

BASELINE BIOLOGICAL SURVEY REPORT
IN THE AREA OF OLCOTT HARBOR,
NEW YORK

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U.S. ARMY CORPS OF ENGINEERS
Buffalo District
Buffalo, New York

ecology and environment, incorporated

P. O. Box D Buffalo, New York 14225 area code (716) 632-4491

Anchorage / Caracas / Houston / Tokyo / Washington

Headquarters: Buffalo, New York

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1. INTRODUCTION

This report presents the results of baseline biological surveys of the aquatic and terrestrial resources in the area of Olcott Harbor, New York. The program was initiated to provide baseline data to assess the effects of the development of a small boat harbor on the biological communities of the study area. The study was conducted in the fall, spring; and summer seasons from October 1977 through August 1978.

The aquatic resources surveyed as part of this investigation included fisheries, benthos, and aquatic vegetation in Eighteenmile Creek, Olcott Harbor, and the nearshore areas of Lake Ontario. The fisheries data obtained included the species composition and relative abundance at each of five sampling stations in the shallow areas of Eighteenmile Creek and at each of six stations in Olcott Harbor and nearshore Lake Ontario. The benthos data included the species composition and relative abundance at each of ten sampling stations located in Olcott Harbor or Lake Ontario. The species composition and distribution of aquatic macrophytes in the shallow water areas of Olcott Harbor and Eighteenmile Creek were also assessed and mapped.

The terrestrial resources surveyed in the area surrounding Olcott Harbor and Eighteenmile Creek included terrestrial vegetation, birds, and mammals. A map of the major vegetation communities in the area surrounding Olcott Harbor was developed, and the characteristic plant species for each community were identified. The data obtained on birds and mammals included their species composition and relative abundance in the study area.

The aquatic sampling stations and the materials and methods used during this survey are described in Section 2 of this report. Section 3 presents the results obtained for each aspect of the survey, and Section 4 contains a brief evaluation of the aquatic and terrestrial resources in the study area and a discussion of the potential impacts of the proposed harbor development program.

The taxonomic keys used for the identification of organisms are listed in Appendix I.

2. MATERIALS AND METHODS

2.1 AQUATIC ENVIRONMENT

Sampling of fish populations within Olcott Harbor, Eighteenmile Creek, and nearshore Lake Ontario was conducted on three separate occasions (sampling periods) to provide data during the spring, summer, and fall seasons. These sampling periods occurred during October 1977, May 1978, and August 1978, hereafter referred to as SP-I, SP-II, and SP-III, respectively.

Five shallow-water fish sampling stations were surveyed within Eighteenmile Creek and Olcott Harbor, as shown in Figure 1. A brief description of each shallow-water sampling station is given in Table 1. With the exception of station 5, the bottom type at each of the shallow-water stations consisted of silt and had sparse to moderate macrophytic growth, some submerged debris, and little or no shade. Station 5 was located on the west side of Olcott Harbor near the Town of Newfane small boat launching ramp during SP-I and II. It was relocated to the east side of Eighteenmile Creek just upstream of the Route 18 bridge during SP-III because of dredging operations underway at the original location. The bottom characteristics of station 5 at the Town of Newfane boat launching ramp were scattered broken concrete over a silt substrate. The SP-III station 5 had a bottom of deep, soft silt, heavily covered with submerged debris. Stations 1 to 4 were shifted slightly (less than 200 feet) during SP-II to accommodate sampling because of the higher water levels present during the spring season

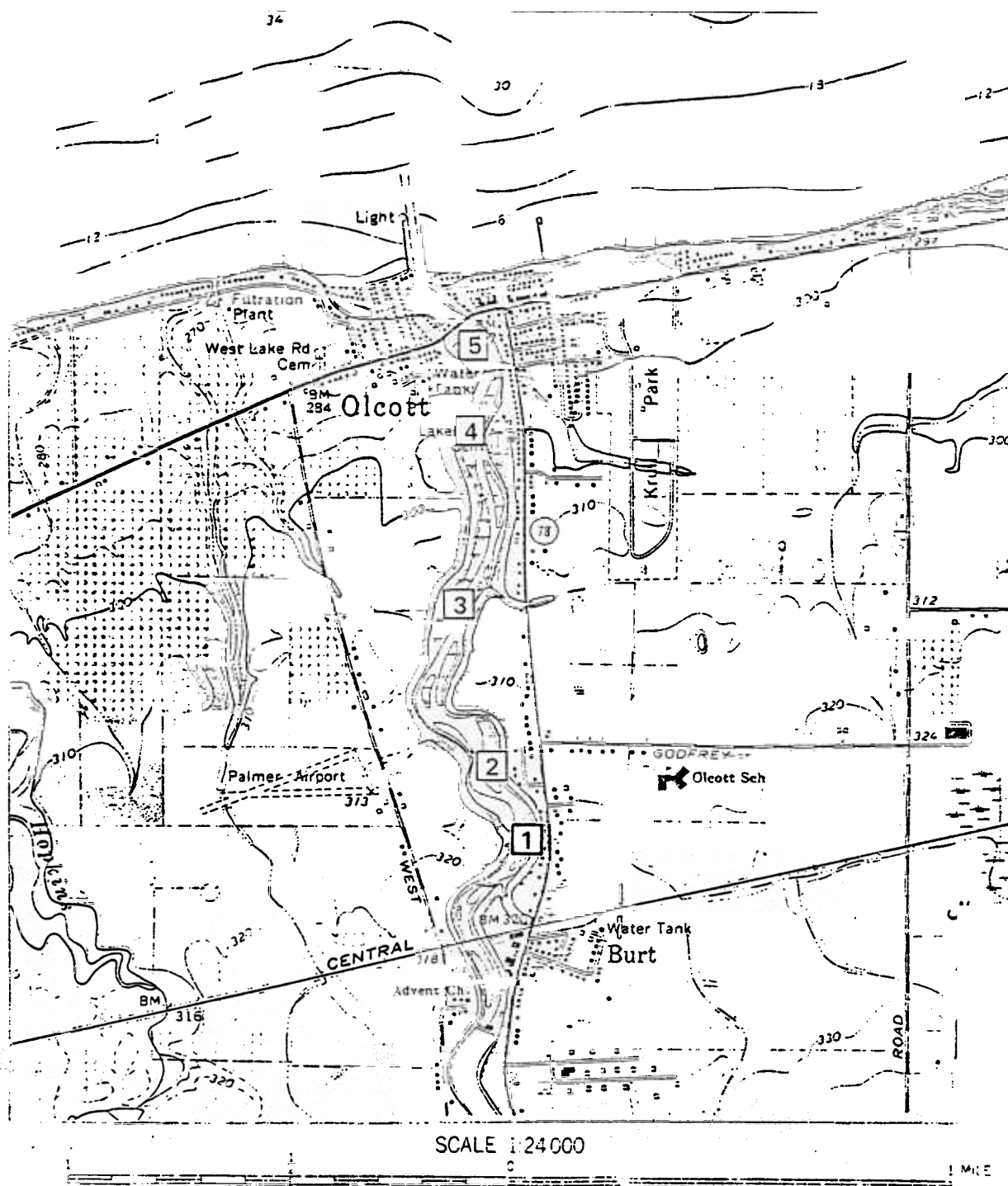


Figure 1. SHALLOW WATER FISH SURVEY STATIONS, OLCOTT, NEW YORK, U.S.G.S. 7.5' QUADRANGLE MAP

TABLE 1

LOCATION AND CHARACTERISTICS OF SAMPLING STATIONS

Eighteenmile Creek (Figure
Fish Seining Stations

<u>Station</u>	<u>Location</u>	<u>Depth</u>	<u>General Characteristics</u>
	Downstream of Burt Dam, adjacent to a <u>Typha</u> mat on east side of creek.	Up to 4 feet	Bottom very soft, consisting primarily of silt, and drops sharply approximately 20 feet from <u>Typha</u> mat. Density of submerged macrophytes - sparse.
2	East side of creek adjacent to well established <u>Typha</u> mat approximately 1000 feet downstream from Station 1.	Up to 3 feet	Bottom primarily silt and submerged debris such as logs and piles. Density of submerged macrophytes - sparse.
3	West side of creek adjacent to <u>Typha</u> mat, approximately 1000 feet downstream from Station 2.	Up to 4 feet	Bottom primarily silt and extremely soft. Density of macrophytes - moderate.
4	West side of creek adjacent to shore, approximately 500 feet upstream of the Route 18 bridge.	Less than 3 feet	Bottom consists of silt and extremely soft. Density of submerged macrophytes - moderate.
5	West side of Ocott Harbor adjacent to Town of Newfane small boat launching ramp.	Up to 4 feet	Bottom consists of scattered rip-rap over silt. Density of submerged macrophytes - sparse.

Table 1 (Continued)

Lake Ontario and Olcott Harbor
Fish Gill Net and Benthic Sampling Stations (Figure 2)

<u>Station</u>	<u>Location</u>	<u>Depth</u>	<u>General Characteristics</u>
1	Lake Ontario, approximately 350 feet west of west pier, off shore.	12 feet	Rock Bottom
2	Lake Ontario, approximately 150 feet northwest of the end of west pier, 650 feet off shore.	3 feet	Rock/cobble bottom.
3	Lake Ontario, approximately 500 feet north of end of west pier, 1100 feet off shore.	15 feet	Rock bottom.
4	Lake Ontario, between ends of east and west piers.	10 feet	Fine sand.
5	Lake Ontario, approximately 650 feet east of east pier, 350 feet off shore.	8 feet	Rock bottom.
6	Olcott Harbor, between shore end of east pier	10 feet	Fine detritus and silt bottom
7	Olcott Harbor 175 feet east of west shore of harbor.	10 feet	Fine detritus and silt bottom.
8	Olcott Harbor, approximately 75 feet west of boat stalls at foot of Main Street.	12 feet	Fine detritus and silt bottom.
9	Olcott Harbor, approximately 100 feet east of west shore, 100 feet downstream of Route 18 bridge.	10 feet	Fine detritus and silt bottom.

Table (Continued)

<u>Station</u>	<u>Location</u>	<u>Depth</u>	<u>General Characteristics</u>
10	Olcott Harbor, approximately 100 feet east of west shore, 100 feet upstream of Route 18 bridge.	10 feet	Fine detritus and silt bottom.

Within Olcott Harbor and Lake Ontario, six stations were sampled for adult fish and ten stations were sampled for benthos. The locations of the adult fish and benthos sampling stations are shown on Figure 2 and described in Table 1. The five stations in Lake Ontario were between 8 and 15 feet deep and had substrates ranging from fine sand to rock, with rock being the predominant bottom type. Within Olcott Harbor, the sampling stations were located in 10 to 12 feet of water and had substrates characterized by clay, silt, and fine organic detritus.

2.1.1 Juvenile Fish

Samples of juvenile fish were obtained in the shallow-water areas of Eighteenmile Creek and upper Olcott Harbor with a 5-by-50-foot seine of 1/4-inch mesh. One seine tow was taken at each station during each sampling period. The seining of approximately 40 to 50 feet of shoreline during each tow is considered one unit of effort. In some cases the length of shoreline that was seined had to be lessened due to physical barriers or obstructions on the bottom.

Captured fish were identified, recorded, and returned to the point of capture whenever possible. Most of the juvenile and forage fish were preserved in 10 percent formalin for later positive identification and enumeration.

Seining was restricted to the shallow-water areas of the creek and harbor (less than 4 feet deep) by the height of the seine. Adult fish, especially game species such as northern pike, bass, and the salmonids, are able to avoid capture with this technique. Consequently, the fish data resulting from seining are selective for juveniles and forage fish. Some sampling losses were unavoidable as the seine was lifted over the bottom debris or rocks and dragged through beds of aquatic macrophytes. These factors contributed to an undetermined reduction in the total catch at each sampling station.

2.1.2 Adult Fish

Adult fish were sampled in Olcott Harbor and Lake Ontario with sinking gill nets. At stations 1, 2, 3, and 5 in Lake Ontario, graduated 200-foot-long gill nets having alternating 50-foot panels of 3/4-inch, 1-1/4-inch, 2-inch, and 3-inch bar mesh were used. At stations 7 and 9 in Olcott Harbor, 125-foot graduated gill nets having

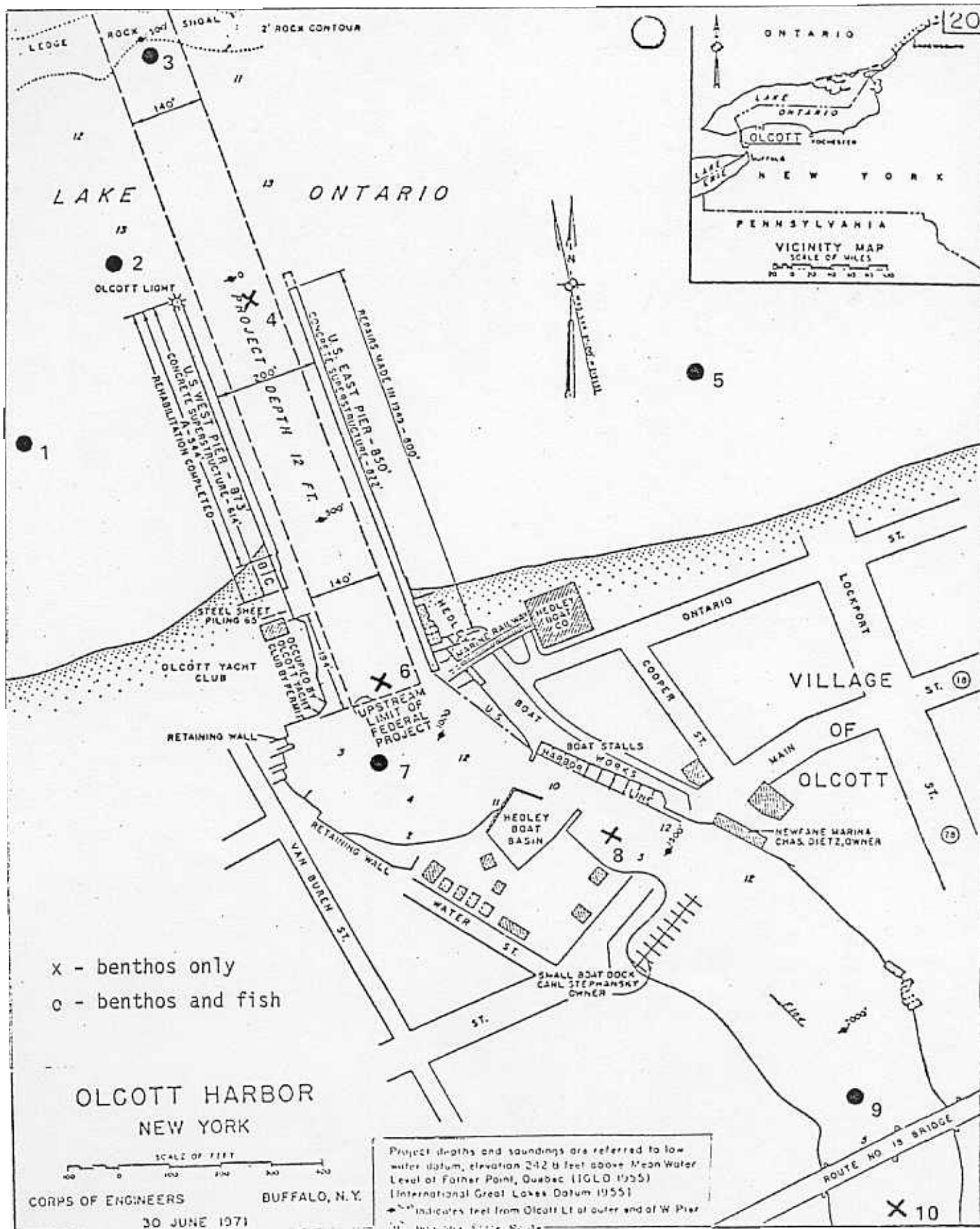


Figure 2 FISH GILL NET AND BENTHIC SAMPLING STATIONS

3/4-inch, 1-1/2-inch, and 2-1/2-inch bar mesh (station 7) and 3/4-inch, 1-inch, and 2-inch bar mesh (station 9) were used. All nets were set at dusk and retrieved at dawn the following day. Upon retrieval of the gill nets, living fish were identified, recorded, and returned at the point of capture. All other specimens were preserved in 10 percent formalin.

Because the size of the mesh determines the size and species of fish that are caught, gill nets are generally considered selective. The use of experimental, variable mesh nets for this study reduced the level of selectivity normally encountered with gill net investigations.

2.1.3 Benthos

Collections for macrobenthos were made with a Ponar grab having an open dimension of 23 by 23 centimeters (9 by 9 inches). Once obtained, all samples were placed in heavy plastic bags and labeled for later processing. Immediately upon being brought to the E and E laboratory, the samples were sieved using a U.S. Standard No. 30 (0.5-millimeter) sieve to reduce sample volume and expedite sample processing. Samples were then preserved in 3 percent formalin. In those samples that contained an excessively large number of individuals, a 25 percent aliquot was removed using standard techniques. Samples were then picked and sorted into major taxonomic categories using a low-power scanning lens and placed into vials containing 3 percent formalin for later identification and enumeration.

The Ponar grab will obtain samples effectively in substrates ranging from soft muds through gravel; however, it is not effective in hard or rocky substrates. In addition, a pressure wave is produced by the grab as it descends through the water column, causing the dispersal of fine materials at the sediment-water interface just prior to impact. As a result, small near-surface organisms such as midge larvae may be displaced and mobile forms like amphipods may avoid capture. This will result in an insignificant reduction in the total number of organisms obtained at each station but will provide species composition of the sample except for the mobile forms.

2.1.4 Aquatic Macrophytes

Aquatic macrophytes were surveyed within Eighteenmile Creek and Olcott Harbor during the first two weeks of August, 1978. This period was selected in order to obtain mature specimens that were flowering or in seed. Sampling was conducted from a small power boat or canoe, or from land using a steel garden rake or small hand shovel, and/or by hand. Upon collection, plant specimens were placed in wide-mouth plastic jars or plastic bags for later identification and preservation. A total of 20 sampling stations was surveyed to determine macrophyte species composition and zonation. The sampling locations are shown on Figure 3 in Section 3 (page 22). Attempts were made to sample all habitats within the creek and harbor in an effort to collect both common and rare species.

Small submerged macrophytes, particularly those with a limited distribution, may not be surveyed using the techniques described above. However, the methods employed are suitable for identifying the dominant aquatic macrophytes occurring in the study area for a general habitat evaluation.

2.2 TERRESTRIAL ENVIRONMENT

2.2.1 Vegetation

A survey of the terrestrial vegetation around Olcott Harbor and Eighteenmile Creek was completed in two phases. In the first phase, the major vegetative covertypes were identified and mapped from aerial photographs having a scale of 1 inch = 1,000 feet. Field surveys were then conducted in the second phase to inventory the common species characterizing the major covertypes and delineate cotype boundaries. Although minor land use modifications are a source of error using this technique, the survey provided adequate data for both the description of the terrestrial vegetation and the general evaluation of terrestrial habitats within the study area.

2.2.2 Avifauna

The determination of bird occurrence within the various habitat types existing within the study area was made by visual observations and by the identification of bird calls or songs. Observations were made on eight separate occasions and included a minimum effort of two days during the fall and summer sampling periods and a minimum effort

of four days during the spring sampling period. The upland portions of the study area and the banks of Eighteenmile Creek were surveyed from a vehicle or on foot, while Eighteenmile Creek and Olcott Harbor were surveyed from a canoe or small power boat. The greatest effort was placed on surveying the water-dependent species utilizing Eighteenmile Creek, Olcott Harbor, and nearshore Lake Ontario.

The avifauna surveys were made during the months of October and November of 1977, and April, May, August, and September of 1978. Observations were made during diurnal and crepuscular periods. As a result, nocturnally active species such as owls were not observed. In addition, other bird species such as ground nesting sparrows or some woodland songbirds may not have been observed because of their quiet or evasive habits.

2.2.3 Mammals

Observations of mammals were made in a similar manner as the surveys for avifauna. The presence of mammals was determined by direct observations or by signs, including tracks, scat, dens, and indications of feeding activity.

Since no trapping techniques were employed and the survey was conducted during diurnal and crepuscular periods, only the common, more conspicuous species which are active during these periods were observed. Many small mammals, particularly nocturnal and elusive species such as bats, mice, voles, shrews, and fox were not observed. This technique, at best, provides only a qualitative, selective estimate of the mammalian fauna in the study area.

The determination of relative abundance by "sign" can be misleading, since the "signs" of a single or a few active individuals can be encountered on many occasions within a small area. During this survey, the relative abundance of species was determined from both the observation of "signs" and the presence of preferred habitat.

3. RESULTS

3.1. AQUATIC ENVIRONMENT

3.1.1 Fish

During the three sampling periods, a total of 910 fish, comprising 21 species, were collected by gill netting. The results of the seasonal gill net sampling are presented in Table 2. The five most abundant species for all seasons were alewife (Alosa pseudoharengus), brown bullhead (Ictalurus nebulosus), yellow perch (Perca flavescens), rainbow smelt (Osmerus mordax), and brown trout (Salmo trutta), which comprised 25.5, 20.0, 6.2, 5.3 and 5.1 percent of the total catch for all seasons, respectively. Salmonid species dominated the fall catch, comprising 46 percent of the catch for that season. The most abundant salmonid species collected in the fall was the brown trout, followed by rainbow trout (Salmo gairdneri), coho salmon (Oncorhynchus kisutch), and chinook salmon (Oncorhynchus tshawytscha), in descending order. During the spring season, the catch was dominated by rainbow smelt, followed by lake trout (Salvelinus namaycush), lake chub (Couesius plumbeus), white bass (Morone chrysops), and white sucker (Catostomus commersoni). Rainbow trout and brown trout were also collected in the spring, but in lesser numbers than those collected in the previous fall. Warm-water species dominated the summer catch and no salmonid species were collected during that season. Alewife, brown bullhead, gizzard shad (Dorosoma cepedianum), carp (Cyprinus carpio), and yellow perch were the five most abundant species collected during the summer season.

Table 2
FISH COLLECTED BY GILL NETTING, OLCOTT HARBOR
Fall, 1977; Spring, 1978; Summer, 1978

SAMPLING STATION*																											
Common Name	Scientific Name	1			2			3			5			7			9			Fall 1977		Spring 1978		Summer 1978		All Seasons	
		Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Total	% Composition	Total	% Composition	Total	% Composition	Total	% Composition
Chinook salmon	Oncorhynchus tshawytscha	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	0	0	7	4.1	0	0.0	0	0.0	7	0.8
Coho salmon	Oncorhynchus kisutch	2	0	0	1	0	0	3	0	0	5	0	0	1	0	0	2	0	0	13	7.4	0	0.0	0	0.0	13	1.4
Rainbow trout	Salmo gairdneri	7	2	0	3	1	0	1	0	0	3	0	0	0	0	0	0	0	0	19	10.4	0	0.0	0	0.0	31	3.3
Brown trout	Salmo trutta	7	0	0	9	0	0	10	0	0	14	0	0	0	5	0	1	0	0	41	23.8	2	1.6	0	0.0	46	5.1
Carp	Cyprinus carpio	0	0	0	0	0	0	1	0	4	0	0	0	0	0	6	2	2	6	3	1.7	1.1	28	6.9	43	4.7	
Flaoborne sucker	Macostomus xiphioides	5	0	0	0	0	0	1	0	0	0	0	0	7	0	0	13	0	0	41	23.8	0	0.0	4	0.4	45	4.9
White bass	Morone chrysops	2	0	1	5	1	0	1	0	0	0	0	0	0	0	0	0	4	0	10	5.8	19	10.3	1	0.2	30	3.3
Yellow perch	Perca flavescens	3	0	2	8	0	5	0	0	0	11	0	18	0	0	0	4	0	0	32	18.6	0	0.0	24	4.3	56	6.2
Northern pike	Esox lucius	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4	2.3	0	0.0	3	0.3	7	0.8
White sucker	Catostomus commersoni	0	4	0	0	5	2	0	0	0	0	0	0	2	1	0	3	1	0	3	1.7	17	9.2	4	0.7	24	2.6
Lake trout	Salvelinus namaycush	0	9	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0.0	23	12.4	0	0.0	23	2.5
Lake chub	Cosmichthys plumbeus	0	4	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0.0	23	12.4	0	0.0	23	2.5
White perch	Morone americana	0	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0.0	6	3.2	8	1.4	14	1.5
Brown bullhead	Ictalurus nebulosus	0	0	18	0	0	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0.0	15	8.1	167	30.2	182	20.0
Goldenfish	Carassius auratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0.0	0	0.0	15	2.7	38	4.2
Freshwater drum	Aplodinotus triostatus	0	0	0	0	0	0	1	0	0	1	0	0	3	4	0	0	3	0	0	0.0	5	2.7	4	0.7	9	1.0
Atwele	Ambloplites rupestris	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0	0.0	220	39.8
Gizzard shad	Dorosoma cepedianum	0	4	40	0	0	2	0	0	79	0	5	25	0	3	0	0	0	1	0	0.0	32	6.5	270	47.2	272	25.5
Blindfold smelt	Osmerus mordax	0	0	11	0	0	2	0	0	0	0	0	14	0	0	0	0	2	16	0	0.0	3	1.6	43	11.4	86	7.3
Black bass	Micropterus dolomieu	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0.0	48	26.0	0	0.0	48	9.3
Channel catfish	Ictalurus punctatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.5	1	0.5	1	0.2	2	0.2
TOTAL		27	27	91	29	27	100	21	30	87	45	30	83	29	30	110	31	33	26	172	100.0	185	100.0	553	100.0	910	100.0

*See Figure 2 for sampling locations.

*See Figure 2 for sampling locations.
Source: Ecology and Environment, Inc.

The results of the seining collections are presented in Table 3. Forage species, particularly shiners (Notropis sp.), were the most abundant group of fish collected. During the three sampling periods, a total of 9,405 individuals, comprising 22 species, was collected in the lower reaches of Eighteenmile Creek. The five most abundant species collected were emerald shiner (Notropis antherinoides), spottail shiner (Notropis hudsonius), pumpkinseed (Lepomis gibbosus), goldfish (Carassius auratus), and golden shiner (Notemigonus crysoleucas), which comprised 89.6, 2.4, 2.6, 2.2, and 1.1 percent of the total catch for all seasons, respectively.

Emerald shiners dominated the catch during the fall and spring seasons, while goldfish, pumpkinseed, and golden shiners made up the greatest portion of the summer catch. The greatest diversity occurred in the fall, when 17 species were collected, while spring and summer catches were represented by 12 species.

3.1.2 Macroinvertebrates

The list of macroinvertebrates collected during this study is presented in Table 4 by taxon and number per square meter. The most abundant macroinvertebrates collected were tubificids which were more prevalent during the fall and summer sampling periods. Gastropods and pelecypods, dipteran larvae, and leeches comprised the remainder of the macroinvertebrates collected during the survey. Numerous shell fragments were also collected at most of the stations. No samples were obtained with the dredge at stations 1, 2, 3, and 5 during any of the three sampling periods because of substrate characteristics (i.e., rock or cobble).

3.1.3 Aquatic Macrophytes

The species of aquatic macrophytes found to occur at each of the 20 sampling stations in the lower reaches of Eighteenmile Creek are listed in Table 5. The plant species are also identified as being either emergents, free-floating, floating-leaved, or submergent, and the cover dominance observed at each sampling station is also noted. Figure 3 shows the distribution of macrophytes and the locations of the sampling stations in Eighteenmile Creek.

Table 3
FISH COLLECTED BY SEINING, LOWER REACHES EIGHTEENMILE CREEK
 Fall, 1977; Spring, 1978; Summer, 1978

Common Name	Scientific Name	SAMPLING STATION*															Fall 1977		Spring 1978		Summer 1978		All Seasons	
		1			2			3			4			5			Total	% Composition	Total	% Composition	Total	% Composition	Total	% Composition
		Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer								
Emerald shiner	<i>Notropis atherinoides</i>	515	1082	17	372	270	0	1310	588	5	503	914	0	216	2632	1	2916	92.8	5487	95.0	23	4.2	8426	89.6
Spottail shiner	<i>Notropis hubbsi</i>	2	16	12	2	6	0	18	8	11	0	15	15	10	116	1	29	0.9	161	2.8	40	7.4	230	2.4
Pumpkinseed	<i>Lepomis gibbosus</i>	4	0	61	37	3	25	19	3	6	14	0	12	9	1	24	113	3.6	7	0.1	128	23.5	248	2.6
Gizzard shad	<i>Dorosoma cepedianum</i>	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	5	0.2	0	0.0	0	0.0	5	< 0.1
Largemouth bass	<i>Micropterus salmoides</i>	0	0	3	0	0	10	0	8	2	1	0	0	0	0	2	18	0.6	8	0.1	27	4.0	48	0.5
Northern hogsucker	<i>Hypentelium nigricans</i>	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5	0.2	0	0.0	0	0.0	5	< 0.1
Goldfish	<i>Carassius auratus</i>	0	0	29	2	1	69	0	0	87	0	0	6	13	1	1	15	0.5	2	< 0.1	192	35.3	209	2.2
Rock bass	<i>Ambloplites rupestris</i>	0	0	2	2	0	1	1	0	0	0	0	0	0	0	0	3	0.1	0	0.0	3	0.6	6	< 0.1
Black crappie	<i>Pomoxis nigromaculatus</i>	0	0	0	1	0	0	2	0	0	1	0	0	2	0	0	6	0.2	0	0.0	0	0.0	6	< 0.1
White sucker	<i>Catostomus commersoni</i>	0	0	1	1	1	2	0	2	1	0	0	0	0	3	1	1	< 0.1	4	< 0.1	5	0.9	10	0.1
Carp	<i>Cyprinus carpio</i>	0	0	0	0	0	0	6	0	8	0	0	2	7	0	0	13	0.4	0	0.0	10	1.8	23	0.2
Golden shiner	<i>Notemigonus crysoleucas</i>	0	5	4	0	0	0	9	21	53	0	2	3	0	8	0	9	0.3	36	0.6	60	11.0	105	1.1
Brown trout	<i>Salmo trutta</i>	0	0	0	0	2	0	0	0	0	2	1	0	0	1	0	2	< 0.1	4	< 0.1	0	0.0	6	< 0.1
Walleye	<i>Stizostedion vitreum</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	< 0.1	0	0.0	0	0.0	1	< 0.1
Black bullhead	<i>Ictalurus melas</i>	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	2	< 0.1	1	< 0.1	0	0.0	3	< 0.1
Pumpkinseed	<i>Notropis anogenus</i>	0	0	31	0	0	2	0	3	20	0	2	2	2	0	0	2	< 0.1	5	< 0.1	55	10.1	62	0.7
Bluegill	<i>Lepomis macrochirus</i>	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	< 0.1	0	0.0	0	0.0	2	< 0.1
Rainbow trout	<i>Salmo gairdneri</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1	< 0.1	0	0.0	1	< 0.1
Banded killifish	<i>Fundulus diaphanus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	1	< 0.1	0	0.0	1	< 0.1
Threespine stickleback	<i>Gasterosteus aculeatus</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	2	< 0.1	0	0.0	2	< 0.1
Brown bullhead	<i>Ictalurus nebulosus</i>	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0.0	0	0.0	3	0.6	3	< 0.1
Yellow perch	<i>Perca flavescens</i>	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0.0	0	0.0	3	0.6	3	< 0.1
TOTAL		523	1109	167	431	283	103	1400	632	194	528	934	44	260	2765	30	3142	100.0	5719	100.0	544	100.0	9405	100.0

*See Figure 1 for sampling locations.

Source: Ecology and Environment, Inc.

Table 4
RELATIVE ABUNDANCE OF MACROINVERTEBRATES COLLECTED AT
EACH STATION, FALL 1977, SPRING, 1978, SUMMER, 1978 – OLCOTT HARBOR, N.Y.
(NUMBER/M²)

TAXA	SAMPLING STATIONS*																	
	4			6			7			8			9			10		
	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer
Oligochaeta Tubificidae <u>Tubifex</u> sp. <u>Limnodrilus</u> sp.		19	1285	2646	76	416	2249		6880	20563	1587		605	151 76 226	6558	7786	907	869
Diptera Chironomidae <u>Chironomus</u> sp. <u>Anatopynia</u> sp. Pelopiinae <u>Pentaneura</u> sp.			38				19			151	76			57		151	76	
Gastropoda Physidae <u>Physa</u> sp.				227	19					151	76						76	
Amnicolidae <u>Amnicola</u> sp. Viviparidae Fragments				X		X			X	151 X	76		X	X	X	X	X	X
Pelecypoda Sphaeriidae <u>Sphaerium</u> sp. Fragments			38	208		X	19 X											
Hirudinea Glossiphoniidae <u>Helobdella</u> sp.										605								
TOTAL NUMBER OF ORGANISMS/M ²		19	1361	3081	95	416	2287		880	21621	2646	6124	605	453	6615	7937	1059	869
TOTAL NUMBER OF TAXA		1	3	4	2	3	4		2	6	5	2	2	4	3	3	4	2

* NO SAMPLES WERE OBTAINED AT STATIONS 1-3 AND 5 BECAUSE OF SUBSTRATE CHARACTERISTICS (i.e., ROCK AND COBBLE).
SEE FIGURE 1 FOR SAMPLING LOCATIONS.

SOURCE: Ecology and Environment, Inc.

Table 5
AQUATIC MACROPHYTES OF OLCOTT HARBOR
AND EIGHTEENMILE CREEK
(Sheet 1 of 4)

STATION NUMBER	GROWTH FORM*	COVER DOMINANCE	SPECIES
1	E E E E F R S S	X X	<i>Impatiens capensis</i> <i>Sagittaria latifolia</i> <i>Sparganium americanum</i> <i>Vitis sp.</i> <i>Lemna minor</i> None <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i>
2	E E E F FL FL S S	X X X co-dominant	<i>Polygonum amphibium</i> <i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Nymphaea odorata</i> <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i>
3	E E E E FL FL S S	X X X	<i>Polygonum amphibium</i> <i>Scirpus fluviatilis</i> <i>Vitis sp.</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Nymphaea odorata</i> <i>Potamogeton crispus</i> <i>Myriophyllum exallescens</i>
4	E E F FL S S S	X X X	<i>Lycopus americanus</i> <i>Typha latifolia</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Ceratophyllum demersum</i> <i>Potamogeton crispus</i> <i>Myriophyllum exallescens</i>
5	E E E F FL S S	X X X X	<i>Sagittaria latifolia</i> <i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> None <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i>
6	E F FL S S S	X X	None None None <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i> <i>Potamogeton crispus</i>

Table 5
AQUATIC MACROPHYTES OF OLCOTT HARBOR
AND EIGHTEENMILE CREEK
(Sheet 2 of 4)

STATION NUMBER	GROWTH FORM*	COVER DOMINANCE	SPECIES
7	E E F FL S	X X X X	<i>Sagittaria latifolia</i> <i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Myriophyllum exallescens</i>
8	E E F FL S S S	X X X	<i>Typha latifolia</i> <i>Vitis sp.</i> <i>Lemna minor</i> None <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i> <i>Potamogeton crispus</i>
9	E E F FL S	X X X	<i>Pontederia cordata</i> <i>Typha latifolia</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Myriophyllum exallescens</i>
10	E F FL S S S	X	None <i>Lemna minor</i> None <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i> <i>Potamogeton crispus</i>
11	E E E F FL S S S	X X X	<i>Sagittaria rigida</i> <i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Ceratophyllum demersum</i> <i>Myriophyllum exallescens</i> <i>Potamogeton crispus</i>
12	E E E F FL S S	X X X X	<i>Pontederia cordata</i> <i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> None <i>Myriophyllum exallescens</i> <i>Potamogeton crispus</i>

Table 5
AQUATIC MACROPHYTES OF OLCOTT HARBOR
AND EIGHTEENMILE CREEK
(Sheet 3 of 4)

STATION NUMBER	GROWTH FORM*	COVER DOMINANCE	SPECIES
13	E E F FL S S S S S	X X X	<i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> None <i>Heteranthera dubia</i> <i>Myriophyllum exalbescens</i> <i>Potamogeton crispus</i> <i>Potamogeton pectinatus</i> <i>Vallisneria americana</i>
14	E E E E E F FL S S S S	 X X	<i>Carex comosa</i> <i>Impatiens capensis</i> <i>Lythrum salicaria</i> <i>Polygonum amphibium</i> <i>Sagittaria latifolia</i> <i>Sparganium americanum</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Ceratophyllum demersum</i> <i>Myriophyllum exalbescens</i> <i>Potamogeton crispus</i> <i>Potamogeton pectinatus</i>
15	E E E F FL S S	 X X X	<i>Polygonum amphibium</i> <i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> <i>Nuphar advena</i> <i>Myriophyllum exalbescens</i> <i>Potamogeton crispus</i>
16	E E E F FL S S S S S		<i>Sagittaria rigida</i> <i>Sagittaria latifolia</i> <i>Sparganium americanum</i> <i>Lemna minor</i> None <i>Heteranthera dubia</i> <i>Myriophyllum exalbescens</i> <i>Potamogeton crispus</i> <i>Potamogeton pectinatus</i> <i>Vallisneria americana</i>
17	E E F FL S S S S S	X X	<i>Sparganium americanum</i> <i>Typha latifolia</i> <i>Lemna minor</i> None <i>Heteranthera dubia</i> <i>Myriophyllum exalbescens</i> <i>Potamogeton crispus</i> <i>Potamogeton pectinatus</i> <i>Vallisneria americana</i>

Table 5
AQUATIC MACROPHYTES OF OLCOTT HARBOR
AND EIGHTEENMILE CREEK
(Sheet 4 of 4)

STATION NUMBER	GROWTH FORM*	COVER DOMINANCE	SPECIES
18	E E E E E F FL S	X X	<i>Alisma subcordatum</i> <i>Juncus effusus</i> <i>Lythrum salicaria</i> <i>Polygonum amphibium</i> <i>Pontederia cordata</i> <i>Sparganium americanum</i> <i>Lemna minor</i> None None
19	E E E E E F FL S S S S	X X	<i>Impatiens capensis</i> <i>Polygonum amphibium</i> <i>Sagittaria latifolia</i> <i>Sagittaria rigida</i> <i>Typha latifolia</i> <i>Lemna minor</i> None <i>Heteranthera dubia</i> <i>Myriophyllum exalbescens</i> <i>Potamogeton pectinatus</i> <i>Vallisneria americana</i>
20	E E E E E E E	X X	<i>Impatiens capensis</i> <i>Rumex altissimus</i> <i>Sagittaria rigida</i> <i>Lemna minor</i> None <i>Heteranthera dubia</i> <i>Vallisneria americana</i>

* GROWTH FORM: E = Emergent
F = Free-Floating
FL = Floating-Leaves
S = Submergent

SOURCE: Ecology and Environment, Inc.

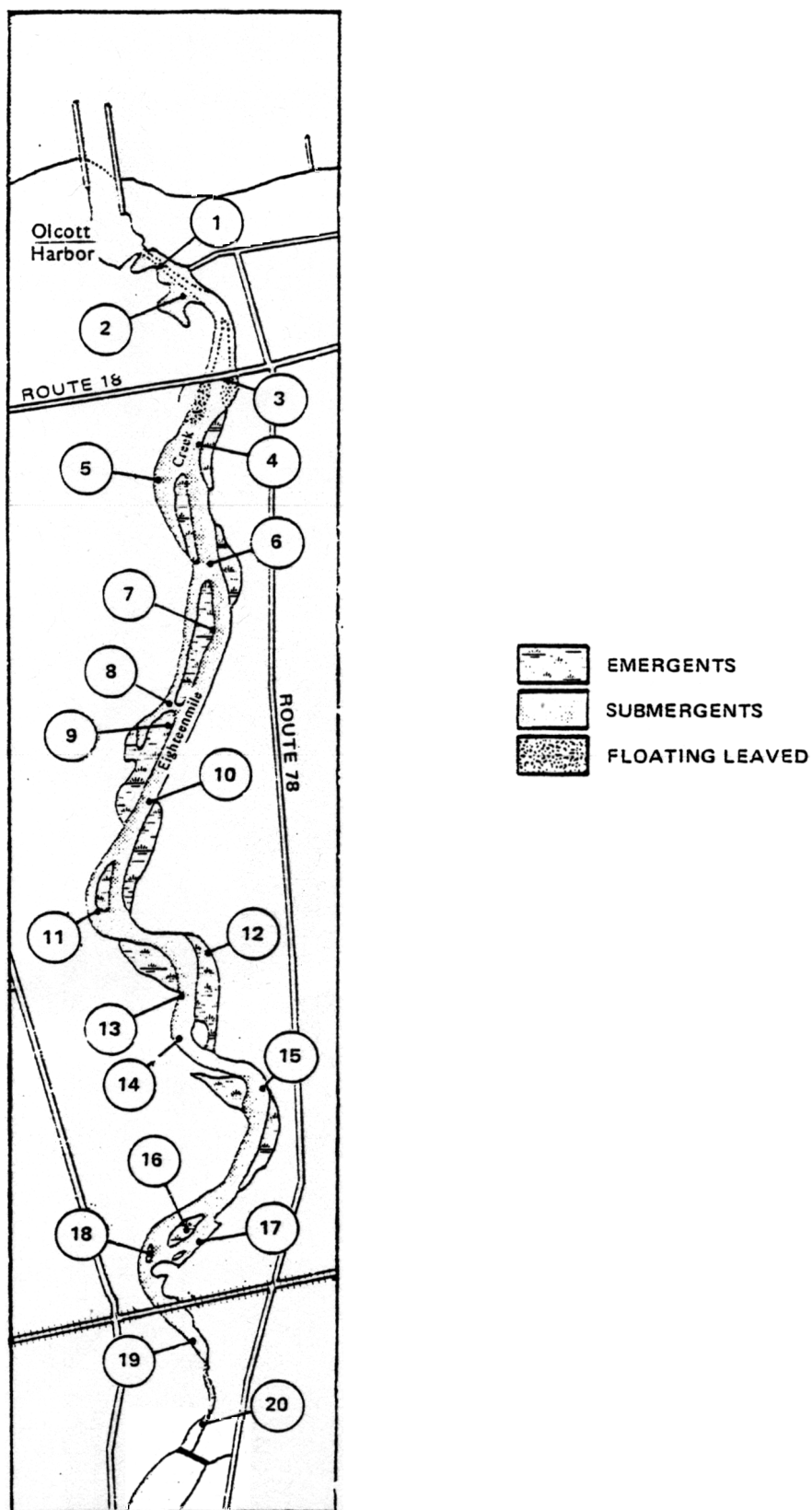


Figure 3 AQUATIC MACROPHYTE DISTRIBUTION AND LOCATION OF SAMPLING STATIONS, EIGHTEENMILE CREEK*

*See Table 5 for species occurring at each station.

The aquatic macrophytes inhabiting Olcott Harbor and the lower reaches of Eighteenmile Creek were found to be typical of calm, turbid northeastern freshwater bodies. Generally, Eighteenmile Creek was dominated by the emergents Typha latifolia and Sparganium americanum, floating mats of Lemna minor, and beds of the submergents Myriophyllum exalbescent and Ceratophyllum demersum. This general dominance and zonation pattern was found throughout the creek basin except where dredging has occurred or boat traffic is extensive, as in Olcott Harbor, downstream of the Route 18 bridge.

Submergent macrophyte communities are generally distributed throughout the portion of Eighteenmile Creek upstream of the Route 18 bridge, except in certain areas: (1) where dredging has occurred or boat traffic is concentrated; (2) where the creek banks drop off sharply to depths and/or turbidity levels too great for submergent growth; or (3) where emergent or floating-leaved macrophytes dominate the community. This nearly universal distribution of submergents is shown in Figure 3. In the extreme upper reaches of the creek (upstream of the railroad bridge near Burt Dam), the current is comparatively fast and the water shallow, resulting in what appeared to be more vigorous plant growth than exists further downstream. Vallisneria americana and Heteranthera dubia were found to be notably more vigorous in this stretch of the creek than those species occurring further downstream, where habitat characteristics appeared more restrictive. Downstream of the Route 18 bridge, macrophyte distribution is restricted to those portions of the harbor that are not dredged. Submergent species dominate this stretch of the creek, occurring in the middle of the creek where the water is shallow and around some of the docking space of the harbor along the shoreline. Generally, macrophyte distribution in this stretch of the creek is patchy and lacks the zonation that exists in the upper reaches of the creek.

3.2 TERRESTRIAL ENVIRONMENT

3.2.1 Terrestrial Vegetation

The terrestrial vegetation occurring on the study area was surveyed and mapped using a coertype, land-use approach. Nine classifications were identified, based on vegetative physiognomy, species composition, previous alterations to the terrestrial environment, and

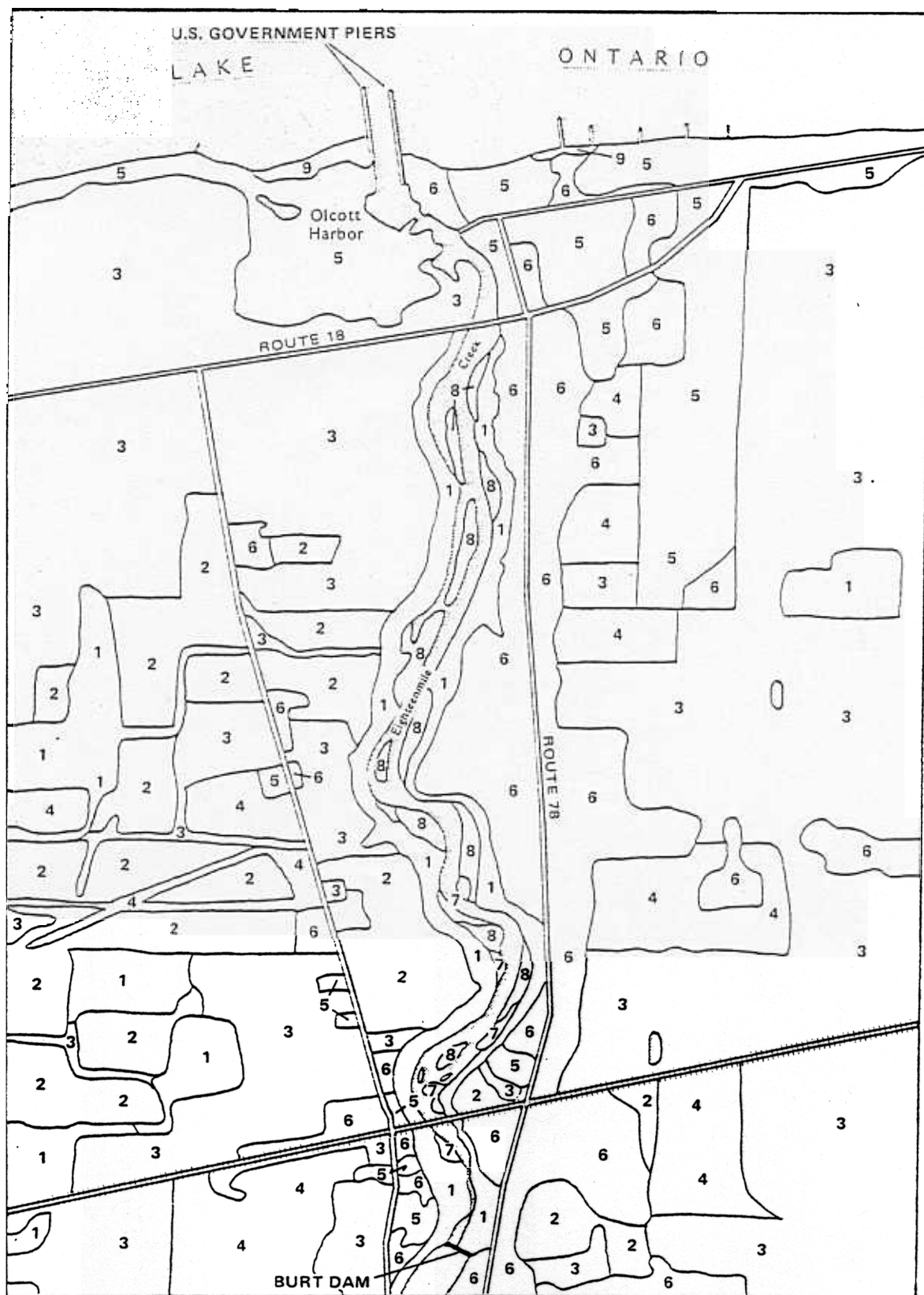
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- | | |
|---------------------|---------------------------------|
| 1 UPLAND FOREST | 4 PASTURE/HAY |
| 2 OLD FIELD | 5 WOODED RESIDENTIAL/COMMERCIAL |
| 3 ORCHARD/SHRUBLAND | 6 OPEN RESIDENTIAL/COMMERCIAL |
| 7 BOTTOMLAND FOREST | |
| 8 MARSH | |
| 9 BEACH | |

Figure TERRESTRIAL VEGETATION OF OLCOTT HARBOR AND VICINITY

white oak, sugar maple, white pine, catalpa, cottonwood, and a variety of ornamental species.

6. Open Residential/Commercial: Those portions of the study area that are sparsely vegetated and are the sites of marinas, parking lots, and small businesses or are characterized by maintained lawns with a general absence of mature trees are classified as open residential/commercial.
7. Bottomland Forest: Bottomland forest occurs primarily along Eighteenmile Creek in the form of small, isolated stands of trees. Green ash, red maple, black willow, and cottonwood are the common indicators of this coverteype, which exists in areas of wet soil or seasonal inundation.
8. Marsh: Marsh vegetation occurs extensively within the Eighteenmile Creek basin, upstream of the Route 18 bridge to Burt Dam. This coverteype is characterized by very dense mats of cattail, bur-reed, and jewelweed.
9. Beach: Beach exists along the shoreline of Lake Ontario, lacks noticeable vegetation, and appears to receive heavy recreational usage.

3.2.2 Avifauna

The bird species observed within the study area, along Eighteenmile Creek, and within Olcott Harbor are listed in Table 6. The relative abundance of each species observed during each season is also provided in Table 6. A species was considered "abundant" if it occurred in large numbers or high densities, "common" if it was observed throughout its preferred habitat, and "uncommon" if it was observed in low numbers and infrequently in its preferred habitat. A total of 68 species was identified during the three sampling periods. The Eighteenmile Creek basin, Olcott Harbor, and the nearshore areas of Lake Ontario were found to receive heavy usage by water-dependent birds. The marsh habitat which exists upstream of the Route 18 bridge was heavily used by waterfowl, especially mallards and black ducks. Broods of both of these species were common in Eighteenmile Creek. Sandpipers, herons, kingfishers, and, during spring migratory periods, warblers were also common in the Eighteenmile Creek basin where suitable marsh or bottomland forest vegetation exists.

Table 6
BIRDS OBSERVED WITHIN THE STUDY AREA
Fall, 1977; Spring, 1978; Summer, 1978

Species	Relative Abundance By Season			Species	Relative Abundance By Season		
	Fall	Spring	Summer		Fall	Spring	Summer
Horned Grebe	—	U	—	Barn Swallow	—	A	A
Pied-billed Grebe	—	C	—	Purple Martin	—	C	C
Gr. Blue Heron	C	C	C	Blue-Jay	C	C	C
Green Heron	—	—	U	Common Crow	C	C	C
Canada Goose	U	—	—	Black-c. Chickadee	C	C	U
Mallard	A	A	A	White-br. Nuthatch	—	U	—
Black Duck	C	C	C	Brown Creeper	—	U	—
Pintail	—	U	—	House Wren	—	C	C
Green-w. Teal	—	—	U	Gray Catbird	—	C	C
American Wigeon	U	—	—	American Robin	—	C	C
Wood Duck	—	—	C	Wood Thrush	—	—	U
Lesser Scaup	U	—	—	Cedar Waxwing	—	C	C
Common Merganser	—	C	—	Starling	A	C	C
Red.-br. Merganser	—	A	—	Red-eyed Vireo	—	C	C
American Kestrel	—	C	C	Yellow Warbler	—	C	C
Ring-n. Pheasant	U	—	—	Yellow-r. Warbler	—	C	U
American Coot	—	C	—	Chestnut-s. Warbler	—	C	C
Killdeer	—	C	C	Common Yellowthroat	—	C	C
Spotted Sandpiper	—	—	C	American Redstart	—	C	C
Least Sandpiper	—	—	U	House Sparrow	A	A	A
Herring Gull	C	C	C	Red-w. Blackbird	—	A	C
Ring-b. Gull	A	A	A	Northern Oriole	—	—	U
Bonaparte's Gull	C	—	—	Common Grackle	—	C	C
Common Tern	U	—	—	Brown-h. Cowbird	—	C	C
Rock Dove	—	C	C	Cardinal	C	C	C
Mourning Dove	—	U	U	Indigo Bunting	—	C	C
Chimney Swift	—	C	C	Evening Grosbeak	U	—	—
Belted Kingfisher	C	C	C	Purple Finch	—	C	U
Common Flicker	—	C	C	American Goldfinch	—	C	C
Downy Woodpecker	U	C	U	Rufous-s. Towhee	—	C	C
Eastern Kingbird	—	C	C	Savannah Sparrow	—	U	U
Eastern Phoebe	—	U	U	Dark-eyed Junco	—	C	—
E. Wood Pewee	—	U	U	Field Sparrow	—	C	C
Tree Swallow	—	A	A	Song Sparrow	—	C	C

KEY

A = Abundant

C = Common

U = Uncommon

SOURCE: Ecology and Environment, Inc.

3.2.3 Mammals

The mammals observed within the study area are listed in Table 7. Extensive muskrat signs were found in the marsh habitat upstream of the Route 18 bridge, along with signs of mink, striped skunk, and raccoon. In the upland forest adjacent to Eighteenmile Creek, red squirrels, gray squirrels, and chipmunks were found to be common. All of the species listed in Table 7 are considered common in the study area, where suitable habitat exists.

Table 7
MAMMALS OBSERVED WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
MUSKRAT	<i>Ondatra zibethica</i>
MINK	<i>Mustela vison</i>
STRIPED SKUNK	<i>Mephitis mephitis</i>
COTTONTAIL RABBIT	<i>Sylvilagus floridanus</i>
RED SQUIRREL	<i>Tamiasciurus hudsonicus</i>
GRAY SQUIRREL	<i>Sciurus carolinensis</i>
RACCOON	<i>Procyon lotor</i>
WOODCHUCK	<i>Marmota monax</i>
CHIPMUNK	<i>Tamias striatus</i>

SOURCE: Ecology and Environment, Inc.

4. DISCUSSION

4.1 AQUATIC ENVIRONMENT

The aquatic habitat of Eighteenmile Creek and Olcott Harbor is characterized by calm, turbid water, a soft, silty bottom supporting dense macrophyte growth, and abundant bottom cover in the form of sunken stumps and branches. Olcott Harbor downstream of the Route 18 bridge receives heavy usage from recreational boating, and much of the shoreline is utilized as dock space. In comparison, much of Eighteenmile Creek upstream of the Route 18 bridge consists of relatively undisturbed marsh habitat along the shoreline and receives little usage from boaters.

The data collected during the three-season seining and gill netting fisheries studies showed the study area to be valuable fish spawning/nursery areas and feeding habitat for both warm-water and cold-water species. The abundance of forage species in the seining catches, along with the presence of juvenile salmonid and warm-water game species supports this conclusion. The dense macrophytic growth occurring in Eighteenmile Creek provides excellent food and cover for the fishery of the study area. Trout and salmon utilize the creek and nearshore areas of Lake Ontario for spawning and/or feeding habitat.

The macroinvertebrate populations exhibit a low diversity and are dominated by pollution tolerant tubificids, indicating potential organic enrichment and periodic low oxygen levels within the creek.

The sheltered calm water, coupled with gradually increasing water depths and a silty bottom, provides excellent habitat for the major zones of aquatic flora, which were found to be well represented upstream of the Route 18 bridge.

The aquatic environment of Eighteenmile Creek provides suitable conditions for a rich fishery and high value marsh habitat. The abundance of forage fish in the creek provides a food source for a variety of birds and mammals, as well as for predatory fish species. The rich macrophyte vegetation also provides an important source of food and cover for waterfowl, marsh birds, and water dependent mammals. In view of the loss of wetland habitat by waterfront development and the heavy recreational usage of Eighteenmile Creek in the stretch downstream of the Route 18 bridge, it is felt that the upper reaches of the creek basin are of increasingly significant ecological value. Wetland habitat is generally non-existent in Olcott Harbor, and the harbor receives less usage by fish and wildlife than the creek basin further upstream. The harbor does serve as an important fish migratory channel to spawning habitat and provides sheltered water conditions suitable for waterfowl feeding and brooding habitat.

4.2 TERRESTRIAL ENVIRONMENT

The variety of terrestrial vegetation covertypes and associated habitats provides suitable breeding, resting, and feeding habitats for both upland and wetland associated birds and mammals, as demonstrated by the presence of herons, sandpipers, gulls, kingfishes, and waterfowl in the Eighteenmile Creek basin. The variety and mosaic distribution of the terrestrial habitat types within the study area provide suitable breeding habitat for most species commonly breeding in the Lake Ontario Plain area of western New York State. Similarly, habitat characteristics are such that an abundant and diverse small mammal population exists within the study area.

The most significant aspect of the terrestrial environment of the study area is felt to be the extensive marsh and bottomland habitat occurring in the Eighteenmile Creek basin. The area was found to be inhabited by a diverse bird population and was utilized by water-dependent mammals such as muskrat and mink. This habitat is felt to be especially valuable because of the comparatively unnatural, modified

characteristics of the surrounding study area and the loss of similar habitat in Olcott Harbor due to development.

4.3 POTENTIAL IMPACTS OF THE PROPOSED PROJECT

This section briefly discusses some of the potential impacts of the proposed project on the aquatic and terrestrial biota and their respective habitats, based on a review of Considered Plan 10, as shown in Figure 5.

The impacts to terrestrial wildlife will be minor, consisting of the avoidance of the harbor and nearshore areas by wildlife during construction operations. Since the proposed activities will not result in the long-term loss or modification of terrestrial habitats or the valuable wetlands upstream of the Route 18 bridge, the duration of impacts to the terrestrial environment will be short-term. Feeding and/or brooding waterfowl and gulls will avoid the areas of proposed construction because of the disturbances resulting from these activities, and there should be no significant decrease in the local breeding population.

Short-term impacts to aquatic biota, particularly cold-water and warm-water fish, will be in the form of the avoidance of Eighteenmile Creek and nearshore Lake Ontario during construction periods. This impact could result in major, long-term effects to the fishery of the region if the area is avoided by breeding stock during several successive fall or spring spawning periods. If this occurs, the loss of recruitment to future breeding populations could result in a decreased usage of Eighteenmile Creek for several years following construction activities. Such long-term implications should be considered when scheduling construction activities.

The potential long-term adverse impacts to the cold-water and warm-water fishery resources of the region cannot be accurately projected until a hydraulic model is developed which will determine the potential alterations to sedimentation, water quality, temperature, and flow characteristics resulting from the proposed offshore breakwater design. These physical factors are important to migratory fish species, and their modification could inhibit fish utilization in Eighteenmile Creek. Based on the data resulting from this study, the principal game species that would be affected are brown trout, rainbow trout, chinook salmon, and coho salmon.

APPENDIX I
IDENTIFICATION KEYS

A. FISH

- Eddy, S. How to know the Freshwater Fishes, Wm. C. Brown Co. Dubuque, Iowa. 2nd Edition, 1969, 286 pp.
- Eddy, S. and A.C. Hodson, Taxonomic Keys to the Common Animals of the North Central States. Burgess Publ. Co., Minneapolis, Minnesota, 3rd. Edition. 1961 pp. 87-123.
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