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Oak Orchard Harbor Summer Data Report to the Army Corps of Engineers Buffalo District

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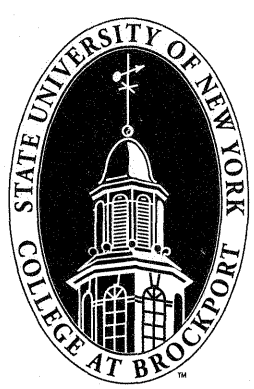

Oak Orchard Harbor

Summer Data Report

to the

Army Corps of Engineers

Buffalo District

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Brockport, New York

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Dr. Ronald Dilcher collected and identified macrophytes and birds. Michael Calaban's identifications of invertebrates were verified by Dr. Stephen Arnold. Dr. Arnold identified all oligochaetes. George Pesecreta and Michael Calaban provided valuable assistance in the field. Joyce Makarewicz was our typist. We thank them for their continuing effort.

INTRODUCTION

On 8 and 9 July 1979, benthos, fish, macrophytes and birds were collected or observed at Oak Orchard Harbor, New York, to evaluate the potential biological impact of dredging the harbor area. This is a data report. In the final report, our analysis and interpretation of the data collected will be presented.

Figures 1 and 2 are maps of the Oak Orchard Harbor area indicating the location of sampling sites. Table 1 provides information on bottom characteristics at the benthos sampling sites. Fishing pressure was light, but pleasure boat traffic was heavy compared to the usage during the autumn 1978 sampling trip. Water temperature was 19°C.

METHODS

Fish

Ichthyoplankton and Egg Sampling

A 2/3-m diameter tow net, equipped with 1-mm mesh Nitex netting, was towed for 3 minutes near the bottom at Stations 3, 5, 7 and 8 for ichthyoplankton and pelagic eggs. At Stations 1 to 10, benthos samples were taken with a Ponar dredge and were also examined for eggs. Results are presented in Tables 3 and 4.

Gill Netting

Gill nets, 50 m in length, were set near the bottom for 24 hours at Stations 3 (10-cm bar), 5 (6-cm bar), 7 (5-cm bar) and 8 (3-cm bar). Nets were set to minimize interference with fishing and boat traffic

(Fig. 1). Results (Tables 5 and 2) are expressed as the total number of each species captured per set.

All fish were measured (total length), weighed and sexed where possible. The N.Y.S.D.E.C. has recently instructed us to return as many live fish to the lake as possible or our collector's permit would be jeopardized. Sexing was accomplished by opening the body cavity and visually examining the gonads. The state of maturity of each fish was listed according to the following classification criteria: immature fish (I) possessing undeveloped or invisible gonads; mature fish (M) with developed gonads and/or ripe sex products; and spent fish (S) with collapsed gonads and few sex products. Fifty of 109 white perch were sexed from Station 7; all other fish were sexed.

Electrofishing

A 220-volt DC generator equipped with two hand-held probes was used to shock two 50-m sections of shoreline at Stations 7 and 8 (Fig. 1). Because the east shore is heavily developed by marinas with a number of boats moored at docks, only the shallow water areas and macrophyte beds of the west shore, adjacent to Station 8, were electroshocked. At Station 7 both the east and west shores were electroshocked. In a 50-m transect parallel to the shore, 14 single fish nests and 1 cluster of 3 nests were observed. Many of the nests were obviously pumpkinseed nests since they were guarded by adults of this species. However, several largemouth bass were observed in this area, as well as carp. This shallow, sandy area on the east and west side of Station 7 is an ideal nesting habitat. Results are presented in Table 6.

Benthos

Three Ponar grabs were taken at each of the ten sampling stations (Fig. 1). Samples were taken with no conscious bias at each site in Lake Ontario, while sample sites at each station in Oak Orchard Creek were spaced laterally across the channel and labeled East, West or Center. In some instances, a benthic sample was not initially retrieved with the Ponar sampler. A repeat sample was attempted, but if no substrate was dredged up, the bottom was assumed to be rock or large cobble. In the field, each dredge sample was washed through a 0.471-mm mesh screened bucket to remove fine sediments. Debris and organisms retained on screens were placed in bottles and preserved in 4% formaldehyde solution.

In the laboratory, organisms were hand-picked from the debris. Invertebrates were keyed to the species level if possible and preserved in 95% ethyl alcohol. Four randomly selected samples were repicked, and picking efficiency was computed for each taxon (lowest efficiency = 73%, for oligochaetes). Counts per grab, corrected for picking efficiency, were converted to individuals per square meter (Ponar grab bite = 0.0529 m^2).

Specific identification of Caenis and Polycentropus was not possible because of the lack of published taxonomic keys for immature stages (Edmunds et al. 1976, Wiggins 1977). A key to the larvae of Palpomyia of North America promised by Grogan and Wirth (1975) has not been published, making it impossible to refer our specimens to one of the 16 described species. It was not possible to collect the pupae or adults of the Chironomidae necessary for specific identification of the larvae. Results are presented in Tables 7 and 8.

Macrophytes

The presence, location, species composition and the extent of aquatic macrophyte beds were determined and mapped (Fig. 2). Four substations (4.6 m, 15.2 m, 30.5 m and 45.7 m from shore) on 12 transects (Fig. 2) were sampled. Representative specimens were taken by hand, dip net or with a grab sampler. Results are presented in Tables 9 and 10.

Birds

Ten hours (6:30AM to 4:30PM) were spent observing and identifying birds in the project area. Conditions were bright with haze. Sears (8x50) binoculars and a Bausch & Lomb spotting scope with 10x, 20x and 60x eyepieces aided in identifying and observing birds. Results are presented in Table 11.

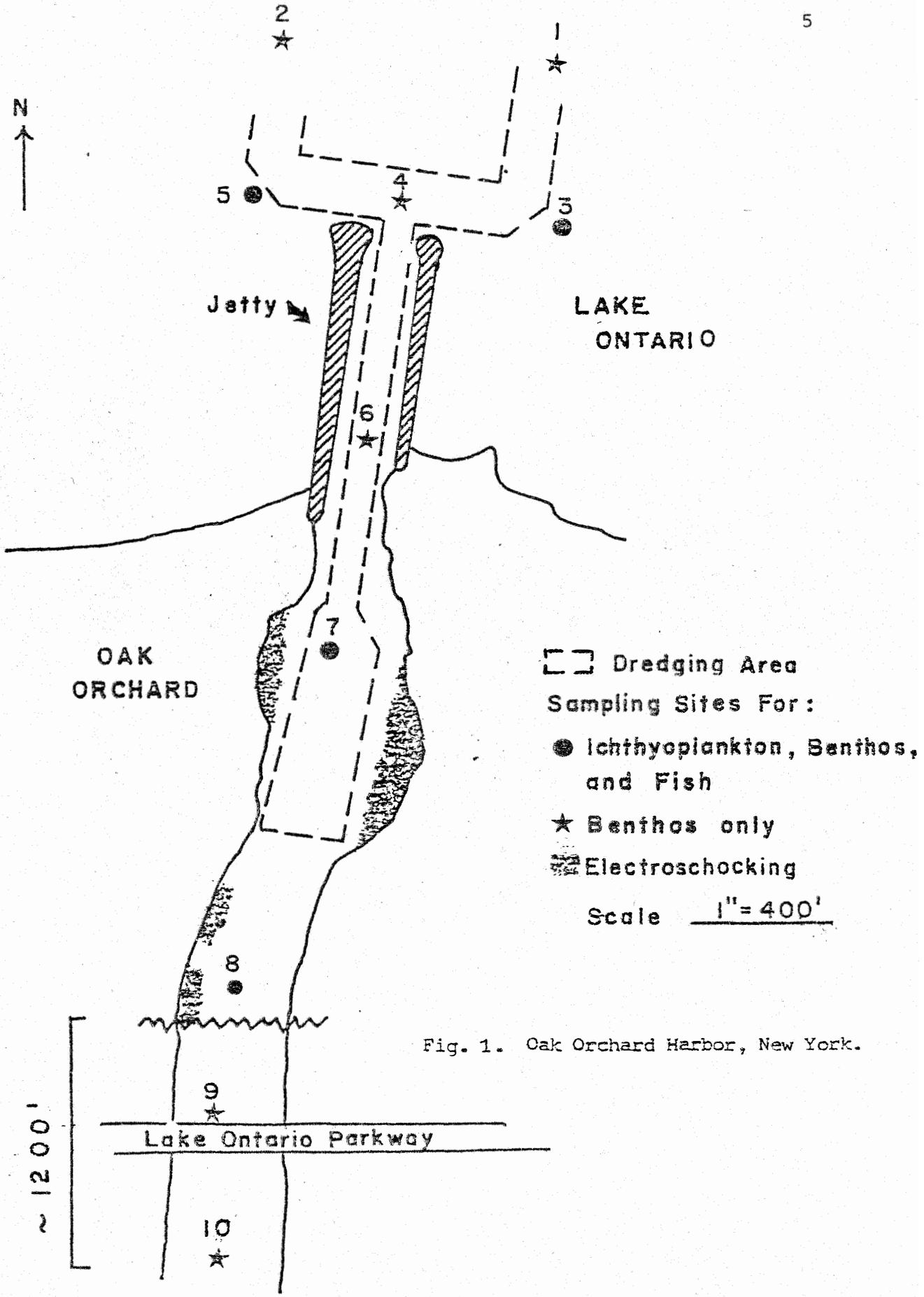

Fig. 1. Oak Orchard Harbor, New York.

Table 1. Bottom characteristics of sample sites.

Station 1	Cobble and sand bottom
Station 2	Cobble bottom
Station 3	Cobble and gravel bottom
Station 4	Cobble and sand bottom
Station 5	Cobble bottom
Station 6	Cobble and sand bottom
Station 7	Ooze with organic debris
Station 8	Dark sediment with considerable organic debris
Station 9	Ooze and organic debris, shale on east side of channel
Station 10	West side of creek is black ooze; channel is ooze grading off to shale on the east side

Table 2. Species list of fish.

Chordata, Pisces

Amiidae

Amia calva

Catostomidae

Moxostoma spp.

Centrachidae

Ambloplites rupestris
Lepomis gibbosus
Lepomis macrochirus
Micropterus dolomieui
Micropterus salmoides
Pomoxis nigromaculatus

Clupeidae

Dorosoma cepedianum

Cyprinidae

Cyprinus carpio
Notemigonus crysoleucas
Notropis bifrenatus

Cyprinodontidae

Fundulus diaphanus

Esocidae

Esox lucius

Ictaluridae

Ictalurus nebulosus

Lepisosteidae

Lepisosteus osseus

Percidae

Etheostoma nigrum

Serranidae

Morone americana

Table 3. Results of ichthyoplankton tows.

Station 3	No eggs or larvae
Station 5	No eggs or larvae
Station 7	No eggs or larvae
Station 8	No eggs or larvae

Table 4. Fish eggs observed in benthos samples.

Station	Number
6W	1
5E	8
5W	6
1C	33
1W	91

Table 5

SAMPLING DATE 7-9-79
STATION NUMBER 5
GILL NET

WHITE PERCH (Morone americana)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
35.0	630	F	M	31.5	405	F	M
31.0	450	F	M	30.0	405	F	M
31.5	405	M	M	30.0	360	F	M
32.5	495	F	M	29.5	360	F	M
29.0	315	F	M	29.5	315	F	M
28.0	270	F	M	33.5	563	F	M
30.5	383	M	M	29.0	315	F	M
33.0	540	F	M	31.0	360	F	M
32.5	450	M	M	29.0	270	F	M
31.5	360	F	M	29.5	315	F	M
32.0	405	F	M	32.5	428	F	M
33.5	563	M	M	31.5	383	F	M
31.0	360	F	M	33.5	428	F	M
26.0	225	F	M	31.5	338	F	M
33.0	563	F	M	29.0	248	F	S
31.5	315	F	M	31.5	383	F	M
28.0	203	F	M	31.0	315	F	M
29.5	360	F	M	29.0	270	M	M
28.5	225	F	M				

NORTHERN PIKE (Esox lucius)

LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY	LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY
79.0	3.42	F	S				

REDHORSE SUCKER (Moxostoma spp.)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
45.0	990	F	M				

Table 5 (continued)

SAMPLING DATE 7-9-79
STATION NUMBER 5 (continued)
GILL NET

SMALLMOUTH BASS (Micropterus dolomieui)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
33.0	405	M	S				

SAMPLING DATE 7-9-79
STATION NUMBER 7
GILL NET

WHITE PERCH (Morone americana)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
27.6	180	F	S	31.4	360	F	M
27.9	180	?	S	28.6	270	F	M
31.6	360	F	M	36.1	720	F	M
26.3	90	M	M	25.0	90	M	M
25.8	90	F	M	32.8	450	F	S
32.8	540	F	M	29.3	270	F	M
27.8	180	F	M	29.0	225	F	M
31.5	315	F	S	30.5	270	F	M
32.0	495	F	M	29.1	495	F	M
24.6	90	F	M	30.3	270	F	M
36.0	540	F	M	33.5	405	F	M
33.7	450	F	M	31.7	360	F	S
31.1	270	F	S	29.3	270	F	M
29.3	225	F	M	26.4	180	F	M
27.0	90	F	M	32.1	315	F	M
29.9	225	F	S	34.0	450	F	M

Table 5 (continued)

SAMPLING DATE 7-9-79
STATION NUMBER 7 (continued)
GILL NET

WHITE PERCH (Morone americana)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
26.9	180	M	S
28.1	180	F	M
30.5	315	F	M
28.7	225	F	S
27.9	180	F	S
25.0	90	M	S
31.0	315	F	M
27.0	135	F	M
30.0	360	F	M
30.7	315	were not sexed	
29.5	180		
30.0	270		
31.4	405		
28.4	315		
34.1	405		
29.0	495		
28.3	405		
26.7	315		
31.5	585		
32.2	585		
31.0	630		
25.4	270		
27.0	315		
27.8	405		
30.2	405		
30.5	540		
32.3	675		
28.1	405		
29.5	495		
29.9	270	F	M
31.4	360	F	M
31.6	450	F	M
30.2	270	F	M
31.1	495	F	M
30.9	270	F	M
28.1	225	F	M
24.5	90	M	S
30.0	270	were not sexed	
29.0	180		
33.0	495		
24.0	45		
26.0	315		
32.7	405		
28.9	405		
25.5	270		
33.5	720		
34.7	765		
23.5	225		
31.7	540		
29.5	450		
29.3	450		
28.0	405		
27.5	405		
25.5	315		
28.2	450		
26.3	360		
27.7	405		
28.0	360		

Table 5 (continued)

SAMPLING DATE 7-9-79
STATION NUMBER 7 (continued)
GILL NET

WHITE PERCH (Morone americana)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
24.3	270	were not sexed		30.2	495	were not sexed	
33.8	675			32.6	585		
32.3	583			31.6	540		
35.5	720			30.5	405		
28.8	405			27.6	360		
34.0	675			31.5	630		
28.8	315			27.4	315		
30.3	495			28.5	360		
31.4	583			27.5	315		
31.0	495			27.2	360		
29.6	405			30.1	495		
29.2	405			32.0	495		
32.3	583			26.2	315		
30.1	495			27.0	315		

NORTHERN PIKE (Esox lucius)

LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY	LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY
63.2	1.4	F	S	49.9	1.1	M	S
47.8	1.0	M	S	51.3	1.2	F	S

ROCK BASS (Ambloplites rupestris)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
21.5	135	F	M				

Table 5 (continued)

SAMPLING DATE 7-9-79
STATION NUMBER 7 (continued)
GILL NET

SMALLMOUTH BASS (Micropterus dolomieui)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
30.0	315	M	S	29.3	315	M	S
30.0	360	F	M	30.0	315	F	M
29.7	315	F	S				

SAMPLING DATE 7-9-79
STATION NUMBER 8
GILL NET

WHITE PERCH (Morone americana)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
28.0	270	F	M	31.5	540	F	M
29.0	405	F	M	31.5	450	F	M
32.5	540	F	M	30.4	450	F	M
31.5	495	F	M	30.5	450	F	M
34.7	675	F	M	32.2	540	F	M
29.9	405	F	M	34.2	675	F	M
31.5	450	F	M	32.5	495	F	M
32.5	495	F	M	30.0	450	F	M
29.9	495	F	M	26.6	270	M	S
34.7	585	F	M	30.8	450	F	M
31.8	540	M	M	31.2	495	F	M
28.1	360	M	S	27.9	225	F	M
31.0	450	F	M	31.4	495	F	M
35.0	675	F	M	32.0	540	F	M

Table 5 (continued)

SAMPLING DATE 7-9-79
STATION NUMBER 8 (continued)
GILL NET

WHITE PERCH (Morone americana)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
29.8	450	F	M	29.7	405	F	M
30.1	450	F	M	26.6	315	F	M
20.4	119	F	I	19.8	79	M	I
16.5	41	F	I	19.5	95	F	I
17.9	58	?	I	17.0	53	F	I
16.0	45	F	I	17.0	49	F	I

LONGNOSE GAR (Lepisosteus osseus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
70.3	540	M	S	70.8	675	F	M
72.1	765	M	M	65.5	450	M	S
59.6	405	M	S	58.1	405	M	M
72.9	765	M	S				

BOWFIN (Amia calva)

LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY	LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY
50.0	1.0	M	S?				

GIZZARD SHAD (Dorosoma cepedianum)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
32.0	720	F	M				

Table 5 (continued)

SAMPLING DATE 7-9-79
STATION NUMBER 8 (continued)
GILL NET

ALEWIFE

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
21.2	58	F	M				

BLACK CRAPPIE (Pomoxis nigromaculatus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
17.2	54	F	I				

SMALLMOUTH BASS (Micropterus dolomieui)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
17.7	65	F	I				

CARP (Cyprinus carpio)

LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY	LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY
47.0	1.3	?	S				

BLUEGILL (Lepomis macrochirus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
11.5	28	F	M				

GOLDEN SHINER (Notemigonus crysoleucas)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
18.4	61	F	S	18.7	54	F	S

Table 6

SAMPLING DATE 7-8-79
STATION NUMBER 7E
ELECTROSHOCKING

CARP (Cyprinus carpio)

LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY	LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY
49.0	1.8	M	M	53.0	2.1	M	S
50.9	1.7	M	M				

LARGEMOUTH BASS (Micropterus salmoides)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
28.0	370	M	M				

PUMPKINSEED (Lepomis gibbosus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
12.6	33	M	M	11.9	28	M	M
11.3	24	M	M	8.9	11	M	M
6.3	5	?	I				

ROCK BASS (Ambloplites rupestris)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
7.2	9	?	I				

Table 6 (continued)

SAMPLING DATE 7-8-79
STATION NUMBER 7W
ELECTROSHOCKING

CARP (Cyprinus carpio)

LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY	LENGTH(cm)	WEIGHT(kg)	SEX	MATURITY
47.2	1.7	M	S				

PUMPKINSEED (Lepomis gibbosus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
15.8	72	M	M	17.2	72	M	S
12.7	37	M	M	11.6	32	M	M
12.5	38	M	M	10.1	12	F	I
7.9	9	M	I	7.3	6	?	I
7.0	5	?	I	7.2	5	?	I
6.0	4	?	I	7.2	5	?	I
6.7	5	?	I	5.8	4	?	I

EASTERN BANDED KILLIFISH (Fundulus diaphanus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
5.3	~1	M	S				

LARGEMOUTH BASS (Micropterus salmoides)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
12.7	22	M	I	11.6	16	M	I

SAMPLING DATE 7-8-79
STATION NUMBER 7W (continued)
ELECTROSHOCKING

ROCK BASS (Ambloplites rupestris)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
7.0	8	?	I	6.4	6	?	I
6.9	8	?	I	6.0	5	?	I

JOHNNY DARTER (Etheostoma nigrum)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
6.5		?	I				
6.6	$\bar{x}$ = 1.6	M	M				
6.7		M	M				

SAMPLING DATE 7-8-79
STATION NUMBER 8a
ELECTROSHOCKING

BROWN BULLHEAD (Ictalurus nebulosus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
8.2	7	?	I	7.7	6	?	I
6.6	3	?	I				

JOHNNY DARTER (Etheostoma nigrum)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
3.3	< 1	?	I				

Table 6 (continued)

SAMPLING DATE 7-8-79
STATION NUMBER 8a (continued)
ELECTROSHOCKING

PUMPKINSEED (Lepomis gibbosus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
15.7	66	M	M	12.2	29	F	M
12.9	34	M	S	9.3	15	F	M
8.1	5	?	I	8.4	6	?	I
7.4	4	?	I	6.6	3	?	I
6.8	4	?	I	7.8	9	?	I
7.2	6	?	I	6.8	5	?	I
6.4	3	?	I	7.0	5	?	I
5.2	2	?	I				

ROCK BASS (Ambloplites rupestris)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
13.0	33	M	M	8.3	9	?	I
7.2	7	?	I	7.0	7	?	I
6.7	6	?	I	6.9	7	?	I
7.0	7	?	I	6.5	6	?	I
7.3	7	?	I	6.9	7	?	I
7.1	7	?	I	7.1	7	?	I

Table 6 (continued)

SAMPLING DATE 7-8-79
STATION NUMBER 8b
ELECTROSHOCKING

BROWN BULLHEAD (Ictalurus nebulosus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
28.7	272	F	M	6.0	$\bar{x}$ = 3.0	?	I
				6.4		?	I

BOWFIN (Amia calva)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
23.9	130	M	M				

SMALLMOUTH BASS (Micropterus dolomieui)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
10.7	11	M	I				

BRIDLE SHINER (Notropis bifrenatus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
6.6	2	F	M	5.1	1	M	I

PUMPKINSEED (Lepomis gibbosus)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
12.0	37	M	M	11.9	37	M	M
8.5	16	F	M	6.8	6	?	I
7.2	5	?	I	6.5	5	?	I
7.0	6	?	I	6.3	6	?	I
6.8	6	?	I				

Table 6 (continued)

SAMPLING DATE 7-8-79
STATION NUMBER 8b (continued)
ELECTROSHOCKING

ROCK BASS (Ambloplites rupestris)

LENGTH(cm)	WEIGHT(g)	SEX	MATURITY	LENGTH(cm)	WEIGHT(g)	SEX	MATURITY
9.5	13	M	I	7.2	8	?	I
6.5	4	?	I	6.1	5	?	I
6.7	6	?	I	5.1	3	?	I
6.2	4	?	I	6.5	4	?	I
6.7	6	?	I	6.5	4	?	I
6.6	no reading			6.5	5	?	I

Table 7. Species list of benthic invertebrates for Oak Orchard Creek, 8 July 1979.

Phylum
Class
Order
Family
Genus, species, author and year

Annelida
Oligochaeta
Haplotaxida
Naididae
Stylaria lacustris (Linnaeus 1767)
Tubificidae
Limnodrilus hoffmeisteri Claparède 1862
L. claparedeianus Ratzel 1868
Potamothrix modlaviensis Vejdovsky and Mrazek 1902
P. vejdovsky (Hrabe 1941)
Peloscolex ferox (Eisen 1879)
unidentifiable immature Tubificidae

Arthropoda
Crustacea
Podocopa
Cypridae
unidentifiable Cyprinae
Isopoda
Asellidae
Asellus sp.
Amphipoda
Gammaridae
Gammarus fasciatus Say 1818
Insecta
Ephemeroptera
Caenidae
Caenis spp.
Ephemeridae
Hexagenia limbata (Serville 1829)
Megaloptera
Sialidae
Sialis sp.
Trichoptera
Leptoceridae
Ceraclea neffi (Resh 1974)
Coleoptera
Elmidae
Dubiraphia sp.
Diptera
Chironomidae
Procladius spp.
Chironomus spp.

Table 7 (continued).

Arthropoda (cont.)
  Insecta (cont.)
    Diptera (cont.)
      Chironomidae (cont.)
        Cryptochironomus spp.
        Endochironomus spp.
        Parachironomus spp.
        Phaenopsectra spp.
        Polypedilum spp.
        Micropsectra sp.
        Rheotanytarsus spp.
        Cricotopus spp.
        Psectrocladius sp.
        unidentifiable Chironomidae
      Ceratopogonidae
        Palpomyia spp.

Mollusca
  Gastropoda
    Basomatophora
      Physidae
        Physa heterostropha Say 1817
      Lymnaeidae
        unidentifiable immature *Lymnacea* spp.
  Pelecypoda
    Heterodonta
      Sphaeriidae
        Musculium transversum (Say 1829)
        Pisidium (*Cyclocalyx*) *supinum* Schmidt 1850

Table 8. Density of benthic invertebrates, Oak Orchard Harbor, New York. Values are expressed in individuals/m^2.

SPECIES	Stations 1	2	3	4	5	6	7	8	9	10
Stylaria lacustris	12.6									
Limnodrilus hoffmeisteri				143.8			76.1	280.7	186.0	183.6
Limnodrilus claparedeianus				22.4						
Potamothrox moldaviensis				76.6			107.0	194.6	25.9	164.2
Potamothrix vejdovskyi	29.9								116.8	
Peloscolex ferox				32.8						
unidentifiable immature Tubificidae				1005.9		10.0	787.4	573.8	467.9	570.4
unidentifiable Cyprinae						6.3				
Asellus sp.								6.3		
Gammarus fasciatus	113.4	37.8	277.2	138.6	44.1	6.3	6.3	126.0	37.8	44.1
Hexagenia limbata							25.2	6.3	18.9	37.8
Caenis spp.		6.3	12.6					6.3		6.3
Sialis sp.										6.3
Ceraclea neffi	6.3									
Ceraclea neffi pupae					6.3					
Dubiraphia sp.									6.3	
Procladius spp.	10.6					10.6	10.6	53.2		53.2
Chironomus spp.	21.3			74.5				63.9	181.0	244.9
Cryptochironomus spp.				85.2			95.8	21.3	37.9	21.3
Endochironomus spp.							74.5		10.6	10.6

Table 8 (continued).

SPECIES	Stations									
	1	2	3	4	5	6	7	8	9	10
Parachironomus spp.						10.6	42.6		21.3	21.3
Phaenopsectra spp.			21.3	21.3						10.6
Polypedilum spp.				702.7					63.9	149.1
Micropsectra sp.					10.6					
Rheotanytarsus spp.	21.3	42.6	10.6	21.3	74.5					
Cricotopus spp.	31.9	42.6	42.6		53.2					
Psectrocladius sp.					10.6					
Chironomidae pupae	6.3		18.9	31.5						6.3
unidentifiable Chironomidae	1.0		1.0		1.0					
Palpomyia spp.							6.3	18.9		
Physa heterostropha					6.3					
immature Lymnaea spp.					75.6					
Musculium transversum							31.5	12.6		6.3
Pisidium supinum				6.3			6.3			

Table 9. Species list of aquatic macrophytes, Oak Orchard Creek.

Genus and Species	Common Name
Ceratophyllum demersum	Coon-tail
Lemna minor	Lesser Duckweed
Myriophyllum sp.	Water Milfoil
Potamogeton crispus	Pondweed
Potamogeton sp.	Narrow-leaf Pondweed
Vallesnaria americana	Tape Grass
Anacharis canadensis	
Nuphar rubrodiscum	
Nymphaea odorata	
Spirodela polyrhiza	
Wolffia sp.	

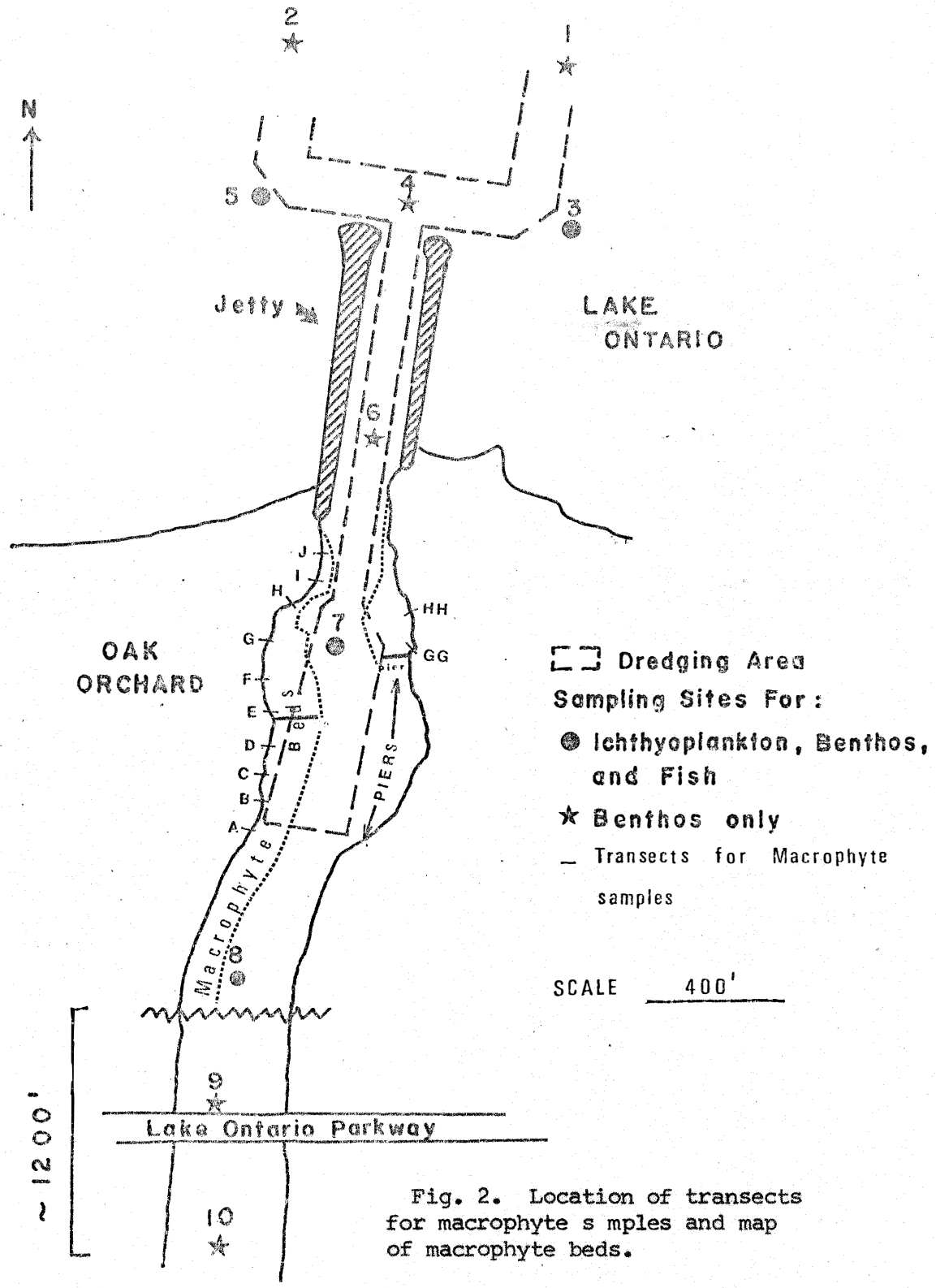

Fig. 2. Location of transects for macrophyte s mples and map of macrophyte beds.

Table 10. Aquatic macrophyte distribution with water depth and station site. Check marks indicate presence of a species. Refer to Figure for location of stations sites.

	Stations																			
	A				B				C				D				E			
Substation	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Depth (m)	1.2	1.7	1.2	.5	1.8	1.5	1.1	.9	.6	1.4	1.7	1.5	.8	1.2	.9	1.2	.6	.9	.9	2.1
*Myriophyllum sp.	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	
Ceratophyllum demersum	x	x		x						x			x	x			x		x	
*Potamogeton sp.	x		x	x			x	x	x	x	x	x	x	x	x		x	x	x	
Anacharis canadensis	x								x				x				x			
Vallesnaria americana																	x			
Nuphar rubrodiscum																	x			
Nymphaea odorata	x								x			x	x				x			
Lemna minor	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Potamogeton crispus																	x			
Spirodela polyrhiza			x	x			x	x					x	x	x	x	x	x	x	x
Wolffia sp.			x	x																

* Flowers lacking

Substation #1 is 4.6 m offshore.

Substation #2 is 15.2 m offshore.

Substation #3 is 30.5 m offshore.

Substation #4 is 45.7 m offshore.

Table 10 (continued).

	Stations																			
	F				G				H				I				J			
Substation	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Depth (m)	1.2	1.2	1.2	3.4	1.5	3.0	5.5	-	4.9	6.1	2.7	-	.9	1.2	5.2	-	.9	2.1	4.3	-
*Myriophyllum sp.	x	x	x		x								x	x			x			
Ceratophyllum demersum	x				x															
*Potamogeton sp.	x	x	x								x		x	x						
Anacharis canadensis	x				x															
Vallesnaria americana					x								x	x						
Nuphar rubrodiscum					x								x	x						
Nymphaea odorata	x																			
Lemna minor	x	x	x	x	x	x	x		x	x	x		x	x	x		x	x	x	
Potamogeton crispus																				
Spirodela polyrhiza	x	x	x																	
Wolffia sp.	x				x															

* Flowers lacking

Substation #1 is 4.6 m offshore.
Substation #2 is 15.2 m offshore.
Substation #3 is 30.5 m offshore.
Substation #4 is 45.7 m offshore.

Table 10 (continued).

Stations

	GG				HH			
Substation	1	2	3	4	1	2	3	4
Depth (m)	1.2	1.5	1.5	3.7	1.1	1.2	.9	2.1
*Myriophyllum sp.		x	x		x	x	x	x
Ceratophyllum demersum		x			x	x	x	x
*Potamogeton sp.		x	x		x	x	x	x
Anacharis canadensis		x						
Vallesnaria americana					x	x		x
Nuphar rubrodiscum							x	
Nymphaea odorata								
Lemna minor	x	x	x		x	x	x	x
Potamogeton crispus								
Spirodela polyrhiza		x						
Wolffia sp.								

* Flowers lacking

Substation #1 is 4.6 m offshore.
Substation #2 is 15.2 m offshore.
Substation #3 is 30.5 m offshore.
Substation #4 is 45.7 m offshore.

Table 11. Species list and observed abundance of birds in the Oak Orchard Creek area on 9 July 1979.

AOU Number	Genus and Species	Common Name	Number
493	*Sturnus vulgaris*	Starling	34
498	*Agelaius phoeniceus*	Red-winged Blackbird	15
273	*Charadrius vociferus*	Killdeer	11
761	*Turdus migratorius*	American Robin	14
501	*Sturnella magna*	Eastern Meadowlark	2
529	*Spinus tristis*	American Goldfinch	2
560	*Spizella passerina*	Chipping Sparrow	1
511	*Quiscalus quiscula*	Common Grackle	26
688.2	*Passer domesticus*	House Sparrow	9
581	*Melospiza melodia*	Song Sparrow	6
54	*Larus delawarensis*	Ring-billed Gull	ca. 250
611	*Progne subis*	Purple Martin	6
613	*Hirundo rustica*	Barn Swallow	8
507	*Icterus galbula*	Northern Oriole	1
132	*Anas platyrhynchos*	Mallard	7
614	*Iridoprocne bicolor*	Tree Swallow	2
313.1	*Columba livia*	Rock Dove	2
412	*Colaptes auratus*	Common Flicker	3
360	*Falco sparverius*	American Kestrel	2
477	*Cyanocitta cristata*	Blue Jay	2
444	*Tyrannus tyrannus*	Eastern Kingbird	1
316	*Zenaida macroura*	Mourning Dove	4
704	*Dumetella carolinensis*	Gray Catbird	4
394	*Dendrocopos pubescens*	Downy Woodpecker	2
619	*Bombycilla cedrorum*	Cedar Waxwing	3
461	*Contopus virens*	Eastern Wood Pewee	2
681	*Geothlypis trichas*	Common Yellowthroat	2
735	*Parus atricapillus*	Black-capped Chickadee	3
263	*Actitus macularia*	Spotted Sandpiper	1

Table 11 (continued).

AOU Number	Genus and Species	Common Name	Number
452	Myiarchus crinitus	Great Crested Flycatcher	1
390	Megaceryle alcyon	Belted Kingfisher	2
616	Riparia riparia	Bank Swallow	5
51	Larus argentatus	Herring Gull	10
201	Butorides virescens	Green Heron	1
388	Coccyzus erythropthalmus	Black-billed Cuckoo	1

Table 12. Taxonomic references.

Plants

Fassett, N. C. 1960. A Manual of Aquatic Plants. Univ. Wisconsin Press. Madison, Wisconsin.

Gleason, H. A. and A. Cronquist. 1968. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. D. Van Nostrand Co., Inc. Princeton, N. J.

Muenscher, W. C. 1965. Keys to Woody Plants. Comstock Publishing. Ithaca, N. Y.

Benthos

Oligochaeta

Brinkhurst, R. O. 1971. A guide for the identification of British aquatic Oligochaeta. Freshwater Biological Association Sci. Publ. No. 22.

Brinkhurst, R. O. and B. G. M. Jamieson. 1971. Aquatic Oligochaeta of the world. Univ. of Toronto Press. Toronto.

Podocopa

Tressler, W. L. 1959. Ostracoda, pp. 657-734. In W. T. Edmondson (ed.). Freshwater Biology. John Wiley, N. Y.

Isopoda

Williams, W. D. 1972. Biota of freshwater ecosystems identification manual No. 7. Freshwater isopods (Asellidae) of North America. U. S. Environmental Protection Agency, Water Pollution Control Res. Ser.

Amphipoda

Holsinger, J. R. 1972. Biota of freshwater ecosystems identification manual No. 5. The freshwater amphipod crustaceans (Gammaridae) of North America. U. S. Environmental Protection Agency Water Pollution Control Res. Ser.

Ephemeroptera

Edmunds, G. F., Jr., S. L. Jensen and L. Berner. 1976. The mayflies of North and Central America. Univ. of Minnesota Press, Minneapolis.

McCafferty, W. P. 1975. The burrowing mayflies (Ephemeroptera: Ephemeroidea) of the United States. Trans. Amer. Entomol. Soc. 101: 447-504.

Table 12 (continued).

Trichiptera

Resh, V. H. 1976. The biology and immature stages of the caddisfly genus Ceraclea in eastern North America (Trichoptera: Leptoceridae). Ann. Entomol. Soc. Amer. 69: 1039-1061.

Wiggins, G. B. 1977. Larvae of the North American caddisfly genera. Univ. of Toronto Press, Toronto.

Coleoptera

Brown, H. P. 1972. Biota of freshwater ecosystems identification manual No. 6. Aquatic dryopoid beetles (Coleoptera) of the United States. U. S. Environmental Protection Agency, Water Pollution Control Res. Ser.

Diptera

Coffman, W. P. 1978. Chironomidae, pp. 345-376. In R. W. Merritt and K. W. Cummins (eds.). An introduction to the aquatic insects of North America. Kendall/Hunt, Dubuque.

Grogan, W. L. and W. W. Wirth. 1975. A revision of the genus Palpomyia Meigen of northeastern North America (Diptera: Ceratopogonidae). Contr. Maryland Agric. Expt. Sta. 5076: 1-49.

Mason, W. T., Jr. 1973. An introduction to the identification of chironomid larvae. U. S. Environmental Protection Agency Analytical Quality Control Laboratory, National Environmental Res. Center, Cincinnati, Ohio.

Wirth, W. W. and A. Stone. 1956. Aquatic Diptera, pp. 372-482. In Usinger, R. L. (ed.). Aquatic insects of California with keys to North American genera and California species. Univ. of California Press, Berkeley.

Pelecypoda

Burch, J. B. 1975. Freshwater sphaeriacean clams (Mollusca: Pelecypoda) of North America. Malacological Publications. Hamburg, Michigan.

Birds

American Ornithologist's Union. 1957. Check-list of North American Birds. 5th ed. American Ornithologists' Union. Baltimore, Maryland.

"Corrections and additions to the thirty-second supplement to the check-list of North American birds." Auk Vol. 90, No. 4, October 1, 1973. 887 p.

Table 12 (continued).

Peterson, R. T. 1947. A Field Guide to the Birds. Houghton Mifflin. Boston, Massachusetts.

"Thirty-second supplement to the American ornithologists' union check-list of North American birds." Auk Vol. 90, No. 2, April 13, 1973. pp. 411-419.

Fish

Eddy, S. and J. C. Underhill. 1978. How to Know the Freshwater Fishes. 3rd ed. W. C. Brown Co. Dubuque, Iowa.

Fish, M. P. 1932. Contributions to the early life histories of sixty-two species of fishes from Lake Erie and its tributary waters. Bull. U. S. Bur. Fish. 47(10): 239-398.

Scott, W. B. and E. J. Crossman. 1973. Freshwater fishes of Canada. Fisheries Research Board of Canada Bulletin. 184: 1-966.