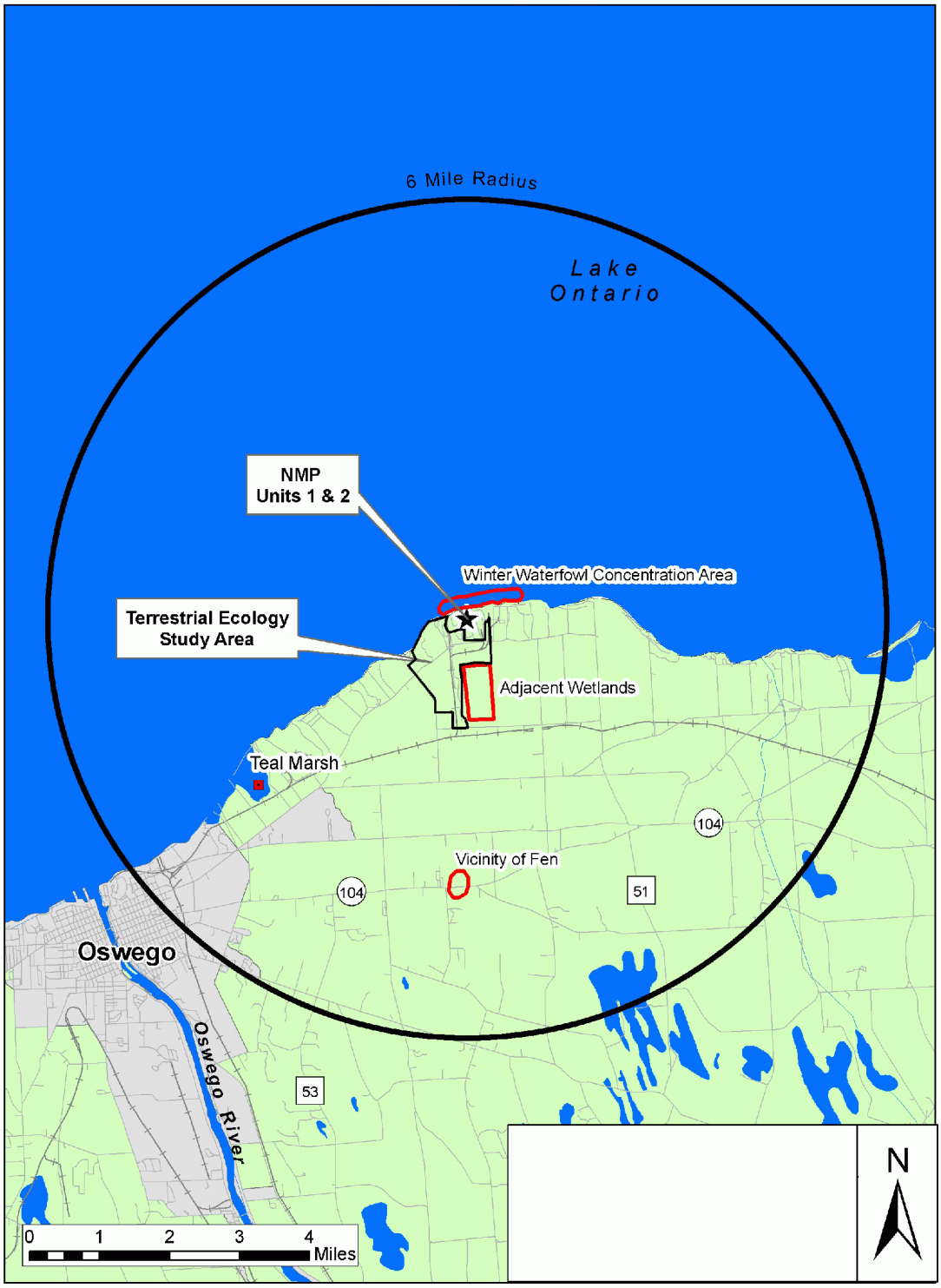
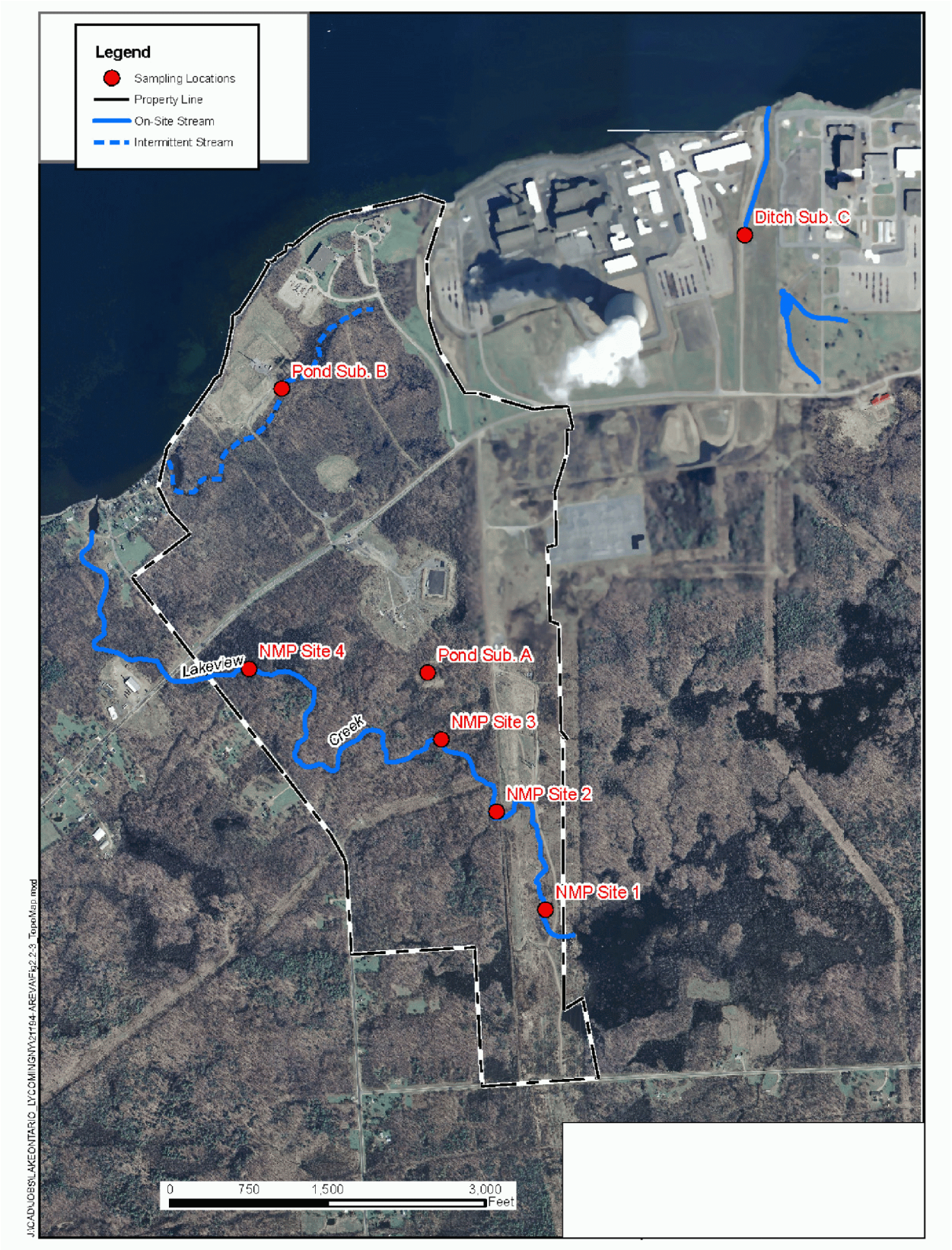


Figure 2.4-3—Important Aquatic Species Habitat Communities in the Vicinity of NMP3NPP



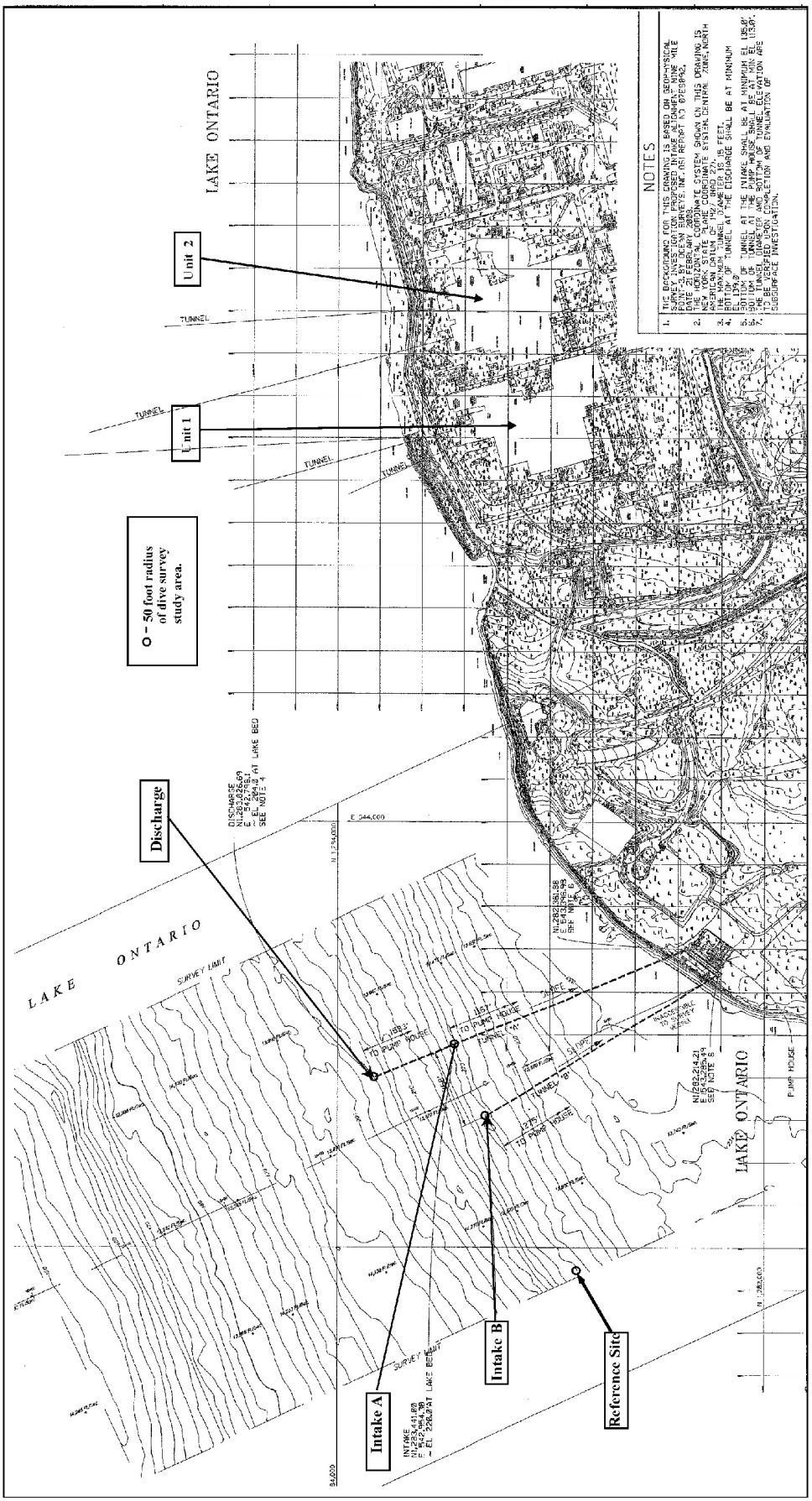


Figure 2.4-4—Location of Intake and Discharge Facilities and Aquatic Ecology Field Investigation