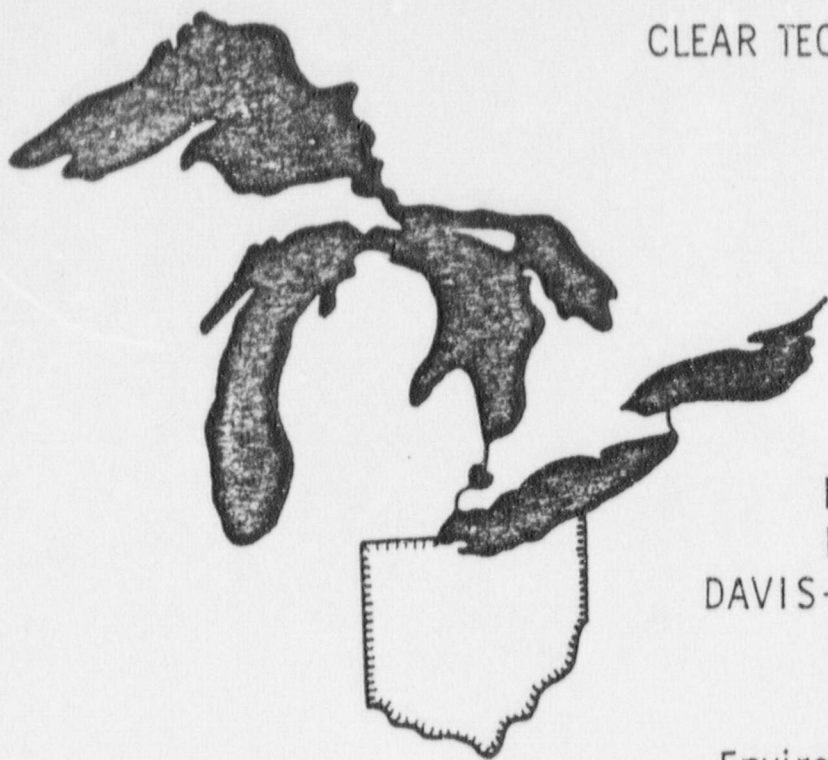


CLEAR TECHNICAL REPORT NO. 88



ICHTHYOPLANKTON STUDIES  
FROM LAKE ERIE NEAR THE  
DAVIS-BESSE NUCLEAR POWER STATION  
DURING 1977

Environmental Technical Specifications  
Sec. 3.1.2.a.4 Ichthyoplankton

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### 3.1.2.a.4 Ichthyoplankton

#### Procedures

Duplicate ichthyoplankton (fish eggs and larvae) samples were collected from the surface and bottom of Stations 3 (control station), 8 (intake), 13 (plume area), 29 (control station), and Toussaint Reef (Figures 1 and 2) using a 0.75 meter diameter heavy-duty oceanographic plankton net (No. 00, 0.75 mm mesh) equipped with a calibrated General Oceanics flow meter. Each sample consisted of a 5-minute tow at 3 to 4 knots/hr with this net. Samples were collected on 13 occasions (approximately 10-day intervals) between 20 April 1977 and 2 September 1977. Sampling was terminated after 2 September as only one sample on 22 August and none of the samples from 2 September contained ichthyoplankters. It should be noted that U.S. EPA (Grosse Ile office) terminates their Western Basin sampling on 15 July each year. Samples were preserved in 5% formalin and returned to the laboratory for sorting and analysis. All specimens were identified and enumerated using the works of Fish (1932), Norden (1961a and b) and Nelson and Cole (1975). Results were reported as the number of individuals per 100 m<sup>3</sup> of water calculated from the volume filtered (flow meter) and the number of individuals within the sample.

#### Results

Specimens collected during the 1977 field season represented 13 taxa, 12 to the species level and one listed as unidentified (Table 1). No eggs were collected in any of the samples. Gizzard shad, yellow perch, walleye and emerald shiners were the dominant species representing 55.9 percent, 25.5 percent, 11.1 percent, and 3.0 percent, respectively, of the total population. No other species represented as much as 1.5% of the total. Gizzard shad occurred from 21 May through 12 August and peaked on 2 June at 198.3 individuals per 100 m<sup>3</sup> of water. Yellow perch were present on the first sampling date, 20 April, but at the low concentration of 0.1/100 m<sup>3</sup>. Perch remained through 13 June and peaked on 21 May at 60.2/100 m<sup>3</sup>. Walleye occurred from 29 April through 2 June and peaked on 21 May at 49.9/100 m<sup>3</sup>. Emerald shiners occurred from 13 June through 22 August and peaked at 6.9/100 m<sup>3</sup> on 27 July and at 6.2/100 m<sup>3</sup> on 25 June.

Station 3 exhibited the greatest larval density, 57.4/100 m<sup>3</sup>, while, in the vicinity of the plant site, the other control station (29) exhibited the lowest density 15.8/100 m<sup>3</sup> (Table 2). Overall, Toussaint Reef exhibited the lowest density, 11.6/100 m<sup>3</sup>. At 4 of the 5 stations, larvae were more abundant at the bottom (Table 3). However, the surface density at Station 3 (80.8/100 m<sup>3</sup>) was so much greater than the bottom density (19.2/100 m<sup>3</sup>) that the overall mean from all stations showed the surface to have a greater density than the bottom.

All raw data were keypunched and stored at the offices of The Ohio State University's Center for Lake Erie Area Research in Columbus, Ohio. A voucher collection of all samples is also maintained at these offices.

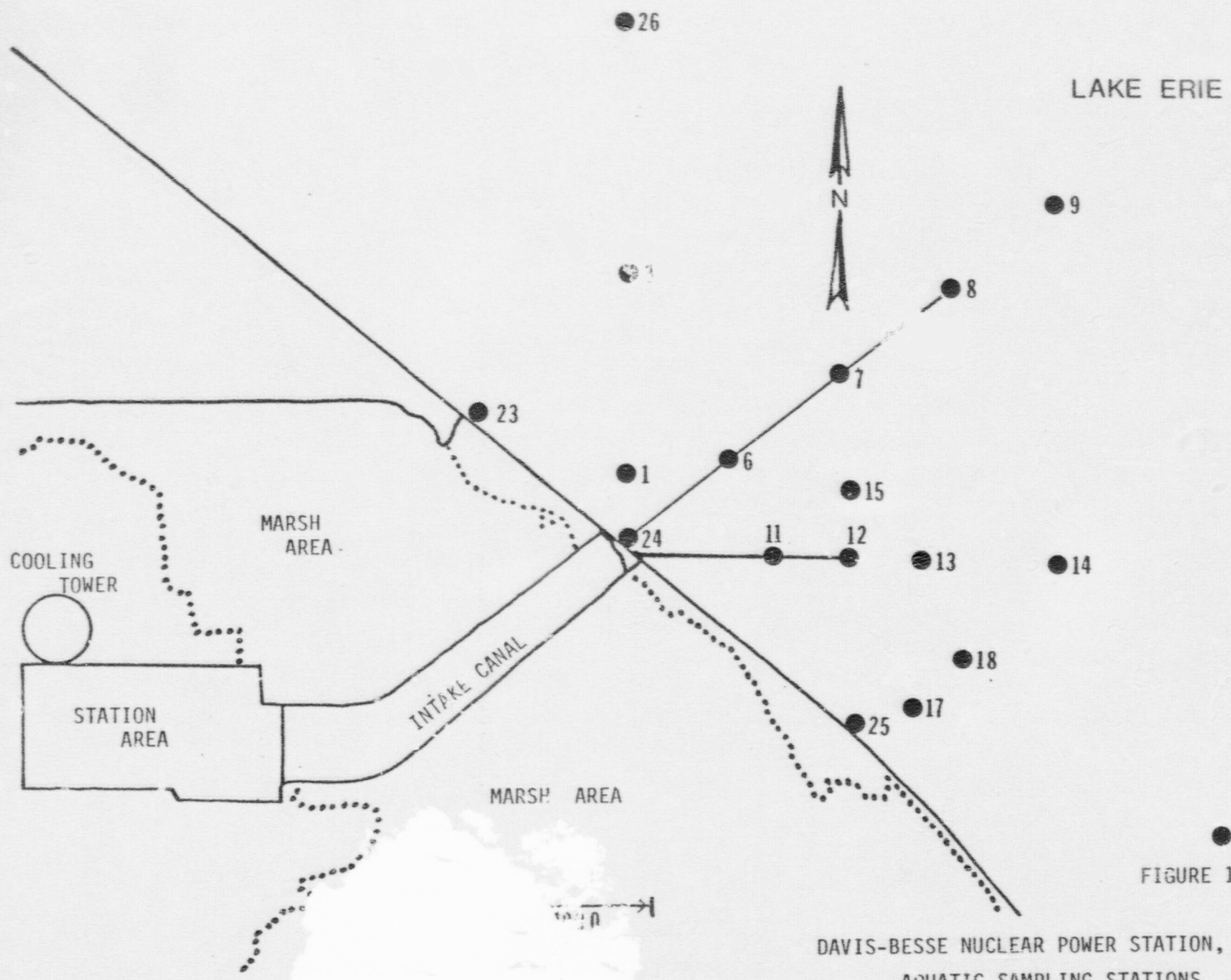


FIGURE 1

DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1  
AQUATIC SAMPLING STATIONS



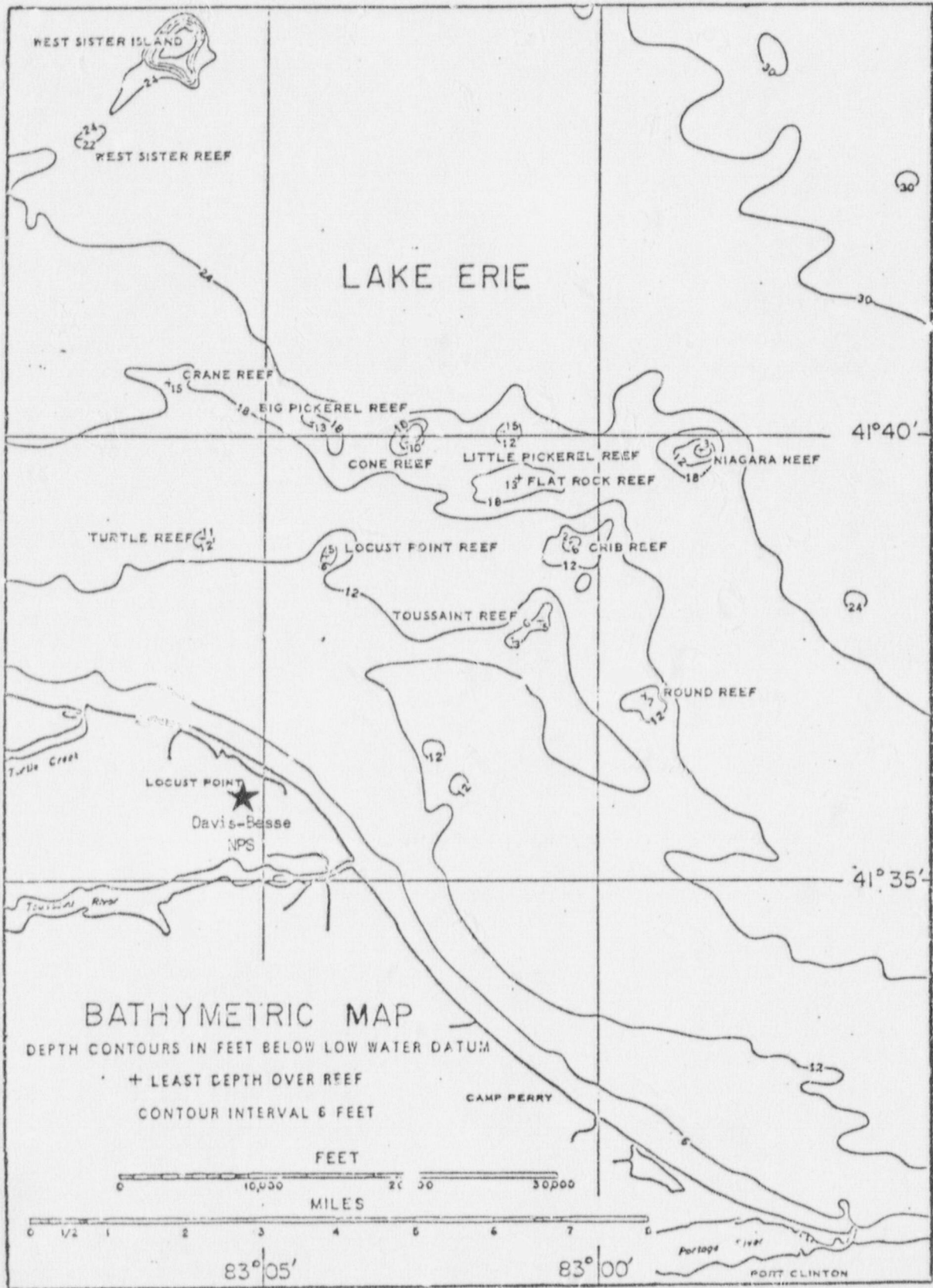


FIGURE 2. REEFS NEAR LOCUST POINT.

TABLE 1

MEAN ICHTHYOPLANKTON CONCENTRATION\*  
AT LOCUST POINT, LAKE ERIE - 1977

DATE	April 20	April 29	May 21	June 2	June 13	June 25	July 5	July 13	July 20	July 27	Aug. 12	Aug. 22	Sept. 2	MEAN
SPECIES														
Carp	0.0	0.1	0.1	2.6	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.28
Emerald Shiner	0.0	0.0	0.0	0.0	0.7	6.2	0.0	0.1	0.0	6.9	0.4	0.2	0.0	1.12
Freshwater Drum	0.0	0.0	0.0	3.3	0.1	1.0	0.3	1.7	0.2	0.0	0.0	0.0	0.0	0.51
Gizzard Shad	0.0	0.0	1.1	198.3	38.0	15.8	1.1	13.4	0.7	0.0	0.4	0.0	0.0	20.68
Logperch Darter	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.04
Rainbow Smelt	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04
Sauger	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.52
Spottail Shiner	0.0	0.0	2.1	0.2	0.0	0.1	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.24
Unidentified	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
Walleye	0.0	3.5	49.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.12
White Bass	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02
White Sucker	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
Yellow Perch	0.1	43.4	60.2	19.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.45
TOTAL	0.1	53.9	113.4	224.6	39.0	23.5	2.5	15.2	0.9	7.0	1.1	0.2	0.0	37.0

\* Data presented as number of larvae per 100 m<sup>3</sup> of water and computed from 2 surface and 2 bottom tows at each of 4 sampling stations (3, 8, 13, 29) at Locust Point.

TABLE 2  
 ICHTHYOPLANKTON CONCENTRATIONS\* AT SAMPLING STATIONS  
 AT LOCUST POINT, LAKE ERIE - 1977

STATIONS DATE	3	8	13	29	MEAN**	Toussaint Reef
April 20	0.3	***	0.0	0.0	0.1	***
April 29	10.1	55.7	67.8	82.2	53.9	37.0
May 21	230.4	4.9	169.7	48.4	113.4	14.1
June 2	396.6	52.1	***	***	224.2	***
June 13	52.8	79.1	17.3	7.0	39.0	59.2
June 25	19.3	24.6	19.9	30.1	23.5	***
July 5	0.0	4.1	5.6	0.0	2.4	0.0
July 13	25.7	5.4	18.8	10.8	15.2	0.6
July 20	0.7	0.7	0.9	1.0	0.8	0.7
July 27	8.6	9.4	2.9	7.2	7.0	4.3
August 12	0.8	0.0	1.0	2.3	1.0	0.0
August 22	0.6	0.0	0.0	0.0	0.1	0.0
September 2	0.0	0.0	0.0	0.0	0.0	0.0
MEAN	57.4	19.7	25.3	15.8	37.0	11.6

- \* Mean number per 100 m<sup>3</sup> of water computed from 2 surface and 2 bottom tows at each station.
- \*\* Does not include results from Toussaint Reef.
- \*\*\* Poor weather conditions precluded sampling at this station.



TABLE 3

PHYTOPLANKTON CONCENTRATIONS<sup>a</sup> AT THE SURFACE AND BOTTOM  
OF SAMPLING STATIONS AT LOCUST POINT, LAKE ERIE - 1977

DATE	DEPTH <sup>d</sup>	STATION 3	STATION 8	STATION 13	STATION 29	MEAN	Toussaint Reef
20 April	S	0.6	b	0.0	0.0	0.2	b
	B	0.0	b	0.0	0.0	0.0	b
29 April	S	7.5	34.3	46.7	32.0	30.1	26.1
	B	12.2	78.9	88.6	134.7	78.6	47.7
21 May	S	230.4	9.9	149.3	51.6	110.4	0.0
	B	c	0.0	193.0	42.9	78.6	32.2
2 June	S	731.9	57.6	b	b	394.8	b
	B	61.4	46.5	b	b	54.0	b
13 June	S	1.5	21.8	19.3	7.3	12.5	72.3
	B	112.6	132.2	15.8	6.5	66.8	47.1
25 June	S	6.9	5.3	18.7	16.9	12.0	b
	B	31.4	46.8	21.0	43.2	35.6	b
5 July	S	0.0	8.5	4.4	0.0	3.2	0.0
	B	0.0	0.0	6.9	0.0	1.7	0.0
13 July	S	51.8	7.6	28.7	8.7	24.2	1.2
	B	10.2	3.5	8.4	14.7	9.2	0.0
20 July	S	0.0	1.6	0.0	0.0	0.4	0.8
	B	1.5	0.0	1.7	1.7	1.2	0.7
27 July	S	16.6	10.8	5.0	13.7	11.5	8.1
	B	0.8	8.4	0.7	0.0	2.5	0.0
12 August	S	1.5	0.0	1.0	3.0	1.4	0.0
	B	0.0	0.0	1.0	1.5	0.6	0.0
22 August	S	1.7	0.0	0.0	0.0	0.4	0.0
	B	0.0	0.0	0.0	0.0	0.0	0.0
2 September	S	0.0	0.0	0.0	0.0	0.0	0.0
	B	0.0	0.0	0.0	0.0	0.0	0.0
MEAN	S	80.8	13.1	22.8	11.1	46.2	10.9
	B	19.2	26.4	28.1	20.4	25.3	12.8

<sup>a</sup> Number per 100 m<sup>3</sup> of water.

<sup>b</sup> Poor weather conditions precluded sampling these stations.

<sup>c</sup> Equipment malfunction.

<sup>d</sup> S=Surface B=Bottom

## Analysis

Ichthyoplankton populations have shown tremendous variations since 1974. Emerald shiners constituted 81 percent of the 1974 larvae, 1 percent of the 1975 larvae, 60 percent of the 1976 larvae, and 3 percent of the 1977 larvae. Yellow perch constituted 5 percent of the 1974 larvae, 70 percent of the 1975 larvae, 4 percent of the 1976 larvae, and 26 percent of the 1977 larvae. Gizzard shad appear to have increased significantly reaching 34 percent of the 1976 larvae and 56 percent of the 1977 larvae. It is felt that the above described variability is largely due to the fact that we are sampling schooling specimens. Consequently, when the net is drawn through a school the density appears quite high.

This is the first year that walleye have constituted a significant portion of the catch. However, adult populations throughout the Western Basin are increasing greatly and, consequently, greater larvae populations are to be expected (Scholl, 1978).

In 1976, control stations (3 and 29) were established on either side of the intake (8)/discharge (13) complex to determine if unusually large fish larvae populations were occurring due to possible spawning in the rip-rap material around these structures. This does not appear to be occurring as larvae densities in 1977, as in 1976, at Stations 8 and 13 were normally within the range set by the control stations. Furthermore, due to the great variability observed, density differences between stations were not significant at the 0.05 level. This indicates that populations occurring in the vicinity of the intake and discharge complex were not unusual for the shore of Lake Erie near Locust Point.



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