

**MONITORING FISHERY RESPONSE TO WETLAND RESTORATION IN WESTERN
LAKE ERIE**

**A SURVEY OF THE TEMPORAL FISH COMMUNITY IN THE
CRANE CREEK ESTUARY:**

1997 PROGRESS REPORT

January 30, 1999

Prepared by:

Anjanette Hintz
U.S. Fish and Wildlife Service
Fishery Resources Office
Alpena, MI 49707
517/ 356-5102

This project was funded in part by the Lake Erie Protection Fund small grant program.

INTRODUCTION

Coastal wetlands are a natural, historic and integral part of a healthy Great Lakes ecosystem. They function as a biological resource to fish by providing spawning, nursery and feeding habitat; and most nearshore species use these areas during some phase of their life cycle. Since 1850, Lake Erie marshland from Vermillion, Ohio to the Detroit River has been reduced from 4,000 km² (1,544 mi²) to 150 km² (58 mi²). Reductions were mainly due to diking, filling, and draining to provide for increasing cultural uses in heavy industry, agriculture, and recreation (Herdendorf and Krieger, 1989). Currently efforts are being made to rehabilitate the structure and function of remaining western Lake Erie coastal wetlands in an effort to conserve and enhance the fish and wildlife which use them.

In 1994 the Metzger Marsh Wetland Restoration Project (U.S. Department of the Interior, 1994) was initiated to improve the structure and function of Metzger Marsh, a degraded western Lake Erie coastal wetland. In an effort to provide a comparison for measuring fish response to the Metzger Marsh restoration project, the Alpena Fishery Resources Office began to monitor the temporal fishery of nearby Crane Creek. The Crane Creek estuary is similarly degraded to pre-construction Metzger Marsh. Fishery data from Crane Creek will assist in identifying pre- and post-construction fishery values in Metzger Marsh and will be used to smooth out fluctuations in year class strength and species composition to provide a measure of the effectiveness of the restoration project in achieving ecosystem goals. Data was gathered from Crane Creek in 1994 when fishery information was gathered from Metzger Marsh prior to its closure for construction. Data collection has continued annually from Crane Creek while Metzger Marsh is closed, and will continue until the marsh has been re-opened to the lake and a survey of the rehabilitated marsh fishery is conducted.

Observations on the fishery of Crane Creek is not only of value to the Metzger Marsh project but is valuable in evaluating the potential for coastal wetland rehabilitation on Crane Creek as well. This study will also aid in better understanding the value and function of the numerous wetland types remaining within the Lake Erie ecosystem.

STUDY SITE

Crane Creek is a tributary to western Lake Erie west of Port Clinton, Ohio. The creek is slow moving with an average gradient of 0.57 m/min (1.9 ft/min) in 1987 (Ohio Department of Transportation, 1987). The majority of the watershed is

located in Wood and Ottawa Counties; although the mouth opens to Lake Erie from Lucas County. The watershed comprises an area of 143.5 km² (55.4 mi²) and supports mainly residential and agricultural uses (Ohio Department of Transportation, 1987).

The primary area of interest for this study is the lower one kilometer of the river which opens up into an estuary at the mouth of Crane Creek (Figure 1). This area is located on the Ottawa National Wildlife Refuge and is managed by the U.S. Fish and Wildlife Service. A lakefront dike separates the estuary from the lake and contains a narrow channel which opens to the lake near the original creek mouth. The estuary is composed of pools 4 and 5 (51.1 and 84.0 hectares respectively) of the refuge. The two pools were originally separated by a now eroded internal dike. The natural creek channel enters the estuary from the southwest where it is separated from the open water by an eroding internal dike which remains along the estuary's southern boundary. The creek channel then follows the eastern edge of the estuary to the mouth.

High winds and resulting seiches produce frequent flow direction and water level changes in the estuary. Water depths are shallow (1.5 meter and less) in general but are deeper in the creek channel (1-3 meters). Sediments throughout the estuary consist mainly of silt. However, sandy sediments are present at the mouth. Waters were turbid throughout the study period and transparency was limited at all times. No emergent or floating aquatic vegetation was noted in 1994 and 1995; however, emergent vegetation was present in 1996 to 1998 along margins of the estuary. A limited amount of submerged vegetation, *Potamogeton* sp., was observed near the southeast corner of the estuary.

Seven established study sites have been sampled in the estuary since 1994. Sampling locations were selected in areas that had sufficient water levels to be accessible with boat and sampling equipment. Sites were also established to sample various habitats located within the estuary. Site descriptions are provided in Table 1.

METHODS

In 1997, six sites were sampled once monthly from April to August and in October in the Crane Creek estuary (Figure 1). One site, site 7, was not sampled in 1997 due to erosion of the beach. Sites 1, 3, and 4 were fished with a 1.2 x 1.2 m trapnet (1.3 cm sq. mesh) with a 22.5 m lead; and sites 2 and 5 with a 0.9 m

hoopnet (1.3 cm sq. mesh) with 15 m wings. Nets were set in the afternoon and lifted the following morning.

Nighttime beach seining was conducted at one shoreline location, site 6. Sampling consisted of two hauls with a 30 x 1.2 m seine (0.64 cm mesh) anchored from the shore. One site, site 6, was sampled with the beach seine in 1997. Water and currents in early 1997 eroded site 7 causing it to be unseivable during the field season. In May, seining was prevented because of high water levels and beach erosion caused by seiche activity.

Nighttime larval sampling was conducted at sites 1 - 5. A 0.5 m ichthyoplankton net (303 um) was used to sample the upper 0.5 m of water at each of the locations. One ten minute tow was collected at each site. The catch was either preserved in alcohol and later identified or directly identified to family and species when possible. In June, problems with larval sampling gear prevented larval collections at 3 of the 5 sites.

Total lengths (mm) were recorded for all fish captured. Scale samples and weights (g) were taken from all sportfish. Fish were returned to the water following data collection. Surface water temperature (°C) and surface dissolved oxygen (mg/l) were recorded at each sample location with a dissolved oxygen meter. Transparency (m) was recorded at each location with a secchi disk, and maximum and minimum water depths (m) were recorded with a handheld digital sounder. Weather conditions were recorded at each location and determined visually. Relative abundance by sample date was determined for all species, biotic data summaries were compiled by date and sample site for each gear type and for sportfish species. A key is provided in Appendix I for abbreviated species codes.

RESULTS AND DISCUSSION

Thirty-five species of fish from thirteen families were represented in the catch from the Crane Creek estuary in 1997 (Table 2). A total of 4,303 captures were made during sampling from April to August and in October. Emerald shiner (*Notropis atherinoides*) was the most abundant species and comprised 30 percent of the total captures overall. Bowfin (*Amia calva*), white sucker (*Catostomus commersoni*), yellow bullhead (*Ictalurus natalis*), walleye (*Stizostedion vitreum*), silver chub (*Hybopsis storeriana*), tadpole madtom (*Noturus gyrinus*), and sea lamprey (*Petromyzon marinus*) were among the least abundant species captured. Species diversity was highest in August with 24 species represented and lowest in May (likely due to the lack of seine data) with 15 species. Aside from a one time

large number of spawning emerald shiners in April, fish numbers rose from a low in May to a peak in July, then declined to a low in October. A greater number of species and families were captured in 1997 than in 1996 (24 species and 10 families); although the overall catch was higher in 1996 (7,714 captures) than in 1997. The high overall catch in 1997 was due to high numbers of seining captures from sampling at 2 sites, sites 6 and 7. In 1997 only site 6 was sampled.

Twelve species of fish were captured in spawning condition, and it is likely that these fish are spawning in the estuary. The species included emerald shiner, spottail shiner (*Notropis hudsonius*), spotfin shiner (*Notropis spilopterus*), yellow perch (*Perca flavescens*), logperch (*Percina caprodes*), trout-perch (*Percopsis omiscomaycus*), quillback carpsucker (*Carpiodes cyprinus*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), orangespotted sunfish (*Lepomis humilis*), freshwater drum (*Aplodinotus grunniens*), and common carp (*Cyprinus carpio*). In many instances the month when the species was in spawning condition was the same month that the greatest abundances were noted for that species. Emerald shiner, spottail shiner, yellow perch, and trout-perch were in greatest abundance in April when they were also found in spawning condition. Quillback carpsucker was in greatest abundance and spawning condition in May; and bluegill and freshwater drum were in greatest abundance and spawning condition in June. It is also interesting to note that larval and juvenile fish from these species were captured later in the field season. Larval yellow perch, emerald shiner, spottail shiner, quillback carpsucker were captured in the estuary in June and July; and juvenile yellow perch, spottail shiner, quillback carpsucker and freshwater drum were present in July and August.

Larval and juvenile fish began to appear in the catch in June and were present in samples through August. Ten species of larval fish were captured from the Crane Creek estuary in 1997 (Table 3c) and included rainbow smelt (*Osmerus mordax*), channel catfish (*Ictalurus punctatus*), gizzard shad (*Dorosoma cepedianum*), white bass (*Morone chrysops*), white perch (*Morone americana*), yellow perch, quillback carpsucker, emerald shiner, spottail shiner and other Cyprinidae species. Catches peaked in June and tapered off through August, and only a few fish were captured in October. The greatest diversity of larval fish species was present in July. Larval rainbow smelt were the most abundant fish captured during larval netting in 1997 and comprised 60 percent of the overall catch for June. Rainbow smelt spawn along the lake shore of the Western Basin of Lake Erie (Goodyear et.al., 1982) and enter the estuaries with incoming lake water caused by seiche. Because of the in and outward flow and mixing of lake water within the estuary

caused by seiche activity, it is difficult to determine if fish are spawning in the area resulting in larval fish or if the larvae are carried into the area. The presence of larval rainbow smelt is an indication that larval fish are indeed carried into the estuary by seiche activity where they may use it as a nursery area. The origin of other larval fish captured within the estuary is difficult to determine based on our current sampling.

Juvenile fish from nine species were captured from the estuary in 1997 (Table 3b) and included rainbow smelt, quillback carpsucker, gizzard shad, emerald shiner, spottail shiner, channel catfish, white bass, white perch, yellow perch and freshwater drum. Catches of juvenile fish followed larval catches by a month with a peak in July decreasing in number in August and only a few captured in October. The greatest diversity of juvenile fish were captured in August. Gizzard shad and quillback carpsucker were the most abundant juvenile species captured in 1997.

SPORTFISH CATCH

Twelve species of common sportfish were captured from the estuary in 1997 (Table 4) and included black crappie, white crappie (*Pomoxis annularis*), bluegill, green sunfish (*Lepomis cyanellus*), orange-spotted sunfish, pumpkinseed, rockbass (*Ambloplites rupestris*), channel catfish, white bass, white perch, yellow perch, and walleye. Channel catfish was the most abundant sportfish species captured and comprised 29 percent of the total sportfish catch. Walleye and green sunfish were among the least abundant catch. The greatest number of sportfish were captured in August, 45 percent of the monthly total catch. The majority of abundances peaked in August, likely due to a large recruitment of juvenile fish vulnerable to the gear. Spawning condition sportfish captured from the estuary included yellow perch, bluegill, pumpkinseed, orangespotted sunfish, and black crappie. Larval yellow perch, white bass, white perch, and channel catfish were captured from the estuary; and black crappie, white crappie, and white perch juveniles were captured as well.

Sportfish ranged in age from 0 to 5 years. The oldest fish captured was a 5 year old black crappie captured in April. The majority of older sportfish, aged 3 years and up, were yellow perch and rockbass. Bluegill, pumpkinseed, orangespotted sunfish, and black and white crappie averaged 2 years old. White bass, white perch, and green sunfish averaged 1 year old.

WETLAND FISH SPECIES

Twelve fish species considered to be obligate wetland species were captured in the Crane Creek estuary in 1997 (Table 2). Obligate wetland species are species which depend on vegetation or wetland habitat for one or more of their life stages

(Johnson, 1989). The majority of obligate species were representatives from the family Centrarchidae. Black crappie was the most abundant obligate species captured while bowfin and yellow bullhead were least abundant. Obligate species were consistently represented in the fish community from April to October with 6 to 8 of the twelve species present during each sampling. Five species were most common, being captured during each sampling and included black crappie, white crappie, pumpkinseed, common carp, and brown bullhead. The greatest number of species was present in June and July; and the greatest abundance was present in August.

The number of obligate wetland species present in the Crane Creek estuary increased from 1996 (9 species) to 1997 (12 species). Since annual surveys began in 1994, the number of obligate species has ranged from 9 to 12 species with the 1997 sampling yielding the greatest number. The Crane Creek estuary has been a degraded wetland for some time. Restoration efforts encouraging vegetative cover and improving water clarity may be important as wetland dependent species are currently using the estuary for some portion of their life cycle. All efforts should be made to preserve habitat, access to Lake Erie, and prevent further degradation.

GEAR COMPARISON

A total of 32 species and 1,083 captures accounting for 25 percent of the overall total catch was made with impoundment gear, 18 species and 2,123 captures 50 percent of the overall total catch was made with a seine, and 10 species and 1,093 captures accounting for 25 percent of the overall total catch by larval netting.

Impoundment gear was selective for larger sized species and adult fish (Table 3a), while juvenile fish and small sized species were more readily captured with the seine. The mesh size of impoundment gear was larger than that of the seine allowing smaller fish to escape. All Centrarchidae species were particularly vulnerable to this form of sampling gear; which captured all 12 sportfish species represented in 1997. Impoundment gear also captured all 12 obligate wetland species. The largest catches made with impoundment gear were in May and October, which comprised 68 and 65 percent of the total catches for those months respectively. Large spring catches were likely due to the presence of spawning adults and large fall catches were likely due to recruitment of juvenile fish to the gear.

Nighttime beach seining was selective for slower, generally smaller sized fish (Table 3b). The physical capture technique allowed larger and faster fish to

escape; while capturing slower and smaller fish due to the fine mesh size. Seining yielded the greatest number of captures overall - likely due to the abundance of juvenile and smaller sized fish. Seine catches comprised 61, 74, and 58 percent of the total catch for the months of April, July, and August respectively. April and May catches consisted predominantly of adult spawning Cyprinids, mainly emerald and spottail shiner. July and August catches were comprised mainly of young-of-the-year gizzard shad, quillback carpsucker, white bass, and channel catfish. October catches were low and consisted mainly of juvenile spottail and emerald shiners - likely the product of spawning adults present in April and May. Only 4 of the 12 sportfish species present and only 4 of the 12 wetland dependent species present within the estuary were captured with this form of gear.

Nighttime larval netting captured small, slow swimming fish present in the upper ½ meter of the water column (Table 3c). Catches consisted of adult spawning emerald shiner in April and larval rainbow smelt, channel catfish, gizzard shad, white bass, white perch, yellow perch, emerald shiner, spottail shiner, and other Cyprinidae species through the rest of the sampling period. The largest larval catch occurred in June, comprising 89 percent of the overall June catch, and consisted of rainbow smelt and Cyprinidae species. Rainbow smelt spawn along the shores of the Western basin and the free floating larvae likely drifted into the estuary with an inward flux of the lake seiche. Catch rates were poor in May as only 1 site was sampled due to problems with gear. No obligate wetland dependent species were captured, and 4 of the 12 sportfish species present were captured with this form of gear.

ACKNOWLEDGEMENTS

This project was funded by the Lake Erie Protection Fund small grant program and the U.S. Fish and Wildlife Service Challenge Cost-Share program in 1996 and 1997. We would like to thank Mr. Larry Martin, Ottawa National Wildlife Refuge Manager, and the staff of the refuge for their continued help with this project.

LITERATURE CITED

Goodyear, C.S., T.A. Edsall, D.M. Ormsby Dempsey, G.D. Moss, and P.E. Polanski. 1982. Atlas of the spawning and nursery areas of Great Lakes fishes. Volume nine: Lake Erie. U.S. Fish and Wildlife Service, Washington DC FWS/OBS-82/52.

- Herdendorf, C.E. and K.A. Krieger. 1989. Overview of Lake Erie and its estuaries within the Great Lakes ecosystem. In *Lake Erie Estuarine Systems: Issues, resources, status, and management*, ed. K.A. Krieger, pp. 1-34. NOAA Estuary-of-the-Month Seminar Series No. 14. NOAA Estuarine Programs Office, Washington, D.C.
- Johnson, D.L. 1989. Lake Erie wetlands: fisheries considerations. In *Lake Erie Estuarine Systems: Issues, resources, status, and management*, ed. K.A. Krieger, pp. 257-274. NOAA Estuary-of-the-Month Seminar Series No. 14. NOAA Estuarine Programs Office, Washington, D.C.
- Ohio Department of Transportation. 1987. Bureau of Environmental Services, Biological Survey Report, pages 13-17. Transportation project WOO/OTT 2-0.00/0.00, PF 1247
- U.S. Department of the Interior. 1994. Metzger Marsh coastal wetland restoration project: draft environmental assessment and finding of no significant impact.

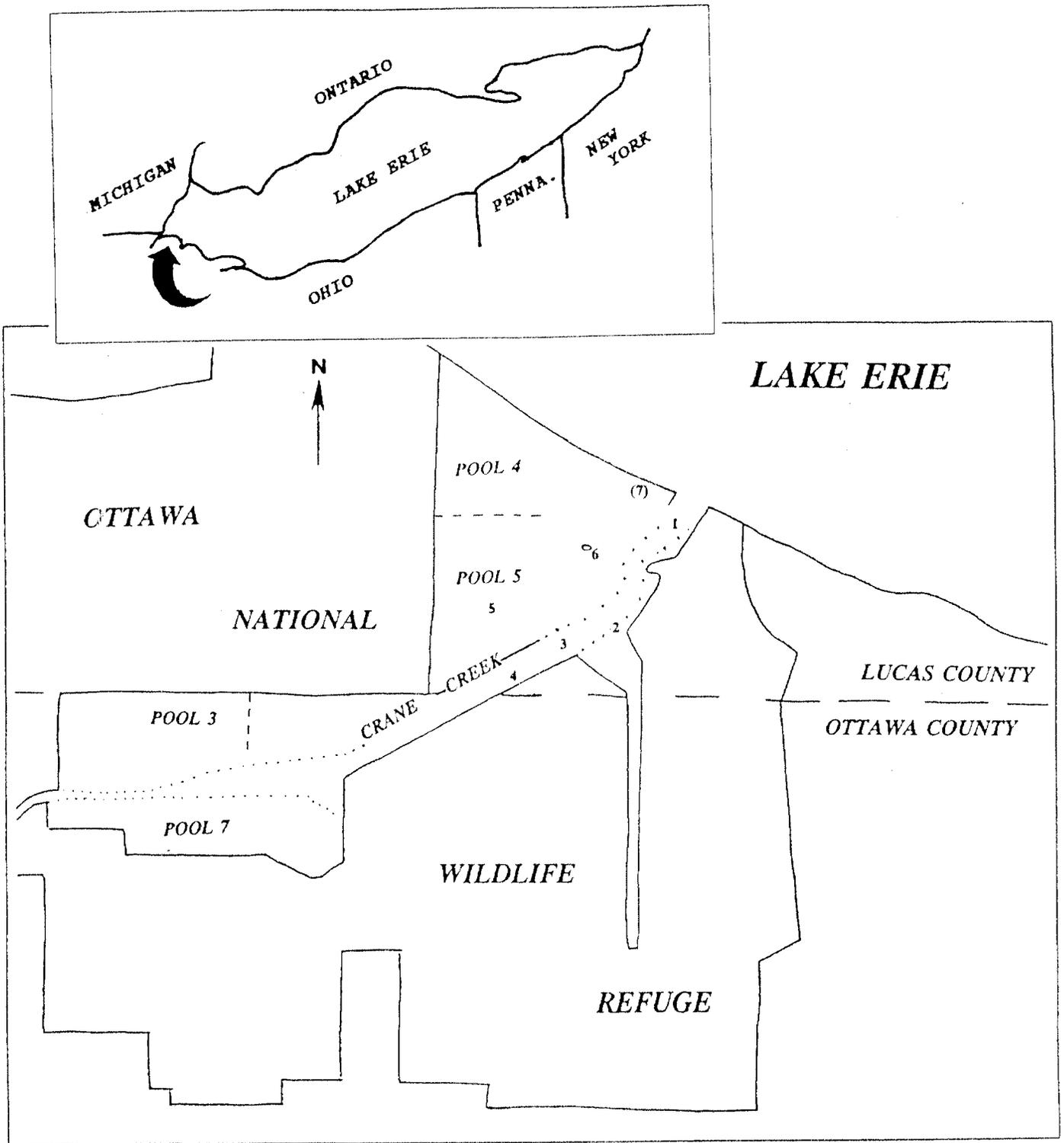


Figure 1. Crane Creek is a tributary to western Lake Erie from the Ottawa National Wildlife Refuge in Lucas County, Ohio. Six locations in the estuary, identified numerically, were sampled in 1997. Site 7 was not sampled due to bank erosion. (Eroded dikes are denoted by "----" and the creek channel is denoted by ".....").

Table 1. Descriptions of Crane Creek fishery survey sites, located on the Ottawa National Wildlife Refuge, Lucas County, Ohio.

Site 1 - Located in the creek channel at the river mouth in the northeast corner of the estuary. Sediments were hard and sandy. Conditions at this site were greatly affected by seiche activity causing variations in intensity and direction of water currents and sampling conditions.

Site 2 - Located in the nearshore area at the opening of a refuge canal to the estuary in the southeast corner. Sediments are soft and silty. Water currents are evident depending upon the direction of the seiche.

Site 3 - Located in the creek channel at the end of the diked channel where it meets the open water along the south shore of the estuary. Sediments are soft and silty. Water currents are evident depending upon the direction of the seiche.

Site 4 - Located in the diked creek channel in a deep hole. Sediments are soft and silty. Water currents are evident depending upon the direction of the seiche.

Site 5 - Located in the middle of pool 5 in shallow open water. There is little water movement outside of weather activity. Sediments are soft and silty and water depths are uniform.

Site 6 - Located on the east end of a depositional island near the creek channel. This is a sandy shore site where sediments to the north are soft and silty and to the south are sandy. Water depths gradually increase away from shore. Water currents are evident depending upon the direction of the seiche.

Site 7 - Located on the west shore of the mouth of the creek at the northeast shore of the estuary. The shore is a sandy depositional area and sediments are soft and silty away from shore. Water depths drop rapidly away from shore and water currents can be high from the west along shore.

Table 2. Relative abundance of fish captured from April to October 1997 in Crane Creek estuary on the Ottawa National Wildlife Refuge, Lucas County, Ohio.

Family and species	Date (1997)					
	4/02-03	5/13-14	** 6/17-18**	7/15-16	8/12-13	10/15-16
AMIIDAE						
Bowfin* (<i>Amia caiva</i>)	1	0	0	0	0	0
CATOSTOMIDAE						
Largemouth buffalo (<i>Ictiobus cyprinellus</i>)	0	0	0	0	3	0
Quillback carpsucker (<i>Carpoides cyprinus</i>)	2	7	12	160	126	0
Spotted sucker (<i>Minytrema melanops</i>)	0	0	0	0	0	3
White sucker (<i>Catostomus commersoni</i>)	1	0	0	0	0	0
CENTRARCHIDAE						
Black crappie* (<i>Pomoxis nigromaculatus</i>)	5	1	1	2	53	2
White crappie* (<i>Pomoxis annularis</i>)	1	3	2	1	20	7
Bluegill* (<i>Lepomis macrochirus</i>)	0	3	8	6	0	6
Green sunfish* (<i>Lepomis cyanellus</i>)	0	0	0	1	3	1
Orangespotted sunfish (<i>Lepomis humilis</i>)	0	0	2	2	10	8
Pumpkinseed* (<i>Lepomis gibbosus</i>)	1	1	2	1	16	8
Rockbass (<i>Ambloplites rupestris</i>)	4	1	1	1	1	1
CLUPEIDAE						
Gizzard shad (<i>Dorosoma cepedianum</i>)	0	2	0	386	118	34
CYPRINIDAE						
Cyprinidae spp.	0	0	212	58	18	1
Bluntnose minnow (<i>Pimephales notatus</i>)	0	0	0	0	2	0
Common carp* (<i>Cyprinus carpio</i>)	4	6	6	4	8	3
Goldfish* (<i>Carassius auratus</i>)	11	0	1	0	0	0
Common shiner (<i>Notropis chrysocephalus</i>)	0	0	0	0	2	0
Emerald shiner (<i>Notropis athenoides</i>)	1081	21	6	39	98	22
Spotfin shiner (<i>Notropis spilopterus</i>)	0	0	1	7	12	0
Spottail shiner (<i>Notropis hudsonius</i>)	364	201	14	31	8	29
Silver chub (<i>Hypopsis storenana</i>)	0	0	0	0	1	0
ICTALURIDAE						
Brown bullhead* (<i>Ameiurus nebulosus</i>)	7	5	0	2	13	14
Yellow bullhead* (<i>Ictalurus natalis</i>)	0	0	1	0	0	0
Channel catfish (<i>Ictalurus punctatus</i>)	3	0	4	50	92	2
Tadpole madtom* (<i>Noturus gymnus</i>)	0	0	0	1	0	0
LEPISOSTEIDAE						
Longnose gar* (<i>Lepisosteus osseus</i>)	0	0	1	0	1	0
OSMERIDAE						
Rainbow smelt (<i>Osmerus mordax</i>)	0	0	455	3	0	0
PERCICHTHYIDAE						
White bass (<i>Morone chrysops</i>)	1	1	5	78	18	5
White perch (<i>Morone americana</i>)	6	2	3	2	21	19
PERCIDAE						
Logperch (<i>Percina caprodes</i>)	3	0	0	0	2	0
Walleye (<i>Stizostedion vitreum</i>)	0	0	1	0	0	0
Yellow perch (<i>Perca flavescens</i>)	15	0	4	0	4	1
PERCOPSIDAE						
Trout-perch (<i>Percopsis omiscomaycus</i>)	78	1	0	0	0	0
PETROMYZONIDAE						
Sea lamprey (<i>Petromyzon marinus</i>)	0	0	0	1	0	0
SCIAENIDAE						
Freshwater drum (<i>Apodinotus grunniens</i>)	6	7	20	32	1	0
N=	1594	262	762	868	651	166
Number of Species	19	15	22	22	25	18

* Denotes species which depend on vegetation or wetland habitat according to Johnson (1989).

** Larval collections made at 2 of 5 sites

*** No seining due to beach erosion.

Table 3a. Biotic data summary for impoundment gear sampling* from Crane Creek estuary, April to October 1997 (total length = mm).

April 02-03				May 13-14				June 17-18			
Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range
BOW	1	642.0	642	BOW	0	--	--	BOW	0	--	--
LAB	0	--	--	LAB	0	--	--	LAB	0	--	--
QUB	2	151.5	140-163	QUB	7	435.0	354-470	QUB	10	477.8	435-540
SSU	0	--	--	SSU	0	--	--	SSU	0	--	--
WHS	1	363.0	363	WHS	0	--	--	WHS	0	--	--
BLC	4	273.0	196-375	BLC	1	210.0	210	BLC	1	225.0	225
WHC	1	260.0	260	WHC	3	235.6	195-306	WHC	2	254.5	254-255
BLG	0	--	--	BLG	3	115.3	97-130	BLG	8	149.0	124-172
GRS	0	--	--	GRS	0	--	--	GRS	0	--	--
ORS	0	--	--	ORS	0	--	--	ORS	2	7305.0	67-80
PUM	1	92.0	92	PUM	1	131.0	131	PUM	2	138.5	123-154
ROB	4	158.2	129-181	ROB	1	110.0	110	ROB	1	174.0	174
GIS	0	--	--	GIS	2	373.0	360-386	GIS	0	--	--
CAP	3	593.3	460-693	CAP	3	430.0	390-461	CAP	6	618.8	510-685
GOF	10	127.2	53-286	GOF	0	--	--	GOF	1	227.0	227
COS	0	--	--	COS	0	--	--	COS	0	--	--
SFS	0	--	--	SFS	0	--	--	SFS	1	N/A	N/A
STS	343	115.3	88-135	STS	141	109.6	88-135	STS	14	114.5	107-125
SIC	0	--	--	SIC	0	--	--	SIC	0	--	--
BRB	7	174.6	55-313	BRB	5	222.4	74-310	BRB	0	--	--
YEB	0	--	--	YEB	0	--	--	YEB	1	240.0	240
CHC	3	86.6	85-88	CHC	0	--	--	CHC	4	151.7	80-363
TAM	0	--	--	TAM	0	--	--	TAM	0	--	--
ING	0	--	--	ING	0	--	--	ING	1	548.0	548
WHB	1	312.0	312	WHB	1	125.0	125	WHB	5	232.0	149-334
WHP	5	101.6	80-116	WHP	2	127.0	83-171	WHP	3	197.3	180-220
LOP	1	127.0	127	LOP	0	--	--	LOP	0	--	--
WAE	0	--	--	WAE	0	--	--	WAE	1	196.0	196
YEP	15	173.4	100-239	YEP	0	--	--	YEP	2	186.5	142-231
TRP	76	100.4	78-127	TRP	1	112.0	112	TRP	0	--	--
SEL	0	--	--	SEL	0	--	--	SEL	0	--	--
FRD	6	134.3	86-281	FRD	7	118.5	104-132	FRD	20	284.4	135-336
Total = 484 Species = 18				Total = 178 Species = 14				Total = 85 Species = 19			

* Effort per month was 5 nights (3 nights effort with 1.2 m trapnet and 2 nights effort with 0.9 m hoopnet).

** Effort for July was 4 nights (site 1 trapnet was fouled) and for August was 4 nights (site 4 trapnet was fouled).

Table 3a. Continued.

July 15-16**				August 12-13**				October 15-16			
Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range
BOW	0	--	--	BOW	0	--	--	BOW	0	--	--
LAB	0	--	--	LAB	2	217.5	215-220	LAB	0	--	--
QUB	0	--	--	QUB	0	--	--	QUB	0	--	--
SSU	0	--	--	SSU	0	--	--	SSU	3	325.3	72-520
WHS	0	--	--	WHS	0	--	--	WHS	0	--	--
BLC	2	119.5	107-132	BLC	53	142.5	68-283	BLC	2	171.0	152-190
WHC	1	205.0	205	WHC	20	166.3	116-356	WHC	7	166.4	60-310
BLG	6	135.1	89-156	BLG	0	--	--	BLG	6	103.6	92-147
GRS	1	62.0	62	GRS	3	91.3	81-112	GRS	1	76.0	76
ORS	2	95.0	60-130	ORS	10	71.3	60-115	ORS	8	75.0	69-79
PUM	1	125.0	125	PUM	16	109.0	74-155	PUM	8	102.1	61-133
ROB	1	204.0	204	ROB	1	192.0	192	ROB	1	190.0	190
GIS	0	--	--	GIS	6	70.0	58-100	GIS	34	79.7	64-149
CAP	4	634.6	605-692	CAP	5	492.4	296-591	CAP	2	490.0	490
GOF	0	--	--	GOF	0	--	--	GOF	0	--	--
COS	0	--	--	COS	2	34.5	26-43	COS	0	--	--
SFS	0	--	--	SFS	0	--	--	SFS	0	--	--
STS	10	112.4	94-134	STS	2	48.5	45-52	STS	4	109.7	105-114
SIC	0	--	--	SIC	1	163.0	163	SIC	0	--	--
BRB	2	--	--	BRB	13	291.6	213-337	BRB	14	189.6	84-287
YEB	0	--	--	YEB	0	--	--	YEB	0	--	--
CHC	23	134.2	90-396	CHC	5	219.4	105-315	CHC	0	--	--
TAM	1	88.0	88	TAM	0	--	--	TAM	0	--	--
LNG	0	--	--	LNG	0	--	--	LNG	0	--	--
WHB	0	--	--	WHB	9	162.3	76-300	WHB	5	98.4	85-111
WHP	0	--	--	WHP	3	162.6	114-212	WHP	12	75.5	64-79
LOP	0	--	--	LOP	0	--	--	LOP	0	--	--
WAE	0	--	--	WAE	0	--	--	WAE	0	--	--
YEP	0	--	--	YEP	4	144.2	131-160	YEP	1	176.0	176
TRP	0	--	--	TRP	0	--	--	TRP	0	--	--
SEL	1	538.0	538	SEL	0	--	--	SEL	0	--	--
FRD	16	181.7	45-455	FRD	1	68.0	68	FRD	0	--	--
Total =	72	Species =	15	Total =	156	Species =	18	Total =	108	Species =	15

* Effort per month was 5 nights (3 nights effort with 1.2 m trapnet and 2 nights effort with 0.9 m hoopnet).

** Effort for July was 4 nights (site 1 trapnet was fouled) and for August was 4 nights (site 4 trapnet was fouled).

Table 3b. Biotic data summary for seine sampling* from Crane Creek estuary, April to October 1997** (total length = mm).

April 02-03				May 13-14				July 15-16***			
Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range
LAB	0	--	--	LAB	0	--	--	LAB	0	--	--
QUB	0	--	--	QUB	0	--	--	QUB	160	34.4	21-49
BLC	1	292.0	292	BLC	0	--	--	BLC	0	--	--
GIS	0	--	--	GIS	0	--	--	GIS	373	39.5	17-46
BLM	0	--	--	BLM	0	--	--	BLM	0	--	--
CAP	1	740.0	740	CAP	3	577.0	577	CAP	0	--	--
GOF	1	113.0	113	GOF	0	--	--	GOF	0	--	--
EMS	943	53.8	35-87	EMS	20	67.5	46-83	EMS	0	--	--
SFS	0	--	--	SFS	0	--	--	SFS	7	59.5	51-66
STS	21	91.5	70-119	STS	60	99.5	52-135	STS	16	31.9	23-37
CHC	0	--	--	CHC	0	--	--	CHC	3	30.6	30-32
LNG	0	--	--	LNG	0	--	--	LNG	0	--	--
WHB	0	--	--	WHB	0	--	--	WHB	64	37.0	25-53
WHP	1	82.0	82	WHP	0	--	--	WHP	0	--	--
LOP	2	83.5	70-97	LOP	0	--	--	LOP	0	--	--
TRP	2	82.5	82-83	TRP	0	--	--	TRP	0	--	--
FRD	0	--	--	FRD	0	--	--	FRD	16	43.6	37-51
Total = 972 Species = 8				Total = 83 Species = 3				Total = 639 Species = 7			
August 12-13				October 15-16							
Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range				
LAB	1	68.0	68	LAB	0	--	--				
QUB	126	59.9	42-73	QUB	0	--	--				
BLC	0	--	--	BLC	0	--	--				
GIS	111	64.2	51-94	GIS	0	--	--				
BLM	2	60.0	59-61	BLM	0	--	--				
CAP	3	458.0	154-650	CAP	1	358.0	358				
GOF	0	--	--	GOF	0	--	--				
EMS	10	73.1	65-81	EMS	22	72.0	37-100				
SFS	12	62.5	55-79	SFS	0	--	--				
STS	5	72.7	51-93	STS	24	71.8	14-121				
CHC	73	48.3	39-59	CHC	2	58.0	52-64				
LNG	1	705.0	705	LNG	0	--	--				
WHB	9	70.1	36-193	WHB	0	--	--				
WHP	18	52.0	39-142	WHP	7	76.0	65-88				
LOP	2	67.0	61-73	LOP	0	--	--				
TRP	0	--	--	TRP	0	--	--				
FRD	0	--	--	FRD	0	--	--				
Total = 373 Species = 13				Total = 56 Species = 5							

* Effort per month was 2 hauls with a 100' seine.

** Seining was not conducted in June due to bank erosion.

*** Effort for July was 1 haul due to partially eroded beach.

Table 3c. Biotic data summary for larval fish sampling* from Crane Creek estuary, April to October 1997 (total length = mm).

April 02-03				May 13-14**				June 17-18			
Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range
QUB	0	--	--	QUB	0	--	--	QUB	2	N/A	N/A
GIS	0	--	--	GIS	0	--	--	GIS	0	--	--
EMS	138	50	36-65	EMS	1	40	40	EMS	6	56.3	45-70
STS	0	--	--	STS	0	--	--	STS	0	--	--
CHC	0	--	--	CHC	0	--	--	CHC	0	--	--
SMT	0	--	--	SMT	0	--	--	SMT	455	N/A	N/A
WHB	0	--	--	WHB	0	--	--	WHB	0	--	--
WHP	0	--	--	WHP	0	--	--	WHP	0	--	--
YEP	0	--	--	YEP	0	--	--	YEP	2	N/A	N/A
CYP	0	--	--	CYP	0	--	--	CYP	212	N/A	N/A
Total = 138 Species = 1				Total = 1 Species = 1				Total = 677 Species = 5			

July 15-16				August 12-13				October 15-16			
Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range	Species	Number	Total Length Mean	Total Length Range
QUB	0	--	--	QUB	0	--	--	QUB	0	--	--
GIS	13	26.8	23-30	GIS	1	27.0	27	GIS	0	--	--
EMS	39	35	23-45	EMS	88	35.3	20-49	EMS	0	--	--
STS	5	26.4	19-42	STS	1	33.0	33	STS	1	40.0	40
CHC	24	16.8	14-18	CHC	14	14.1	10-15	CHC	0	--	--
SMT	3	13	13	SMT	0	--	--	SMT	0	--	--
WHB	13	17.4	11-23	WHB	0	--	--	WHB	0	--	--
WHP	2	16.5	15-18	WHP	0	--	--	WHP	0	--	--
YEP	0	--	--	YEP	0	--	--	YEP	0	--	--
CYP	58	16.6	5-45	CYP	18	13.1	10-20	CYP	0	--	--
Total = 157 Species = 8				Total = 122 Species = 5				Total = 2 Species = 2			

* Effort per month was 50 minutes (10 minutes effort with a 303um mesh 1 m ichthyoplankton net at each of sites 1-5).

** Effort for May was 20 minutes (sites 2-4 were not sampled due to lost sampling gear).

Table 4. Biotic data summary for sportfish captured from Crane Creek estuary, April to October 1997 (length=mm and weight=g).

April 02-03						July 15-16					
Species	Number	Total Length Mean	Total Length Range	Mean Weight	Total Weight	Species	Number	Total Length Mean	Total Length Range	Mean Weight	Total Weight
BLC	5	276.8	196-375	455.0	2275	BLC	2	119.5	107-132	36.0	72
WHC	1	260.0	260	295.0	295	WHC	1	205.0	205	120.0	120
BLG	0	--	--	--	--	BLG	6	135.2	89-156	59.0	354
ROB	4	158.2	129-181	108.7	435	ROB	1	204.0	204	163.0	163
PUM	1	92.0	92	7.0	7	PUM	1	125.0	125	42.0	42
CHC	3	86.6	85-88	5.0	15	CHC	50	71.7	14-396	47.9	1246
WHB	1	312.0	312	450.0	450	WHB	77	34.9	11-53	2.0	154
WHP	6	98.3	80-116	10.5	63	WHP	2	16.5	15-18	2.0	2
YEP	15	173.5	100-239	78.3	1175	YEP	0	--	--	--	--
GRS	0	--	--	--	--	GRS	1	62.0	62	4.0	4
ORS	0	--	--	--	--	ORS	2	95.0	60-130	32.0	64
WAE	0	--	--	--	--	WAE	0	--	--	--	--
Total = 36		Species = 8				Total = 143		Species = 10			

May 13-14						August 12-13					
Species	Number	Total Length Mean	Total Length Range	Mean Weight	Total Weight	Species	Number	Total Length Mean	Total Length Range	Mean Weight	Total Weight
BLC	1	210.0	210	150.0	150	BLC	53	142.6	68-283	64.3	3217
WHC	3	235.6	195-306	213.3	640	WHC	20	166.3	116-356	92.0	1840
BLG	3	115.3	97-130	23.3	70	BLG	0	--	--	--	--
ROB	1	110.0	110	17.4	17	ROB	1	192.0	192	130.0	130
PUM	1	131.0	131	10.0	10	PUM	16	109.1	74-155	32.0	512
CHC	0	--	--	--	--	CHC	92	52.3	39-315	14.7	1340
WHB	1	125.0	125	10.0	10	WHB	18	116.8	36-300	53.9	917
WHP	2	127.0	83-171	20.0	40	WHP	21	67.8	39-212	14.1	297
YEP	0	--	--	--	--	YEP	4	144.2	131-160	25.0	100
GRS	0	--	--	--	--	GRS	3	91.3	81-112	13.3	40
ORS	0	--	--	--	--	ORS	10	71.3	53-115	6.0	60
WAE	0	--	--	--	--	WAE	0	--	--	--	--
Total = 12		Species = 7				Total = 238		Species = 10			

June 17-18						October 15-16					
Species	Number	Total Length Mean	Total Length Range	Mean Weight	Total Weight	Species	Number	Total Length Mean	Total Length Range	Mean Weight	Total Weight
BLC	1	225.0	225	185.0	185	BLC	2	171.0	152-190	87.5	175
WHC	2	254.5	254-255	255.0	510	WHC	7	166.4	59-310	122.1	855
BLG	8	149.7	129-172	82.1	657	BLG	6	103.6	92-147	23.3	140
ROB	1	174.0	174	140.0	140	ROB	1	190.0	190	160.0	160
PUM	2	138.5	123-154	80.0	160	PUM	8	102.1	61-133	21.3	170
CHC	4	151.8	80-363	146.3	585	CHC	2	58.0	52-64	1.0	1
WHB	5	232.0	149-334	234.0	1170	WHB	5	98.4	85-111	10.8	54
WHP	3	197.3	180-220	148.3	445	WHP	19	75.7	64-88	4.0	76
YEP	2 +(2 larval)	186.5	142-231	115.0	230	YEP	1	176.0	176	65.0	65
GRS	0	--	--	--	--	GRS	1	76.0	76	10.0	10
ORS	2	73.5	67-80	11.5	23	ORS	8	75.0	69-79	8.6	69
WAE	1	196.0	196	90.0	90	WAE	0	--	--	--	--
Total = 33		Species = 11				Total = 60		Species = 11			

SPECIES KEY

Common Name	Scientific Name	Abbreviation
Black crappie	<i>Pomoxis nigromaculatus</i>	BLC
Bluegill	<i>Lepomis macrochirus</i>	BLG
Bluntnose minnow	<i>Pimephales notatus</i>	BLM
Bowfin	<i>Amia calva</i>	BOW
Brown bullhead	<i>Ameiurus nebulosus</i>	BRB
Channel catfish	<i>Ictalurus punctatus</i>	CHC
Common carp	<i>Cyprinus carpio</i>	CAP
Common shiner	<i>Notropis chrysocephalus</i>	COS
Cyprinidae species		CYP
Emerald shiner	<i>Notropis atherinoides</i>	EMS
Freshwater drum	<i>Aplodinotus grunniens</i>	FRD
Gizzard shad	<i>Dorosoma cepedianum</i>	GIS
Goldfish	<i>Carassius auratus</i>	GOF
Green sunfish	<i>Lepomis cyanellus</i>	GRS
Largemouth buffalo	<i>Ictiobus cyprinellus</i>	LAB
Logperch	<i>Percina caprodes</i>	LOP
Longnose gar	<i>Lepisosteus osseus</i>	LNG
Orangespotted sunfish	<i>Lepomis humilis</i>	ORS
Pumpkinseed	<i>Lepomis gibbosus</i>	PUM
Quillback carpsucker	<i>Carpionodes cyprinus</i>	QUB
Rainbow smelt	<i>Osmerus mordax</i>	SMT
Rockbass	<i>Ambloplites rupestris</i>	ROB
Sea lamprey	<i>Petromyzon marinus</i>	SEL
Silver chub	<i>Hybopsis storeriana</i>	SIC
Spotfin shiner	<i>Notropis spilopterus</i>	SFS
Spottail shiner	<i>Notropis hudsonius</i>	STS
Spotted sucker	<i>Minytrema melanops</i>	SSU
Tadpole madtom	<i>Noturus gyrinus</i>	TAM
Trout-perch	<i>Percopsis omiscomaycus</i>	TRP
Walleye	<i>Stizostedion vitreum</i>	WAE
White bass	<i>Morone chrysops</i>	WHB
White crappie	<i>Pomoxis annularis</i>	WHC
White perch	<i>Morone americana</i>	WHP
White sucker	<i>Catostomus commersoni</i>	WHS
Yellow bullhead	<i>Ictalurus natalis</i>	YEB
Yellow perch	<i>Perca flavescens</i>	YEP

**MONITORING FISHERY RESPONSE TO WETLAND RESTORATION IN WESTERN
LAKE ERIE**

**A SURVEY OF THE TEMPORAL FISH COMMUNITY IN THE
CRANE CREEK ESTUARY:**

1996 PROGRESS REPORT

August 3, 1997

Prepared by:

Anjanette Hintz
U.S. Fish and Wildlife Service
Fishery Resources Office
Alpena, MI 49707
517/ 356-5102

This project was funded in part by the Lake Erie Protection Fund small grant program.

INTRODUCTION

Coastal wetlands are a natural, historic and integral part of a healthy Great Lakes ecosystem. They function as a biological resource to fish by providing spawning, nursery and feeding habitat; and most nearshore species use these areas during some phase of their life cycle. Since 1850, Lake Erie marshland from Vermillion, Ohio to the Detroit River has been reduced from 4,000 km² (1,544 mi²) to 150 km² (58 mi²). Reductions were mainly due to diking, filling, and draining to provide for increasing cultural uses in heavy industry, agriculture, and recreation (Herdendorf and Krieger, 1989). Currently efforts are being made to rehabilitate the structure and function of remaining western Lake Erie coastal wetlands in an effort to conserve and enhance the fish and wildlife which use them.

In 1994 the Metzger Marsh Wetland Restoration Project (U.S. Department of the Interior, 1994) was initiated to improve the structure and function of Metzger Marsh, a degraded western Lake Erie coastal wetland. In an effort to provide a comparison for measuring fish response to the Metzger Marsh restoration project, the Alpena Fishery Resources Office began to monitor the temporal fishery of nearby Crane Creek. The Crane Creek estuary is similarly degraded to pre-construction Metzger Marsh. Fishery data has been gathered from the estuary of Crane Creek since 1994 to assist in identifying pre- and post-construction fishery values. The information gathered from the Crane Creek estuary will be used to smooth out fluctuations in year class strength and species composition to provide a measure of the effectiveness of the restoration project in achieving ecosystem goals.

Observations on the fishery of Crane Creek is not only of value to the Metzger Marsh project but is valuable in evaluating the potential for coastal wetland rehabilitation on Crane Creek as well. This study will also aid in better understanding the value and function of the numerous wetland types remaining within the Lake Erie ecosystem.

STUDY SITE

Crane Creek is a tributary to western Lake Erie west of Port Clinton, Ohio. The creek is slow moving with an average gradient of 0.57 m/min (1.9 ft/min) in 1987 (Ohio Department of Transportation, 1987). The majority of the watershed is located in Wood and Ottawa Counties; although the mouth opens to Lake Erie from Lucas County. The watershed comprises an area of 143.5 km² (55.4 mi²) and supports mainly residential and agricultural uses (Ohio Department of Transportation, 1987).

The primary area of interest for this study is the lower one kilometer of the river which opens up into an estuary at the mouth of Crane Creek (Figure 1). This area is located on the Ottawa National Wildlife Refuge and is managed by the U.S. Fish and Wildlife Service. A lakefront dike separates the estuary from the lake and contains a narrow channel which opens to the lake near the original creek mouth. The estuary is composed of pools 4 and 5 (51.1 and 84.0 hectares respectively) of the refuge. The two pools were originally separated by a now eroded internal dike. The natural creek channel follows the eastern edge of the estuary to the southwest where it is separated from the open water by an eroding internal dike which remains along the estuary's southern boundary.

Lake Erie seiches produce frequent flow direction and water level changes in the estuary. Water depths are shallow (1 meter and less in depth) in general but are deeper in the creek channel (1-2 meters in depth). Sediments throughout the estuary consisted mainly of silt; however, sandy sediments are present at the mouth. Waters were turbid throughout the study period and transparency was limited at all times. No emergent or floating aquatic vegetation was noted from June to October. A limited amount of submerged vegetation, *Potamogeton* sp., was observed in the southeast corner of the estuary in June.

Seven study sites were sampled in the estuary in 1996. Sampling locations were selected in 1994 in areas that had sufficient water levels to be accessible with boat and sampling equipment. Sites were established to sample various habitats located within the estuary. Site descriptions are provided in Table 1.

METHODS

Seven sites were sampled once a month from June to October 1996 in the Crane Creek estuary (Figure 1). Impoundment gear, trap and hoop nets, were fished for one night per month at sites 1 - 5. Sites 1, 3, and 4 were fished with a 1.2 x 1.2 m trapnet (1.3 cm sq. mesh) with a 22.5 m lead; and sites 2 and 5 were fished with a 0.9 m hoopnet (1.3 cm sq. mesh) with 15 m wings. Nets were set in the afternoon and lifted the following morning.

Nighttime beach seining was used to sample two shoreline locations, sites 6 and 7. Sampling at each site consisted of two hauls with a 30 x 1.2 m seine (0.64 cm mesh). One end of the seine was anchored on shore during sampling.

Nighttime larval sampling was conducted at sites 1 - 5 beginning in July 1996. A 0.5 m ichthyoplankton net (303 um) was used to sample the upper 0.5 m of

water at each of the locations. One ten minute tow or two five minute tows were collected at each location. The catch was either preserved in formalin and later identified or directly identified to species.

Total lengths (mm) were recorded for all fish captured. Scale samples and weights (g) were taken from all sportfish. Fish were returned to the water following data collection. Surface water temperature (°C), surface dissolved oxygen (mg/l), transparency (m), substrate type (sand, silt, or rock), maximum and minimum water depths (m) and weather conditions were recorded at each sample location. Relative abundance by sample date was determined for all species and biotic data summaries were compiled for all species by date and sample site.

RESULTS AND DISCUSSION

Twenty-four species of fish from ten families were represented in the catch from the Crane Creek estuary in 1996 (Table 2). A total of 7714 captures were made during sampling from June to October. Gizzard shad was the most abundant species and comprised 54 percent of the total captures overall. Trout perch, longear sunfish, and largemouth bass were the least abundant species. Species diversity was highest in September with 21 species represented and lowest in October with 17 species.

In general, fish abundance was lowest in June and rose to a peak in August then declined through October. Large catches from July to September corresponded to high average water temperatures and were mainly due to large seine catches of young-of-the-year fish.

Young-of-the-year fish began to appear in the catch in the July (Table 3b) and were present through October. Young-of-the-year and juvenile fish from ten species were captured in the estuary and included: quillback carpsucker, gizzard shad, common carp, emerald shiner, spottail shiner, channel catfish, white bass, white perch, yellow perch and freshwater drum. Young-of-the-year gizzard shad and channel catfish were the most abundant species captured in 1996. The presence of these fish indicates that the area is being used as a nursery area. Only adult fish were captured in the estuary in June; and although not observed, spawning may be occurring in the estuary in the spring. The value of the estuary for fish reproduction will be more apparent following continued larval assessment.

SPORTFISH CATCH

Eleven species of common sportfish were captured in the estuary in 1996 (Table 4) and included black crappie, white crappie, bluegill, largemouth bass, rock bass, longear sunfish, pumpkinseed, channel catfish, white bass, white perch, and yellow perch. Juvenile channel catfish was the most abundant sportfish species captured and largemouth bass and white crappie were among the least. The greatest number of sportfish were taken in September and consisted mainly of young-of-the-year channel catfish. Young-of-the-year and juvenile white bass, white perch, and yellow perch were also captured.

WETLAND FISH SPECIES

Nine fish species considered to be obligate wetland species, species which depend on vegetation or wetland habitat for one or more of their life stages according to Johnson (1989), were captured in Crane Creek in 1996 (Table 2). Carp was the most commonly captured wetland dependant species while largemouth bass and white crappie were the least captured. Obligate wetland dependant species were fairly stable representatives in the fish community from June to September with 7-8 of the nine species present during each sampling. Representation dropped in October, mainly from the Centrarchid family. Decreases or lack of presence of obligate wetland species may indicate that wetland degradation or loss is affecting the fishery resource.

Although some obligate wetland species were captured, their abundance was low relative to the number of facultative wetland species encountered. Facultative wetland species are species which are more loosely tied to vegetation and wetland habitat than obligate users. Many of the species captured during sampling efforts were facultative wetland species which are a more stable portion of the community and are able to adjust to the loss of wetland continuity according to Johnson (1989). Gizzard shad, quillback carpsucker, white bass, channel catfish, yellow perch, and white perch were among facultative wetland species captured.

GEAR COMPARISON

Impoundment gear captured a total of 1003 fish from 21 species, and seining a total of 6662 fish from 18 species. Centrarchid species were among those species more vulnerable to impoundment gear and Cyprinids to seining (Table 5). Overall, a greater number of fish were captured seining overall and catches comprised 97, 95, and 84 percent of the total catch for the months of July, August, and September respectively. Predominantly adult fish and larger sized species were captured with impoundment gear, while juvenile fish and small sized species were captured with a seine (Table 3a & 3b). Mesh sizes were larger on trap and hoop nets than on the seine allowing smaller fish to escape.

Sportfish were more represented in impoundment gear, 11 of 11 species, than seining, 6 of 11 species.

Few larval fish were captured in 1996 and larval netting was inconclusive due to initiation of this sampling gear late in the season. Catches made during larval sampling consisted of young-of-the-year emerald shiner and channel catfish. These catches were made during August and September, with largest numbers of captures in September.

ACKNOWLEDGEMENTS

This project was funded by the Lake Erie Protection Fund small grant program and the U.S. Fish and Wildlife Service Challenge Cost-Share program in 1996. We would like to thank and acknowledge the staff of the Ottawa National Wildlife Refuge and Ross Adams, Larry Martin, Stan Cornelius and Marge Miller for project cooperation, equipment storage, and fiscal coordination.

LITERATURE CITED

- Herdendorf, C.E. and K.A. Krieger. 1989. Overview of Lake Erie and its estuaries within the Great Lakes ecosystem. In *Lake Erie Estuarine Systems: Issues, resources, status, and management*, ed. K.A. Krieger, pp. 1-34. NOAA Estuary-of-the-Month Seminar Series No. 14. NOAA Estuarine Programs Office, Washington, D.C.
- Johnson, D.L. 1989. Lake Erie wetlands: fisheries considerations. In *Lake Erie Estuarine Systems: Issues, resources, status, and management*, ed. K.A. Krieger, pp. 257-274. NOAA Estuary-of-the-Month Seminar Series No. 14. NOAA Estuarine Programs Office, Washington, D.C.
- Ohio Department of Transportation. 1987. Bureau of Environmental Services, Biological Survey Report, pages 13-17. Transportation project WOO/OTT 2-0.00/0.00, PF 1247
- U.S. Department of the Interior. 1994. Metzger Marsh coastal wetland restoration project: draft environmental assessment and finding of no significant impact.

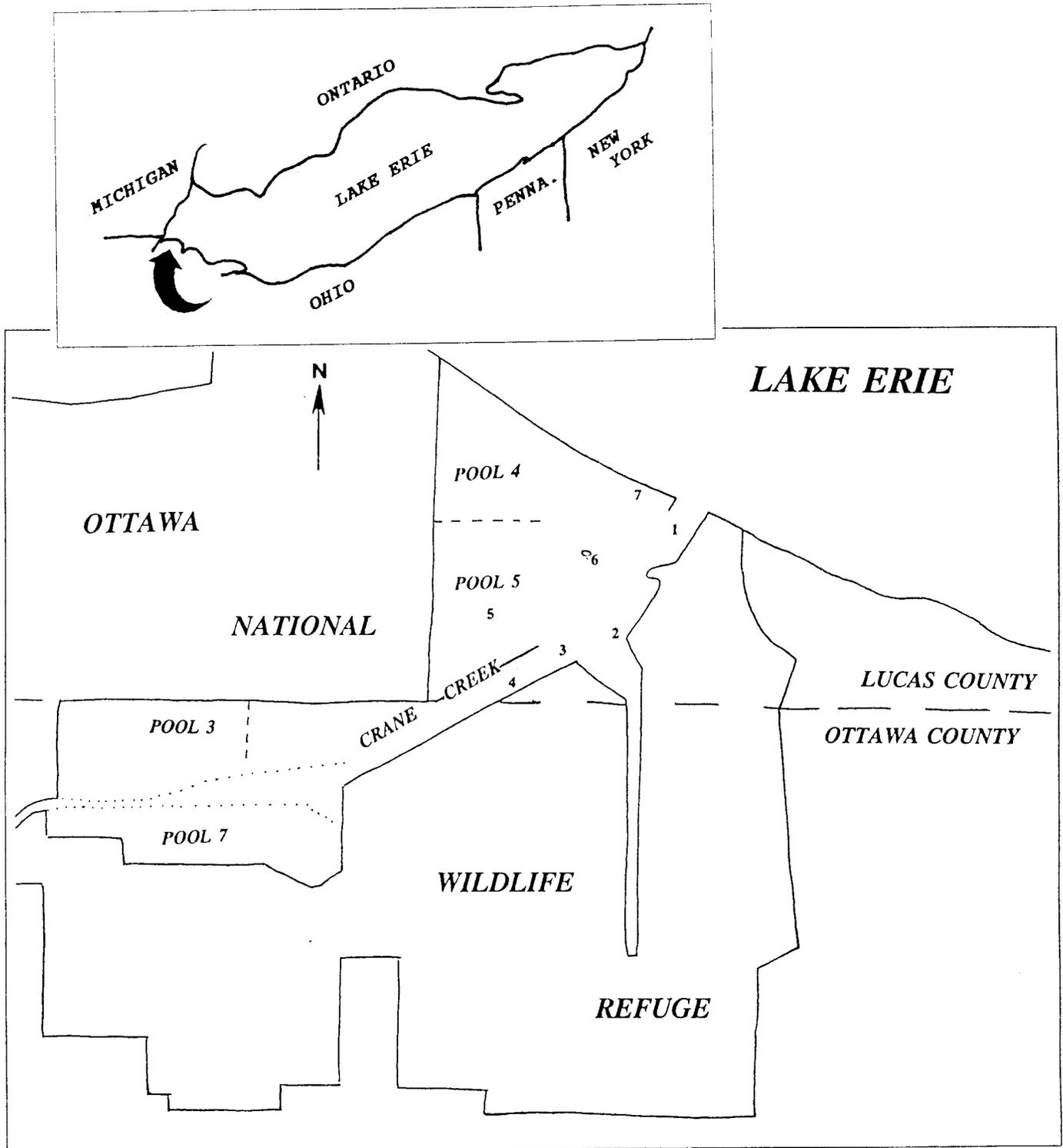


Figure 1. Crane Creek is a tributary to western Lake Erie from the Ottawa National Wildlife Refuge in Lucas County, Ohio. Seven locations in the estuary, identified numerically, were sampled in 1996. (Eroded dikes are de-noted by "----" and the creek channel is de-noted by "....").

Table 1. Descriptions of 1996 Crane Creek fishery survey sites, located on the Ottawa National Wildlife Refuge, Lucas County, Ohio.

Site 1 - Located in the creek channel at the river mouth in the northeast corner of the estuary. Sediments were hard and sandy. Conditions at this site were greatly affected by seiche activity causing variations in intensity and direction of water currents and sampling conditions.

Site 2 - Located in the nearshore area at the opening of a refuge canal to the estuary in the southeast corner. Sediments are soft and silty. Water currents are evident depending upon the direction of the seiche.

Site 3 - Located in the creek channel at the end of the diked channel where it meets the open water along the south shore of the estuary. Sediments are soft and silty. Water currents are evident depending upon the direction of the seiche.

Site 4 - Located in the diked creek channel in a deep hole. Sediments are soft and silty. Water currents are evident depending upon the direction of the seiche.

Site 5 - Located in the middle of pool 5 in shallow open water. There is little water movement outside of weather activity. Sediments are soft and silty and water depths are uniform.

Site 6 - Located on the east end of a depositional island near the creek channel. This is a sandy shore site where sediments to the north are soft and silty and to the south are sandy. Water depths gradually increase away from shore. Water currents are evident depending upon the direction of the seiche.

Site 7 - Located on the west shore of the mouth of the creek at the northeast shore of the estuary. The shore is a sandy depositional area and sediments are soft and silty away from shore. Water depths drop rapidly away from shore and water currents can be high from the west along shore.

Table 2. Relative abundance of fish captured June to October 1996 from Crane Creek estuary on the Ottawa National Wildlife Refuge, Lucas County, Ohio.

Family and species	Date (1996)				
	6/04-05	7/09-10	8/05-06	9/04-05	10/08-09
CATOSTOMIDAE					
Quillback (<i>Cariodes cyprinus</i>)	7	313	83	95	2
CENTRARCHIDAE					
Black crappie* (<i>Pomoxis nigromaculatus</i>)	2	1	3	10	0
White crappie* (<i>Pomoxis annularis</i>)	0	1	3	4	0
Bluegill* (<i>Lepomis macrochirus</i>)	3	10	5	6	0
Largemouth bass* (<i>Micropterus salmoides</i>)	1	0	0	1	1
Rockbass (<i>Ambloplites rupestris</i>)	1	1	0	2	4
Longear sunfish (<i>Lepomis megalotis</i>)	0	0	0	1	0
Pumpkinseed* (<i>Lepomis gibbosus</i>)	1	8	4	1	0
CLUPEIDAE					
Gizzard shad (<i>Dorosoma cepedianum</i>)	21	678	2857	362	245
CYPRINIDAE					
Bluntnose minnow (<i>Pimephales notatus</i>)	0	0	0	0	6
Common carp* (<i>Cyprinus carpio</i>)	17	7	11	23	5
Goldfish* (<i>Carassius auratus</i>)	3	0	8	0	8
Emerald shiner (<i>Notropis atherinoides</i>)	14	14	67	107	68
Spotfin shiner (<i>Notropis spilopterus</i>)	0	8	39	18	0
Spottail shiner (<i>Notropis hudsonius</i>)	123	21	6	14	17
ICTALURIDAE					
Brown bullhead* (<i>Ameiurus nebulosus</i>)	1	2	6	10	23
Channel catfish (<i>Ictalurus punctatus</i>)	12	37	542	681	119
LEPISOSTEIDAE					
Longnose gar* (<i>Lepisosteus osseus</i>)	2	1	9	10	0
PERCICHTHYIDAE					
White bass (<i>Morone chrysops</i>)	3	349	100	39	17
White perch (<i>Morone americana</i>)	8	4	22	99	47
PERCIDAE					
Logperch (<i>Percina caprodes</i>)	0	0	1	4	2
Yellow perch (<i>Perca flavescens</i>)	3	7	6	7	1
PERCOPSIDAE					
Troutperch (<i>Percopsis omiscomaycus</i>)	0	0	0	0	1
SCIAENIDAE					
Freshwater drum (<i>Aplodinotus grunniens</i>)	7	16	74	65	14
N=	229	1478	3846	1559	580
Number of Species	18	18	19	21	17

* Denotes obligate wetland species according to Johnson (1989).

Table 3a. Biotic data summaries for impoundment gear sampling from Crane Creek estuary, June to October 1996 (total length = mm)

June 04-05				July 09-10				August 05-06			
Species	Number	Average Total Length	Range Total Length	Species	Number	Average Total Length	Range Total Length	Species	Number	Average Total Length	Range Total Length
QUB	7	237.3	103-435	QUB	1	167.0	167	QUB	2	232.5	230-235
BLC	2	235.0	210-260	BLC	1	232.0	232	BLC	3	138.3	125-155
WHC	0	--	--	WHC	1	114.0	114	WHC	3	264.3	230-280
BLG	3	103.3	95-110	BLG	10	108.1	70-164	BLG	5	117.2	74-165
LMB	1	275.0	275	LMB	0	--	--	LMB	0	--	--
ROB	1	190.0	190	ROB	1	105.0	105	ROB	0	--	--
LOS	0	--	--	LOS	0	--	--	LOS	0	--	--
PUM	1	110.0	110	PUM	8	105.6	75-145	PUM	4	103.2	83-130
GIS	5	350.0	300-465	GIS	2	44.5	36-53	GIS	42	69.0	50-77
BLM	0	--	--	BLM	0	--	--	BLM	0	--	--
CAP	6	565.5	328-670	CAP	5	N/A	N/A	CAP	8	569.7	415-710
GOF	3	155.6	74-290	GOF	0	--	--	GOF	8	292.2	60-442
EMS	1	N/A	N/A	EMS	0	--	--	EMS	0	--	--
SFS	0	--	--	SFS	0	--	--	SFS	0	--	--
STS	119	N/A	89-127	STS	0	--	--	STS	0	--	--
BRB	1	290.0	290	BRB	2	300.5	300-301	BRB	5	297.2	261-345
CHC	8	150.1	84-232	CHC	2	74.0	28-120	CHC	9	144.6	109-215
LNG	1	655.0	655	LNG	1	610.0	610	LNG	2	557.0	534-580
WHB	2	221.5	173-270	WHB	3	195.6	37-300	WHB	17	72.0	42-100
WHP	8	176.8	160-200	WHP	2	183.5	180-187	WHP	1	185.0	185
LOP	0	--	--	LOP	0	--	--	LOP	0	--	--
YEP	3	140.0	105-160	YEP	0	--	--	YEP	6	206.8	156-303
TRP	0	--	--	TRP	0	--	--	TRP	0	--	--
FRD	6	329.3	153-742	FRD	1	173.0	173	FRD	72	89.9	66-228

* Effort per month was 5 nights (3 nights effort with 1.2 m trapnet and 2 nights effort with 0.9 m hoopnet).
 ** Effort for July was 4 nights (site 4 trapnet was fouled) and for October was 4 nights (site 3 trapnet was fouled).

Table 3a. Continued.

September 04-05				October 08-09			
Species	Number	Average Total Length	Range Total Length	Species	Number	Average Total Length	Range Total Length
QUB	3	220.3	204-232	QUB	1	473.0	473
BLC	10	216.7	126-297	BLC	0	--	--
WHC	4	254.2	153-330	WHC	0	--	--
BLG	5	137.4	105-164	BLG	0	--	--
LMB	1	307.0	307	LMB	1	275.0	275
ROB	0	--	--	ROB	4	186.7	147-220
LOS	1	71.0	71	LOS	0	--	--
PUM	1	138.0	138	PUM	0	--	--
GIS	56	79.0	51-135	GIS	177	89.4	59-148
BLM	0	--	--	BLM	0	--	--
CAP	13	336.5	288-385	CAP	0	--	--
GOF	0	--	--	GOF	6	116.6	93-142
EMS	0	--	--	EMS	0	--	--
SFS	0	--	--	SFS	0	--	--
STS	0	--	--	STS	0	--	--
BRB	10	228.8	92-330	BRB	6	106.5	64-130
CHC	18	109.4	75-144	CHC	23	262.8	126-340
LNG	4	411.0	394-445	LNG	93	78.3	55-100
WHB	6	130.2	99-165	WHB	0	--	--
WHP	29	101.9	67-217	WHP	16	115.3	53-184
LOP	0	--	--	LOP	24	76.4	59-117
YEP	1	168.0	168	LOP	0	--	--
TRP	0	--	--	YEP	1	90.0	90
FRD	55	134.6	94-332	TRP	1	77.0	77
				FRD	14	132.7	93-375

SPECIES KEY

QUB	Quillback carpsucker
BLC	Black crappie
WHC	White crappie
BLG	Bluegill
LMB	Largemouth bass
ROB	Rockbass
LOS	Longear sunfish
PUM	Pumpkinseed
GIS	Gizzard shad
BLM	Bluntnose minnow
CAP	Common carp
GOF	Goldfish
EMS	Emerald shiner
SFS	Spotfin shiner
STS	Spottail shiner
BRB	Brown bullhead
CHC	Channel catfish
LNG	Longnose gar
WHB	White bass
WHP	White perch
LOP	Logperch
YEP	Yellow perch
TRP	Trout perch
FRD	Freshwater drum

* Effort per month was 5 nights (3 nights effort with 1.2 m trapnet and 2 nights effort with 0.9 m hoopnet).
 ** Effort for July was 4 nights (site 4 trapnet was fouled) and for October was 4 nights (site 3 trapnet was fouled).

Table 3b. Biotic data summaries for seine sampling from Crane Creek estuary, June to October 1996 (total length=mm).

June 04-05				July 09-10				August 05-06			
Species	Number	Average Total Length	Range Total Length	Species	Number	Average Total Length	Range Total Length	Species	Number	Average Total Length	Range Total Length
QUB	0	--	--	QUB	312	41.4	21-145	QUB	81	60.1	47-88
BLC	0	--	--	BLC	0	--	--	BLC	0	--	--
WHC	0	--	--	WHC	0	--	--	WHC	0	--	--
BLG	0	--	--	BLG	0	--	--	BLG	0	--	--
LMB	0	--	--	LMB	0	--	--	LMB	0	--	--
ROB	0	--	--	ROB	0	--	--	ROB	0	--	--
LOS	0	--	--	LOS	0	--	--	LOS	0	--	--
PUM	0	--	--	PUM	0	--	--	PUM	0	--	--
GIS	16	318.1	280-430	GIS	676	54.6	21-163	GIS	2815	85.7	50-110
BLM	0	--	--	BLM	0	--	--	BLM	0	--	--
CAP	11	N/A	N/A	CAP	2	29.5	28-31	CAP	3	412.7	285-585
GOF	0	--	--	GOF	0	--	--	GOF	0	--	--
EMS	13	N/A	N/A	EMS	14	61.3	29-87	EMS	67	50.6	32-72
SFS	0	--	--	SFS	8	69.2	51-85	SFS	39	57.6	50-65
STS	4	N/A	N/A	STS	21	31.7	24-40	STS	6	44.7	38-50
BRB	0	--	--	BRB	0	--	--	BRB	1	240.0	240
CHC	4	77.5	65-90	CHC	35	30.7	25-35	CHC	533	41.4	33-46
LNG	1	750	750	LNG	0	--	--	LNG	7	649.5	560-810
WHB	1	390	390	WHB	346	39.2	26-50	WHB	83	69.2	32-341
WHP	0	--	--	WHP	2	39.5	37-42	WHP	21	46.4	32-66
LOP	0	--	--	LOP	0	--	--	LOP	1	54.0	54
YEP	0	--	--	YEP	7	40.1	32-47	YEP	0	--	--
TRP	0	--	--	TRP	0	--	--	TRP	0	--	--
FRD	1	N/A	N/A	FRD	15	48.4	21-163	FRD	2	81.5	71-92

* Effort per month was 4 hauls (2 hauls per site with a 100' seine).

** Effort for June was 2 hauls (site 6 was not sampled due to nesting terns) and for July and September was 3.5 hauls (site 7 was sampled with a 15 m haul due to high fast water).

Table 3b. Continued.

September 04-05				October 08-09			
Species	Number	Average Total Length	Range Total Length	Species	Number	Average Total Length	Range Total Length
QUB	92	93.4	70-114	QUB	1	130	130
BLC	0	--	--	BLC	0	--	--
WHC	0	--	--	WHC	0	--	--
BLG	1	38.0	38	BLG	0	--	--
LMB	0	--	--	LMB	0	--	--
ROB	2	140.0	105-175	ROB	0	--	--
LOS	0	--	--	LOS	0	--	--
PUM	0	--	--	PUM	0	--	--
GIS	306	69.7	45-105	GIS	67	98.3	60-147
BLM	0	--	--	BLM	6	53.3	32-80
CAP	10	N/A	N/A	CAP	5	N/A	N/A
GOF	0	--	--	GOF	2	107	107
EMS	84	45.5	32-57	EMS	56	50.4	36-86
SFS	18	60.8	47-72	SFS	0	--	--
STS	14	54.1	45-78	STS	11	69.4	60-87
BRB	0	--	--	BRB	0	--	--
CHC	661	57.8	50-72	CHC	23	63.9	53-80
LNG	6	557.5	390-655	LNG	0	--	--
WHB	33	64.1	51-99	WHB	1	138	138
WHP	70	58.7	45-70	WHP	23	79.5	58-290
LOP	4	73.5	70-81	LOP	2	75	66-84
YEP	6	80.0	74-90	YEP	0	--	--
TRP	0	--	--	TRP	0	--	--
FRD	10	93.5	72-111	FRD	0	--	--

SPECIES KEY

QUB	Quillback carpsucker
BLC	Black crappie
WHC	White crappie
BLG	Bluegill
LMB	Largemouth bass
ROB	Rockbass
LOS	Longear sunfish
PUM	Pumpkinseed
GIS	Gizzard shad
BLM	Bluntnose minnow
CAP	Common carp
GOF	Goldfish
EMS	Emerald shiner
SFS	Spottin shiner
STS	Spottail shiner
BRB	Brown bullhead
CHC	Channel catfish
LNG	Longnose gar
WHB	White bass
WHP	White perch
LOP	Logperch
YEP	Yellow perch
TRP	Trout perch
FRD	Freshwater drum

* Effort per month was 4 hauls (2 hauls per site with a 30 m seine).

** Effort for June was 2 hauls (site 6 was not sampled due to nesting terns) and for July and September was 3.5 hauls (site 7 was sampled with a 15 m haul due to high fast water).

Table 4. Biotic data summaries for sportfish captured from Crane Creek estuary, June to October 1996 (weight=g, total length=mm, and abundance=% of total catch).

June 05-06							September 04-05						
Species	Number	Ave. Tot. Length	Rge. Tot. Length	Average Weight	Total Weight		Species	Number	Ave. Tot. Length	Rge. Tot. Length	Average Weight	Total Weight	
BLC	2	235.0	210-260	235	470		BLC	10	216.7	126-297	207	2070	
WHC	0	--	--	--	--		WHC	4	254.2	153-330	380	1140	
BLG	3	103.3	95-110	28.3	85		BLG	6	120.8	38-164	49.6	298	
LMB	1	275.0	275	550	550		LMB	1	307.0	307	480	480	
ROB	1	190.0	190	160	160		ROB	2	140.0	105-175	75.0	150.0	
LOS	0	--	--	--	--		LOS	1	71.0	71	10	10	
PUM	1	110.0	110	40	40		PUM	1	138.0	138	55	55	
CHC	12	125.9	65-232	28.8	345		CHC	681	75.9	50-144	3	2043	
WHB	3	277.6	173-390	118.3	355		WHB	39	61.1	51-165	9.5	294	
WHP	8	176.8	160-200	75.7	530		WHP	99	95.5	45-217	16.2	550	
YEP	3	140.0	105-160	40	120		YEP	7	92.6	74-168	7.7	54	

July 09-10							October 08-09						
Species	Number	Ave. Tot. Length	Rge. Tot. Length	Average Weight	Total Weight		Species	Number	Ave. Tot. Length	Rge. Tot. Length	Average Weight	Total Weight	
BLC	1	232.0	232	220	220		BLC	0	--	--	--	--	
WHC	1	114.0	114	12	12		WHC	0	--	--	--	--	
BLG	10	108.1	70-164	37.2	372		BLG	0	--	--	--	--	
LMB	0	--	--	--	--		LMB	1	275.0	275	310	310	
ROB	1	105.0	105	30	30		ROB	4	186.7	147-220	155	620	
LOS	0	--	--	--	--		LOS	0	--	--	--	--	
PUM	8	105.6	75-145	24.6	197		PUM	0	--	--	--	--	
CHC	37	32.4	25-120	3.1	115		CHC	119	77.7	53-100	3.9	460	
WHB	349	37.4	26-300	5.5	1928		WHB	17	116.6	53-184	26.9	458	
WHP	4	111.5	37-187	54	216		WHP	47	78.0	58-290	5.4	254.5	
YEP	7	40.1	32-47	4.0	28.0		YEP	1	90.0	90	4.5	4.5	

August 05-06						
Species	Number	Ave. Tot. Length	Rge. Tot. Length	Average Weight	Total Weight	
BLC	3	138.3	125-155	42.3	127	
WHC	3	264.3	230-280	343.3	1030	
BLG	5	117.2	74-165	48	240	
LMB	0	--	--	--	--	
ROB	0	--	--	--	--	
LOS	0	--	--	--	--	
PUM	4	103.2	83-130	25	100	
CHC	542	42.7	33-215	2.4	1308.8	
WHB	100	60.8	32-341	8.3	834.2	
WHP	22	52.3	32-185	7.9	174.5	
YEP	6	206.8	156-303	85	510	

SPECIES KEY	
BLC	Black crappie
WHC	White crappie
BLG	Bluegill
LMB	Largemouth bass
ROB	Rock bass
LOS	Longear sunfish
PUM	Pumpkinseed
CHC	Channel catfish
WHB	White bass
WHP	White perch
YEP	Yellow perch

Table 5. Relative abundance of fish captured in impoundment gear and seining from June to October 1996 in Crane Creek estuary on the Ottawa National Wildlife Refuge, Lucas County, Ohio.

Impoundment Gear				Seine						
Family and species	Date (1996)			Family and species	Date (1996)					
	6/04-05	7/09-10	8/05-06		9/04-05	10/08-09	6/04-05	7/09-10	8/05-06	9/04-05
CATOSTOMIDAE				Quillback	7	1	2	3	1	1
CENTRARCHIDAE				Black crappie	2	1	3	10	0	0
				White crappie	0	1	3	4	0	0
				Bluegill	3	10	5	5	0	0
				Largemouth bass	1	0	0	1	1	0
				Rock bass	1	1	0	0	4	0
				Longear sunfish	0	0	0	1	0	0
				Pumpkinseed	1	8	4	1	0	0
CLUPEIDAE				Gizzard shad	5	2	42	56	177	67
CYPRINIDAE				Bluntnose minnow	0	0	0	0	0	6
				Common carp	6	5	8	13	0	5
				Goldfish	3	0	8	0	6	2
				Emerald shiner	1	0	0	0	0	56
				Spottin shiner	0	0	0	0	0	0
				Spottail shiner	119	0	0	0	6	11
ICTALURIDAE				Brown bullhead	1	2	5	10	23	0
				Channel catfish	8	2	9	18	93	23
LEPISOSTEIDAE				Longnose gar	1	1	2	4	0	0
PERCICHTHYIDAE				White bass	2	3	17	6	16	1
				White perch	8	2	1	29	24	23
PERCIDAE				Logperch	0	0	0	0	0	2
				Yellow perch	3	0	6	1	1	4
PERCOPSIDAE				Troutperch	0	0	0	0	1	0
SCIAENIDAE				Freshwater drum	6	1	72	55	14	0
Impoundmt. N=	178	40	187	217	367	Seine N=	51	1438	3659	1317
Percent of Total Catch	77.3	2.71	4.86	13.92	63.28	Percent of Total Catch	22.27	97.29	95.14	84.48
Number of Species	18	14	15	16	13	Number of Species	8	11	13	15