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1983 NINE MILE POINT AQUATIC ECOLOGY STUDIES

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SUMMARY

In accordance with the requirements of the NRC's Environmental Technical Specifications*, impingement catches were monitored on a frequency of 4-20 samples per month from January through December 1983 at the Nine Mile Point Unit 1 and the James A. FitzPatrick nuclear power stations.

Impingement sampling at Nine Mile Point Unit 1 during 1983 resulted in the collection of 32 taxa; 29 fish species or other taxa, one amphibian species (tadpoles) and two invertebrate species (crayfish and clam). Alewife was the most numerous specie comprising 87 percent of the total catch. Alewife, rainbow smelt, and sculpins accounted for 97 percent of all fish collected. Ninety six percent of the total biomass collected in 1983 at Nine Mile Point Unit 1 was comprised of alewife, gizzard shad, and rainbow smelt. The total number of aquatic organisms impinged at Nine Mile Point Unit 1 was estimated to be approximately 140,921.

At James A. FitzPatrick, impingement of aquatic organisms was estimated to be 116,005. Thirty-nine taxa were identified, including 37 fish species or genera, a mollusk, and a crustacean. Alewife and rainbow smelt comprised approximately 90 percent of the total impingement catch. Alewife comprised nearly 70 percent of the total biomass collected in 1983. Rainbow smelt and gizzard shad comprised 15 percent of the total biomass. The estimated impingement collections never exceeded the specified ranges for either plant during 1983.

The overall condition of the fish collected was healthy. Scars and other abnormalities found were most likely naturally caused and not a direct result of power plant operation.

No alterations to the existing fish community or population levels occurred as a direct result of power plant operation in the Nine Mile Point area as determined by the 1983 impingement data. In comparison to the standing stock estimates (O'Gorman and Bergstedt 1983, personal communication) for the two most abundant impinged species, alewife (4-4.5 billion) and rainbow smelt (0.5 billion), the numbers impinged at either power plant represented a negligible portion of the fish community of Lake Ontario. No rare, endangered, or threatened fish species were collected in the Nine Mile Point area during 1983. No <u>Corbicula</u> sp. mollusks were found in the 1983 impingement collections.

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* The Nine Mile Point Unit 1 and James A. FitzPatrick Environmental Technical Specifications were revised on 11 March 1983 as a result of Amendments 51 and 73, respectively. These amendments deleted non-radiological monitoring from the Appendix B Technical Specifications. However, impingement monitoring was continued in accordance with New York State Pollutant Discharge Elimination System (SPDES) Permit requirements.

1. INTRODUCTION

This report presents the results of aquatic ecological studies conducted by Ecological Analysts, Inc. (EA) during 1983 in the vicinity of the Nine Mile Point promontory in southeastern Lake Ontario. These aquatic studies were conducted in accordance with Environmental Technical Specifications for the Nine Mile Point Unit 1 and the James A. FitzPatrick nuclear generating stations, as prescribed by the U.S. Nuclear Regulatory Commission.

The ecological interaction of the Nine Mile Point Unit 1 and James A. FitzPatrick plants with the Lake Ontario environment in the vicinity of the Nine Mile Point Promontory has been under study since the 1960s. This 1983 study represents a continuation of those early studies which were initiated during construction of the two nuclear plants (Nine Mile Point began operation in December 1969, James A. FitzPatrick started operation in July 1975).

The two stations are located on the shore of Lake Ontario approximately 11 kilometers (seven miles) northeast of the City of Oswego, New York. Nine Mile Point Unit 1 is a 620-MWe boiling water reactor with the cooling water intake structure located off shore in approximately 7.6 meters (25 feet) of water and the discharge structure located near shore in approximately 5.2 meters (17 feet) of water. James A. FitzPatrick is an 821-MWe boiling water reactor with the water intake structure located near shore in approximately 7.3 meters (24 feet) of water and the discharge, with a 236-meter (774-ft) diffuser, located off shore in approximately 9.1 meters (30 feet) of water.

This annual report consists of data descriptions and discussions of results from the sampling program conducted by EA from January 1983 through December 1983. The sampling program consisted of impingement studies at both power plants throughout the year.

Appendixes are provided as follows: Appendix A - Impingement tables and plant operational information; Appendix B - Exceptions to the Standard Operating Procedures; Appendix C - A report of the abnormalities, diseases, and external parasites found on fish collected in the impingement; and Appendix D - A list of common and scientific names of all taxa collected in 1983 at the Nine Mile Point power stations.

2. MATERIALS AND METHODS

2.1 IN-PLANT STUDIES

2.1.1 Impingement Sampling

In accordance with the requirements of the NRC's Environmental Technical Specifications, impingement catches were monitored on a frequency of 4-20 samples per month from January through December 1983 at the Nine Mile Point Unit 1 and the James A. FitzPatrick nuclear power stations (Table 2-1).

Samples were collected over a 24-hour period on randomly selected days. Samples were initiated around 1300 hours of the sampling day and were mechanically washed into a collecting basket with a 9.5-mm (3/8-in.) stretch mesh liner. The collection basket remained in place for the duration of the sample, unless high impingement or debris loads required that it be emptied, in which case it was removed, emptied, and repositioned.

Plant operational data were obtained for each sampling date to document cooling water flow rates, intake and discharge temperatures, and power production. Meteorological data such as wind speed and direction and air temperature were obtained twice during the impingement sample.

A subsampling routine was devised for occasions when high impingement rates or high debris loads were encountered. The subsampling technique was based on volume, and the total 24-hour catch was estimated using the formula:

$$\text{Estimated No. of fish in Total Sample} = \frac{\text{Volume of Total Sample X No. of Fish in Aliquot}}{\text{Volume of Subsample}}$$

The volume of the total sample was determined by repeatedly filling a volumetrically graduated container, recording the values, and adding them. The total volume was thoroughly mixed by hand or with a shovel and spread out evenly over a flat surface. An aliquot(s) of the total sample was randomly selected and this portion of the sample was removed and measured to determine its volume.

The subsample constituted at least 25 percent by volume of the total sample. The fish in the subsample were then processed according to regular laboratory procedures (Section 2.1.2.).

2.1.2 Laboratory Processing

After the impinged organisms were washed into the collection basket, the basket was removed and emptied. The samples were returned to the laboratory and all organisms were sorted, identified, and enumerated. Identification was made to the lowest possible taxonomic level, which was usually species. For the convenience of the reader, common names are used in the text; however, a list of common and their associated scientific names are included in Appendix D. For each taxa collected, total number and total weight were determined. In addition, individual lengths and individual weights were recorded for a maximum

TABLE 2-1 IMPINGEMENT SAMPLING REGIME ASSOCIATED WITH ENVIRONMENTAL TECHNICAL SPECIFICATIONS FOR NINE MILE POINT UNIT 1 AND JAMES A. FITZPATRICK, 1983

	No. of Sampling Days per Month[a]	
	Nine Mile Point	James A. FitzPatrick
January	4	4
February	4	4
March	4	4
April	16	16
May	20	20
June	4	6
July	4	4
August	6	4
September	4	4
October	4	4
November	4	4
December	4	4
Total	78	78

(a) Days assigned within each month were selected randomly using random number tables (Rand Corporation 1955).

of 40 specimens per species per impingement sample. In July, the standard operating procedure was revised to comply with the SPDES permit requirements, since the NRC Environmental Technical Specifications were amended to delete non-radiological monitoring. Specimens (to a maximum of 25 individuals) of the following species were analyzed for length and weight: white perch, alewife, and rainbow smelt. All specimens collected of smallmouth bass, yellow perch, and each species of salmonid were analyzed. Any other species present in the collections were enumerated and weighed to obtain a total count and total weight for each taxa.

Total lengths were measured to the nearest millimeter; weights were measured to the nearest 0.1 gram for specimens less than 10 grams, to the nearest 1.0 gram for specimens between 10 and 2,000 grams, and to the nearest 25 grams for specimens over 2,000 grams based on the precision of the scales used for measurement. Any unusual conditions, abnormalities, or presence of fish tags were noted on the data sheets.

2.1.3 Data Analysis

Data were tabulated to present impingement rates (number and weight) for each species as well as all species combined. Total estimated impingement for each month was calculated using the formula:

$$D = \frac{c}{v} (x)$$

where

D = total estimated impingement
c = the number of fish collected during the sampling period
v = the volume of cooling water used during the sampling period
x = the total monthly volume of cooling water used.

The annual impingement estimate was then calculated by adding the 12 monthly impingement estimates.

2.2 WATER QUALITY DETERMINATIONS

2.2.1 Impingement Sampling

At the onset and completion of each impingement sample, intake and discharge temperatures ($\pm$0.5 C) were determined with a bucket of water retrieved from both locations.

3. RESULTS

3.1 IN-PLANT STUDIES

Nine Mile Point Unit 1 and James A. FitzPatrick power plants have once-through cooling systems with intake and discharge structures located nearby in Lake Ontario. Aquatic organisms, detritus, and other debris enter with the water pumped from the vicinity of the submerged intake pipes. These organisms, detritus, and debris are impinged on trash racks, which are used for screening out large items, and the traveling screens are used for screening out smaller materials. The traveling screens are backwashed to remove any accumulation of organisms, detritus, and debris into a sluiceway which empties into an impingement collection basket. Studies of fish impingement began in the spring of 1972 at Nine Mile Point Unit 1 and in 1975 at James A. FitzPatrick. The fish impinged at both plants have been monitored yearly in order to estimate abundance and biomass losses for each species.

The objectives of the 1983 impingement sampling program were to estimate annual fish losses, to determine species composition of impinged fish, and to describe seasonal patterns of fish impingement. In addition, plant operating conditions (Table 3-1 and Appendix Tables A-1 and A-2) were logged during 1983. The results obtained during the 1983 impingement sampling program follow.

3.1.1 Nine Mile Point Nuclear Station Unit 1

3.1.1.1 Species Composition and Estimated Impingement

Impingement sampling at Nine Mile Point Unit 1 during 1983 resulted in the collection of 32 taxa. Twenty-nine fish species or other taxa, one amphibian (tadpoles), and two invertebrate species (crayfish and clam) were identified. Alewife was the most numerous species comprising 87 percent of the total catch. Alewife, together with rainbow smelt and the sculpin family (*Cottus* sp.), accounted for 97 percent of all the taxa collected (Table 3-2). No single species was caught in all 12 months. Alewife, rainbow smelt, and sculpins were all caught in eleven months of 1983 (Table A-3).

Impingement rates at Nine Mile Point were highest (number per 1,000 m^3 of water pumped) in March, April, and June (Figure 3-1). During January and part of February few fish were impinged as the outage continued from 1982 and a reduced water volume was pumped. The high catch per volume of water (1,343,524 m^3) occurred during early spring. Collections of alewife and rainbow smelt occurred in the spring months and then decreased as the fish finished spawning and moved offshore. Increased impingement rates in the late summer and fall ocurred as young-of-the-year fish were impinged. The December peak is evidence of an influx of gizzard shad into the impingement collections.

Ninety-six percent of the total biomass collected at Nine Mile Point Unit 1 during 1983 was comprised of alewife, gizzard shad, and rainbow smelt (Table 3-3). Gizzard shad dominated the biomass during November and December. Alewife and rainbow smelt dominated the biomass collected in the spring (April, May, June) months (Table A-4). The total number of aquatic organisms impinged at Nine Mile Point Unit 1 during 1983 was estimated to be approximately 140,921

TABLE 3-1 RECORD OF OUTAGES AT NINE MILE POINT UNIT 1 AND JAMES A. FITZPATRICK POWER PLANTS DURING 1983

Nine Mile Point Unit 1		James A. FitzPatrick	
Outage Start Date	Outage Duration (Days)	Outage Start Date	Outage Duration (Days
1 JAN*	155	10 JAN	5
28 JUL	3	18 JAN	6
		4 JUN	91

* Plant shutdown started 20 March 1982 and continued to 4 June 1983.

TABLE 3-2 NUMERICAL ABUNDANCE AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT NINE MILE POINT UNIT 1, 1983

Species Name	Number Collected	Percent Composition
Alewife	42,910	87.0
Rainbow smelt	3,999	8.1
Sculpin family	763	1.5
White perch	348	0.7
Tessellated darter	264	0.5
Gizzard shad	236	0.5
Trout perch	219	0.4
Spottail shiner	192	0.4
Crayfish	120	0.2
Threespine stickleback	54	0.1
Yellow perch	43	0.1
Smallmouth bass	32	0.1
Rock bass	25	0.1
Stonecat	23	<0.1
American eel	20	<0.1
White sucker	10	<0.1
Chinook salmon	8	<0.1
Clam	6	<0.1
Emerald shiner	3	<0.1
White bass	3	<0.1
Bluegill	3	<0.1
Unidentified fish (damaged)	3	<0.1
Blacknose dace	2	<0.1
Longnose dace	2	<0.1
Burbot	2	<0.1
Pumpkinseed	2	<0.1
Tadpoles	2	<0.1
Rainbow trout	1	<0.1
Northern pike	1	<0.1
Shiner family	1	<0.1
Bluntnose minnow	1	<0.1
Brown bullhead	1	<0.1
Black crappie	1	<0.1
Total	49,300	100.0

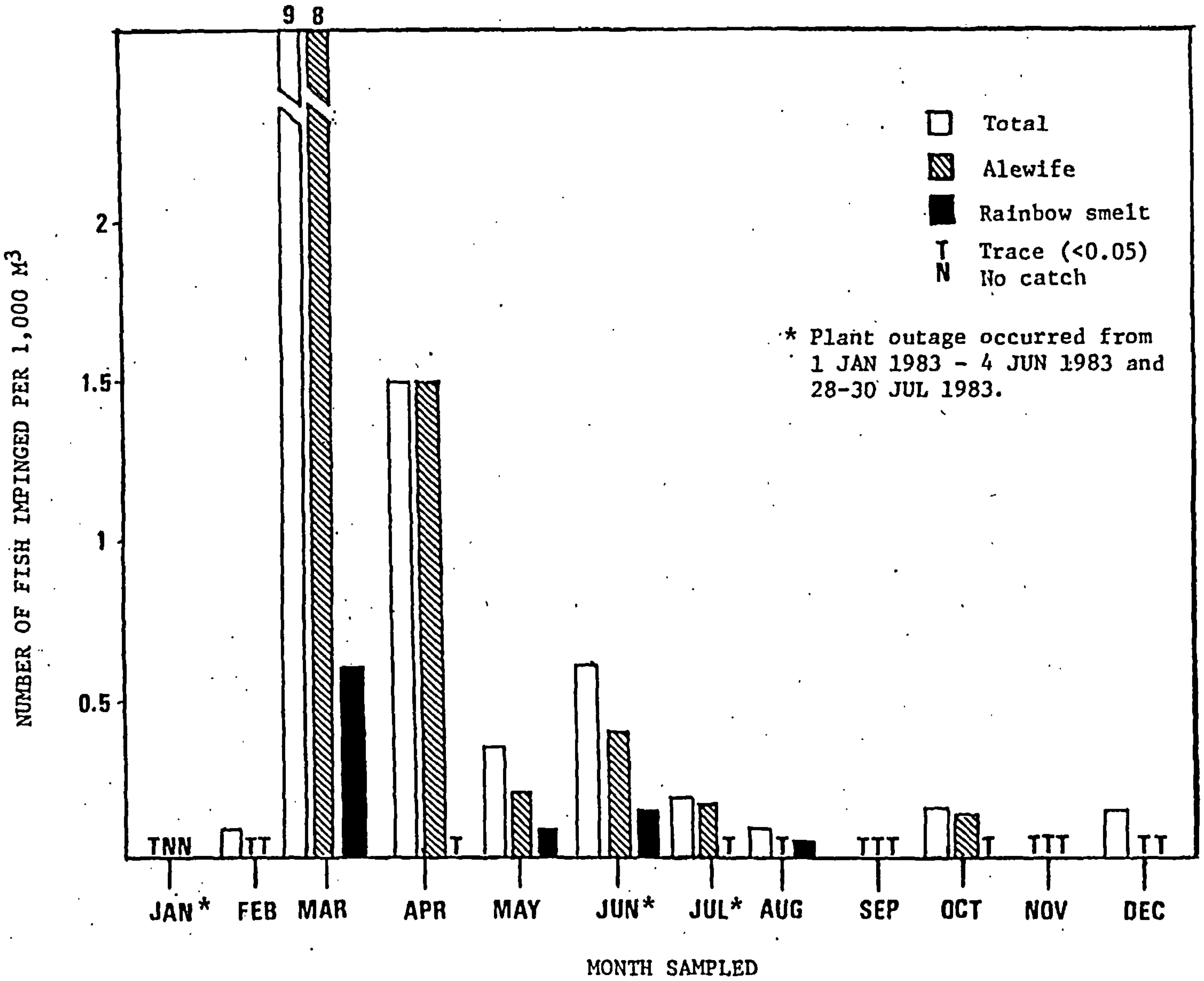

Figure 3-1. Seasonal variations in impingement rates at Nine Mile Point Unit 1, 1983.

TABLE 3-3 BIOMASS (G) AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT NINE MILE POINT UNIT 1, 1983

Species Name	Weight Collected	Percent Composition
Alewife	1,193,085	90.6
Gizzard shad	46,813	3.6
Rainbow smelt	24,861	1.9
White perch	12,644	1.0
White sucker	7,945	0.6
American eel	5,950	0.4
Yellow perch	5,346	0.4
Rock bass	3,740	0.3
Sculpin family	2,746	0.2
Trout perch	2,428	0.2
Burbot	1,947	0.1
Smallmouth bass	1,861	0.1
Spottail shiner	1,761	0.1
Rainbow trout	1,624	0.1
Stonecat	1,516	0.1
Tessellated darter	568	<0.1
Crayfish	493	<0.1
Brown bullhead	327	<0.1
Chinook salmon	184	<0.1
Northern pike	131	<0.1
Pumpkinseed	108	<0.1
White bass	97	<0.1
Bluegill	77	<0.1
Threespine stickleback	67	<0.1
Unidentified fish (damaged)	47	<0.1
Clam	21	<0.1
Longnose dace	13	<0.1
Emerald shiner	13	<0.1
Tadpoles	9	<0.1
Black crappie	7	<0.1
Blacknose dace	5	<0.1
Bluntnose minnow	2	<0.1
Shiner family	1	<0.1
Total	1,316,437	100.0

individuals (Table A-5). Alewife abundance was estimated at 113,526 which is 81 percent of the total. Total weight was estimated to be 3,450 kilograms with alewife estimated at 2,765 kilograms which was 80 percent of the total biomass.

3.1.1.2 Temporal and Length Distributions

During January and a portion of February, the main circulating water pumps were shut down at Nine Mile Point. Few fish were impinged during that time. April was the month of peak impingement in 1983 at Nine Mile Point Unit 1. Alewife dominated the spring impingement collections, comprising 90 percent of the total catch during those months. Rainbow smelt ranked second in abundance during April, May, and June, accounting for 6.8 percent of the total catch for those months. Sculpins ranked third in abundance comprising 1.4 percent of the catch during the same time period.

Rainbow smelt dominated the catch in August and September, comprising 77 percent of the total catch in September. Fall collections were again dominated by alewife except in December when a large collection of gizzard shad dominated the catch.

Length frequency distributions are given for six representative important species (RIS): alewife, rainbow smelt, spottail shiner, smallmouth bass, white perch, and yellow perch (Table A-6). Alewife collected in the spring and summer at Nine Mile Point Unit 1 were subadult to adult fish; young-of-the-year alewife were collected in the late summer (August and September) and fall (October and November). In August and September, 51 and 84 percent, respectively, of all alewife collected were young of the year. Collections of young-of-the-year alewife peaked in October with 94 percent of the total alewife catch.

Adult and subadult rainbow smelt were collected in April, May, and June. Young-of-the-year smelt were found in collections made in late summer (August) and fall (September, October, and November). Of the rainbow smelt collected in August, 94 percent were young of the year. This percentage increased in September to 98 percent and then decreased through October (96 percent) and November when 95 percent of all the rainbow smelt impinged were young of the year.

White perch were found in the impingement samples at Nine Mile Point Unit 1 in 9 of the 12 collection months. Their peak occurrence was in December, primarily as young of the year and subadults. Young-of-the-year white perch were also found in the collections in April and May. Most yellow perch collected were adults or subadults in age. Yellow perch were not collected in large numbers, rather they were collected as individuals or in small numbers in 10 months of 1983. Spottail shiners were collected in May, June, and July in the highest numbers. Smallmouth bass were collected in small numbers throughout the year. Young-of-the-year smallmouth bass were found in the impingement in the spring and summer.

3.1.2 James A. FitzPatrick Nuclear Power Plant

3.1.2.1 Species Composition and Estimated Impingement

Impingement sampling at James A. FitzPatrick during 1983 resulted in the collection of 39 taxa; 37 fish species or genera were identified. Two of the taxa collected were non-fish species: a mollusk and a crustacean. Alewife and rainbow smelt comprised approximately 90 percent of the total impingement catch (Table 3-4). Rainbow smelt were caught in each month sampled; alewives in 11 of the months sampled; as were sculpin, spottail shiner, and yellow perch. Rock bass and smallmouth bass were collected in 10 months of 1983 (Table A-7). Alewife comprised 70.7 percent of the total fish biomass collected in 1983 (Table 3-5). Rainbow smelt and gizzard shad comprised 14.9 percent of the total biomass. Alewife dominated biomass collections in the spring months. Gizzard shad dominated the biomass only in the months of November and December (Table A-8). White perch accounted for 1 percent of the total biomass collected at James A. FitzPatrick.

The total number of aquatic organisms impinged at James A. FitzPatrick during 1983 was estimated to be 116,005 (Table A-9). Alewife were estimated at 61,406 or 52.9 percent of the total. The rainbow smelt population impinged in 1983 was estimated at 36,254 (31.2 percent of the total). Total weight was estimated to be 2,590 kilograms and alewife were estimated at 1,295 kilograms or 50 percent of the total biomass.

3.1.2.2 Temporal and Length Distributions

Periods of peak estimated impingement at James A. FitzPatrick in 1983 occurred during the spring (May) and in September and December (Figure 3-2). In April and May, alewife and rainbow smelt contributed to the large impingement. These were primarily subadults and adults. June, July, and August were months of low impingement while the plant was shut down and little water was pumped. In September, the peak impingement was due to large collections of young-of-the-year rainbow smelt and alewife. Of the total alewife catch in September at James A. FitzPatrick, 87 percent were young of the year. In the same month, 99 percent of the rainbow smelt collected were also young of the year. High percentages of young-of-the-year smelt and alewife in the impingement collections were also found in August (88 percent rainbow smelt and 52 percent alewife) and October (91 percent rainbow smelt and 85 percent alewife). The high impingement estimate for December was influenced by an influx of gizzard shad, white perch (young of the year), threespine sticklebacks, alewife, and smelt. Overall, rainbow smelt dominated the winter collections (58 percent of the total monthly collections for the winter).

Alewife and rainbow smelt co-dominated during all of the spring with alewife the dominant species in April and May (72 percent of total catch in April and May). Trout perch were collected in large numbers only in May (98 percent of all trout perch collected were collected in May). Impingement collections declined in the summer months but continued to be dominated by the alewife and rainbow smelt. In the fall, impingement collections increased and was primarily due to an influx of young-of-the-year alewife and smelt. Gizzard shad increased in the collections (360 were collected in 1983 as opposed to 265 in 1982).

TABLE 3-4 NUMERICAL ABUNDANCE AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT JAMES A. FITZPATRICK, 1983

Species Name	Number Collected	Composition
Alewife	29,998	65.6
Rainbow smelt	11,320	24.8
Trout perch	1,083	2.4
White perch	936	2.0
Spottail shiner	412	0.9
Sculpin family	399	0.9
Threespine stickleback	379	0.8
Gizzard shad	360	0.8
Tessellated darter	268	0.6
Crayfish	139	0.3
Rock bass	116	0.3
Yellow perch	96	0.2
Smallmouth bass	52	0.1
Pumpkinseed	34	0.1
Stonecat	25	0.1
Brown trout	14	<0.1
White sucker	14	<0.1
Bluegill	13	<0.1
Emerald shiner	11	<0.1
White bass	11	<0.1
Clam	11	<0.1
Lake trout	8	<0.1
American eel	5	<0.1
Cisco	3	<0.1
Central mudminnow	2	<0.1
Brown bullhead	2	<0.1
Coho salmon	1	<0.1
Chinook salmon	1	<0.1
Rainbow trout	1	<0.1
Chain pickerel	1	<0.1
Golden shiner	1	<0.1
Lake chub	1	<0.1
White catfish	1	<0.1
Black bullhead	1	<0.1
Yellow bullhead	1	<0.1
Burbot	1	<0.1
Sunfish family	1	<0.1
Black crappie	1	<0.1
Northern pike	1	<0.1
Total	45,724	100.0

TABLE 3-5 BIOMASS (G) AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT JAMES A. FITZPATRICK, 1983

Species Name	Weight Collected	Percent Composition
Alewife	680,047	70.7
Rainbow smelt	74,170	7.7
Gizzard shad	69,201	7.2
Brown trout	25,973	2.7
Rock bass	22,553	2.3
Smallmouth bass	14,032	1.5
Trout perch	13,282	1.4
White sucker	11,375	1.2
White perch	11,181	1.2
Yellow perch	9,517	1.0
Spottail shiner	5,577	0.6
White catfish	4,400	0.5
American eel	4,058	0.4
Cisco	2,576	0.3
Rainbow trout	2,075	0.2
Burbot	2,000	0.2
Stonecat	1,893	0.2
Walleye	1,252	0.1
Sculpin family	1,235	0.1
Pumpkinseed	989	0.1
White bass	908	0.1
Tessellated darter	673	0.1
Crayfish	622	0.1
Threespine stickleback	515	0.1
Yellow bullhead	364	<0.1
Black bullhead	249	<0.1
Lake trout	148	<0.1
Northern pike	112	<0.1
Bluegill	73	<0.1
Coho salmon	47	<0.1
Emerald shiner	33	<0.1
Brown bullhead	30	<0.1
Lake chub	27	<0.1
Central mudminnow	25	<0.1
Clam	5	<0.1
Chinook salmon	4	<0.1
Sunfish family	3	<0.1
Golden shiner	2	<0.1
Black crappie	2	<0.1
Total	961,228	100.0

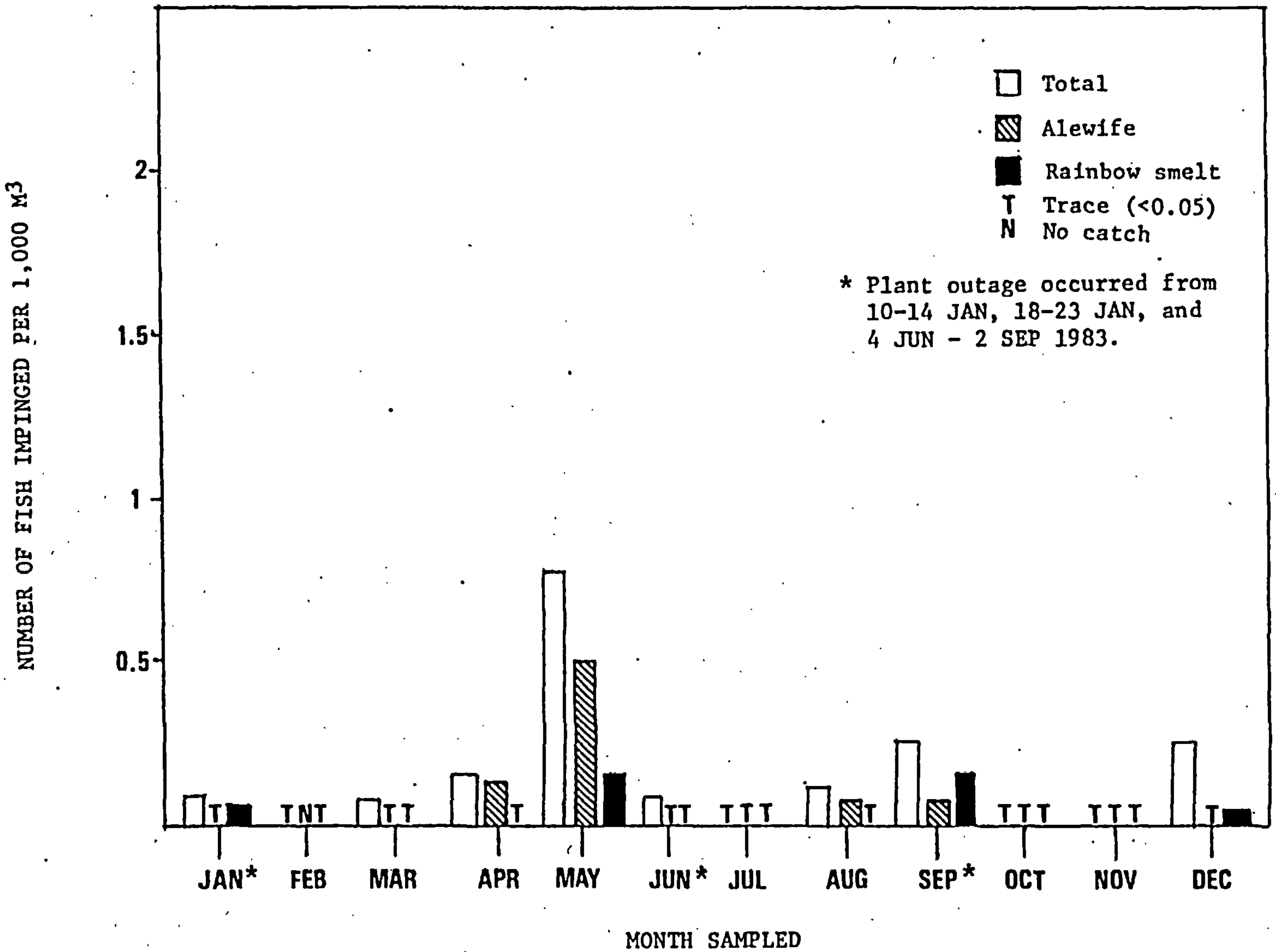

Figure 3-2. Seasonal variations in impingement rates at James A. FitzPatrick, 1983.

Length frequency distributions are given for the six representative important species (RIS): alewife, rainbow smelt, spottail shiner, smallmouth bass, white perch, and yellow perch (Table A-10). Adults were the principal age group of alewife collected in 11 of the 12 sampling months. In August, September, and October, young-of-the-year alewife comprised the majority of alewife collected. Young-of-the-year alewife were also caught in March, April, and May. In contrast to the alewife, the young-of-the-year age group dominated collections of impinged rainbow smelt throughout most of the year (9 of 12 months). Adults dominated the rainbow smelt catch in March, April, and December. The majority of white perch collected in the spring were young of the year. No white perch of any age group were collected during the summer or early fall. One sample in December contained a large number of young-of-the-year white perch (568). Adult yellow perch were collected during eleven months of the year with an increased occurrence in May and December. Few (<15) young-of-the-year yellow perch were collected during 1983.

Spottail shiners were collected during 11 months of 1983 with the majority of adults collected in May and June. Most of these were adults. A few subadults were collected in the winter months. Young-of-the-year spottail shiners were collected in the fall. Adult smallmouth bass were collected throughout most of the year, though their numbers were higher in May and June. Young-of-the-year smallmouth bass were collected in April, May, and December.

3.1.3 Water Quality

Intake and discharge daily average temperatures were measured at the beginning and end of each impingement sample. Intake temperatures were taken from the plant operational log and were also measured in the intake canal (in front of the trash bars) by EA personnel. Discharge temperatures were measured in the discharge canal by EA personnel.

Intake temperatures recorded by EA at Nine Mile Point Unit 1 ranged from a minimum of 0.0 C on 25 December to a maximum of 24.6 C on 9 August. Discharge temperatures (when the plant was operating near generating capacity during June through December) on sampling days varied from a low of 6.9 C on 7 December to a high of 41.1 C on 9 August (Table A-1).

At James A. FitzPatrick, intake temperatures measured by EA on sampling days reached a minimum of 0.3 C on 19 January and a maximum of 23.9 C on 5 September. Discharge temperatures during plant operation January - May and August - December were lowest on 6 March and highest on 21 September. The lowest discharge temperature was 19.3 C and the highest 37.8 C (Table A-2). Minimum and maximum temperatures corresponded with normal seasonal cycles in lake temperatures.

4. ENVIRONMENTAL IMPACT ASSESSMENT

4.1 INTRODUCTION

The 1983 report is submitted to fulfill requirements of Niagara Mohawk Power Corporation and the New York Power Authority as amended by the U.S. Nuclear Regulatory Commission in the Spring of 1979 to assess any environmental impact. If total monthly impingement catches deviate from the daily ranges as specified in Section 3.1.2 of the Nine Mile Point Unit 1 Environmental Technical Specifications (Table 4-1) or exceed the monthly maximum limit by greater than 50 percent as specified in Section 4.1.1-B of the James A. FitzPatrick Enviromental Technical Specifications (Table 4-2), a discussion of events is to be included in the annual report. The results of impingement studies as detailed in Chapter 3 are discussed here with respect to the effects of plant operation on the fish community.

The Nine Mile Point Unit 1 Environmental Technical Specifications were revised on 11 March 1983 as a result of Amendment 51 issued by the Nuclear Regulatory Commission. This amendment effectively deleted all non-radiological related monitoring requirements which included fish impingement. The non-radiological monitoring, in regards to impingement sampling, was instituted as a function of the New York State Department of Environmental Conservation. The requirement for impingement sampling is contained in the station's SPDES Permit. The James A. FitzPatrick Nuclear Power Plant Environmental Technical Specifications were also revised as a result of Amendment 73, dated 11 March 1983. This amendment deleted all non-radiological monitoring. Impingement sampling would become a requirement of the plant's SPDES Permit at some point in the future. In the meantime, impingement sampling was continued using the guidance of the Nine Mile Point Unit 1 SPDES Permit.

4.2 IMPINGEMENT COLLECTIONS AT NINE MILE POINT NUCLEAR STATION UNIT 1 AND JAMES A. FITZPATRICK NUCLEAR POWER PLANT, 1983

Periodic collections of impinged fish have been conducted at Nine Mile Point Unit 1 since 1972 and at James A. FitzPatrick since 1975. The species composition of impingement collections in 1983 was similar to that observed during the past years' (1972-1982) impingement catches. Between 26 and 48 taxa have been caught at Nine Mile Point Unit 1 in the past years. The lowest diversity of fish species was 26 taxa reported in 1982 and may be attributable to the fact that the main circulating water pumps were shut down for most of the year during repairs at the plant. Repairs continued in 1983 and the circulating pumps remained shut down into February. Twenty-eight fish taxa were collected at Nine Mile Point in 1983--only slightly higher in diversity from 1982 and attributable to the continued shut down.

At James A. FitzPatrick, impingement studies have yielded between 43 and 54 fish species per year. The 1983 study resulted in the collection of 36 fish taxa; lower than in previous years. This may be attributed in part to the fact that the plant was shut down during June, July, and August. During the course of the shut down, the operation of the main circulating water pumps was generally reduced to one or two of the three existing pumps.

TABLE 4-1 COMPARISON OF SPECIFIED MONTHLY IMPINGEMENT RANGES AND ACTUAL SAMPLING RESULTS OF NINE MILE POINT UNIT 1, 1983

Month	Daily Average Low*	Number of Fish High*	Actual Daily Average
JAN	231	631	1 fish/day
FEB	211	718	33.50
MAR	482	2,864	350.5
APR**	5,552	20,923	2,123
MAY	8,501	50,759	325
JUN	1,366	3,213	857
JUL	718	2,648	280
AUG	0	5,020	131
SEP	0	1,397	53
OCT	154	338	219
NOV	103	1,565	33
DEC	294	1,713	203

* From Table 3.1-4, Section 3.1.2 of the Nine Mile Point Nuclear Station Unit 1 Environmental Technical Specifications.

** The requirement of daily average number of fish was deleted April 1983 as a result of Amendment 51 to the Environmental Technical Specifications dated 11 March 1983. In order to be consistent, this table shows the daily average number of fish for the remainder of the year.

TABLE 4-2 COMPARISON OF SPECIFIED MONTHLY MAXIMUM IMPINGEMENT ALLOWANCES AND ESTIMATED MONTHLY IMPINGEMENT FOR 1983 AT JAMES A. FITZPATRICK

Month	Monthly Maximum*	+50 Percent*	Total Estimated Impinged
JAN	41,596	62,394	4,775
FEB	16,646	24,969	1,404
MAR	22,595	33,893	3,945
APR**	413,854	620,781	9,813
MAY	1,750,162	2,625,243	51,497
JUN	131,769	197,654	2,739
JUL	67,249	100,874	816
AUG	33,708	50,562	4,907
SEP	31,570	47,355	15,034
OCT	32,428	48,642	2,707
NOV	87,928	131,892	1,217
DEC	30,837	46,256	16,292

* From Table 4.1.1-2, Section 4.1.1-B of the James A. FitzPatrick Nuclear Power Plant Environmental Technical Specifications. The reportable monthly maximum estimated impingement is limit specified plus 50 percent.

** The requirement of specified monthly maximum plus 50 percent was deleted April 1983 as a result of Amendment 73 of the Environmental Technical Specifications dated 11 March 1983. In order to be consistent, this table shows the monthly maximum plus 50 percent for the remainder of the year.

Impingement catches have generally been dominated by alewife. However, there are two exceptions: in 1978 threespine stickleback was the dominant species and in 1979 rainbow smelt was the dominant species. Rainbow smelt has been second in abundance during most years except in 1976 when threespine stickleback was second in abundance and in 1979 when rainbow smelt was dominant.

In 1983, alewife dominated impingement collections at both Nine Mile Point Unit 1 and James A. FitzPatrick power plants constituting over 87 and 65 percent of the total catch, respectively. Rainbow smelt was second in abundance at both plants: 8.1 percent of the catch at Nine Mile Point Unit 1 and 24.8 percent at James A. FitzPatrick. Sculpins were third in abundance at Nine Mile Point Unit 1 with 1.5 percent of the total catch, and trout perch was the third most abundant species at James A. FitzPatrick with 2.4 percent of the total catch. White perch were fourth in abundance at both plants. Threespine stickleback was low in abundance at both plants in 1983.

In terms of biomass, alewife has been the dominant species during most years of the impingement study. Gizzard shad dominated the biomass collection in 1978 because of an abundance of large individuals. Rainbow smelt has been either second or third in abundance. In 1983, alewife was the dominant species, in terms of biomass, at both plants. Rainbow smelt was second by weight at James A. FitzPatrick and third in biomass at Nine Mile Point Unit 1. Gizzard shad was second in weight at Nine Mile Point Unit 1 and third in biomass at James A. FitzPatrick.

Estimated annual impingement at both power plants has been highly variable over the years. Estimated annual impingement at Nine Mile Point Unit 1 from 1974 to 1982 ranged from a low of 89,526 fish in 1982 to a high of 3.4 million fish in 1976. James A. FitzPatrick annual estimated impingement ranged from 244,000 fish in 1979 to a high of 4.3 million fish in 1976. Impingement estimates for 1983 at Nine Mile Point Unit 1 were slightly higher (140,921) compared to estimates for 1982. Impingement estimates for 1983 at James A. FitzPatrick were less than the previous lower annual estimated impingement rate of 244,000 fish (1979). This represented a reduction of 127,995 fish or 52 percent. In comparison to the standing stock estimates (O'Gorman and Bergstedt 1983, personal communication) for the two most abundant impinged species, alewife (4-4.5 billion) and rainbow smelt (0.5 billion), the numbers impinged during 1983 at either power plant represented a negligible portion of the fish community of Lake Ontario.

4.3 OCCASIONS WHERE SPECIFIED LIMITS WERE EXCEEDED

In 1983, the average daily catch at Nine Mile Point Unit 1 was lower than the established daily ranges from January to July and in November and December (Table 4-1) Nine Mile Point Unit 1 main circulating water pumps were shut down in January, and part of February, therefore few organisms were impinged. At no time in 1983 were the upper daily ranges exceeded at Nine Mile Point Unit 1.

Established monthly limits at James A. FitzPatrick were not exceeded in 1983 (Table 4-2). Biological factors such as population size, migration patterns, schooling, and spawning behavior in conjunction with environmental factors such as water temperature, currents, heavy waves, and plant operating parameters affect impingement rates. Migrations of large populations of adult alewife and rainbow smelt during the spring and early summer seasons are triggered by responses to certain environmental and biological conditions. As the water temperature of the lake increased, these two species move inshore to spawn. The impingement of adult alewife and rainbow smelt during the spring and early summer has been well documented at the Nine Mile Point plants and elsewhere. Spigarelli et al. (1982) noted similar results at three power plants on Lake Michigan. After spawning the adult fish moved offshore to deeper, cooler waters and were impinged in fewer numbers.

The lower impingement ranges seen at the Nine Mile Point plants may have been influenced by the mild winter and corresponding early warming of the lake. The mean intake temperature at James A. FitzPatrick in May 1982 was 6.5 C, and in 1983 was 9.2 C. In July 1982, the mean intake temperature was 19.4, and in July 1983 was 21.8. The 1983 temperatures may have induced the fish to seek the cooler, deeper offshore waters earlier, reducing their time spent inshore for spawning and the likelihood of their becoming impinged. Brandt et al. (1980) also discussed the possibility that the most abundant fish species in Lake Michigan were positioned at different temperature strata to reduce competition for food resources. Shifts in the thermocline could cause fish to adjust their position in the water column. In addition, schools and aggregates of certain fish species could induce localized increased in population densities of fish in the lake.

The impingement sample collected at Nine Mile Point Unit 1 on 7 April contained over 30 percent of the total collection for that month (1 of 16 samples). James A. FitzPatrick did not experience a large impingement. The majority of fish impinged on that date were alewives (99.8 percent of the catch). A schooling species, alewife can maintain their schools in adverse conditions through the use of lateral line sensors (Burgess and Shaw 1979). Large schools of alewife in shallow water for spawning may move into calmer waters offshore during storms. It is conceivable that a school moving offshore in weather conditions like those on 7 April (10-20 knot winds from the west) could be drawn into the intake canals of the power plants. This could explain the "localized" high impingement at Nine Mile Point Unit 1 on 7 April. O'Gorman and Bergstedt (1983 personal communication) noted that inshore schools and aggregates of fish can disintegrate at night and scatter throughout the water column. Because of the forementioned influences on fish behavior, it is possible that the susceptibility of individual fish or whole schools of fish to impingement could increase or decrease depending on existing conditions.

Previous studies at the Nine Mile Point power plants have indicated that rates of impingement are affected by specific weather conditions such as high winds from the west or northwest. Studies by Ecological Analysts, Inc. in the vicinity of Nine Mile Point Unit 1 have supported these observations. While overall impingement for 1983 at both plants was low, on a few dates during the year impingement collections at the plants increased when westerly winds exceeded 15 knots and associated high waves occurred. For example, on 20 and 29 December 1983, collections at both plants were larger than the other December samples. On these days winds of 15-30 knots in combination with waves of 4-8 feet influenced the sample size. At James A. FitzPatrick, 81 percent of the fish collected in December were collected on those dates, and at Nine Mile Point Unit 1 over 70 percent of the monthly catch was obtained.

4.4 EFFECTS OF POWER PLANT OPERATION AT NINE MILE POINT ON THE FISH COMMUNITY

One of the five Great Lakes, Lake Ontario, is roughly oval in shape, 190 miles long, and 53 miles wide. The lake was formed by extensive glaciation some 10,000 years ago. It has a surface area of 7,340 square miles with an average depth of 250-300 feet (TI 1978). Historically, Lake Ontario was listed as an oligotrophic lake with the principal offshore fish stocks consisting of Coregonus sp., lake trout, and burbot (Christie 1974). Lake Ontario as well as the other Great Lakes have undergone some extensive biological changes. Lamprey invasion, overfishing, and changing water quality have played an important role in the fish species and fish population shifts and changes through the years. Introduction of the alewife in the 1870s and the rainbow smelt in 1912 added additional pressure to the changing natural fish community.

Aquatic collections in the vicinity of Nine Mile Point have been in progress since the 1960s through 1982. During the 1960s and early 1970s, studies on the current flow patterns and aquatic populations were conducted by Dr. J.F. Storr under contract to Niagara Mohawk Power Corporation. From 1973 through early 1977, Lawler, Matusky, and Skelly Engineers (LMS 1975, 1976, 1977) employed gill nets, trawls, seines, and fish traps in their survey of the Nine Mile Point nearfield. Texas Instruments (TI 1978, 1979, 1980) continued sampling with various gears until early 1979 when the sampling program utilizing gill nets at four selected transects was initiated. Ecological Analysts (EA 1981, 1982) conducted this sampling program from 1981 through 1982. In addition, trawls were conducted by the New York State Department of Environmental Conservation (NYSDEC) in the spring of 1977 (Elrod et al. 1978) and by the U.S. Fish and Wildlife Service (FWS) and NYSDEC in 1978, 1979 (Elrod et al. 1979, 1980), and 1980 and 1981 (O'Gorman and Bergstedt 1982, 1983 personal communication).

Data collected from impingement samples suggests that the fish community structure in the Nine Mile Point vicinity during any given year varies seasonally from one of low species diversity during the winter and early spring to one of high species diversity from spring to fall. However, species composition in the vicinity of Nine Mile Point has changed little during the nine years of power plant operation. Oscillations in fish abundance reflect the biology of the species coupled with the interaction among species and variable environmental factors. The occurrence of certain dominant species in the impingement collections generally coincided with spawning behavior (e.g., rainbow smelt and alewife in the spring collections). However, large isolated impingement collections of certain species were often associated with particular meteorological conditions (i.e., high wind and waves) in association with behavioral movements. Increases and decreases in alewife and rainbow smelt populations have been observed throughout Lake Ontario and as localized fluctuations and are well documented in the literature (e.g., Christie 1974; Elrod et al. 1979, 1980; Scott and Crossman 1973).

Christie (1974) using experimental gill nets showed annual oscillations, which could vary ten-fold, in the size of the spawning run of the alewife from 1958 to 1970. Christie (1974) also correlated certain peaks in the gill net data with significant mortalities along the lakeshore. In the vicinity of the Oswego Steam Station in Oswego, New York, Lawler, Matusky and Skelly Engineers (LMS 1975) reported fluctuations in natural concentrations of the alewife population by as much as 800 percent from year to year. LMS (1977) also reported that populations of alewife in the vicinity of Nine Mile Point vary by as much as half an order of magnitude. An important factor in the fluctuations in alewife abundance appears to be periodic large die-offs of the alewife stocks during the spring, possibly due to low temperature shock (Graham 1956, in Colby 1971) reported since their introduction in the Great Lakes. In recent years the greatest numbers were recorded in 1974 and 1976 (LMS 1975, 1977). According to the FWS and NYSDEC (Elrod et al. 1979, 1980), the population of alewife declined because of a die-off during the severe cold winter of 1976-1977. Losses were estimated as high as 60-75 percent of the population in the vicinity of the Nine Mile Point promontory. This population decline was reflected by decreasing catches of alewife in impingement collections from 1975 through 1978 which were not only recorded at Nine Mile Point power plants, but also at Ontario Hydro power stations in Canadian waters (TI 1981). According to the FWS (O'Gorman and Bergstedt 1983, 1984, personal communication), lake-wide populations of alewife increased through 1981 and then decreased slightly during 1982 as a result of a probable die-off during the winter of 1982. Alewife increased in their 1983 catch. The size and condition of alewife stocks after 1981 would most likely be influenced by climatic conditions and possibly by the number of salmonids stocked (Elrod et al. 1982, personal communication).

Rainbow smelt populations have also displayed some oscillations in the Great Lakes from year to year. Introduced in 1912 in Lake Michigan, populations of rainbow smelt became abundant in Lake Ontario in the late 1940s (Christie 1974). This species has also been noted to suffer large population losses possibly as a result of disease (Van Oosten 1947, in Scott and Crossman 1973), as noted in Lake Huron and Lake Michigan in 1942-1946 and in Lake Erie as recently as 1969 (Scott and Crossman 1973). Rupp (1968, in Kirchels and Stanley 1981) showed ten-fold variations in rainbow smelt abundance during the spawning runs in Branch Lake, Maine over an 8-year period. Commercial yield of rainbow smelt (Christie 1974) was noted to decline in Lake Ontario from 1960 through 1970 and then increase after 1970. Studies by NYSDEC and FWS indicated an 11-fold increase in rainbow smelt populations from 1972-1978 (TI 1981).

Yearly oscillations in the lakewide rainbow smelt population were noted by the biologists at the Oswego Fish and Wildlife Station (O'Gorman and Bergstedt 1982, 1983 personal communication) from 1978 to 1982. Generally, the recruitment of smelt is higher during the odd years. However, 1983 data show that the 1982 year class which should have been a low recruitment year was fairly strong but the overall size of the smelt decreased (Bergstedt, 1984 personal communication). Rainbow smelt also are not evenly distributed in Lake Ontario. The FWS estimated that nearly half the rainbow smelt in all U.S waters of Lake Ontario were concentrated around Cape Vincent (TI 1981).

Impingement numbers were low in 1983 and did not reflect the increases in the alewife and rainbow smelt populations seen by FWS. The outages at both plants during 1983 may have obscured fish abundance data in part through reduced impingement as a result of reduced circulating water flow and therefore did not reveal any significant changes in the fish community.

All of the above data indicates that no long-term trends toward reductions in the major fish population in the vicinity of Nine Mile Point have been apparent. The observed fluctuations in population size have occurred over a range within the ability of those populations to maintain themselves. The maintenance of these populations will most likely be affected by natural environmental factors (e.g., temperature, disease) and man-induced changes in the trophic structure (e.g., salmonid stocking programs).

Thus, it appears that changes in relative abundance of fish populations in the vicinity of Nine Mile Point are the result of fluctuations in natural mortality and variation in both localized and lakewide spawning success of various species which compose the local fish community. Such oscillations in population size of various species should not be confused with community instability in an ecological sense. Stability has numerous definitions and connotations with respect to ecosystems but very generally refers to the ability of a system to remain relatively similar to itself in the presence of perturbation (Levin 1975). That is, stability is some measure of the response of a system and its ability to oscillate about and return to some "equilibrium state." Therefore, a certain level of fluctuation in population size among various species in a community is inherent in the concept of stability as an ecosystem responds to changes or extremes in natural and anthropogenic factors in the biotic and abiotic environment.

4.5 SUMMARY

Impingement of fish at Nine Mile Point Unit 1 and James A. FitzPatrick power plants appears to have little effect on the fish community structure or fish population size in the vicinity of Nine Mile Point or on the entire Lake Ontario aquatic ecosystem as determined by comparison of 1983 impingement numbers with standing stock estimates. Impingement of fish at the power plants tends to affect the populations in the manner of a stationary predator, as discussed by Voigtlander (1980); fish populations can generally adapt to the predator.

Species composition in the vicinity of Nine Mile Point has shown little variation from year to year. Natural biological factors such as habitat and temperature preference, schooling, and migration behavior play an important role in seasonal variations in species occurrence or absence. Oscillations in fish abundance reflect the biology of species coupled with interactions among species and variable environmental factors. While certain fish species around Nine Mile Point, such as alewife and rainbow smelt, exhibit wide fluctuations in population size, other species, such as white sucker, remain fairly static.

In conclusion, no alterations to the existing fish community or population levels occurred as a result of power plant operation in the Nine Mile Point area during 1983 based on the impingement study. No incidents of cold shock to fish due to shutdowns at either plant were reported or observed in impingement collections during 1983.

No rare, endangered, or threatened fish species were collected in the Nine Mile Point area during 1983. No Corbicula sp. mollusks were found in the 1983 impingement collections at Nine Mile Point Unit 1 or James A. FitzPatrick power plants. Finally, no unusual or high occurrence of diseases, parasites, or other abnormalities were noted on the fish collected in the Nine Mile Point vicinity during 1983.

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APPENDIX A

IMPINGEMENT TABLES

TABLE A-1 PLANT OPERATING CONDITIONS AT NINE MILE POINT UNIT 1 NUCLEAR STATION DURING 1983

STATION: Nine Mile Point MONTH: January 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	0	1	35,972.6	0	NA1	NA1
2	0	1	35,972.6	0	NA	NA
3	0	1	35,972.6	0	NA	NA
4	0	1	51,778.8	0	NA	NA
5	0	1	51,778.8	0	NA	NA
6	0	1	51,778.8	0	NA	NA
7	0	1	51,778.8	0	NA	NA
8	0	1	51,778.8	0	NA	NA
9	0	1	51,778.8	0	NA	NA
10	0	1	51,778.8	0	NA	NA
11	0	1	51,778.8	0	NA	NA
12	0	1	51,778.8	0	NA	NA
13	0	1	51,778.8	0	NA	NA
14	0	1	51,778.8	0	NA	NA
15	0	1	51,778.8	0	NA	NA
16	0	1	51,778.8	0	NA	NA
17	0	1	51,778.8	0	NA	NA
18	0	1	51,778.8	0	NA	NA
19	0	1	51,778.8	0	NA	NA
20	0	1	51,778.8	0	NA	NA
21	0	1	51,778.8	0	NA	NA
22	0	1	51,778.8	0	NA	NA
23	0	1	51,778.8	0	NA	NA
24	0	1	61,044.5	0	NA	NA
25	0	1	61,044.5	0	NA	NA
26	0	1	61,044.5	0	NA	NA
27	0	1	61,044.5	0	NA	NA
28	0	1	61,044.5	0	NA	NA
29	0	1	61,044.5	0	NA	NA
30	0	1	61,044.5	0	NA	NA
31	0	1	61,044.5	0	NA	NA

STATION: Nine Mile Point MONTH: February 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	0	1	30,522.2	0	NA	NA
2	0	1	30,522.2	0	NA	NA
3	0	1	30,522.2	0	NA	NA
4	0	1	27,252.0	0	NA	NA
5	0	1	27,252.0	0	NA	NA
6	0	1	27,252.0	0	NA	NA
7	0	1	27,252.0	0	NA	NA
8	0/2	1	305,222.4	0	NA	NA
9	2	1	708,552.0	0	NA	NA
10	2	1	712,912.3	0	NA	NA
11	2	1	709,097.0	0	NA	NA
12	2	1	711,822.2	0	NA	NA
13	2	1	711,822.2	0	NA	NA
14	2	1	711,822.2	0	NA	NA
15	2	1	711,822.2	0	NA	NA
16	2/0	1	413,685.4	0	NA	NA
17	0	1	33,792.5	0	NA	NA
18	0	1	33,792.5	0	NA	NA
19	0	1	33,792.5	0	NA	NA
20	0/2	1	179,863.2	0	NA	NA
21	2	1	715,092.5	0	NA	NA
22	2	1	715,092.5	0	NA	NA
23	2	1	715,092.5	0	NA	NA
24	2	1	715,092.5	0	NA	NA
25	2	1	709,097.0	0	NA	NA
26	2	1	709,097.0	0	NA	NA
27	2	1	709,097.0	0	NA	NA
28	2	1	709,097.0	0	NA	NA

TABLE A-1 (Cont.)

STATION: Nine Mile Point MONTH: March 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2/0	1	27,797.0	0	NA	NA
2	0	1	27,797.0	0	NA	NA
3	0	1	27,797.0	0	NA	NA
4	0	1	27,797.0	0	NA	NA
5	0	1	27,797.0	0	NA	NA
6	0	1	27,797.0	0	NA	NA
7	0	1	27,797.0	0	NA	NA
8	0	1	27,797.0	0	NA	NA
9	0	1	27,797.0	0	NA	NA
10	0	1	11,990.9	0	NA	NA
11	0	1	28,342.1	0	NA	NA
12	0	1	57,229.2	0	NA	NA
13	0	1	57,229.2	0	NA	NA
14	0	1	57,229.2	0	NA	NA
15	0	1	57,229.2	0	NA	NA
16	0	1	57,229.2	0	NA	NA
17	0	1	57,229.2	0	NA	NA
18	0	1	57,229.2	0	NA	NA
19	0	1	57,229.2	0	NA	NA
20	0	1	57,229.2	0	NA	NA
21	0	1	57,229.2	0	NA	NA
22	0	1	57,229.2	0	NA	NA
23	0	1	57,229.2	0	NA	NA
24	0	1	57,229.2	0	NA	NA
25	0	1	44,148.2	0	NA	NA
26	0	1	44,148.2	0	NA	NA
27	0	1	44,148.2	0	NA	NA
28	0	1	44,148.2	0	NA	NA
29	0	1	44,148.2	0	NA	NA
30	0	1	44,148.2	0	NA	NA
31	0	1	44,148.2	0	NA	NA

STATION: Nine Mile Point MONTH: April 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	0/2	1	1,419,829.2	0	NA	NA
2	2	1	1,419,829.2	0	NA	NA
3	2	1	1,419,829.2	0	NA	NA
4	2	1	1,419,829.2	0	NA	NA
5	2	1	1,419,829.2	0	NA	NA
6	2	1	1,419,829.2	0	NA	NA
7	2	1	1,419,829.2	0	NA	NA
8	2	1	1,419,829.2	0	NA	NA
9	2	1	1,419,829.2	0	NA	NA
10	2	1	1,419,829.2	0	NA	NA
11	2	1	1,419,829.2	0	NA	NA
12	2	1	1,419,829.2	0	NA	NA
13	2	1	1,419,829.2	0	NA	NA
14	2	1	1,419,829.2	0	NA	NA
15	2	1	1,419,829.2	0	NA	NA
16	2	1	1,422,009.4	0	NA	NA
17	2	1	1,422,009.4	0	NA	NA
18	2	1	1,422,009.4	0	NA	NA
19	2	1	1,404,023.0	0	NA	NA
20	2	1	1,404,023.0	0	NA	NA
21	2	1	1,409,473.4	0	NA	NA
22	2	1	1,409,473.4	0	NA	NA
23	2	1	1,409,473.4	0	NA	NA
24	2	1	1,409,473.4	0	NA	NA
25	2	1	1,409,473.4	0	NA	NA
26	2	1	1,409,473.4	0	NA	NA
27	2	1	1,409,473.4	0	NA	NA
28	2/1	1	1,376,771.0	0	NA	NA
29	1/2	1	898,225.9	0	NA	NA
30	2/0	1	472,549.7	0	NA	NA

TABLE A-1 (Cont.)

STATION: Nine Mile Point MONTH: May 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	0	1	46,873.4	0	NA	NA
2	0	1	46,873.4	0	NA	NA
3	0	1	46,873.4	0	NA	NA
4	0	1	46,873.4	0	NA	NA
5	0	1	46,873.4	0	NA	NA
6	0	1	46,873.4	0	NA	NA
7	0	1	46,873.4	0	NA	NA
8	0	1	46,873.4	0	NA	NA
9	0/2	1	652,412.9	0	NA	NA
10	2	1	1,409,473.4	0	NA	NA
11	2	1	1,409,473.4	0	NA	NA
12	2	1	1,409,473.4	0	NA	NA
13	2	1	1,431,275.0	0	NA	NA
14	2	1	1,431,275.0	0	NA	NA
15	2	1	1,431,275.0	0	NA	NA
16	2	1	1,431,275.0	0	NA	NA
17	2	1	1,431,275.0	0	NA	NA
18	2	1	1,431,275.0	0	NA	NA
19	2	1	1,431,275.0	0	NA	NA
20	2	1	1,431,275.0	0	NA	NA
21	2	1	1,431,275.0	0	NA	NA
22	2	1	1,431,275.0	0	NA	NA
23	2	1	1,429,639.9	0	NA	NA
24	2	1	1,429,639.9	0	NA	NA
25	2	1	1,429,639.9	0	NA	NA
26	2	1	1,429,639.9	0	NA	NA
27	2	1	1,434,545.3	0	NA	NA
28	2	1	1,434,545.3	0	NA	NA
29	2	1	1,434,545.3	0	NA	NA
30	2	1	1,434,545.3	0	NA	NA
31	2	1	1,434,545.3	0	NA	NA

STATION: Nine Mile Point MONTH: June 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	2	1	1,434,545.3	0	NA	NA
2	2	1	1,434,545.3	0	NA	NA
3	2	1	1,434,545.3	0	NA	NA
4	2	1	1,434,545.3	0	NA	NA
5	2	1	1,434,545.3	84	11.6	15.7
6	2	1	1,321,177.0	154	12.6	21.3
7	2	1	1,291,744.8	269	12.3	23.2
8	2	1	1,446,536.2	373	13.3	23.5
9	2	1	1,446,536.2	438	12.9	24.6
10	2	1	1,446,536.2	435	12.7	24.5
11	2	1	1,446,536.2	462	13.7	26.2
12	2	1	1,446,536.2	505	13.9	27.6
13	2	1	1,446,536.2	530	15.2	29.1
14	2	1	1,450,896.5	517	16.3	30.4
15	2	1	1,450,896.5	501	15.8	30.3
16	2	1	1,450,896.5	540	15.9	30.9
17	2	2	1,493,954.6	593	17.4	33.8
18	2	2	1,493,954.6	599	17.9	34.9
19	2	2	1,493,954.6	565	19.1	36.4
20	2	2	1,484,143.9	603	14.8	32.2
21	2	2	1,484,143.9	607	15.9	31.2
22	2	2	1,484,143.9	602	15.5	32.6
23	2	2	1,484,143.9	595	16.0	33.3
24	2	2	1,470,517.9	584	20.1	37.2
25	2	2	1,470,517.9	593	17.1	34.2
26	2	2	1,470,517.9	589	20.3	37.6
27	2	2	1,470,517.9	585	20.9	38.3
28	2	2	1,470,517.9	604	14.4	31.5
29	2	2	1,470,517.9	608	9.2	26.1
30	2	2	1,499,405.0	606	8.8	25.9

TABLE A-1 (Cont.)

STATION: Nine Mile Point — MONTH: July 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2	2	1,499,405.0	597	13.9	28.0
2	2	2	1,499,405.0	570	18.8	33.3
3	2	2	1,499,405.0	585	19.1	36.2
4	2	2	1,499,405.0	581	19.7	36.9
5	2	2	1,499,405.0	584	21.3	38.5
6	2	2	1,499,405.0	583	21.3	38.4
7	2	2	1,499,405.0	584	21.3	38.4
8	2	2	1,499,405.0	584	21.1	38.2
9	2	2	1,499,405.0	494	20.8	35.8
10	2	2	1,499,405.0	585	20.7	37.8
11	2	2	1,499,405.0	586	20.7	37.8
12	2	2	1,499,405.0	586	21.0	38.3
13	2	2	1,499,405.0	586	21.4	38.8
14	2	2	1,499,405.0	588	21.1	38.5
15	2	2	1,499,405.0	118	21.1	38.4
16	2	2	1,499,405.0	365	21.7	30.3
17	2	2	1,499,405.0	540	20.8	30.9
18	2	2	1,499,405.0	582	21.8	38.1
19	2	2	1,499,405.0	580	21.6	39.2
20	2	2	1,499,405.0	557	21.6	38.6
21	2	2	1,499,405.0	560	22.3	39.3
22	2	2	1,499,405.0	565	22.3	39.2
23	2	2	1,499,405.0	564	23.1	39.9
24	2	2	1,499,405.0	574	22.1	38.9
25	2	2	1,499,405.0	575	22.3	38.8
26	2	2	1,499,405.0	562	22.2	38.6
27	2	2	1,499,405.0	197	22.6	37.6
28	2	2	1,493,954.6	0	23.1	28.2
29	2	2	1,493,954.6	0	23.5	24.0
30	2	2	1,493,954.6	0	23.4	23.9
31	2	2	1,493,954.6	13.7	23.1	25.6

STATION: Nine Mile Point — MONTH: August 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2	2	1,493,954.6	278	23.1	34.6
2	2	2	1,493,954.6	474	23.2	37.3
3	2	2	1,493,954.6	554	23.3	39.6
4	2	2	1,493,954.6	573	23.3	40.3
5	2	2	1,493,954.6	578	23.3	40.4
6	2	2	1,493,954.6	569	23.9	40.9
7	2	2	1,493,954.6	554	24.2	40.9
8	2	2	1,525,021.9	548	24.3	40.9
9	2	2	1,525,021.9	547	24.6	41.1
10	2	2	1,525,021.9	569	23.8	40.6
11	2	2	1,511,395.9	573	22.6	39.6
12	2	2	1,511,395.9	604	13.1	30.1
13	2	2	1,511,395.9	579	9.8	26.9
14	2	2	1,511,395.9	541	12.9	26.7
15	2	2	1,511,395.9	604	9.3	27.3
16	2	2	1,511,395.9	607	8.9	26.6
17	2	2	1,511,395.9	607	11.4	28.9
18	2	2	1,511,395.9	603	11.6	31.3
19	2	2	1,511,395.9	597	16.6	34.8
20	2	2	1,511,395.9	589	19.3	36.7
21	2	2	1,511,395.9	586	19.7	37.0
22	2	2	1,511,395.9	589	20.3	37.7
23	2	2	1,511,395.9	587	20.8	38.1
24	2	2	1,511,395.9	587	20.9	38.1
25	2	2	1,511,395.9	587	20.3	37.5
26	2	2	1,511,395.9	586	20.4	37.8
27	2	2	1,511,395.9	582	21.6	39.0
28	2	2	1,511,395.9	581	21.8	39.1
29	2	2	1,511,395.9	582	21.3	38.4
30	2	2	1,511,395.9	573	22.0	39.4
31	2	2	1,511,395.9	574	22.8	40.3

TABLE A-1 (Cont.)

STATION: Nine Mile Point MONTH: September 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2	2	1,511,395.9	571	22.9	40.2
2	2	2	1,531,562.4	570	23.1	39.9
3	2	2	1,531,562.4	570	23.0	40.2
4	2	2	1,531,562.4	567	23.0	40.2
5	2	2	1,531,562.4	554	23.3	40.0
6	2	2	1,531,562.4	551	23.1	39.7
7	2	2	1,531,562.4	551	23.3	39.9
8	2	2	1,531,562.4	569	22.8	40.1
9	2	2	1,521,751.7	576	22.8	40.1
10	2	2	1,521,751.7	563	23.0	40.2
11	2	2	1,521,751.7	558	23.1	40.1
12	2	2	1,521,751.7	565	22.8	39.9
13	2	2	1,521,751.7	569	22.6	39.8
14	2	2	1,521,751.7	573	22.2	39.6
15	2	2	1,521,751.7	574	22.0	39.4
16	2	2	1,521,751.7	573	21.3	36.1
17	2	2	1,521,751.7	446	20.1	34.1
18	2	2	1,521,751.7	542	20.8	37.3
19	2	2	1,511,395.9	576	20.8	38.0
20	2	2	1,511,395.9	577	20.8	38.0
21	2	2	1,511,395.9	580	20.4	37.9
22	2	2	1,511,395.9	581	19.6	37.0
23	2	2	1,511,395.9	580	18.9	36.0
24	2	2	1,511,395.9	580	19.0	36.4
25	2	2	1,511,395.9	580	19.0	36.5
26	2	2	1,511,395.9	581	18.8	36.4
27	2	2	1,511,395.9	583	18.8	36.4
28	2	2	1,511,395.9	580	19.3	36.7
29	2	2	1,511,395.9	582	18.8	36.1
31	2	2	1,511,395.9	580	18.9	36.2

STATION: Nine Mile Point MONTH: October 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2	2	1,511,395.9	578	18.6	35.9
2	2	2	1,511,395.9	581	18.9	36.4
3	2	2	1,511,395.9	586	18.7	36.3
4	2	2	1,511,395.9	561	18.8	35.0
5	2	2	1,511,395.9	591	18.5	35.6
6	2	2	1,511,395.9	593	17.9	35.4
7	2	2	1,498,860.0	593	17.6	35.2
8	2	2	1,498,860.0	593	18.0	33.8
9	2	2	1,498,860.0	495	17.7	31.8
10	2	2	1,498,860.0	586	16.8	34.1
11	2	2	1,498,860.0	599	16.4	33.8
12	2	2	1,498,860.0	605	14.0	31.4
13	2	1	1,451,986.6	600	13.8	31.3
14	2	1	1,451,986.6	597	15.1	32.8
15	2	1	1,451,986.6	602	14.9	32.4
16	2	1	1,451,986.6	600	15.7	33.2
17	2	1	1,451,986.6	600	15.7	33.3
18	2	1	1,455,801.8	599	15.8	33.4
19	2	1	1,457,437.0	601	15.4	32.9
20	2	1	1,454,166.7	602	13.8	31.3
21	2	1	1,454,166.7	604	13.9	31.3
22	2	1	1,454,166.7	604	13.3	30.8
23	2	1	1,454,166.7	603	11.9	29.4
24	2	1	1,454,166.7	603	12.8	30.3
25	2	1	1,454,166.7	604	11.2	28.7
26	2	1	1,454,166.7	603	12.3	30.0
27	2	1	1,454,166.7	601	12.8	30.4
28	2	1	1,454,166.7	604	11.5	29.2
29	2	1	1,454,166.7	608	11.6	29.1
30	2	1	1,454,166.7	606	12.3	29.9
31	2	1	1,454,166.7	606	11.2	28.7

TABLE A-1 (Cont.)

STATION: Nine Mile Point MONTH: November 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	2	1	1,443,265.9	605	10.7	28.3
2	2	1	1,443,265.9	605	10.9	28.4
3	2	1	1,445,991.1	605	11.4	28.8
4	2	1	1,445,991.1	607	11.3	28.8
5	2	1	1,443,265.9	438	10.6	23.8
6	2	1	1,443,265.9	522	10.6	25.6
7	2	1	1,443,265.9	582	10.4	27.1
8	2	1	1,443,265.9	605	10.9	28.3
9	2	1	1,443,265.9	603	10.9	28.4
10	2	1	1,443,265.9	606	10.4	27.9
11	2	1	1,443,265.9	608	10.7	28.1
12	2	1	1,443,265.9	608	11.0	28.3
13	2	1	1,443,265.9	606	9.5	26.9
14	2	1	1,445,991.1	603	9.4	26.7
15	2	1	1,445,991.1	515	9.0	23.6
16	2	1	1,445,991.1	422	8.3	21.1
17	2	1	1,445,991.1	436	8.3	22.9
18	2	1	1,443,265.9	436	7.5	20.5
19	2	1	1,443,265.9	554	8.4	23.1
20	2	1	1,443,265.9	584	8.2	25.2
21	2	1	1,443,265.9	609	8.2	25.6
22	2	1	1,443,265.9	608	7.6	24.9
23	2	1	1,443,265.9	610	8.1	25.4
24	2	1	1,443,265.9	610	8.3	25.8
25	2	1	1,443,265.9	612	7.0	24.5
26	2	1	1,443,265.9	611	6.1	23.5
27	2	1	1,443,265.9	610	7.1	24.3
28	2	1	1,441,630.8	611	7.2	24.6
29	2	1	1,443,265.9	611	6.8	24.2
30	2	1	1,443,265.9	613	5.6	22.6

STATION: Nine Mile Point MONTH: December 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	2	1	1,438,905.6	613	4.2	20.7
2	2	1	1,438,905.6	597	4.4	21.0
3	2	1	1,441,630.8	444	5.6	18.6
4	2	1	1,441,630.8	560	6.2	22.4
5	2	1	1,441,630.8	607	6.6	23.5
6	2	1	1,443,265.9	609	6.3	14.9
7	2	1	1,443,265.9	613	4.8	6.9
8	2	1	1,443,265.9	613	3.6	20.8
9	2	1	1,438,905.6	611	4.3	22.0
10	2	1	1,438,905.6	613	4.1	21.8
11	2	1	1,438,905.6	612	4.8	22.6
12	2	1	1,438,905.6	611	5.5	22.5
13	2	1	1,439,995.7	613	4.3	22.1
14	2	1	1,439,995.7	613	3.9	21.5
15	2	1	1,443,265.9	613	5.3	23.1
16	2	1	1,443,265.9	613	3.5	21.2
17	2	1	1,371,320.6	612	2.2	21.7
18	2	1	1,241,056.1	611	2.3	22.3
19	2	1	1,255,772.2	613	2.7	22.7
20	2	1	1,269,943.2	610	2.6	22.7
21	2	1	1,269,943.2	597	4.8	23.9
22	2	1	1,285,749.4	609	2.8	22.3
23	2	1	1,256,862.2	609	0.9	20.9
24	2	1	1,256,862.2	516	0.0	16.4
25	2	1	1,256,862.2	606	0.0	19.2
26	2	1	1,256,862.2	610	0.0	20.0
27	2	1	1,242,146.2	611	0.2	20.4
28	2	1	1,285,749.4	613	1.5	21.8
29	2	1	1,243,781.3	614	0.2	20.2
30	2	1	1,214,349.1	607	0.3	20.0
31	2	1	1,185,462.0	592	0.2	20.7

1 On 20 March 1982, NMP Unit 1 went off line and continued to be off line into 1983. "NA" represents information not reported on NME Unit 1 "401" monthly log.

TABLE A-2 PLANT OPERATING CONDITIONS AT JAMES A. FITZPATRICK NUCLEAR POWER PLANT DURING 1983

STATION: James A. FitzPatrick MONTH: January 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	3	2	2,050,440.5	823	3.9	23.6
2	3	2	2,050,440.5	823	3.7	23.4
3	3	2	2,115,191.2	824	3.0	23.0
4	3	2	2,028,856.9	824	2.7	22.8
5	3	2	2,028,856.9	821	3.3	23.2
6	3	2	1,985,689.7	821	3.7	23.4
7	3	2	1,834,604.6	821	3.6	23.6
8	3	2	1,813,021.1	593	3.9	19.3
9	3/2	2	293,013.5	593	3.9	19.4
10	2	2	1,504,310.4	01a	2.6	3.3
11	2	2	1,504,310.4	0	2.6	3.2
12	2	2	1,504,310.4	0	2.2	2.9
13	2	2	1,504,310.4	0	2.6	3.2
14	2	2	1,504,310.4	0	2.4	3.2
15	2	2	827,370.7	156b	2.7	10.4
16	3	1	1,661,281.8	585	3.8	19.5
17	3/2	2	824,100.5	393	2.7	13.0
18	2	2	1,504,310.4	0c	0.7	1.6
19	2	2	1,504,310.4	0	0.3	1.2
20	2	2/1	1,378,315.3	0	0.6	1.4
21	2	1	1,315,363.2	0	0.3	1.1
22	2	1	1,315,363.2	0	0.3	0.6
23	2	1	1,315,363.2	0	0.7	1.6
24	2	1	683,988.9	138d	0.8	8.7
25	2/3	1	845,349.8	495	1.2	17.3
26	3	1	1,545,188.4	671	4.7	21.7
27	3	1	1,545,188.4	688	4.8	22.1
28	3	1	1,524,585.8	584	4.7	19.9
29	3	1	1,689,405.8	709	4.4	22.2
30	3	1	1,792,418.5	651	3.6	20.6
31	3	1	1,751,213.5	643	2.9	19.8

STATION: James A. FitzPatrick MONTH: February 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	3	2	1,791,437.5	753	3.6	22.2
2	3	2	1,769,853.9	809	4.1	23.5
3	3	2	1,791,437.5	813	4.6	23.9
4	3	2	1,791,437.5	810	4.2	23.6
5	3	2	1,769,853.9	815	4.3	23.8
6	3	2	1,769,853.9	815	4.7	24.1
7	3	2	1,769,853.9	814	4.3	23.8
8	3	2	1,769,853.9	813	3.7	23.3
9	3	2	1,769,853.9	814	3.3	23.1
10	3	2	1,769,853.9	816	3.2	22.9
11	3	2	1,791,437.5	812	3.9	23.4
12	3	2	1,769,853.9	814	2.9	22.7
13	3	2	1,769,853.9	814	3.9	23.4
14	3	2	1,791,437.5	811	4.4	23.7
15	3	2	1,791,437.5	813	4.3	23.7
16	3	2	1,791,437.5	814	4.3	23.7
17	3	2	1,791,437.5	812	4.3	23.7
18	3	2	1,791,437.5	814	4.2	23.7
19	3	2	1,791,437.5	816	4.4	23.9
20	3	2	1,791,437.5	814	4.7	24.1
21	3	2	1,791,437.5	682	4.4	21.4
22	3	2	1,791,437.5	747	4.6	22.8
23	3	2	1,791,437.5	802	4.4	24.0
24	3	2	1,791,437.5	817	4.8	24.2
25	3/2	2	1,683,083.5	753	4.7	22.7
26	2	2	1,402,017.3	2	2.1	3.8
27	2/3	2	1,395,084.4	497	3.8	19.0
28	3	2	1,769,853.9	674	4.3	21.3

TABLE A-2 (Cont.)

STATION: James A. FitzPatrick — MONTH: March 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	3	2	1,791,437.5	784	4.7	23.3
2	3	2	1,791,437.5	819	5.1	24.3
3	3	2	1,791,437.5	819	5.1	24.3
4	3	2	1,834,604.6	817	4.9	24.4
5	3	2	1,856,188.2	820	5.4	24.8
6	3	2	1,856,188.2	821	5.3	24.6
7	3	2	1,856,188.2	824	5.9	25.1
8	3	2	1,856,188.2	830	6.2	25.2
9	3	2	1,856,188.2	825	5.5	24.9
10	3	2	1,813,021.1	829	5.1	24.7
11	3	2	1,834,604.6	827	5.4	24.3
12	3	2	1,834,604.6	831	4.8	24.2
13	3	2	1,834,604.6	831	4.9	24.3
14	3	2	1,834,604.6	830	5.3	24.6
15	3	2	1,834,604.6	831	5.4	24.8
16	3	2	1,834,604.6	829	5.9	25.0
17	3	2	1,985,689.7	831	4.4	24.1
18	3	2	2,093,607.6	823	4.2	23.8
19	3	2	2,093,607.6	824	4.7	24.1
20	3	2	2,115,191.2	827	4.7	24.3
21	3	2	2,093,607.6	829	4.4	24.1
22	3	2	2,093,607.6	825	3.8	23.5
23	3	2	2,093,607.6	825	3.1	22.9
24	3	2	2,115,191.2	822	3.1	22.9
25	3	2	2,115,191.2	823	2.6	22.6
26	3	2	2,093,607.6	628	2.8	19.3
27	3	2	2,072,024.1	692	3.2	20.6
28	3	2	2,072,024.1	799	2.8	22.3
29	3	2	2,072,024.1	828	2.9	23.0
30	3	2	2,072,024.1	829	2.8	22.9
31	3	2	2,072,024.1	829	2.9	22.9

STATION: James A. FitzPatrick — MONTH: April 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	3	2	2,072,024.1	677	3.4	20.7
2	3	2	2,093,607.6	721	3.6	21.5
3	3	2	2,115,191.2	778	4.2	22.9
4	3	2	2,115,191.2	805	4.3	23.4
5	3	2	2,115,191.2	817	4.3	23.7
6	3	2	2,093,607.6	829	3.8	23.6
7	3	2	2,093,607.6	830	3.7	23.5
8	3	2	2,093,607.6	828	4.2	23.9
9	3	2	2,093,607.6	831	4.8	24.4
10	3	2	2,093,607.6	830	4.8	24.4
11	3	2	2,115,191.2	830	4.6	24.6
12	3	2	2,093,607.6	830	4.7	24.2
13	3	2	2,093,607.6	833	4.1	23.9
14	3	2	2,093,607.6	830	4.9	24.5
15	3	2	2,115,191.2	778	4.8	23.5
16	3	2	2,093,607.2	612	3.8	19.8
17	3	2	2,115,191.2	761	4.4	22.7
18	3	2	2,115,191.2	820	6.2	25.2
19	3	2	2,115,191.2	827	6.1	25.4
20	3	2	2,115,191.2	829	4.9	24.4
21	3	2	2,115,191.2	828	4.7	24.2
22	3	2	2,115,191.2	830	4.6	24.2
23	3	2	2,115,191.2	825	4.6	24.1
24	3	2	2,115,191.2	831	5.1	24.6
25	3	2	2,115,191.2	829	5.3	24.8
26	3	2	2,136,774.8	829	5.3	24.7
27	3	2	2,115,191.2	829	5.4	24.9
28	3	2	2,115,191.2	831	4.7	24.3
29	3	2	2,115,191.2	830	5.8	25.1
30	3	2	2,136,774.8	698	6.2	23.1

TABLE A-2 (Cont.)

STATION: James A. FitzPatrick MONTH: May 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	3	2	2,136,774.8	694	7.6	24.0
2	3	2	2,136,774.8	771	7.0	24.9
3	3	2	2,158,358.4	802	8.4	26.6
4	3	2	2,158,358.4	825	8.9	27.4
5	3	2	2,158,358.4	829	8.7	27.3
6	3	2	2,158,358.4	825	9.3	27.8
7	3	2	2,158,358.4	827	7.0	26.1
8	3	2	2,158,358.4	828	8.3	27.2
9	3	2	2,158,358.4	829	8.7	27.5
10	3	2	2,158,358.4	824	9.5	28.1
11	3	2	2,158,358.4	814	9.1	27.6
12	3	2	2,158,358.4	818	9.6	27.9
13	3	2	2,158,358.4	826	10.8	29.0
14	3	2	2,158,358.4	636	10.3	25.1
15	3	2	2,158,358.4	594	9.4	23.4
16	3	2	2,158,358.4	708	9.4	25.8
17	3	2	2,158,358.4	804	9.2	27.3
18	3	2	2,158,358.4	820	10.1	28.3
19	3	2	2,158,358.4	818	8.3	27.4
20	3	2	2,158,358.4	815	7.9	26.7
21	3	2	2,158,358.4	817	9.7	27.9
22	3	2	2,158,358.4	814	9.4	27.7
23	3	2	2,158,358.4	812	8.6	27.1
24	3	2	2,158,358.4	809	10.0	28.2
25	3	2	2,158,358.4	808	10.0	28.1
26	3	2	2,158,358.4	806	10.3	28.3
27	3	2	2,158,358.4	802	10.1	28.1
28	3	2	2,158,358.4	806	9.9	27.9
29	3	2	2,158,358.4	803	8.9	27.1
30	3	2	2,158,358.4	800	9.3	27.3
31	3	2	2,158,358.4	767	10.3	27.5

STATION: James A. FitzPatrick MONTH: June 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	3	2	2,158,358.4	486	10.7	23.0
2	3	2	2,158,358.4	442	11.2	22.8
3	3/2	2	1,831,334.4	53	12.0	17.2
4	2	2	1,504,310.4	0e	11.6	12.2
5	2	2	1,504,310.4	0	11.8	12.6
6	2	2	1,504,310.4	0	12.4	13.2
7	2	2	1,504,310.4	0	12.6	13.7
8	2	2	1,504,310.4	0	12.9	14.2
9	2	2	1,504,310.4	0	12.4	13.9
10	2	2	1,504,310.4	0	12.6	14.0
11	2	2	1,504,310.4	0	14.1	15.2
12	2	2	1,504,310.4	0	14.2	15.2
13	2	2	1,504,310.4	0	14.9	16.1
14	2	2	1,504,310.4	0	16.2	16.9
15	2	2	1,504,310.4	0	16.7	17.6
16	2	2	1,504,310.4	0	17.1	18.0
17	2	2	1,504,310.4	0	17.5	18.3
18	2	2	1,504,310.4	0	18.7	19.3
19	2	2	1,504,310.4	0	20.2	20.3
20	2	2	1,504,310.4	0	16.2	17.8
21	2	2	1,504,310.4	0	15.4	17.2
22	2	2	1,504,310.4	0	15.2	16.9
23	2	2	1,504,310.4	0	17.7	18.5
24	2	2	1,504,310.4	0	21.2	21.1
25	2	2	1,504,310.4	0	19.7	20.2
26	2	2	1,504,310.4	0	20.6	20.6
27	2	2	1,504,310.4	0	21.0	21.3
28	2	2	1,504,310.4	0	15.6	17.8
29	2	2	1,504,310.4	0	13.4	14.2
30	2	2	1,504,310.4	0	8.0	9.4

TABLE A-2 (Cont.)

STATION: James A. FitzPatrick MONTH: July 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2	2	1,504,310.4	0	14.1	14.9
2	2	2	1,504,310.4	0	19.1	19.4
3	2	2	1,504,310.4	0	19.8	20.1
4	2	2	1,504,310.4	0	20.6	21.1
5	2	2	1,504,310.4	0	21.2	21.8
6	2	2	1,504,310.4	0	21.5	21.7
7	2	2	1,504,310.4	0	21.3	21.6
8	2	2	1,504,310.4	0	21.1	21.7
9	2	2	1,504,310.4	0	21.7	21.7
10	2	2	1,504,310.4	0	20.8	21.5
11	2	2	1,504,310.4	0	20.7	21.4
12	2	2	1,504,310.4	0	20.9	21.7
13	2	2	1,504,310.4	0	21.2	21.4
14	2	2	1,504,310.4	0	21.7	21.5
15	2	2	1,504,310.4	0	21.7	21.6
16	2	2	1,504,310.4	0	21.7	21.6
17	2	2	1,504,310.4	0	21.8	21.7
18	2	2	1,504,310.4	0	22.6	22.3
19	2/1	2	1,340,798.4	0	22.5	22.3
20	1/0	2	468,734.4	0	22.4	22.1
21	1	2	850,262.4	0	24.0	23.2
22	1	2	850,262.4	0	23.4	23.1
23	1	2	850,262.4	0	22.7	22.8
24	1	2	850,262.4	0	22.5	22.7
25	1	2	850,262.4	0	22.8	22.8
26	1	2	850,262.4	0	23.1	23.0
27	1	2	850,262.4	0	23.3	22.8
28	1	2	850,262.4	0	23.6	22.8
29	1	2	850,262.4	0	23.9	23.2
30	1	2	850,262.4	0	24.2	23.2
31	1	2	850,262.4	0	24.2	23.1

STATION: James A. FitzPatrick MONTH: August 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	1	2	850,262.4	0	23.8	23.0
2	1	2	850,262.4	0	24.1	23.7
3	1	2	850,262.4	0	24.1	24.0
4	1	1	752,155.2	0	24.2	24.1
5	1	1	752,155.2	0	24.3	24.1
6	1	1	752,155.2	0	24.6	24.7
7	1	1	752,155.2	0	25.7	25.6
8	1	1	752,155.2	0	25.4	25.3
9	1	1	752,155.2	0	25.5	25.3
10	1/2	1	1,079,179.2	0	24.2	23.3
11	2	1	1,406,203.2	0	23.4	22.6
12	2	1	1,406,203.2	0	12.2	14.7
13	2	1	1,406,203.2	0	9.7	10.1
14	2	1	1,406,203.2	0	18.1	13.7
15	2	1	1,406,203.2	0	14.8	14.8
16	2	1	1,406,203.2	0	15.6	15.6
17	2	1	1,406,203.2	0	11.9	11.6
18	2	1	1,406,203.2	0	14.1	14.9
19	2	1	1,406,203.2	0	17.2	16.6
20	2	1	1,406,203.2	0	19.6	19.0
21	2	1	1,406,203.2	0	19.9	19.7
22	2	1	1,406,203.2	0	19.8	19.4
23	2	1	1,406,203.2	0	20.7	19.7
24	2	1	1,406,203.2	0	21.3	20.3
25	2	1	1,406,203.2	0	21.9	20.9
26	2	1	1,406,203.2	0	21.6	20.4
27	2	1	1,406,203.2	0	21.8	21.3
28	2	1	1,406,203.2	0	21.8	21.3
29	2	1	1,406,203.2	0	22.4	21.4
30	2	1	1,406,203.2	0	22.4	21.3
31	2	1	1,406,203.2	0	23.5	22.1

TABLE A-2 (Cont.)

STATION: James A. FitzPatrick MONTH: September 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	2	1	1,406,203.2	0	23.5	23.6
2	2	1	1,406,203.2	0	23.4	23.4
3	2	1/2	1,455,256.8	10f	23.7	26.3
4	2	2	1,504,301.4	37	23.4	26.2
5	2	2	1,504,301.4	189	23.9	31.4
6	2	2	1,504,301.4	189	23.4	30.9
7	2	2	1,504,301.4	232	23.7	32.3
8	2/3	2	1,558,814.4	267	23.4	32.7
9	3	2	2,158,358.4	434	23.3	33.7
10	3	2	2,158,358.4	596	23.7	37.2
11	3	2	2,158,358.4	686	23.6	38.6
12	3	2	2,158,358.4	622	23.1	37.1
13	3	2	2,158,358.4	604	22.9	36.3
14	3	2	2,158,358.4	643	21.8	36.4
15	3	2	2,115,191.2	659	22.6	36.9
16	3	2	2,115,191.2	749	21.3	37.2
17	3	2	2,115,191.2	673	22.0	37.1
18	3	2	2,115,191.2	797	21.3	38.0
19	3	2	2,115,191.2	796	21.0	37.7
20	3	2	2,115,191.2	796	21.0	37.8
21	3	2	2,115,191.2	797	20.9	37.6
22	3	2	2,115,191.2	803	20.5	37.0
23	3	2	2,115,191.2	771	19.7	35.7
24	3	2	2,115,191.2	625	19.3	32.2
25	3	2	2,115,191.2	752	19.4	34.7
26	3	2	2,115,191.2	804	19.6	35.9
27	3	2	2,115,191.2	809	19.3	35.7
28	3	2	2,093,607.6	809	19.7	36.1
29	3	2	2,115,191.2	811	19.3	35.8
30	3	2	2,115,191.2	807	19.0	35.8

STATION: James A. FitzPatrick MONTH: October 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Temperatures (C) Discharge
1	3	2	2,115,191.2	811	18.8	35.7
2	3	2	2,115,191.2	811	19.2	36.0
3	3	2	2,115,191.2	812	19.1	35.9
4	3	2	2,115,191.2	811	19.2	36.1
5	3	2	2,115,191.2	809	18.8	35.6
6	3	2	2,136,774.8	814	18.6	35.5
7	3	2	2,136,774.8	809	18.1	35.1
8	3	2	2,136,774.8	813	18.2	35.2
9	3	2	2,136,774.8	819	17.1	34.3
10	3	2	2,136,774.8	820	16.4	33.6
11	3	2	2,136,774.8	820	16.2	33.4
12	3	2	2,136,774.8	823	14.4	31.8
13	3	2	2,136,774.8	820	14.4	31.8
14	3	2	2,136,774.8	815	15.9	33.1
15	3	2	2,158,358.4	819	15.2	32.6
16	3	2	2,136,774.8	821	15.9	33.2
17	3	2	2,115,191.2	822	15.9	33.2
18	3	2	2,115,191.2	821	16.4	33.7
19	3	2	2,136,774.8	820	15.2	32.6
20	3	2	2,136,774.8	823	13.7	31.3
21	3	2	2,136,774.8	824	13.6	31.2
22	3	2	2,136,774.8	820	13.1	30.7
23	3	2	2,158,358.4	819	12.7	30.4
24	3	2	2,158,358.4	815	12.3	29.9
25	3	2	2,158,358.4	817	12.2	29.8
26	3	2	2,136,774.8	813	12.2	29.8
27	3	2	2,136,774.8	818	13.8	31.2
28	3	2	2,136,774.8	819	12.2	30.3
29	3	2	2,136,774.8	805	11.8	29.3
30	3	2	2,115,191.2	819	12.4	30.1
31	3	2	2,093,607.6	820	11.8	29.6

TABLE A-2 (Cont.)

STATION: James A. FitzPatrick MONTH: November 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	3	2	2,093,607.6	818	11.2	27.3
2	3	2	2,115,191.2	818	11.3	27.7
3	3	2	2,115,191.2	816	12.0	28.3
4	3	2	2,115,191.2	818	12.2	28.6
5	3	2	2,093,607.6	580	11.4	23.7
6	3	2	2,115,191.2	648	11.1	24.4
7	3	2	2,115,191.2	756	10.9	26.3
8	3	2	2,115,191.2	816	10.8	27.1
9	3	2	2,115,191.2	817	11.6	27.8
10	3	2	2,115,191.2	820	11.2	26.9
11	3	2	2,115,191.2	818	10.4	26.7
12	3	2	2,115,191.2	821	11.1	27.4
13	3	2	2,115,191.2	822	10.0	26.0
14	3	2	2,115,191.2	824	9.4	25.6
15	3	2	2,115,191.2	823	8.5	24.6
16	3	2	2,093,607.6	822	7.3	23.5
17	3	2	2,093,607.6	823	7.6	24.6
18	3	2	2,115,191.2	817	7.9	23.7
19	3	2	2,115,191.2	822	8.0	24.2
20	3	2	2,093,607.6	823	8.6	24.8
21	3	2	2,115,191.2	822	8.3	24.4
22	3	2	2,115,191.2	823	8.4	24.4
23	3	2	2,115,191.2	823	8.4	24.3
24	3	2	2,115,191.2	821	8.6	24.7
25	3	2	2,115,191.2	821	7.7	23.8
26	3	2	2,115,191.2	821	6.6	22.3
27	3	2	2,136,774.8	823	7.4	23.1
28	3	2	2,115,191.2	823	6.8	22.5
29	3	2	2,136,774.8	822	7.4	23.1
30	3	2	2,115,191.2	822	5.8	21.3

STATION: James A. FitzPatrick MONTH: December 1983

Date	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume (m3) of Water Pumped	Mean Electrical Output (MWe)	Temperatures (C) Intake	Discharge
1	3	2	2,136,774.8	823	4.4	20.2
2	3	2	2,115,191.2	802	5.4	21.0
3	3	2	2,093,607.6	811	5.8	21.3
4	3	2	2,115,191.2	819	5.9	21.4
5	3	2	2,115,191.2	821	6.2	21.9
6	3	2	2,115,191.2	821	6.3	22.1
7	3	2	2,050,440.5	823	5.1	20.9
8	3	2	1,942,522.6	820	4.8	20.6
9	3	2	1,920,939.0	819	6.1	22.1
10	3	2	1,920,939.0	822	6.4	22.4
11	3	2	1,920,939.0	824	5.8	21.7
12	3	2	1,920,939.0	824	5.4	21.2
13	3	2	1,942,522.6	822	5.3	21.1
14	3	2	1,920,939.0	820	4.9	20.6
15	3	2	1,920,939.0	818	7.2	22.9
16	3	2	2,028,856.9	819	5.7	21.4
17	3	2	2,093,607.6	630	3.2	15.4
18	3	2	2,028,856.9	672	3.9	16.8
19	3	2	1,985,689.7	795	3.8	18.8
20	3	2	1,899,355.4	818	4.2	19.7
21	3	2	1,877,771.8	815	5.2	20.4
22	3	2	1,920,939.0	821	5.0	20.5
23	3	2	1,813,021.1	821	3.9	19.4
24	3	2	1,769,853.9	825	4.1	19.3
25	3	2	1,705,103.1	826	4.1	19.3
26	3	2	1,705,103.1	826	4.1	19.5
27	3	2	1,726,686.7	825	4.3	19.9
28	3	2	1,726,686.7	824	4.6	20.4
29	3	2	1,791,437.5	825	3.8	19.6
30	3	2	1,726,686.7	822	4.2	19.6
31	3	2	1,661,936.0	823	4.6	19.9

TABLE A-2 (Cont.)

---

a. 10 January - 14 January - Plant off line
b. 15 January - Plant on line
c. 18 January -23 January - Plant off line
d. 24 January - Plant on line
e. 4 June - 2 September - Plant off line
f. 2 September - Plant on line

NOTE: Volume of water pumped each day was derived from gross circulating water flow data reported in James A. FitzPatrick '401' monthly reports. Water volumes were corrected for tempering when applicable. Power production is daily average (gross MWe) from James A. FitzPatrick '401' monthly reports. All temperatures were derived from James A. FitzPatrick '401' monthly reports. Average intake temperatures were from the main condenser inlet water boxes which do not reflect any tempering effects. Average discharge temperatures were taken in the discharge tunnel.

TABLE A-3 TEMPORAL ABUNDANCE AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT NINE MILE POINT UNIT 1, 1983

	JAN		FEB		MAR		APR		MAY		JUN	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	---	---	3	1.8	1,107	91.0	33,210	97.7	3,955	60.7	2,337	68.1
Rainbow smelt	---	---	55	32.9	81	6.7	523	1.5	1,657	25.5	817	23.8
Sculpin family	---	---	57	34.1	6	0.5	141	0.4	437	6.7	53	1.6
White perch	---	---	3	1.8	12	1.0	66	0.2	65	1.0	10	0.3
Gizzard shad	---	---	1	0.6	---	---	1	T	---	---	---	---
Tessellated darter	---	---	4	2.4	3	0.3	---	---	204	3.1	40	1.2
Trout perch	---	---	2	1.2	---	---	4	T	105	1.6	81	2.4
Spottail shiner	---	---	1	2.6	2	0.2	6	T	42	0.6	70	2.0
Crayfish	---	---	30	18.0	3	0.3	24	0.1	16	0.3	2	0.1
Threespine stickleback	---	---	---	---	---	---	2	T	---	---	---	---
Yellow perch	---	---	2	1.2	1	0.1	2	T	8	0.1	5	0.2
Smallmouth bass	1	50.0	5	3.0	---	---	4	T	5	0.1	1	T
Rock bass	---	---	1	0.6	---	---	1	T	3	0.1	6	0.2
Stonecat	---	---	---	---	1	0.1	---	---	2	T	2	0.1
American eel	---	---	---	---	---	---	---	---	1	T	---	---
White sucker	---	---	---	---	---	---	---	---	2	T	---	---
Chinook salmon	---	---	---	---	---	---	---	---	3	0.1	4	0.1
Clam	---	---	3	1.8	---	---	---	---	---	---	---	---
Emerald shiner	---	---	---	---	---	---	---	---	2	T	1	T
White bass	---	---	---	---	---	---	3	T	---	---	---	---
Bluegill	---	---	---	---	---	---	---	---	---	---	1	T
Unidentified fish (damaged)	1	50.0	---	---	---	---	---	---	---	---	---	---
Blacknose dace	---	---	---	---	---	---	---	---	2	T	---	---
Longnose dace	---	---	---	---	---	---	---	---	---	---	---	---
Burbot	---	---	---	---	---	---	1	T	---	---	---	---
Pumpkinseed	---	---	---	---	---	---	---	---	---	---	---	---
Tadpoles	---	---	---	---	---	---	---	---	---	---	---	---
Rainbow trout	---	---	---	---	---	---	---	---	1	T	---	---
Northern pike	---	---	---	---	---	---	---	---	---	---	---	---
Shiner family	---	---	---	---	---	---	---	---	1	T	---	---
Bluntnose minnow	---	---	---	---	---	---	---	---	1	T	---	---
Brown bullhead	---	---	---	---	---	---	---	---	---	---	---	---
Black crappie	---	---	---	---	---	---	---	---	---	---	---	---
Total	2	---	167	---	1,216	---	33,988	---	6,512	---	3,430	---

NOTE: 'T' represents a trace percentage of less than 0.1 percent. Percentage totals may not equal 100.0 percent due to rounding.

TABLE A-3 (Cont.)

	JUL		AUG		SEP		OCT		NOV		DEC		Totals	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	1,053	93.8	225	28.1	26	12.2	849	96.6	61	48.9	84	10.1	42,910	87.0
Rainbow smelt	2	0.2	477	59.6	165	77.1	10	1.1	36	25.9	176	21.2	3,999	8.1
Sculpin family	5	0.5	17	2.1	3	1.4	9	1.0	4	2.9	31	3.7	763	1.5
White perch	1	0.1	4	0.5	---	---	1	0.1	---	---	186	22.4	348	0.7
Gizzard shad	1	0.1	1	0.1	---	---	---	---	22	15.8	210	25.3	236	0.5
Tessellated darter	---	---	9	1.1	1	0.5	1	0.1	---	---	2	0.2	264	0.5
Trout perch	20	1.8	3	0.4	---	---	---	---	---	---	4	0.5	219	0.4
Spottail shiner	28	2.5	9	1.1	8	3.7	---	---	2	1.4	24	2.9	192	0.4
Crayfish	2	0.2	16	2.0	---	---	2	0.2	7	5.0	18	2.2	120	0.2
Threespine stickleback	---	---	---	---	---	---	1	0.1	1	0.7	50	6.0	54	0.1
Yellow perch	2	0.2	2	0.3	5	2.3	---	---	1	0.7	15	1.8	43	0.1
Smallmouth bass	---	---	12	1.5	1	0.5	---	---	---	---	3	0.4	32	0.1
Rock bass	---	---	8	1.0	---	---	---	---	1	0.7	5	0.6	25	0.1
Stonecat	3	0.3	9	1.1	2	0.9	2	0.2	1	0.7	1	0.1	23	T
American eel	1	0.1	3	0.4	---	---	---	---	---	---	15	1.8	20	T
White sucker	1	0.1	4	0.5	2	0.9	---	---	1	0.7	---	---	10	T
Chinook salmon	1	0.1	---	---	---	---	---	---	---	---	---	---	8	T
Clam	---	---	---	---	1	0.5	1	0.1	---	---	1	0.1	6	T
Emerald shiner	---	---	---	---	---	---	---	---	---	---	---	---	3	T
White bass	---	---	---	---	---	---	---	---	---	---	---	---	3	T
Bluegill	---	---	---	---	---	---	---	---	1	0.7	1	0.1	3	T
Unidentified fish (damaged)	---	---	---	---	---	---	1	0.1	1	0.7	---	---	3	T
Blacknose dace	---	---	---	---	---	---	---	---	---	---	---	---	2	T
Longnose dace	---	---	---	---	---	---	---	---	---	---	2	0.2	2	T
Burbot	---	---	1	0.1	---	---	---	---	---	---	---	---	2	T
Pumpkinseed	---	---	---	---	---	---	2	0.2	---	---	---	---	2	T
Tadpoles	2	0.2	---	---	---	---	---	---	---	---	---	---	2	T
Rainbow trout	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Northern pike	---	---	---	---	---	---	---	---	---	---	1	0.1	1	T
Shiner family	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Bluntnose minnow	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Brown bullhead	1	0.1	---	---	---	---	---	---	---	---	---	---	1	T
Black crappie	---	---	1	0.1	---	---	---	---	---	---	---	---	1	T
Totals	1,123	---	801	---	214	---	879	---	139	---	829	---	49,300	---

TABLE A-4 BIOMASS (G) AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT NINE MILE POINT UNIT 1, 1983

	JAN		FEB		MAR		APR		MAY		JUN	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	---	---	12	0.4	11,952	92.2	997,850	98.8	97,212	79.2	54,025	87.3
Gizzard shad	---	---	1,601	58.0	---	---	10	T	---	---	---	---
Rainbow smelt	---	---	476	17.3	761	5.9	7,142	0.7	10,699	8.7	2,843	4.6
White perch	---	---	12	0.4	96	0.7	2,897	0.3	5,512	4.5	1,370	2.2
White sucker	---	---	---	---	---	---	---	---	1,866	1.5	---	---
American eel	---	---	---	---	---	---	---	---	102	0.1	---	---
Yellow perch	---	---	335	12.1	108	0.8	81	T	987	0.8	417	0.7
Rock bass	---	---	31	1.1	---	---	<1	T	285	0.2	452	0.7
Sculpin family	---	---	200	7.3	17	0.1	602	0.1	1,554	1.3	169	0.3
Trout perch	---	---	13	0.5	---	---	30	T	1,193	1.0	898	1.5
Burbot	---	---	---	---	---	---	1,376	0.1	---	---	---	---
Smallmouth bass	3	8.4	29	1.1	---	---	22	T	506	0.4	610	1.0
Spottail shiner	---	---	1	T	9	0.1	49	T	444	0.4	721	1.2
Rainbow trout	---	---	---	---	---	---	---	---	1,624	1.3	---	---
Stonecat	---	---	---	---	1	T	---	---	138	0.1	261	0.4
Tessellated darter	---	---	3	0.1	1	T	---	---	477	0.4	68	0.1
Crayfish	---	---	43	1.6	13	0.1	151	T	122	0.1	12	T
Brown bullhead	---	---	---	---	---	---	---	---	---	---	---	---
Chinook salmon	---	---	---	---	---	---	---	---	8	T	13	T
Northern pike	---	---	---	---	---	---	---	---	---	---	---	---
Pumpkinseed	---	---	---	---	---	---	---	---	---	---	---	---
White bass	---	---	---	---	---	---	97	T	---	---	---	---
Bluegill	---	---	---	---	---	---	---	---	---	---	9	T
Threespine stickleback	---	---	---	---	---	---	2	T	---	---	---	---
Unidentified fish (damaged)	37	91.6	---	---	---	---	---	---	---	---	---	---
Clam	---	---	3	0.1	---	---	---	---	---	---	---	---
Longnose dace	---	---	---	---	---	---	---	---	---	---	---	---
Emerald shiner	---	---	---	---	---	---	---	---	9	T	4	T
Tadpoles	---	---	---	---	---	---	---	---	---	---	---	---
Black crappie	---	---	---	---	---	---	---	---	---	---	---	---
Blacknose dace	---	---	---	---	---	---	---	---	5	T	---	---
Bluntnose minnow	---	---	---	---	---	---	---	---	2	T	---	---
Shiner family	---	---	---	---	---	---	---	---	1	T	---	---
Total	40	---	2,759	---	12,959	---	1,010,309	---	122,746	---	61,871	---

NOTE: 'T' represents a trace percentage of less than 0.1 percent. Percentage totals may not equal 100 percent due to rounding.

TABLE A-4 (Cont.)

	JUL		AUG		SEP		OCT		NOV		DEC		Totals	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	24,150	89.2	2,566	23.1	200	6.2	1,601	85.0	1,382	30.0	2,134	3.7	1,193,085	90.6
Gizzard shad	34	0.1	53	0.5	---	---	---	---	2,065	44.9	43,050	74.4	46,813	3.6
Rainbow smelt	16	0.1	951	8.6	76	2.4	6	0.3	109	2.4	1,782	3.1	24,861	1.9
White perch	106	0.4	967	8.7	---	---	9	0.5	---	---	1,676	2.9	12,644	1.0
White sucker	1,222	4.5	2,438	22.0	1,612	50.1	---	---	807	17.5	---	---	7,945	0.6
American eel	5	T	243	2.2	---	---	---	---	---	---	5,600	9.7	5,950	0.5
Yellow perch	272	1.0	212	1.9	1,203	37.4	---	---	82	1.8	1,649	2.9	5,346	0.4
Rock bass	---	---	1,735	15.6	---	---	---	---	4	0.1	1,232	2.1	3,740	0.3
Sculpin family	14	0.1	54	0.5	5	0.2	20	1.1	13	0.3	98	0.2	2,746	0.2
Trout perch	227	0.8	50	0.5	---	---	---	---	---	---	17	T	2,428	0.2
Burbot	---	---	571	5.2	---	---	---	---	---	---	---	---	1,947	0.1
Smallmouth bass	---	---	625	5.6	6	0.2	---	---	---	---	59	0.1	1,861	0.1
Spottail shiner	292	1.1	74	0.7	16	0.5	---	---	14	0.3	142	0.3	1,761	0.1
Rainbow trout	---	---	---	---	---	---	---	---	---	---	---	---	1,624	0.1
Stonecat	218	0.8	500	4.5	98	3.0	119	6.3	88	1.9	93	0.2	1,516	0.1
Tessellated darter	---	---	8	0.1	2	0.1	4	0.2	---	---	5	T	568	T
Crayfish	28	0.1	41	0.4	---	---	6	0.3	10	0.2	67	0.1	493	T
Brown bullhead	327	1.2	---	---	---	---	---	---	---	---	---	---	327	T
Chinook salmon	164	0.6	---	---	---	---	---	---	---	---	---	---	184	T
Northern pike	---	---	---	---	---	---	---	---	---	---	131	0.2	131	T
Pumpkinseed	---	---	---	---	---	---	108	5.7	---	---	---	---	108	T
White bass	---	---	---	---	---	---	---	---	---	---	---	---	97	T
Bluegill	---	---	---	---	---	---	---	---	17	0.4	51	0.1	77	T
Threespine stickleback	---	---	---	---	---	---	2	0.1	1	T	62	0.1	67	T
Unidentified fish (damaged)	---	---	---	---	---	---	<1	T	10	0.2	---	---	47	T
Clam	---	---	---	---	<1	T	10	0.5	---	---	8	T	21	T
Longnose dace	---	---	---	---	---	---	---	---	---	---	13	T	13	T
Emerald shiner	---	---	---	---	---	---	---	---	---	---	---	---	13	T
Tadpoles	9	T	---	---	---	---	---	---	---	---	---	---	9	T
Black crappie	---	---	7	0.1	---	---	---	---	---	---	---	---	7	T
Blacknose dace	---	---	---	---	---	---	---	---	---	---	---	---	5	T
Bluntnose minnow	---	---	---	---	---	---	---	---	---	---	---	---	2	T
Shiner family	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Total	27,083	---	11,096	---	3,219	---	1,884	---	4,603	---	57,869	---	1,316,437	---

TABLE A-5 ESTIMATED ABUNDANCE AND BIOMASS (G) FOR IMPINGED TAXA AT NINE MILE POINT UNIT 1, 1983

	JAN		FEB		MAR		APR	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Alewife	---	---	24	96	11,179	120,698	61,646	1,846,710
Rainbow smelt	---	---	440	3,806	818	7,683	971	13,218
Sculpin family	---	---	456	1,600	61	176	262	1,115
White perch	---	---	24	96	121	969	123	5,360
Gizzard shad	---	---	8	12,801	---	---	2	18
Tessellated darter	---	---	32	21	30	12	---	---
Trout perch	---	---	16	104	---	---	7	55
Spottail shiner	---	---	8	9	20	89	11	91
Crayfish	---	---	240	344	30	135	47	279
Threespine stickleback	---	---	---	---	---	---	4	4
Yellow perch	---	---	16	2,679	10	1,091	4	150
Smallmouth bass	15	52	40	232	---	---	7	41
Rock bass	---	---	8	248	---	---	2	1
Stonecat	---	---	---	---	10	13	---	---
American eel	---	---	---	---	---	---	---	---
White sucker	---	---	---	---	---	---	---	---
Chinook salmon	---	---	---	---	---	---	---	---
Emerald shiner	---	---	---	---	---	---	---	---
White bass	---	---	---	---	---	---	6	179
Bluegill	---	---	---	---	---	---	---	---
Clam	---	---	24	22	---	---	---	---
Blacknose dace	---	---	---	---	---	---	---	---
Longnose dace	---	---	---	---	---	---	---	---
Burbot	---	---	---	---	---	---	2	2,547
Pumpkinseed	---	---	---	---	---	---	---	---
Tadpoles	---	---	---	---	---	---	---	---
Rainbow trout	---	---	---	---	---	---	---	---
Northern pike	---	---	---	---	---	---	---	---
Shiner family	---	---	---	---	---	---	---	---
Bluntnose minnow	---	---	---	---	---	---	---	---
Brown bullhead	---	---	---	---	---	---	---	---
Black crappie	---	---	---	---	---	---	---	---
Unidentified fish (damaged)	15	566	---	---	---	---	---	---
Total(a)	31	618	1,335	22,056	12,280	130,866	63,094	1,869,769

a. Totals may not equal sum at column or row as a result of rounding.

TABLE A-5 (Cont.)

	MAY		JUN		JUL		AUG	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Alewife	6,804	167,228	16,907	390,831	8,118	186,179	1,163	13,265
Rainbow smelt	2,852	18,405	5,910	20,567	15	123	2,465	4,918
Sculpin family	752	2,672	383	1,223	39	106	88	280
White perch	112	9,481	72	9,913	8	817	21	4,998
Gizzard shad	---	---	---	---	8	262	5	274
Tessellated darter	351	821	298	489	---	---	46	41
Trout perch	181	2,152	536	6,496	154	1,750	15	258
Spottail shiner	72	764	506	5,216	216	2,247	46	380
Crayfish	28	210	15	84	15	213	83	214
Threespine stickleback	---	---	---	---	---	---	---	---
Yellow perch	14	1,698	36	3,017	15	2,097	10	1,096
Smallmouth bass	9	871	7	4,413	---	---	62	3,233
Rock bass	5	490	43	3,270	---	---	41	8,968
Stonecat	3	237	15	1,888	23	1,681	46	2,584
American eel	2	175	---	---	8	41	15	1,256
White sucker	3	3,210	---	---	8	9,421	21	12,602
Chinook salmon	5	13	29	92	8	1,264	---	---
Emerald shiner	3	16	7	27	---	---	---	---
White bass	---	---	---	---	---	---	---	---
Bluegill	---	---	7	61	---	---	---	---
Clam	---	---	---	---	---	---	---	---
Blacknose dace	3	9	---	---	---	---	---	---
Longnose dace	---	---	---	---	---	---	---	---
Burbot	---	---	---	---	---	---	5	2,951
Pumpkinseed	---	---	---	---	---	---	---	---
Tadpoles	---	---	---	---	15	69	---	---
Rainbow trout	2	2,794	---	---	---	---	---	---
Northern pike	---	---	---	---	---	---	---	---
Shiner family	2	1	---	---	---	---	---	---
Bluntnose minnow	2	3	---	---	---	---	---	---
Brown bullhead	---	---	---	---	8	2,521	---	---
Black crappie	---	---	---	---	---	---	5	37
Unidentified fish (damaged)	---	---	---	---	---	---	---	---
Total	11,205	211,250	24,771	447,587	8,658	208,790	4,140	57,356

TABLE A-5 (Cont.)

	SEP		OCT		NOV		DEC		Totals	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Alewife	195	1,499	6,410	12,087	455	10,085	625	15,874	113,526	2,764,552
Rainbow smelt	1,234	565	75	46	263	796	1,309	13,256	16,352	83,383
Sculpin family	22	35	68	149	29	95	231	729	2,391	8,180
White perch	—	—	8	64	—	—	1,384	12,467	1,873	44,165
Gizzard shad	—	—	—	—	161	15,069	1,562	320,240	1,746	348,644
Tessellated darter	7	18	8	29	—	—	15	39	778	1,470
Trout perch	—	—	—	—	—	—	30	125	939	10,840
Spottail shiner	60	120	—	—	15	102	179	1.056	1,148	10,119
Crayfish	—	—	15	45	51	74	134	498	643	2,051
Threespine stickleback	—	—	8	12	7	9	372	460	391	485
Yellow perch	37	8,997	—	—	7	598	112	12,267	261	33,690
Smallmouth bass	7	44	—	—	—	—	22	439	169	9,325
Rock bass	—	—	—	—	7	31	37	9,165	143	22,173
Stonecat	15	734	15	898	7	642	7	692	141	9,369
American eel	—	—	—	—	—	—	112	41,657	137	43,129
White sucker	15	12,056	—	—	7	5,889	—	—	54	43,178
Chinook salmon	—	—	—	—	—	—	—	—	42	1,369
Emerald shiner	—	—	—	—	—	—	—	—	10	43
White bass	—	—	—	—	—	—	—	—	6	179
Bluegill	—	—	—	—	7	124	7	379	21	564
Clam	7	5	8	75	—	—	—	—	39	102
Blacknose dace	—	—	—	—	—	—	—	—	3	9
Longnose dace	—	—	—	—	—	—	15	97	15	97
Burbot	—	—	—	—	—	—	—	—	7	5,498
Pumpkinseed	—	—	15	812	—	—	—	—	15	812
Tadpoles	—	—	—	—	—	—	—	—	15	69
Rainbow trout	—	—	—	—	—	—	—	—	2	2,794
Northern pike	—	—	—	—	—	—	7	974	7	974
Shiner family	—	—	—	—	—	—	—	—	2	1
Bluntnose minnow	—	—	—	—	—	—	—	—	2	3
Brown bullhead	—	—	—	—	—	—	—	—	8	2,521
Black crappie	—	—	—	—	—	—	—	—	5	37
Unidentified fish (damaged)	—	—	8	5	7	70	—	—	30	641
Total	1,600	24,071	6,636	14,223	1,014	33,587	6,159	430,415	140,921	3,450,486

TABLE A-6 LENGTH DISTRIBUTION OF SELECT REPRESENTATIVE IMPORTANT SPECIES IMPINGED AT NINE MILE POINT UNIT 1, 1983

ALEWIFE

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	0	1	0	0	0	0	0	0	0	0	0	0
MAR 83	1	1	3	1	0	7	30	41	2	0	0	0	0
APR 83	0	0	9	1	5	44	239	324	18	0	0	0	0
MAY 83	0	1	54	16	3	45	200	250	11	1	0	0	0
JUN 83	0	0	2	1	2	12	79	61	3	0	0	0	0
JUL 83	0	0	0	0	0	11	61	82	6	0	0	0	0
AUG 83	25	17	0	1	0	4	21	24	2	0	0	0	0
SEP 83	3	6	0	0	0	0	2	1	1	0	0	0	0
OCT 83	3	17	9	0	0	0	0	1	0	0	0	0	0
NOV 83	0	6	4	0	0	1	4	6	1	0	0	0	0
DEC 83	0	0	0	0	0	0	4	14	3	0	0	0	0
INTERVAL TOTALS	32	48	82	20	10	124	640	804	47	1	0	0	0

DATE	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	0	0	0.0	0.0	0.0	0.0	0.0
FEB 83	2	1	80.0	0.0	80.0	80.0	80.0
MAR 83	1021	86	161.9	27.3	45.0	169.5	192.0
APR 83	32570	640	167.1	17.0	74.0	170.0	206.0
MAY 83	3374	581	157.6	30.1	64.0	168.0	210.0
JUN 83	2177	160	164.4	16.3	87.0	167.0	198.0
JUL 83	893	160	169.6	12.5	143.0	170.0	200.0
AUG 83	130	95	112.2	61.4	29.0	148.0	194.0
SEP 83	13	13	90.2	58.6	42.0	59.0	192.0
OCT 83	819	30	67.3	23.4	37.0	66.0	177.0
NOV 83	39	22	124.0	55.7	55.0	152.5	193.0
DEC 83	63	21	175.8	11.1	155.0	175.0	198.0
SUMMARY TOTALS	41101	1809	158.2	32.8	29.0		210.0

P = Number of unmeasured organisms; N = Number of lengths; MIN = Shortest length;
X = Mean length; MED = Median length; SD = Standard deviation; MAX = Greatest length;
NA = Data not available.

TABLE A-6 (Cont.)

RAINBOW SMELT

DATE	LENGTH INTERVALS (MM) 30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	1	5	4	15	7	1	0	1	0	0	0	0
MAR 83	0	6	20	14	15	12	7	4	1	0	0	0	0
APR 83	0	16	50	60	49	95	84	33	6	4	1	0	0
MAY 83	0	37	184	84	37	64	43	20	7	3	0	0	0
JUN 83	0	6	80	42	16	11	4	1	0	0	0	0	0
JUL 83	0	0	0	0	2	0	0	0	0	0	0	0	0
AUG 83	50	0	26	7	2	1	1	0	0	0	0	0	0
SEP 83	19	8	0	1	0	0	0	0	0	0	0	0	0
OCT 83	0	5	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	14	4	0	1	0	0	0	0	0	0	0	0
DEC 83	0	0	4	0	20	10	8	4	1	1	0	0	0
INTERVAL TOTALS	69	93	373	212	157	200	148	62	16	8	1	0	0

DATE	P	N	X	SD	RANGE MIN	RANGE MED	RANGE MAX
JAN 83	0	0	0.0	0.0	0.0	0.0	0.0
FEB 83	21	34	116.1	24.0	62.0	118.5	190.0
MAR 83	2	79	111.4	34.0	56.0	107.0	196.0
APR 83	125	398	129.2	35.6	54.0	134.0	242.0
MAY 83	1178	479	105.9	35.6	52.0	92.0	225.0
JUN 83	657	160	94.4	22.5	63.0	87.0	175.0
JUL 83	0	2	111.5	0.7	111.0	111.5	112.0
AUG 83	390	87	61.8	26.5	34.0	46.0	156.0
SEP 83	137	28	48.9	12.5	38.0	48.5	108.0
OCT 83	5	5	59.0	6.0	54.0	55.0	67.0
NOV 83	17	19	65.8	16.7	53.0	63.0	127.0
DEC 83	128	48	135.2	30.0	71.0	129.5	229.0
SUMMARY TOTALS	2660	1339	108.3	38.6	34.0		242.0

TABLE A-6 (Cont.)

WHITE PERCH

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9	290.0 309.9
JAN 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	1	2	0	0	0	0	0	0	0	0	0	0	0
MAR 83	0	1	6	4	1	0	0	0	0	0	0	0	0	0
APR 83	1	11	24	20	2	0	0	1	0	1	2	0	3	1
MAY 83	0	5	28	12	0	1	1	0	1	3	5	4	2	3
JUN 83	0	0	5	0	0	0	0	0	0	0	1	1	0	0
JUL 83	0	0	0	0	0	0	0	0	0	1	0	0	0	0
AUG 83	0	0	0	0	0	0	0	0	0	1	3	0	0	0
SEP 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC 83	1	8	30	6	3	1	1	1	1	0	0	0	0	0
INTERVAL TOTALS	2	26	95	42	6	2	2	2	2	6	11	5	5	4

DATE	P	N	X	SD	RANGE MIN	RANGE MED	RANGE MAX
JAN 83	0	0	0.0	0.0	0.0	0.0	0.0
FEB 83	0	3	68.3	10.0	57.0	72.0	76.0
MAR 83	0	12	87.3	12.1	68.0	87.5	110.0
APR 83	0	66	102.5	59.6	49.0	83.5	295.0
MAY 83	0	65	131.4	78.5	57.0	89.0	305.0
JUN 83	3	7	128.0	81.2	78.0	81.0	257.0
JUL 83	0	1	210.0	0.0	210.0	210.0	210.0
AUG 83	0	4	233.0	6.8	225.0	233.5	240.0
SEP 83	0	0	0.0	0.0	0.0	0.0	0.0
OCT 83	1	0	0.0	0.0	0.0	0.0	0.0
NOV 83	0	0	0.0	0.0	0.0	0.0	0.0
DEC 83	134	52	87.3	28.9	49.0	83.5	207.0
SUMMARY TOTALS	138	210	110.2	63.9	49.0		305.0

TABLE A-6 (Cont.)

YELLOW PERCH

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9	290.9 309.9	310.0 329.9
JAN 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
MAR 83	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
APR 83	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
MAY 83	0	0	0	0	0	0	1	2	0	2	3	0	0	0	0
JUN 83	0	0	0	0	1	0	1	1	0	1	0	1	0	0	0
JUL 83	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
AUG 83	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
SEP 83	0	0	0	0	0	0	0	1	0	0	1	1	1	0	1
OCT 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
DEC 83	0	0	0	0	0	2	4	1	3	3	1	0	1	0	0
INTERVAL TOTALS	0	0	1	0	1	2	6	7	6	7	6	4	2	0	1

DATE	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	0	0	0.0	0.0	0.0	0.0	0.0
FEB 83	0	2	219.0	38.2	192.0	219.0	246.0
MAR 83	0	1	223.0	0.0	223.0	223.0	223.0
APR 83	0	2	139.5	75.7	86.0	139.5	193.0
MAY 83	0	8	209.5	30.4	165.0	215.5	242.0
JUN 83	0	5	186.0	50.2	123.0	188.0	252.0
JUL 83	0	2	232.0	46.7	199.0	232.0	265.0
AUG 83	0	2	210.5	55.9	171.0	210.5	250.0
SEP 83	0	5	256.0	51.3	180.0	255.0	321.0
OCT 83	0	0	0.0	0.0	0.0	0.0	0.0
NOV 83	0	1	188.0	0.0	188.0	188.0	188.0
DEC 83	0	15	193.0	41.2	140.0	196.0	285.0
SUMMARY TOTALS	0	43	204.5	46.7	86.0		321.0

TABLE A-6 (Cont.)

SPOTTAIL SHINER

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	1	0	0	0	0	0	0	0	0	0	0	0
MAR 83	0	1	0	1	0	0	0	0	0	0	0	0	0
APR 83	0	2	0	1	3	0	0	0	0	0	0	0	0
MAY 83	0	11	0	8	13	6	0	0	0	0	0	0	0
JUN 83	0	16	1	5	13	7	0	0	0	0	0	0	0
JUL 83	0	1	0	2	12	4	0	0	0	0	0	0	0
AUG 83	0	1	1	1	0	0	0	0	0	0	0	0	0
SEP 83	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT 83	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC 83	0	0	0	0	0	0	0	0	0	0	0	0	0
INTERVAL TOTALS	0	33	2	18	41	17	0	0	0	0	0	0	0

DATE	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	0	0	0.0	0.0	0.0	0.0	0.0
FEB 83	0	1	50.0	0.0	50.0	50.0	50.0
MAR 83	0	2	82.5	24.7	65.0	82.5	100.0
APR 83	0	6	95.0	24.8	60.0	107.5	117.0
MAY 83	4	38	99.1	30.3	51.0	107.5	137.0
JUN 83	28	42	95.5	32.9	50.0	108.0	140.0
JUL 83	9	19	116.1	15.8	59.0	118.0	132.0
AUG 83	6	3	75.0	20.5	55.0	74.0	96.0
SEP 83	8	0	0.0	0.0	0.0	0.0	0.0
OCT 83	0	0	0.0	0.0	0.0	0.0	0.0
NOV 83	2	0	0.0	0.0	0.0	0.0	0.0
DEC 83	24	0	0.0	0.0	0.0	0.0	0.0
SUMMARY TOTALS	81	111	99.0	29.9	50.0		140.0

TABLE A-6 (Cont.)

SMALLMOUTH BASS

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9	290.0 309.9
JAN 83	0	1	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	1	4	0	0	0	0	0	0	0	0	0	0	0
MAR 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APR 83	0	2	2	0	0	0	0	0	0	0	0	0	0	0
MAY 83	0	0	4	0	0	0	0	0	0	0	0	0	0	0
JUN 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUL 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG 83	1	2	1	0	0	0	0	0	0	0	0	0	0	0
SEP 83	0	0	1	0	0	0	0	0	0	0	0	0	0	0
OCT 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC 83	0	0	0	1	2	0	0	0	0	0	0	0	0	0
INTERVAL TOTALS	1	6	12	1	2	0	0	0	0	0	0	0	0	0

	LENGTH INTERVALS (MM)								RANGE		
DATE	310.0 329.9	330.0 349.9	350.0 369.9	370.0 389.9	P	N	X	SD	MIN	MED	MAX
JAN 83	0	0	0	0	0	1	61.0	0.0	61.0	61.0	61.0
FEB 83	0	0	0	0	0	5	73.8	12.4	54.0	79.0	85.0
MAR 83	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
APR 83	0	0	0	0	0	4	72.8	9.4	64.0	71.0	85.0
MAY 83	1	0	0	0	0	5	127.8	106.4	75.0	84.0	318.0
JUN 83	0	1	0	0	0	1	343.0	0.0	343.0	343.0	343.0
JUL 83	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
AUG 83	0	0	0	1	7	5	121.2	139.5	46.0	65.0	370.0
SEP 83	0	0	0	0	0	1	75.0	0.0	75.0	75.0	75.0
OCT 83	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
NOV 83	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
DEC 83	0	0	0	0	0	3	110.0	6.2	103.0	112.0	115.0
SUMMARY TOTALS	1	1	0	1	7	25	108.6	90.4	46.0		370.0

TABLE A-7 TEMPORAL ABUNDANCE AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT JAMES A. FITZPATRICK, 1983

	JAN		FEB		MAR		APR		MAY		JUN	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	124	21.6	---	---	258	46.7	4,482	85.5	23,235	70.0	170	32.1
Rainbow smelt	397	69.0	106	63.1	246	44.6	614	11.7	7,529	22.7	322	60.9
Trout perch	---	---	---	---	---	---	5	0.1	1,059	3.2	8	1.5
White perch	4	0.7	9	5.4	13	2.4	52	1.0	275	0.8	2	0.4
Spottail shiner	4	0.7	3	1.8	5	0.9	2	T	333	1.0	7	1.3
Sculpin family	15	2.6	16	9.5	9	1.6	25	0.5	293	0.9	3	0.6
Threespine stickleback	1	0.2	---	---	2	0.4	1	T	10	T	---	---
Gizzard shad	1	0.2	---	---	---	---	5	0.1	6	T	---	---
Tessellated darter	---	---	2	1.2	---	---	6	0.1	233	0.7	1	0.2
Crayfish	4	0.7	2	1.2	---	---	14	0.3	39	0.1	---	---
Rock bass	6	1.0	23	13.7	15	2.7	11	0.2	44	0.1	6	1.1
Yellow perch	5	0.9	2	1.2	2	0.4	8	0.2	48	0.1	1	0.2
Smallmouth bass	---	---	---	---	1	0.2	3	T	25	0.1	6	1.1
Pumpkinseed	1	0.2	1	0.6	---	---	---	---	---	---	---	---
Stonecat	---	---	2	1.2	---	---	1	T	12	T	2	0.4
Brown trout	2	0.4	---	---	1	0.2	1	T	1	T	---	---
White sucker	---	---	---	---	---	---	2	T	2	T	---	---
Bluegill	1	0.2	---	---	---	---	1	T	5	T	---	---
Emerald shiner	4	0.7	---	---	---	---	1	T	6	T	---	---
White bass	4	0.7	1	0.6	---	---	3	T	2	T	---	---
Clam	2	0.4	---	---	---	---	---	---	---	---	---	---
Lake trout	---	---	---	---	---	---	---	---	8	T	---	---
American eel	---	---	---	---	---	---	---	---	3	T	---	---
Cisco	---	---	---	---	---	---	---	---	---	---	---	---
Central mudminnow	---	---	---	---	---	---	2	T	---	---	---	---
Brown bullhead	---	---	---	---	---	---	---	---	---	---	---	---
Coho salmon	---	---	---	---	---	---	---	---	---	---	1	0.2
Chinook salmon	---	---	---	---	---	---	---	---	1	T	---	---
Rainbow trout	---	---	---	---	---	---	---	---	1	T	---	---
Chain pickerel	---	---	---	---	---	---	---	---	1	T	---	---
Golden shiner	---	---	---	---	---	---	---	---	1	T	---	---
Lake chub	---	---	---	---	---	---	1	T	---	---	---	---
White catfish	---	---	---	---	---	---	---	---	1	T	---	---
Black bullhead	---	---	---	---	---	---	---	---	---	---	---	---
Yellow bullhead	---	---	1	0.6	---	---	---	---	---	---	---	---
Burbot	---	---	---	---	---	---	---	---	1	T	---	---
Sunfish family	---	---	---	---	---	---	---	---	---	---	---	---
Black crappie	---	---	---	---	---	---	---	---	1	T	---	---
Walleye	---	---	---	---	---	---	---	---	1	T	---	---
Total	575	---	168	---	552	---	5,240	---	33,176	---	529	---

NOTE: "T" represents a trace percentage of less than 0.1 percent. Percentage totals may not equal 100.0 percent due to rounding.

TABLE A-7 (Cont.)

	JUL		AUG		SEP		OCT		NOV		DEC		Totals	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	83	80.6	405	63.2	670	32.5	243	65.9	87	51.2	241	11.3	29,998	65.6
Rainbow smelt	3	2.9	206	32.1	1,329	64.6	79	21.4	57	33.5	432	20.2	11,320	24.8
Trout perch	---	---	4	0.6	7	0.3	---	---	---	---	---	---	1,083	2.4
White perch	---	---	---	---	---	---	---	---	1	0.6	580	27.1	936	2.0
Spottail shiner	1	1.0	3	0.5	16	0.8	5	1.4	---	---	33	1.5	412	0.9
Sculpin family	1	1.0	3	0.5	12	0.6	4	1.1	---	---	18	0.8	399	0.9
Threespine stickleback	---	---	1	0.2	---	---	---	---	---	---	364	17.0	379	0.8
Gizzard shad	---	---	---	---	---	---	2	0.5	4	2.4	342	16.0	360	0.8
Tessellated darter	---	---	1	0.2	5	0.2	8	2.2	3	1.8	9	0.4	268	0.6
Crayfish	2	1.9	5	0.8	2	0.1	15	4.1	8	4.7	48	2.2	139	0.3
Rock bass	1	1.0	---	---	1	T	1	0.3	---	---	8	0.4	116	0.3
Yellow perch	---	---	1	0.2	7	0.3	1	0.3	3	1.8	18	0.8	96	0.2
Smallmouth bass	1	1.0	2	0.3	1	T	1	0.3	1	0.6	11	0.5	52	0.1
Pumpkinseed	---	---	---	---	---	---	---	---	---	---	32	1.5	34	0.1
Stonecat	3	2.9	2	0.3	1	T	---	---	---	---	2	0.1	25	0.1
Brown trout	3	2.9	4	0.6	1	T	---	---	1	0.6	---	---	14	T
White sucker	2	1.9	3	0.5	2	0.1	---	---	3	1.8	---	---	14	T
Bluegill	---	---	1	0.2	1	T	4	1.1	---	---	---	---	13	T
Emerald shiner	---	---	---	---	---	---	---	---	---	---	---	---	11	T
White bass	---	---	---	---	---	---	---	---	---	---	1	T	11	T
Clam	---	---	---	---	3	0.2	6	1.6	---	---	---	---	11	T
Lake trout	---	---	---	---	---	---	---	---	---	---	---	---	8	T
American eel	---	---	---	---	---	---	---	---	2	1.2	---	---	5	T
Cisco	3	2.9	---	---	---	---	---	---	---	---	---	---	3	T
Central mudminnow	---	---	---	---	---	---	---	---	---	---	---	---	2	T
Brown bullhead	---	---	---	---	---	---	---	---	---	---	2	0.1	2	T
Coho salmon	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Chinook salmon	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Rainbow trout	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Chain pickerel	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Golden shiner	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Lake chub	---	---	---	---	---	---	---	---	---	---	---	---	1	T
White catfish	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Black bullhead	---	---	---	---	1	T	---	---	---	---	---	---	1	T
Yellow bullhead	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Burbot	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Sunfish family	---	---	---	---	---	---	---	---	---	---	1	T	1	T
Black crappie	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Walleye	---	---	---	---	---	---	---	---	---	---	---	---	1	T
Total	103	---	641	---	2,059	---	369	---	170	---	2,142	---	45,724	---

TABLE A-8. BIOMASS (G) AND PERCENT COMPOSITION OF IMPINGED TAXA COLLECTED AT JAMES A. FITZPATRICK, 1983

	JAN		FEB		MAR		APR		MAY		JUN	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	4,021	25.9	---	---	7,026	42.7	134,050	86.4	512,212	80.9	4,672	38.4
Rainbow smelt	2,188	14.1	725	12.3	2,451	14.9	6,268	4.0	58,243	9.2	785	6.5
Gizzard shad	1,309	8.5	---	---	---	---	961	0.6	59	T	---	---
Brown trout	5,526	35.7	---	---	3,186	19.4	2,800	1.8	2,246	0.4	---	---
Rock bass	1,672	10.8	3,954	66.8	2,740	16.6	2,666	1.7	9,445	1.5	1,372	11.3
Smallmouth bass	---	---	---	---	639	3.9	940	0.6	6,379	1.0	4,435	36.4
Trout perch	---	---	---	---	---	---	89	0.1	12,993	2.0	136	1.1
White sucker	---	---	---	---	---	---	2,854	1.8	1,722	0.3	---	---
White perch	258	1.7	303	5.1	71	0.4	2,424	1.6	4,134	0.7	308	2.5
Yellow perch	219	1.4	354	6.0	272	1.7	1,489	1.0	3,330	0.5	101	0.8
Spottail shiner	50	0.3	9	0.2	55	0.3	4	T	5,199	0.8	94	0.8
White catfish	---	---	---	---	---	---	---	---	4,400	0.7	---	---
American eel	---	---	---	---	---	---	---	---	3,942	0.6	---	---
Cisco	---	---	---	---	---	---	---	---	---	---	---	---
Rainbow trout	---	---	---	---	---	---	---	---	2,075	0.3	---	---
Burbot	---	---	---	---	---	---	---	---	2,000	0.3	---	---
Stonecat	---	---	146	2.5	---	---	64	T	999	0.2	223	1.8
Walleye	---	---	---	---	---	---	---	---	1,252	0.2	---	---
Sculpins	33	0.2	38	0.6	23	0.1	78	0.1	965	0.2	8	0.1
Pumpkinseed	109	0.7	2	T	---	---	---	---	---	---	---	---
White bass	63	0.4	14	0.2	---	---	371	0.2	403	0.1	---	---
Tessellated darter	---	---	4	0.1	---	---	16	T	620	0.1	2	T
Crayfish	8	0.1	7	0.1	---	---	42	T	214	T	---	---
Threespine stickleback	1	T	---	---	3	T	1	T	13	T	---	---
Yellow bullhead	---	---	364	6.2	---	---	---	---	---	---	---	---
Black bullhead	---	---	---	---	---	---	---	---	---	---	---	---
Lake trout	---	---	---	---	---	---	---	---	148	T	---	---
Chain pickerel	---	---	---	---	---	---	---	---	112	T	---	---
Bluegill	33	0.2	---	---	---	---	9	T	25	T	---	---
Coho salmon	---	---	---	---	---	---	---	---	---	---	47	0.4
Emerald shiner	8	T	---	---	---	---	2	T	22	T	---	---
Brown bullhead	---	---	---	---	---	---	---	---	---	---	---	---
Lake chub	---	---	---	---	---	---	27	T	---	---	---	---
Central mudminnow	---	---	---	---	---	---	25	T	---	---	---	---
Clam	<1	T	---	---	---	---	---	---	---	---	---	---
Chinook salmon	---	---	---	---	---	---	---	---	4	T	---	---
Sunfish family	---	---	---	---	---	---	---	---	---	---	---	---
Golden shiner	---	---	---	---	---	---	---	---	2	T	---	---
Black crappie	---	---	---	---	---	---	---	---	2	T	---	---
Total	15,499	---	5,920	---	16,466	---	155,181	---	633,160	---	12,183	---

NOTE: "T" represents a trace percentage of less than 0.1 percent. Percentage totals may not equal 100 percent due to rounding.

TABLE A-8 (Cont.)

	JUL		AUG		SEP		OCT		NOV		DEC		Totals	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alewife	2,059	15.7	1,065	10.7	1,531	27.0	675	33.2	3,390	49.3	9,346	11.0	680,047	70.7
Rainbow smelt	3	T	300	3.0	871	15.4	153	7.5	202	2.9	1,981	2.3	74,170	7.7
Gizzard shad	---	---	---	---	---	---	554	27.3	476	6.9	65,842	77.3	69,201	7.2
Brown trout	6,077	46.3	5,600	56.1	183	3.2	---	---	355	5.2	---	---	25,973	2.7
Rock bass	185	1.4	---	---	71	1.3	400	19.7	---	---	48	0.1	22,553	2.3
Smallmouth bass	123	0.9	804	8.1	6	0.1	29	1.4	454	6.6	223	0.3	14,032	1.5
Trout perch	---	---	39	0.4	25	0.4	---	---	---	---	---	---	13,282	1.4
White sucker	1,917	14.6	1,951	19.5	1,405	24.8	---	---	1,526	22.2	---	---	11,375	1.2
White perch	---	---	---	---	---	---	---	---	13	0.2	3,669	4.3	11,181	1.2
Yellow perch	---	---	32	0.3	1,127	19.9	151	7.4	286	4.2	2,156	2.5	9,517	1.0
Spottail shiner	15	0.1	7	0.1	21	0.4	10	0.5	---	---	113	0.1	5,577	0.6
White catfish	---	---	---	---	---	---	---	---	---	---	---	---	4,400	0.5
American eel	---	---	---	---	---	---	---	---	116	1.7	---	---	4,058	0.4
Cisco	2,576	19.6	---	---	---	---	---	---	---	---	---	---	2,576	0.3
Rainbow trout	---	---	---	---	---	---	---	---	---	---	---	---	2,075	0.2
Burbot	---	---	---	---	---	---	---	---	---	---	---	---	2,000	0.2
Stonecat	165	1.3	131	1.3	150	2.7	---	---	---	---	15	T	1,893	0.2
Walleye	---	---	---	---	---	---	---	---	---	---	---	---	1,252	0.1
Sculpins	4	T	6	0.1	13	0.2	13	0.6	---	---	53	0.1	1,235	0.1
Pumpkinseed	---	---	---	---	---	---	---	---	---	---	878	1.0	989	0.1
White bass	---	---	---	---	---	---	---	---	---	---	57	0.1	908	0.1
Tessellated darter	---	---	2	T	4	0.1	3	0.1	7	0.1	15	T	673	0.1
Crayfish	4	T	47	0.5	4	0.1	36	1.8	52	0.8	209	0.2	622	0.1
Threespine stickleback	---	---	<1	T	---	---	---	---	---	---	497	0.6	515	0.1
Yellow bullhead	---	---	---	---	---	---	---	---	---	---	---	---	364	T
Black bullhead	---	---	---	---	249	4.4	---	---	---	---	---	---	249	T
Lake trout	---	---	---	---	---	---	---	---	---	---	---	---	148	T
Chain pickerel	---	---	---	---	---	---	---	---	---	---	---	---	112	T
Bluegill	---	---	1.0	T	2	---	4	0.2	---	---	---	---	73	T
Coho salmon	---	---	---	---	---	---	---	---	---	---	---	---	47	T
Emerald shiner	---	---	---	---	---	---	---	---	---	---	---	---	33	T
Brown bullhead	---	---	---	---	---	---	---	---	---	---	30	T	30	T
Lake chub	---	---	---	---	---	---	---	---	---	---	---	---	27	T
Central mudminnow	---	---	---	---	---	---	---	---	---	---	---	---	25	T
Clam	---	---	---	---	2	T	3	0.2	---	---	---	---	5	T
Chinook salmon	---	---	---	---	---	---	---	---	---	---	---	---	4	T
Sunfish family	---	---	---	---	---	---	---	---	---	---	3	T	3	T
Golden shiner	---	---	---	---	---	---	---	---	---	---	---	---	2	T
Black crappie	---	---	---	---	---	---	---	---	---	---	---	---	2	T
Total	13,128	---	9,984	---	5,663	---	2,031	---	6,877	---	85,135	---	961,228	---

TABLE A-9. ESTIMATED ABUNDANCE AND BIOMASS (G) FOR IMPINGED TAXA AT JAMES A. FITZPATRICK, 1982

	JAN		FEB		MAR		APR	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Alewife	1,041	33,744	---	---	1,844	50,218	8,410	251,521
Rainbow smelt	3,332	18,363	896	6,130	1,758	17,518	1,152	11,761
Trout perch	---	---	---	---	---	---	10	168
White perch	34	2,165	76	2,566	93	507	97	4,548
Spottail shiner	34	416	25	79	36	392	4	7
Sculpin family	126	279	135	318	64	167	47	147
Threespine stickleback	8	8	---	---	14	18	2	3
Gizzard shad	8	10,986	---	---	---	---	10	1,803
Tessellated darter	---	---	17	30	---	---	11	29
Crayfish	34	70	17	60	---	---	27	78
Rock bass	50	14,032	195	33,438	107	19,584	29	5,002
Yellow perch	42	1,842	17	2,994	14	1,944	15	2,793
Smallmouth bass	---	---	---	---	7	4,567	6	1,764
Pumpkinseed	8	915	8	16	---	---	---	---
Stonecat	---	---	17	1,235	---	---	2	120
Brown trout	17	46,376	---	---	7	22,772	2	5,254
White sucker	---	---	---	---	---	---	4	5,355
Bluegill	8	277	---	---	---	---	2	17
Emerald shiner	34	67	---	---	---	---	2	4
White bass	34	529	8	118	---	---	6	697
Lake trout	---	---	---	---	---	---	---	---
American eel	---	---	---	---	---	---	---	---
Cisco	---	---	---	---	---	---	---	---
Central mudminnow	---	---	---	---	---	---	4	46
Brown bullhead	---	---	---	---	---	---	---	---
Clam	17	2	---	---	---	---	---	---
Coho salmon	---	---	---	---	---	---	---	---
Chinook salmon	---	---	---	---	---	---	---	---
Rainbow trout	---	---	---	---	---	---	---	---
Chain pickerel	---	---	---	---	---	---	---	---
Golden shiner	---	---	---	---	---	---	---	---
Lake chub	---	---	---	---	---	---	2	51
White catfish	---	---	---	---	---	---	---	---
Black bullhead	---	---	---	---	---	---	---	---
Yellow bullhead	---	---	8	3,078	---	---	---	---
Burbot	---	---	---	---	---	---	---	---
Sunfish family	---	---	---	---	---	---	---	---
Black crappie	---	---	---	---	---	---	---	---
Walleye	---	---	---	---	---	---	---	---
Total(a)	4,826	130,072	1,421	50,062	3,945	117,686	9,832	291,169

a. Totals may not equal sum of column or row as a result of rounding.

TABLE A-9 (Cont.)

	MAY		JUN		JUL		AUG	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Alewife	36,112	796,077	880	24,190	670	16,625	3,125	8,217
Rainbow smelt	11,702	90,521	1,667	4,066	24	24	1,589	2,312
Trout perch	1,646	20,194	41	704	—	—	30	301
White perch	427	6,425	10	1,595	—	—	—	—
Spottail shiner	455	8,080	36	489	8	121	23	52
Sculpin family	518	1,500	16	40	8	34	23	46
Threespine stickleback	15	20	—	—	—	—	8	2
Gizzard shad	9	92	—	—	—	—	—	—
Tessellated darter	362	963	5	8	—	—	8	12
Crayfish	59	332	—	—	16	30	38	363
Rock bass	68	14,679	32	7,104	8	1,494	—	—
Yellow perch	75	5,175	5	523	—	—	8	247
Smallmouth bass	39	9,914	32	22,962	8	993	15	6,205
Pumpkinseed	—	—	—	—	—	—	—	—
Stonecat	19	1,553	10	1,155	24	1,332	15	1,011
Brown trout	1	3,491	—	—	24	49,068	30	43,205
White sucker	3	2,676	—	—	16	15,479	23	15,052
Bluegill	8	38	—	—	—	—	8	7
Emerald shiner	9	35	—	—	—	—	—	—
White bass	3	626	—	—	—	—	—	—
Lake trout	13	230	—	—	—	—	—	—
American eel	5	6,127	—	—	—	—	—	—
Cisco	—	—	—	—	24	20,800	—	—
Central mudminnow	—	—	—	—	—	—	—	—
Brown bullhead	—	—	—	—	—	—	—	—
Clam	—	—	—	—	—	—	—	—
Coho salmon	—	—	5	243	—	—	—	—
Chinook salmon	1	6	—	—	—	—	—	—
Rainbow trout	1	3,225	—	—	—	—	—	—
Chain pickerel	1	174	—	—	—	—	—	—
Golden shiner	1	3	—	—	—	—	—	—
Lake chub	—	—	—	—	—	—	—	—
White catfish	1	6,838	—	—	—	—	—	—
Black bullhead	—	—	—	—	—	—	—	—
Yellow bullhead	—	—	—	—	—	—	—	—
Burbot	1	3,108	—	—	—	—	—	—
Sunfish family	—	—	—	—	—	—	—	—
Black crappie	1	2	—	—	—	—	—	—
Walleye	1	1,946	—	—	—	—	—	—
Total	51,562	984,053	2,739	63,080	832	106,000	4,945	77,031

TABLE A-9 (Cont.)

	SEP		OCT		NOV		DEC		Totals	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Alewife	4,904	11,206	1,890	5,250	654	25,474	1,876	72,751	61,406	1,295,273
Rainbow smelt	9,728	6,373	614	1,192	429	1,516	3,363	15,421	36,254	175,190
Trout perch	51	183	---	---	---	---	---	---	1,778	21,550
White perch	---	---	---	---	8	98	4,515	28,560	5,260	46,464
Spottail shiner	117	156	39	77	---	---	257	880	1,034	10,749
Sculpin family	88	97	31	102	---	---	140	413	1,196	3,143
Threespine stickleback	---	---	---	---	---	---	2,833	3,869	2,880	3,920
Gizzard shad	---	---	16	4,309	30	3,577	2,662	512,525	2,735	533,292
Tesslelated darter	37	26	62	22	23	53	70	117	595	1,260
Crayfish	15	27	117	280	60	391	374	1,623	757	3,254
Rock bass	8	520	8	3,111	---	---	62	374	567	99,338
Yellow perch	51	8,249	8	1,174	23	2,149	140	16,783	398	43,873
Smallmouth bass	8	41	8	225	8	3,412	86	1,736	217	51,819
Pumpkinseed	---	---	---	---	---	---	249	6,834	265	7,765
Stonecat	8	1,098	---	---	---	---	16	117	111	7,621
Brown trout	8	1,339	---	---	8	2,667	---	---	97	174,172
White sucker	15	10,284	---	---	23	11,467	---	---	84	60,313
Bluegill	8	13	31	31	---	---	---	---	65	383
Emerald shiner	---	---	---	---	---	---	---	---	45	106
White bass	---	---	---	---	---	---	8	444	59	2,414
Lake trout	---	---	---	---	---	---	---	---	13	320
American eel	---	---	---	---	15	872	---	---	20	6,999
Cisco	---	---	---	---	---	---	---	---	24	20,800
Central mudminnow	---	---	---	---	---	---	---	---	4	46
Brown bullhead	---	---	---	---	---	---	16	234	16	234
Clam	22	14	47	25	---	---	---	---	86	41
Coho salmon	---	---	---	---	---	---	---	---	5	243
Chinook salmon	---	---	---	---	---	---	---	---	1	6
Rainbow trout	---	---	---	---	---	---	---	---	1	3,225
Chain pickerel	---	---	---	---	---	---	---	---	1	174
Golden shiner	---	---	---	---	---	---	---	---	1	3
Lake chub	---	---	---	---	---	---	---	---	2	51
White catfish	---	---	---	---	---	---	---	---	1	6,838
Black bullhead	8	1,823	---	---	---	---	---	---	8	1,823
Yellow bullhead	---	---	---	---	---	---	---	---	8	2,233
Burbot	---	---	---	---	---	---	---	---	1	3,108
Sunfish family	---	---	---	---	---	---	8	25	8	25
Black crappie	---	---	---	---	---	---	---	---	1	2
Walleye	---	---	---	---	---	---	---	---	1	1,946
Total	15,071	41,450	2,870	15,799	1,277	51,676	16,674	662,704	116,005	2,590,016

TABLE A-10 LENGTH DISTRIBUTION OF SELECT REPRESENTATIVE IMPORTANT SPECIES IMPINGED AT JAMES A. FITZPATRICK, 1983

ALEWIFE

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
	LENGTH INTERVALS (MM)												
JAN 83	0	0	0	0	0	8	42	28	3	0	0	0	0
FEB 83	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR 83	0	1	13	3	0	0	34	66	4	0	0	0	0
APR 83	0	1	25	5	6	32	228	315	27	1	0	0	0
MAY 83	0	2	91	16	6	13	191	356	43	1	0	0	0
JUN 83	0	0	0	0	0	5	44	105	6	0	0	0	0
JUL 83	0	0	0	0	0	1	19	47	3	0	0	0	0
AUG 83	9	17	1	0	0	0	6	19	0	0	0	0	0
SEP 83	45	35	6	0	0	0	2	10	1	0	0	0	0
OCT 83	10	29	1	0	0	0	2	3	2	0	0	0	0
NOV 83	0	5	0	0	0	0	5	54	13	0	0	0	0
DEC 83	0	0	4	0	1	1	9	24	6	0	0	0	0
INTERVAL TOTALS	64	90	141	24	13	60	582	1027	108	2	0	0	0

DATE	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	43	81	166.5	12.9	145.0	166.0	198.0
FEB 83	0	0	0.0	0.0	0.0	0.0	0.0
MAR 83	137	121	160.3	33.7	69.0	172.0	207.0
APR 83	3842	640	165.8	22.9	69.0	170.0	223.0
MAY 83	22516	719	159.2	35.0	63.0	171.0	210.0
JUN 83	10	160	173.4	11.4	145.0	175.0	207.0
JUL 83	13	70	173.7	11.1	149.0	173.0	207.0
AUG 83	353	52	110.7	61.4	30.0	74.0	186.0
SEP 83	571	99	68.3	43.7	34.0	52.0	194.0
OCT 83	196	47	72.1	45.4	39.0	54.0	195.0
NOV 83	10	77	173.7	31.1	53.0	180.0	204.0
DEC 83	196	45	166.5	31.5	73.0	175.0	201.0
SUMMARY TOTALS	27887	2111	156.4	39.9	30.0		223.0

P = Number of unmeasured organisms; N = Number of lengths; MIN = Shortest length;
X = Mean length; MED = Median length; SD = Standard deviation; MAX = Greatest length;
NA = Data not available.

TABLE A-10 (Cont.)

RAINBOW SMELT

DATE	LENGTH INTERVALS (MM) 30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	36	44	22	11	28	7	2	3	0	0	0	0
FEB 83	4	13	19	10	12	16	5	1	1	0	0	0	0
MAR 83	1	7	20	20	16	34	19	3	2	0	0	0	0
APR 83	1	41	127	78	63	97	63	24	4	1	1	0	0
MAY 83	0	48	203	156	53	99	98	33	14	5	4	1	0
JUN 83	0	44	52	2	2	4	1	2	0	0	0	0	0
JUL 83	0	1	1	0	0	0	0	0	0	0	0	0	0
AUG 83	31	3	7	5	2	0	1	0	0	0	0	0	0
SEP 83	18	59	0	2	0	0	1	0	0	0	0	0	0
OCT 83	1	27	2	2	0	2	0	0	1	0	0	0	0
NOV 83	0	16	17	2	0	1	1	1	1	0	0	0	0
DEC 83	1	6	4	4	17	17	2	1	1	0	0	0	0
INTERVAL TOTALS	57	301	496	303	176	298	198	67	27	6	5	1	0

DATE	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	244	153	97.8	34.6	51.0	88.0	205.0
FEB 83	25	81	102.9	35.7	45.0	94.0	200.0
MAR 83	124	122	120.3	33.7	37.0	128.0	204.0
APR 83	114	500	114.1	35.2	45.0	110.0	235.0
MAY 83	6815	714	113.6	38.4	51.0	102.0	264.0
JUN 83	215	107	77.1	22.9	51.0	73.0	172.0
JUL 83	1	2	75.0	14.1	65.0	75.0	85.0
AUG 83	157	49	59.0	27.0	37.0	45.0	151.0
SEP 83	1249	80	55.4	14.5	42.0	53.0	160.0
OCT 83	44	35	69.0	31.5	49.0	58.0	198.0
NOV 83	18	39	81.8	33.7	59.0	70.0	206.0
DEC 83	379	53	116.2	32.0	45.0	126.0	192.0
SUMMARY TOTALS	9385	1935	105.2	38.8	37.0		264.0

TABLE A-10 (Cont.)

WHITE PERCH

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	2	0	1	0	0	0	0	0	0	0	1	0
FEB 83	0	2	3	2	0	1	0	0	0	0	0	0	0
MAR 83	0	1	11	1	0	0	0	0	0	0	0	0	0
APR 83	0	9	23	8	1	0	1	3	1	1	2	1	2
MAY 83	0	25	88	25	0	0	1	3	1	3	5	2	0
JUN 83	0	0	1	0	0	0	0	0	0	0	0	0	1
JUL 83	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG 83	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP 83	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT 83	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	0	0	1	0	0	0	0	0	0	0	0	0
DEC 83	0	1	26	6	0	0	0	1	0	0	0	0	0
INTERVAL TOTALS	0	40	152	44	1	1	2	7	2	4	7	4	3

DATE	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	0	4	121.3	87.9	67.0	83.5	251.0
FEB 83	1	8	82.9	28.8	51.0	73.0	145.0
MAR 83	0	13	77.5	9.1	61.0	74.0	92.0
APR 83	0	52	108.5	60.0	57.0	84.0	279.0
MAY 83	118	153	93.5	43.4	61.0	82.0	261.0
JUN 83	0	2	182.5	135.1	87.0	182.5	278.0
JUL 83	0	0	0.0	0.0	0.0	0.0	0.0
AUG 83	0	0	0.0	0.0	0.0	0.0	0.0
SEP 83	0	0	0.0	0.0	0.0	0.0	0.0
OCT 83	0	0	0.0	0.0	0.0	0.0	0.0
NOV 83	0	1	99.0	0.0	99.0	99.0	99.0
DEC 83	546	34	86.7	17.6	62.0	85.0	176.0
SUMMARY TOTALS	665	267	95.6	46.0	51.0		279.0

TABLE A-10 (Cont.)

YELLOW PERCH

DATE	LENGTH INTERVALS (MM) 30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	0	1	1	1	0	0	1	0	1	0	0	0
FEB 83	0	0	0	0	0	0	0	0	0	0	1	1	0
MAR 83	0	0	0	0	0	0	0	0	0	1	1	0	0
APR 83	0	1	0	1	0	0	0	1	0	1	2	0	0
MAY 83	0	1	1	1	1	1	1	7	2	4	1	1	0
JUN 83	0	0	0	0	0	0	0	0	0	1	0	0	0
JUL 83	0	0	0	0	0	0	0	0	0	0	0	0	0
AUG 83	0	0	0	0	0	0	1	0	0	0	0	0	0
SEP 83	1	0	0	0	0	0	0	0	1	2	1	0	1
OCT 83	0	0	0	0	0	0	0	0	0	0	1	0	0
NOV 83	0	0	0	0	0	0	0	0	1	1	0	0	0
DEC 83	0	0	0	0	0	0	2	2	3	1	1	1	0
INTERVAL TOTALS	1	2	2	3	2	1	4	11	7	12	8	3	1

DATE	LENGTH INTERVALS (MM) 290.0 309.9	310.0 329.9	330.0 349.9	P	N	X	SD	RANGE MIN	MED	MAX
JAN 83	0	0	0	0	5	140.8	58.5	79.0	123.0	223.0
FEB 83	0	0	0	0	2	248.0	2.8	246.0	248.0	250.0
MAR 83	0	0	0	0	2	228.0	7.1	223.0	228.0	233.0
APR 83	1	0	1	0	8	209.3	91.0	62.0	225.5	330.0
MAY 83	0	0	0	27	21	176.4	51.3	61.0	181.0	264.0
JUN 83	0	0	0	0	1	217.0	0.0	217.0	217.0	217.0
JUL 83	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
AUG 83	0	0	0	0	1	160.0	0.0	160.0	160.0	160.0
SEP 83	1	0	0	0	7	213.7	83.5	43.0	224.0	303.0
OCT 83	0	0	0	0	1	240.0	0.0	240.0	240.0	240.0
NOV 83	0	0	0	1	2	206.5	4.9	203.0	206.5	210.0
DEC 83	0	0	0	8	10	196.9	33.1	155.0	193.0	250.0
SUMMARY TOTALS	2	0	1	36	60	192.1	60.1	43.0		330.0

TABLE A-10 (Cont.)

SPOTTAIL SHINER

LENGTH INTERVALS (MM)

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
JAN 83	0	1	0	0	2	1	0	0	0	0	0	0	0
FEB 83	0	1	1	1	0	0	0	0	0	0	0	0	0
MAR 83	0	1	1	1	1	1	0	0	0	0	0	0	0
APR 83	0	2	0	0	0	0	0	0	0	0	0	0	0
MAY 83	0	8	1	25	41	25	0	0	0	0	0	0	0
JUN 83	0	1	0	0	4	2	0	0	0	0	0	0	0
JUL 83	0	0	0	0	1	0	0	0	0	0	0	0	0
AUG 83	0	0	0	0	0	0	0	0	0	0	0	0	0
SEP 83	0	0	0	0	0	0	0	0	0	0	0	0	0
OCT 83	0	0	0	0	0	0	0	0	0	0	0	0	0
NOV 83	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC 83	0	0	0	0	0	0	0	0	0	0	0	0	0
INTERVAL TOTALS	0	14	3	27	49	29	0	0	0	0	0	0	0

DATE	F	N	X	SD	RANGE MIN	MED	MAX
JAN 83	0	4	103.8	33.0	56.0	113.5	132.0
FEB 83	0	3	76.7	19.7	54.0	86.0	90.0
MAR 83	0	5	98.8	29.2	61.0	97.0	134.0
APR 83	0	2	59.5	6.4	55.0	59.5	64.0
MAY 83	233	100	112.8	20.8	50.0	114.0	142.0
JUN 83	0	7	113.7	27.0	55.0	122.0	135.0
JUL 83	0	1	116.0	0.0	116.0	116.0	116.0
AUG 83	3	0	0.0	0.0	0.0	0.0	0.0
SEP 83	16	0	0.0	0.0	0.0	0.0	0.0
OCT 83	5	0	0.0	0.0	0.0	0.0	0.0
NOV 83	0	0	0.0	0.0	0.0	0.0	0.0
DEC 83	33	0	0.0	0.0	0.0	0.0	0.0
SUMMARY TOTALS	290	122	110.2	23.2	50.0		142.0

TABLE A-10 (Cont.)

SMALLMOUTH BASS

DATE	30.0 49.9	50.0 69.9	70.0 89.9	90.0 109.9	110.0 129.9	130.0 149.9	150.0 169.9	170.0 189.9	190.0 209.9	210.0 229.9	230.0 249.9	250.0 269.9	270.0 289.9
	LENGTH INTERVALS (MM)												
JAN 83	0	0	0	0	0	0	0	0	0	0	0	0	0
FEB 83	0	0	0	0	0	0	0	0	0	0	0	0	0
MAR 83	0	0	0	0	0	0	0	0	0	0	0	0	0
APR 83	0	0	2	0	0	0	0	0	0	0	0	0	0
MAY 83	0	1	4	1	0	0	0	0	0	0	0	0	1
JUN 83	0	0	0	0	0	0	0	0	0	0	0	0	1
JUL 83	0	0	0	0	0	0	0	0	0	1	0	0	0
AUG 83	0	1	0	0	0	0	0	0	0	0	0	0	0
SEP 83	0	0	1	0	0	0	0	0	0	0	0	0	0
OCT 83	0	0	0	0	0	1	0	0	0	0	0	0	0
NOV 83	0	0	0	0	0	0	0	0	0	0	0	0	0
DEC 83	0	0	0	4	2	0	0	0	0	0	0	0	0
INTERVAL TOTALS	0	2	7	5	2	1	0	0	0	1	0	0	2

DATE	290.0 309.9	310.0 329.9	330.0 349.9	350.0 369.9	370.0 389.9	P	N	X	SD	RANGE MIN	RANGE MED	RANGE MAX
	LENGTH INTERVALS (MM)											
JAN 83	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
FEB 83	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
MAR 83	0	0	0	0	0	0	1	395.0	0.0	395.0	395.0	395.0
APR 83	0	0	0	0	0	0	3	186.0	180.1	81.0	83.0	394.0
MAY 83	0	0	0	0	0	14	11	221.5	166.7	63.0	94.0	428.0
JUN 83	0	0	0	2	2	0	6	358.5	47.3	270.0	370.0	404.0
JUL 83	0	0	0	0	0	0	1	221.0	0.0	221.0	221.0	221.0
AUG 83	0	0	0	0	1	0	2	222.0	224.9	63.0	222.0	381.0
SEP 83	0	0	0	0	0	0	1	73.0	0.0	73.0	73.0	73.0
OCT 83	0	0	0	0	0	0	1	131.0	0.0	131.0	131.0	131.0
NOV 83	0	0	1	0	0	0	1	340.0	0.0	340.0	340.0	340.0
DEC 83	0	0	0	0	0	0	6	106.0	14.3	91.0	102.0	126.0
SUMMARY TOTALS	0	0	1	2	3	19	33	223.8	145.4	63.0		428.0

APPENDIX B

EXCEPTIONS TO STANDARD OPERATING PROCEDURES

TABLE B-1 EXCEPTIONS TO STANDARD OPERATING PROCEDURES FOR IMPINGEMENT AT NINE MILE POINT NUCLEAR STATION UNIT 1

30 MAR 1983	Void Impingement Sample - Traveling screen No. 12 was not functioning at the onset of the 30 March 1983 impingement sample. During the collection period, the screen was repaired and rotated. This introduced fish into the sample that were impinged previous to the start of the sample. The sample was rescheduled and completed on 31 March 1983.
6 APR 1983	Loss of Impingement Sample - During the collection period, high volumes of detritus caused the sample to overflow the impingement basket. An undetermined amount of sample was lost. The sample was rescheduled and completed on 11 April 1983.
21 APR 1983	Loss of Impingement Sample - During the collection period, high winds and waves brought large quantities of detritus into the cooling water intake. The sample overflowed the impingement basket and an undetermined amount of sample was lost. The sample was rescheduled and completed on 26 April 1983.
17 MAY 1983	Loss of Sample - During the collection period, high volumes of detritus caused the sample to overflow the impingement basket. An undetermined amount of sample was lost. The sample was rescheduled and completed on 20 May 1983.
18 MAY 1983	Loss of Sample - During the collection period, high volumes of detritus caused the sample to overflow the impingement basket. An undetermined amount of sample was lost. The sample was rescheduled and completed on 27 May 1983.
24 MAY 1983	Loss of Sample - During the collection period, high volumes of detritus caused the sample to overflow the impingment basket. An undetermined amount of sample was lost. The sample was rescheduled and completed on 28 May 1983.
7 DEC 1983	Loss of Sample - During the collection period, high winds and waves brought large quantities of detritus into the cooling water intake. The collection basket overflowed and an undetermined amount of sample was lost. The sample was rescheduled and completed on 12 December 1983.

NOTE: No impingement samples were missed during the 1983 sampling season. Whenever possible, samples were rescheduled using randomly selected days as required by the Environmental Technical Specifications, where applicable.

TABLE B-2 EXCEPTIONS TO STANDARD OPERATING PROCEDURES FOR IMPINGEMENT AT JAMES A. FITZPATRICK NUCLEAR POWER PLANT

8 MAR 1983	Rescheduled Sample - The scheduled impingement sample for 8 March 1983 could not be set. The traveling screens were tagged and could not be operated. The sample was rescheduled and completed on 18 March 1983.
20 APR 1983	Loss of Impingement Sample - During the collection period, high volumes of detritus caused the sample to overflow the impingment basket. An undetermined amount of sample was lost. The sample was rescheduled and completed on 25 April 1983.
20 JUL 1983	Rescheduled Sample - The impingement sample to be collected on 20 July 1983 was rescheduled so that maintenance could be performed on the wash trough. The sample was rescheduled and completed on 28 July 1984.
11 OCT 1983	Rescheduled Impingement Sample - A full-scale test of the radiological emergency response system limited access to the power plant on the scheduled impingement collection day of 12 October 1983. The sample was rescheduled and completed on 28 October 1983.
26 OCT 1983	Rescheduled Impingement Sample - Maintenance work on the overhead crane prevented the impingement sample from being set as scheduled. The sample was rescheduled and completed on 29 October 1983.

NOTE: No impingement samples were missed during the 1983 sampling season. Whenever possible, samples were rescheduled using randomly selected days as required by the Environmental Technical Specifications, where applicable.

APPENDIX C

CONDITION OF FISH: ABNORMALITIES, DISEASES, AND EXTERNAL PARASITES

APPENDIX C

CONDITION OF FISH: ABNORMALITIES, DISEASES, AND EXTERNAL PARASITES

Fish collected in the impingement samples were checked for any outstanding abnormalities, diseases, or external parasites and for general physical condition. Thirteen species from impingement were found to have some type of abnormality or affliction.

Rainbow smelt and sculpins from impingement collections were most commonly found to have afflictions. Sculpins exhibited an internal abdominal tumor characterized by one or more white sacs. Fungus (Saprolegnia) affected rainbow smelt caught in April and May. Other abnormalities observed on rainbow smelt were: 1 occurrence of "pug nose" (deformity of snout) and 2 occurences of scoliosis (curvature of the spine).

The three most common afflictions affecting other fish species were fungus, lamprey and other scars, and black spot infection (characterized by small black spots scattered on body and fins). Black spot infection was noticed on golden shiner and rock bass. Only one individual of golden shiner was found with the infection, however, 3 individual rock bass were similarly infected. Fungus affected a few individuals of each of the following species: gizzard shad, white perch, yellow perch, brown trout, stonecat, and alewife. An occasional lamprey scar was observed on white sucker and brown trout. Other incidents of disease affected a variety of species. A brown trout exhibited a broken and torn jaw. A smallmouth bass had "pug nose". A trout perch had scoliosis. One sculpin had a tumor-like growth under the pectoral fins.

Overall, the physical condition of the fish collected in impingement samples was healthy. Some alewife, gizzard shad, and sculpin had hemorrhaging around the head. Rainbow smelt and alewife occasionally had vertical lacerations on their sides. These could have been caused by the impingement collection gear. Scars and other abnormalities were most likely naturally caused and not a direct result of power plant operation.

APPENDIX D

SCIENTIFIC AND COMMON NAMES
OF ALL TAXA COLLECTED IN 1983

TABLE D-1 SCIENTIFIC AND COMMON NAMES OF ALL TAXA COLLECTED IN 1983

Scientific Name	Common Name
Alosa pseudoharengus	Alewife
Ambloplites rupestris	Rock bass
Anguilla rostrata	American eel
Catostomus commersoni	White sucker
Centrarchidae	Sunfish
Coregonus artedii	Cisco
Cottus spp.	Sculpins
Couesius plumbeus	Lake chub
Cyprinidae	Shiners
Dorosoma cepedianum	Gizzard shad
Etheostoma olmstedi	Tessellated darter
Esox lucius	Northern pike
Family Cambaridae	Crayfish
Gasterosteus aculeatus	Threespine stickleback
Ictalurus catus	White catfish
Ictalurus melas	Black bullhead
Ictalurus natalis	Yellow bullhead
Ictalurus nebulosus	Brown bullhead
Lepomis gibbosus	Pumpkinseed
Lepomis macrochirus	Bluegill
Lota lota	Burbot
Micropterus dolomieui	Smallmouth bass
Mollusca	Clam and clam shell
Morone americana	White perch
Morone chrysops	White bass
Notemigonus crysoleucas	Golder shiner
Notropis atherinoides	Emerald shiner
Notropis hudsonius	Spottail shiner
Noturus flavus	Stonecat
Oncorhynchus kisutch	Coho salmon
Oncorhynchus tshawytscha	Chinook salmon
Osmerus mordax	Rainbow smelt
Perca flavescens	Yellow perch
Percopsis omiscomaycus	Trout perch
Pimephales notatus	Bluntnose minnow
Pomoxis nigromaculatus	Black crappie
Rana spp.	Tadpole
Rhinichthys atratulus	Blacknose dace
Rhinichthys cataractae	Longnose dace
Salmo gairdneri	Rainbow trout
Salmo trutta	Brown trout
Salvelinus namaycush	Lake trout
Stizostedion vitreum vitreum	Walleye
Umbra limi	Central mudminnow