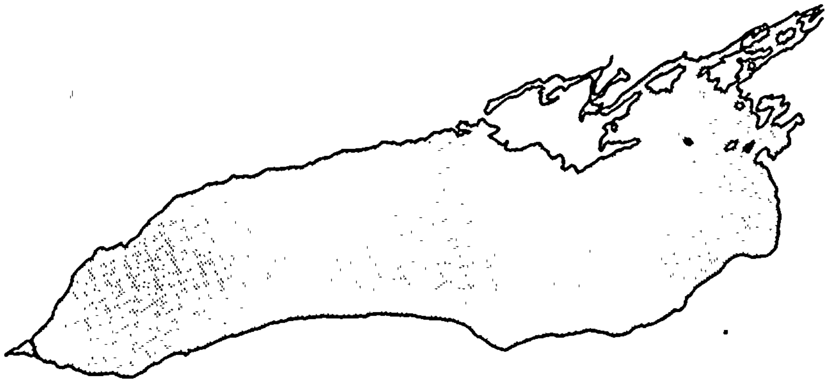
NIAGARA MOHAWK POWER CORPORATION

POWER AUTHORITY OF THE STATE OF NEW YORK



1980
NINE MILE POINT AQUATIC ECOLOGY STUDIES

MARCH 1981

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1980 NINE MILE POINT

AQUATIC ECOLOGY STUDIES

Prepared for:

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FOREWORD

The 1980 annual report presents the results of aquatic ecology studies conducted in the vicinity of Nine Mile Point on Lake Ontario (Oswego County, New York) during 1980. Nine Mile Point is the site of the 610-MWe Nine Mile Point Unit-I and 821-MWe James A. FitzPatrick Nuclear Power Stations. The studies were conducted by Niagara Mohawk Power Corporation (NMPC) and the Power Authority of the State of New York (PASNY) and represent a continuation of ecological studies that were initiated as the stations were being constructed (Nine Mile Point began producing power in 1969; FitzPatrick in 1975). The sampling program included surveys in Lake Ontario in the vicinity of the Nine Mile Point promontory from April through November (December samples were not taken due to adverse weather) and impingement studies at both power stations during the entire year. The ecological studies were conducted in accordance with Environmental Technical Specifications prepared by the U.S. Nuclear Regulatory Commission.

The objective of this report is to summarize results of the 1980 program, presenting data on lake fish catches in the vicinity of the plants. Comparisons are made among samples from the discharge plume areas, from areas of the lake that are outside immediate influence of the discharges, and from within the plants. Conclusions are presented regarding the effects of power plant operation on the temporal, and spatial distribution, of fish and on selected water quality parameters in the area.

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SECTION I

SUMMARY

A. SUMMARY OF LAKE ONTARIO STUDIES

1. Fish

Gill net collections in the vicinity of Nine Mile Point yielded 20 taxa during the 1980 study. During every month of sampling, five species were present in the area, and three other species were observed during at least six of the eight months. The dominant species included alewife, spottail shiner, yellow perch, white sucker and trout-perch.

In terms of temporal distribution, gill-net catches were dominated by alewives from April through July and in September. Yellow perch were most abundant in August and co-dominant with alewife in November. Temporal distribution patterns observed during 1980 were typical for fish populations in eastern Lake Ontario: larger catches in the spring and early summer; smaller catches during mid-summer; and a secondary peak of abundance in the fall (October).

Spatial distribution based on gill-net catches at the 30-foot depth contour varied from month to month in 1980 as in 1979 and displayed no consistent trend with respect to experimental and control areas.

2. Water Quality

Evaluation of water temperature and dissolved oxygen data revealed that values were well within normal ranges for the Nine Mile Point area specifically and Lake Ontario generally. No consistent differences in thermal conditions were observed between control and experimental transects. Temperature differences greater than 1°C above control transects were observed at the experimental transects on a minority of sampling dates, indicating that the thermal plume influenced only a relatively small zone which commonly did not impact the fixed sampling stations. No significant differences were observed in dissolved oxygen (DO) concentrations among transects and at no time was DO low enough to stress aquatic organisms.

B. SUMMARY OF IMPINGEMENT STUDIES

1. Impingement - Nine Mile Point Unit I

There were 36 taxa in impingement samples collected at the Nine Mile Point power plant during 1980. Estimated annual impingement was approximately 401,000 fish weighing approximately 7,946 kilograms. Compared with previous years (1976 and earlier) this estimated total impingement was low, although greater than 1979. No threatened or endangered species were observed during 1980.

Numerically, alewife and rainbow smelt dominated 1980 impingement collections, while alewife, rainbow smelt and gizzard shad dominated catches in terms of biomass. Impingement rates were highest in January, April, June, July and October. Length-frequency distributions indicated that primarily adults and subadults were impinged during the winter and spring, while young-of-the-year were encountered in the summer and fall samples.

2. Impingement - James A. FitzPatrick

At the James A. FitzPatrick power plant during 1980 an estimated 296,000 fish of 43 taxa weighting some 5,676 kilograms were impinged. As at Nine Mile Point, impingement at James A. FitzPatrick during 1980 was low compared with impingements of 1976 and earlier years and no threatened or endangered species were observed.

Numerically, alewife and rainbow smelt dominated impingement sampling; rainbow smelt, gizzard shad, and alewife comprised approximately 92 percent of the total biomass. Impingement rates were highest in January, June, July, and October. Adult and subadult fish were generally impinged from January through July, while young-of-the-year were encountered in summer.

SECTION II

INTRODUCTION

Ecological studies in the vicinity of the Nine Mile Point promontory during 1980 represented continuing efforts begun in the 1960s by Niagara Mohawk Power Corporation (NMPC) and the Power Authority of the State of New York (PASNY) to evaluate the potential effects of existing power station operations at Nine Mile Point on the near-field aquatic ecosystem of Lake Ontario.

Two nuclear electric generating stations are located on the Nine Mile Point promontory on the south shore of Lake Ontario: Nine Mile Point Nuclear Station Unit 1, which has been operating since December 1969; and James A. FitzPatrick Nuclear Station, which began operating in July 1975 (Figure II-1). A third nuclear station (Nine Mile Point Nuclear Station Unit 2) is under construction at this site.

This annual report fulfills the utilities commitment to assess changes, if any, in the aquatic ecosystem caused by power plant operations. These studies fulfill monitoring requirements established by the Nuclear Regulatory Commission (NRC) in operating licenses issued to the Nine Mile Point Unit 1 and the James A. FitzPatrick plants.

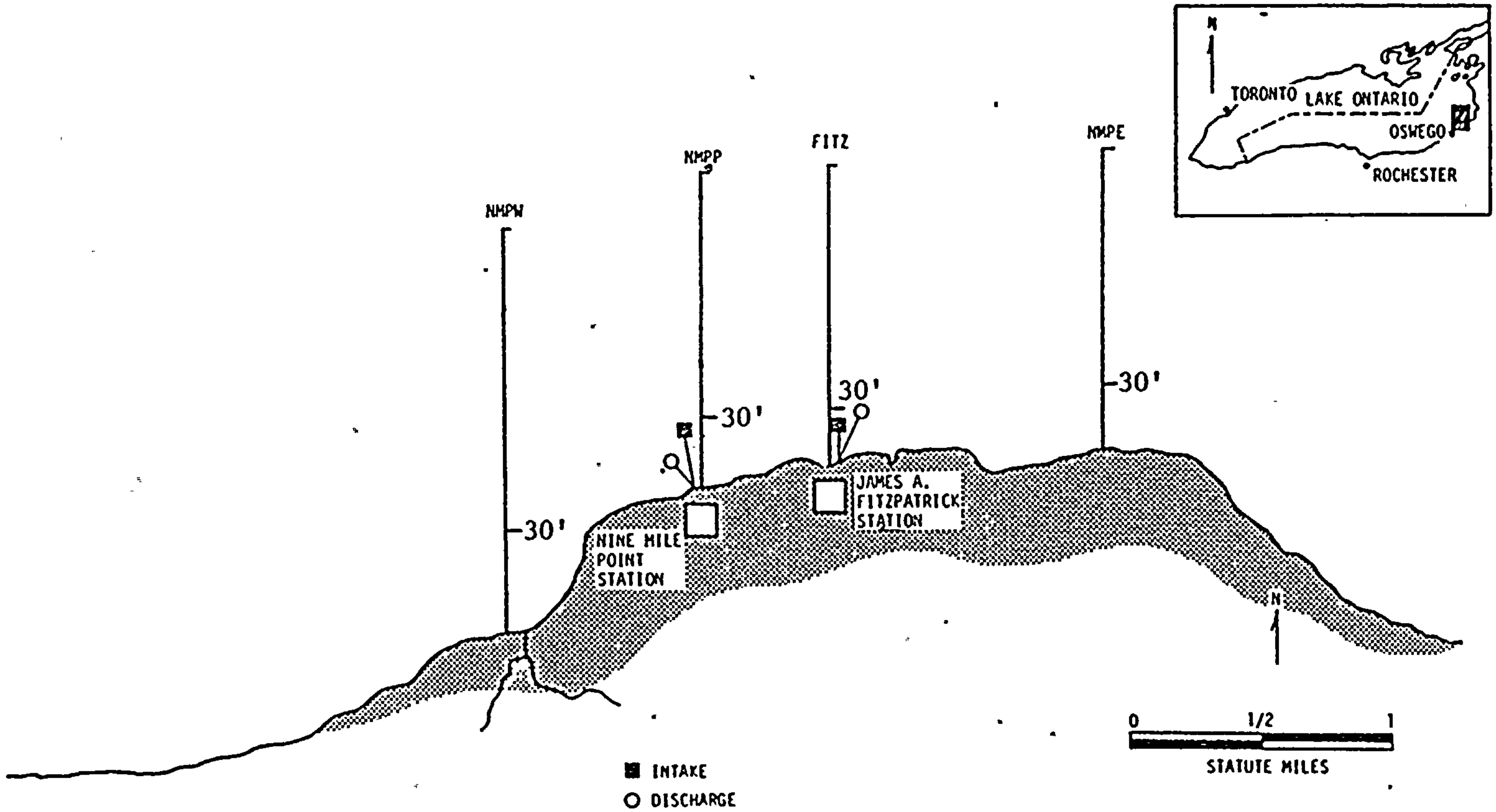


Figure II-1 Sampling Area for Nine Mile Point Aquatic Ecology Studies Showing Location of Sampling Transects and Intake and Discharge Structures

SECTION III

METHODS AND MATERIALS

A. LAKE ONTARIO STUDIES

The sampling design and methods described in this section represent a program that has evolved as a result of changes which occurred during the spring of 1979 in U.S. Nuclear Regulatory Commission Environmental Technical Specifications for the Nine Mile Point Unit - 1 and the James A. FitzPatrick Nuclear Power Plants.

Sampling for the 1980 program was conducted along four transects extending perpendicular from the Lake Ontario shoreline (Figure II-1 and Table III-1). The transects - NMPP (Nine Mile Point Plant) and FITZ (J. A. FitzPatrick Plant) - represent a zone in the lake near the two plants' submerged intake and discharge structures. This zone can be influenced by the removal of cooling water and by subsequent thermal discharges and has been referred to as the experimental area. The transect to the west of the power stations, NMPW (Nine Mile Point West), is upcurrent (approximately .7 statuate miles) of the experimental area most of the time with respect to the prevailing currents and thus represents a zone considered outside the influence of the intakes and thermal discharges; this area has been referred to as a control area. The NMPE (Nine Mile Point East) transect is usually downcurrent (approximately 1.2 statuate miles) from the discharge structures with respect to the prevailing currents and represents an area that sometimes is influenced by the thermal discharges; this zone has been referred to as the farfield area.

TABLE III-1

Sampling Schedule for Aquatic Ecology Studies in Lake Ontario near Nine Mile Point and James A. FitzPatrick Power Plants, 1980

TASK	FREQUENCY*,**	SEASON	DEPTH CONTOUR (ft)	TRANSECT	DEPTH	SAMPLES PER YEAR
Fisheries						
Gill Net	Semimonthly (N)	Apr.-Aug.	30	NMPW, NMPP, FITZ, NMPE	Bottom	56
	Monthly (N)	Sept.-Dec.				
Water Quality						
DO	Semimonthly (N)	Apr.-Aug.	30	NMPW, NMPP, FITZ, NMPE	Bottom	56
	Monthly (N)	Sept.-Dec.				
Water Temperature	Semimonthly (N)	Apr.-Aug.	30	NMPW, NMPP, FITZ, NMPE	Bottom	56
	Monthly (N)	Sept.-Dec.				

*(N) = Night Sampling

** Semimonthly is defined as twice per month

1. Fisheries

In an aquatic ecosystem fish represent the higher consumer levels and provide a base for sport and commercial fishing activities. The fish population in the vicinity of Nine Mile Point includes both primary and secondary consumers.

a. Field Sampling

Adult and juvenile fish populations in the Nine Mile Point study area were sampled with experimental gill nets during 1980. The experimental nets were 8 feet deep and had six 25-foot-long panels. Mesh sizes of the panels ranged from 0.5 to 2.5 inches bar measure in 0.5 inch increments. Gill net sets were made twice monthly from April through August and monthly from September through November at four locations*. All nets were set at the bottom, parallel to shore along the 30-foot depth contour. To the extent weather permitted sets were made the night preceeding an impingement collection (approximately at sunset) and retrieved approximately 12-hours later (near sunrise).

b. Laboratory Processing

Fish were identified to the species level when possible and enumerated. Total lengths (millimeters) and total weights (grams) were determined for a minimum of 40 individuals per species per catch. Additionally, total weights were determined for all specimens by species. Total lengths were recorded to the nearest millimeter, while weights were recorded to the nearest 0.1 gram for fish less than 10 grams, the nearest gram for fish between 10 and 2000 grams, and the nearest 10 grams for fish weighting more than 2000 grams.

*Note that December collections were missed due to adverse weather and heavy icing of near shore areas.

c. Data Reduction

Catch data from gill nets were expressed as a catch-per-unit-effort (C/f) where the number of individuals per gill net set was standarized to a 12-hour set.

The gill net C/f, for example, was estimated as:

$$\text{Gill net C/f} = \frac{(x_1)\ (12)}{T_1}$$

where

x_1 = number of fish caught in i^{th} sample

T_1 = duration of set in hours

2. Water Quality

The water quality sampling effort (dissolved oxygen and bottom water temperature collection) was designed to provide an indication of possible environmental stress in the vicinity of the gill net set locations.

a. Field Sampling

Water samples collected for dissolved oxygen (DO) analysis were obtained from the near bottom strata using either a 4 or 5 liter water sample collection bottle. Water temperatures were determined in situ using a thermistor or taken with a hand held thermometer ($\pm$ 0.5°C) using a water sample bottle to collect the near-bottom sample. DO and water temperature samples were taken at the 30-foot depth contour of the four transects, in conjunction with gill net collections. Samples were obtained twice monthly from April through August and monthly from September through November.

b. Laboratory Processing

Dissolved oxygen values were determined (nearest 0.1 mg/l) from collected water samples utilizing the azide modification of the Winkler method (APHA, 1976).

B. IN-PLANT STUDIES

In accordance with requirements of NRC's Environmental Technical Specifications, impingement rates were monitored 4 to 20 times per month from January through December at the Nine Mile Point Unit - 1 and the James A. FitzPatrick Nuclear Power Stations (Tables III-2, III-3).

Fish impingement range limitations resulting from Environmental Technical Specification changes for the Nine Mile Point Unit-1 and James A. FitzPatrick Nuclear Power Stations are provided in Tables III-4 and 5. Data relating to these tables is considered in Appendix D.

1. Impingement

a. Field Sampling

Impingement was monitored from January through December at the Nine Mile Point Unit 1 and the James A. FitzPatrick plants. Sampling was conducted for a 24-hour period on each randomly selected day (Table III-3). Impingement monitoring generally began at 0001 (military time) each sampling day and the collection baskets remained in sampling position until the end of the 24-hour period (unless very high impingmement rates or debris loads required emptying the basket more often).

Plant operational data were obtained for each sampling date to document cooling-water flow rates, intake and discharge temperatures, and power production.

Table III-2

Schedule for Impingement Studies at Nine Mile Point Unit One and James A. FitzPatrick Power Plants, 1980

Plant	Frequency	Season	Location	Depth	Samples/Year	Comments
Nine Mile Point Unit One	4-20/month	Jan-Dec	Traveling screens	Whole water column	78	Composite 24-hr sample obtained on 4 to 20 randomly selected days per month
James A. FitzPatrick	4-20/month	Jan-Dec	Traveling screens	Whole water column	78	Composite 24-hr sample obtained on 4 to 20 randomly selected days per month

TABLE III-3

Impingement Sampling Regime Associated with Revised Environmental Technical Specifications for the Nine Mile Point and James A. FitzPatrick Power Plants

	No. of Sampling Days per Month*	
	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

*Days assigned within each month were selected randomly through utilization of the random numbers generator of a calculator.

Table III-4

Fish Impingement Range Specification* for the Nine Mile Point Unit - 1 Nuclear Power Station

Month	Daily Average Number of Fish Low	High
JAN	231	631
FEB	211	718
MAR	482	2,864
APR	5,552	20,923
MAY	8,501	50,759
JUN	1,366	3,213
JUL	718	2,648
AUG	0	5,020
SEP	0	1,397
OCT	154	338
NOV	103	1,565
DEC	294	1,713

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

Table III-5

Fish Impingement Collection Specification*
for the James A. FitzPatrick Nuclear Power Plant

Month	Monthly Maximum Number of Fish
JAN	41,596
FEB	16,646
MAR	22,595
APR	413,854
MAY	1,750,162
JUN	131,769
JUL	67,249
AUG	33,708
SEP	31,570
OCT	32,428
NOV	87,928
DEC	30,837

* From Table 4.1.1-2 Section 4.1.1-B of the James A. FitzPatrick Nuclear Power Plant's Environmental Technical Specifications

When impingement rates at either plant exceeded 20,000 fish per 24-hour period, impingement sampling was continued on a daily basis until the rate dropped below 20,000 fish per 24-hour period at the affected plant.*

b. Laboratory Processing

All impinged fish were identified to species when possible and eumerated after collection. Total numbers and weights for each species and individual total lengths and weights for a maximum of 40 fish of each species per 24-hour sample period were recorded. Unusual conditions (e.g. damaged individuals or presence of fish tags) were documented.

c. Data Reduction and Analysis

Data were tabulated to present impingement rates (number and weight) for each species as well as all species combined. Three separate techniques were used to estimate the number of fish impinged at the Nine Mile Point and FitzPatrick Plants: a standard ratio estimator, a mean sample density estimator, and the Hartley-Ross ratio estimator. Examination of the impingement data collected during previous studies indicated that there were relatively distinct periods of high, low, and intermediate impingement. Total impingement was estimated for each month to reduce the bias of combining high and low impingement rates, and the impingement estimates for twelve months were added to obtain the annual estimate.

Although three different techniques were initially used to calculate annual impingement estimates, comparison of these estimates suggested that the Hartley-Ross method produced the best estimates due to its unbiased nature. Final results in this report are based on the unbiased Hartley-Ross technique.

*Note: At the James A. FitzPatrick Plant there was also a plan for additional impingement sampling to meet New York State Department of Environmental Conservation requirements.

are based on the unbiased Hartley-Ross technique. However, since the standard ratio estimator and the mean sample density estimator are more commonly used, although biased, the three techniques are described and discussed in the following paragraphs.

The three methods differ in the estimation of the number of fish impinged per volume of cooling water used. The data for all three estimates consist of the number of fish collected during the sample period (c_i), the volume of cooling water used during the sample day (v_i), and the number of sampling days in the time period (n).

The average density method is strongly biased and inconsistent (Cochran, 1963): $D_1 = \frac{1}{n} \sum \frac{c_i}{v_i}$

The standard ratio estimator of density is also biased and has a relatively small standard error (Cochran,1963). The standard ratio estimate formula is:

$$D_2 = \frac{\sum c_i}{\sum v_i}$$

The Hartley-Ross estimator is unbiased (Goodman and Hartley, 1958):

$$D_3 = \frac{1}{n} \sum \frac{c_i}{v_i} + \frac{\sum c_i - \frac{1}{n} \sum \frac{c_i}{v_i} \sum v_i}{\bar{v}\ (n-1)}$$

where v is the average volume pumped during all days of the season, including both sample and non-sample days.

Then, using the following notation (after Goodman and Hartley, 1958):

$$S_{01} = \sum d_i = \sum \frac{c_i}{v_i} \qquad S_{02} = \sum d_i^2$$

$$S_{10} = \sum v_i \qquad S_{11} = \sum c_i \qquad S_{12} = \sum c_i d_i$$

$$S_{20} = \sum v_i^2 \qquad S_{21} = \sum c_i v_i \qquad S_{22} = \sum c_i^2$$

where all the summations are i = 2, ..., n, and n is the number of samples taken. The Hartley-Ross estimator can be expressed as:

$$D_3 = \frac{S_{01}}{n} + \frac{S_{11} - \frac{1}{n} S_{01} S_{10}}{\bar{v}(n - 1)}$$

Occasionally, high debris loads inhibited the collection of all fish and debris impinged during a 24-hour sampling period. When this occurred at Nine Mile Point Unit-1, a volumetric subsampling technique was employed. The total catch (numbers and weight) was estimated using the formula:

$$No._d = \frac{(x_n) \cdot V}{f}$$

where

$No._d$ = estimated impingement for 24-hour period

x_n = total number (or weight) of species (or all species combined) with subsample

f = volume of subsample

V = volume of total 24-hour catch

A concerted effort was made to obtain a subsample of at least 25 percent of the total catch.

SECTION IV

RESULTS AND DISCUSSION — LAKE ONTARIO STUDIES

The 1980 Lake Ontario monitoring program was designed to describe the composition and relative abundance, both spatially and temporally, of fish — a major component of the aquatic biota. The program also monitored water quality (dissolved oxygen and temperature) in the study area. Following is a discussion of the results obtained for the 1980 sampling program using methods described in Section III.

A. FISHERIES

1. Species Composition

From the 3,265 fish collected with gill nets in the Nine Mile Point vicinity during 1980, 20 taxa were identified (Table IV-1 and Appendix Table A-1). Alewife and spottail shiners accounted for over 85 percent of all fish collected with gill nets. Five taxa — alewife, spottail shiner, white perch, white sucker, and yellow perch were collected during each month sampled while lake chub, rainbow smelt and stonecat were collected during at least six of the eight months (Figure IV-1). The ramaining 12 taxa appeared sporadically in the gill net samples.

2. Temporal and Spatial Distribution.

The temporal distribution of fish collected by gill nets was characterized by periods of peak abundance (catch per 12-hour set) during April, June, and July and lower catch rates during the remainder of the sampling period especially November (Table IV-2). Alewife dominated monthly catches from April through July and in September. Yellow perch were dominant in August and alewife and yellow perch were co-dominant during November. Catch rates among transects along the 30-foot contour were variable, although as in 1979 catches were frequently lowest at the transect nearest the Nine Mile Point plant (NMPP) and highest near the FitzPatrick plant (transect FITZ). Catches at the transects NMPW (the westernmost and not subject to thermal influence from power plant discharges — and NMPE — (the easternmost) were intermediate to catches observed at the NMPP and FITZ transects (Table IV-3).

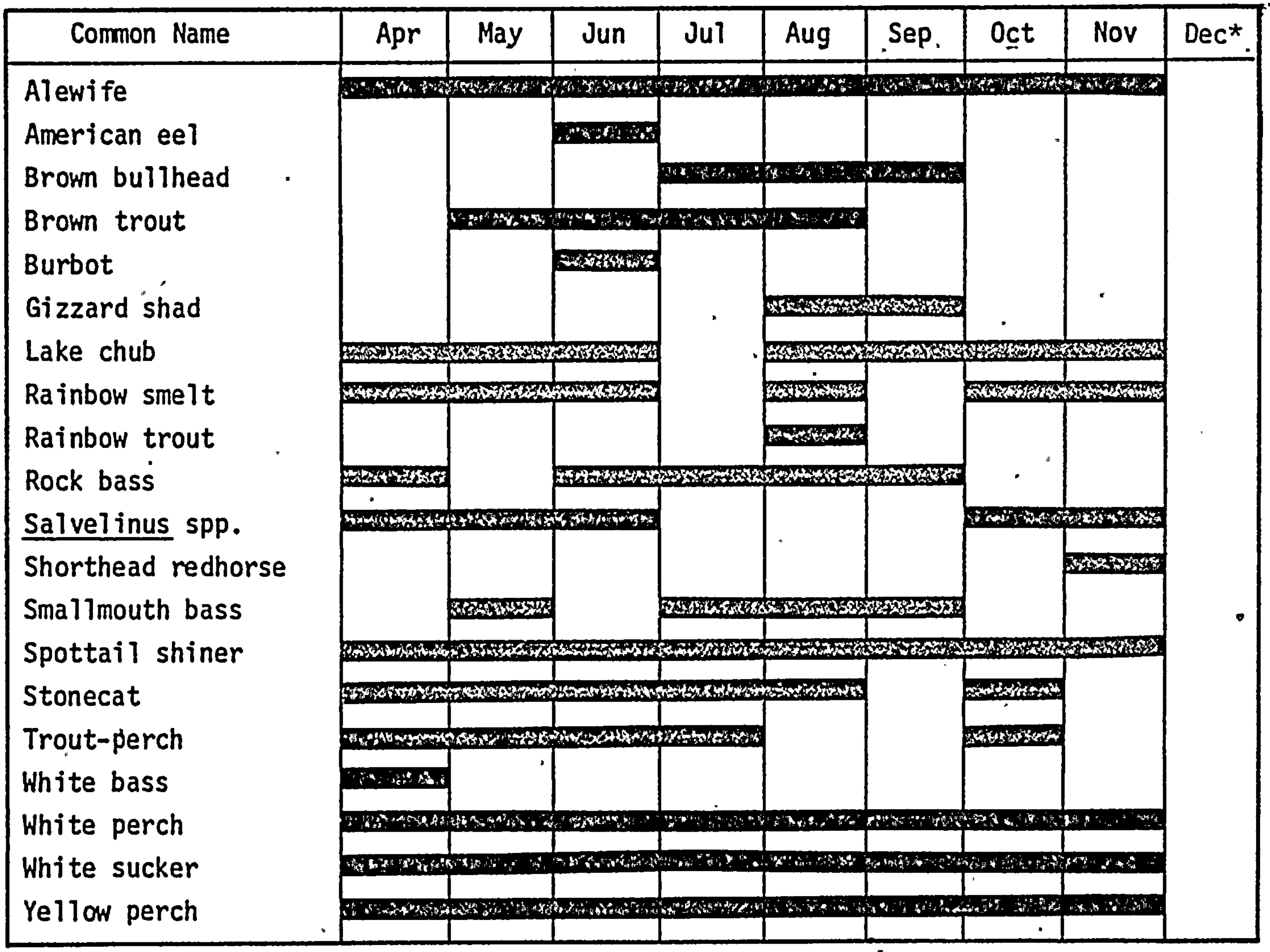
Table IV-1

Number and Percent Composition of Fish Collected with Gill Nets, Nine Mile Point, April through November 1980

Species*	Number	Percent Composition (%)
Alewife	2,018	61.8
American eel	1	T**
Brown bullhead	13	0.4
Brown trout	6	0.2
Burbot	2	0.1
Gizzard shad	8	0.2
Lake chub	17	0.5
Rainbow smelt	37	1.1
Rainbow trout	2	0.1
Rock bass	11	0.3
Salvelinus spp.	10	0.3
Shorthead redhorse	1	T
Smallmouth bass	10	0.3
Spottail shiner	767	23.5
Stonecat	11	0.3
Trout-perch	90	2.8
White bass	1	T
White perch	51	1.6
White sucker	98	3.0
Yellow perch	111	3.4
Total	3,265	

*Common names according to the American Fisheries Society (Robins et al 1980).

**T = <0.1%.



*Samples not collected in December due to adverse weather.

Figure IV-1. Monthly Occurrence of Gill Net Fish, 1980

Table IV-2

Temporal Abundance of Fish Collected by Gill Net, Nine Mile Point Vicinity, 1980

Common Name	Catch per 12-Hr Set* Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec**
Alewife	72.0	23.0	80.0	106.0	0.8	5.0	6.0	2.0	
Rainbow smelt	3.0	0.3	0.2	0	0.3	0	1.0	1.0	
Smallmouth bass	0	0.1	0	0.1	0.7	1.0	0	0	
White perch	0.8	2.0	2.0	0.9	0.3	1.0	2.0	0.8	
Yellow perch	1.0	0.2	0.9	1.0	6.0	3.0	6.0	2.0	
Total Catch	83.0	40.0	116.0	162.0	30.0	21.0	42.0	10.0	

*Monthly mean catch rates for samples collected at the 30-ft depth contour of four transects.

**Samples not collected during December due to adverse weather.

Table IV-3

Spatial Distribution of Total Fish Collected by Gill Net, Nine Mile Point Vicinity, 1980

Transect	Catch per 12-Hr Set* Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec**	Annual Mean
NMPW	12	13	189	139	32	20	38	6		64
NMPP	25	15	156	174	14	21	16	3		62
FITZ	202	19	66	187	12	34	72	7		83
NMPE	95	112	53	147	61	10	43	23		78

*Monthly mean catch rates for samples collected at the 30-ft depth contour.

**Samples not collected during December due to adverse weather.

3. Selected Species Studies

Species selected for detailed studies of several of their population characteristics were alewife, rainbow smelt, smallmouth bass, white perch, and yellow perch. They were selected due to their classification as representative important species by Niagara Mohawk Power Corporation, the Nuclear Regulatory Commission, the Power Authority of the State of New York, EPA, and the New York Department of Environmental Conservation. This subsection discusses the temporal and spatial distribution and length — frequency distribution of the selected fishes.

a. Alewife

1) Temporal and Spatial Distribution

Gill net catches (catch per 12-hour set) of alewives reached peak levels during April, June, and July and declined sharply during summer (Table IV-2 and Appendix Table A-1). As in previous years, no fall peak in alewife levels was observed during 1980. Although alewives were collected during every month sampled, very few were taken by gill net during August. Annual mean catch rates were nearly identical at all four transects (Appendix Table A-2).

2) Length — Frequency Distribution

Alewives collected by gill net during 1980 ranged from approximately 91 to 230 millimeters in total length and were primarily adult fish (Appendix Table A-3). During spring and early summer collections of alewife in the 151-160, 161-170, and 171-180 size ranges were predominant.

b. Rainbow Smelt

1) Temporal and Spatial Distribution

Gill net catches of rainbow smelt were highest during the April 1980. No rainbow smelt were collected in July or September and very few were taken during other months sampled (Table IV-2). Annual mean catch rates were highest at transects NMPE and FITZ (Appendix Table A-2).

2) Length — Frequency Distribution

Rainbow smelt collected by gill nets ranged from approximately 121 to 230 millimeters in total length. During the spring, the predominant size class was from 131-160 millimeters in total length. Rainbow smelt in the 151-180 size range were predominant during fall collections (Appendix Table A-3).

c. White Perch

1) Temporal and Spatial Distribution

Gill net catches of white perch increased in the spring (April through June) and declined during summer (Table IV-2). A secondary peak in white perch abundance was observed in October with a subsequent decline during November. Along the 30-foot depth contour, the highest annual mean catch was at transect NMPP (Appendix Table A-2).

2) Length — Frequency Distribution

White perch collected with gill nets ranged from approximately 91 to 310 millimeters in total length. Adult and or subadult white perch were taken during each month of the study (Appendix Table A-3). Young-of-the-year white perch were observed only during October.

d. Yellow Perch

1) Temporal and Spatial Distribution

In 1980 gill net catches of yellow perch were greatest during August and October with few specimens collected during the spring (Table IV-2). In contrast, 1979 yellow perch catches increased steadily through the spring, declined in summer, reached peak levels in September, and declined through the fall months. Based on 1980 annual mean catches, yellow perch abundance was greatest at the FITZ and NMPE transects (Appendix Table A-2).

2) Length — Frequency Distribution

The approximate total length range of yellow perch collected with gill nets was 101 to 290 millimeters (Appendix Table A-3). Spring and summer collections yielded yellow perch predominantly in the 171 to 210 millimeter total length range, representing primarily age-III and age IV fish. Several 261- to 290-millimeter total length yellow perch (representing ages IV through VI) were collected during the summer.

e. Smallmouth Bass

1) Temporal and Spatial Distribution

Gill nets deployed along the 30-foot depth contour captured only ten smallmouth bass during the 1980 study (Table IV-1). All specimens were taken in spring and summer. As in 1979, no spatial distribution pattern among transects could be determined because of the low catches (Appendix Table A-2).

2) Length — Frequency Distribution

Smallmouth bass collected with gill nets ranged from approximately 261 to 430 millimeters in total length (Appendix Table A-3).

B. WATER QUALITY

During 1980, water temperature and dissolved oxygen were measured in conjunction with monthly gill net efforts to provide an indication of possible environmental stress in the vicinity of the gill net set locations.

1. Water Temperature

Bottom strata water temperatures taken at four transects along the 30-foot depth contour ranged from 4.1°C to 24.8°C during the 1980 study (Table IV-4). Water temperatures at all transects increased gradually during the spring and early summer to peak levels in August and then gradually decreased through the fall. Bottom temperatures taken at the FITZ transects (in the vicinity of the FitzPatrick discharge) exceeded by more than 1°C those of NMPW and NMPE transects (not in the immediate vicinity of the discharges), on 21 July and 27 August. At the NMPP transect near the Nine Mile Point discharge, bottom water temperatures were not elevated more than 1°C above those at the NMPW or NMPE transects on any sampling occasion.

Table IV-4

Monthly Variation in Water Temperature and Dissolved Oxygen in the Vicinity of Nine Mile Point, 1980*

Parameter	Transect	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec†
Temperature (°C)										
First Bi-monthly collection**	NMPW	4.1	8.0	11.7	18.5	22.6	21.2	12.5	6.8	
	NMPP	4.4	7.5	11.5	18.5	22.7	21.0	12.8	6.9	
	FITZ	4.5	5.9	11.7	18.2	22.7	21.1	12.9	6.9	
	NMPE	5.5	6.5	11.8	18.3	22.5	21.3	12.9	7.2	
Second Bi-monthly collection	NMPW	6.4	8.4	10.0	20.4	24.8	***	***	***	***
	NMPP	6.0	8.5	10.6	21.4	22.5	***	***	***	***
	FITZ	5.4	7.6	10.7	22.7	23.1	***	***	***	***
	NMPE	5.3	8.3	11.4	21.6	20.8	***	***	***	***
Dissolved Oxygen										
First Bi-monthly collection	NMPW	14.0	12.5	11.5	10.0	8.7	8.7	10.0	11.8	
	NMPP	13.7	12.5	11.5	10.3	8.5	8.3	10.4	11.7	
	FITZ	13.6	12.6	11.8	10.2	8.8	8.4	10.4	11.8	
	NMPE	13.7	13.1	11.1	10.2	8.7	9.4	10.5	11.5	
Second Bi-monthly collection	NMPW	13.2	13.0	13.4	7.8	9.4	***	***	***	***
	NMPP	13.2	13.8	13.4	9.2	10.1	***	***	***	***
	FITZ	13.7	13.2	13.4	9.7	9.4	***	***	***	***
	NMPE	13.4	13.2	14.2	9.1	8.8	***	***	***	***

*All samples taken in conjunction with monthly gill net efforts at the bottom water strata of the 30-foot depth contour.

**Bi-monthly = twice per month.

***Not required.

†Samples not collected in December due to adverse weather.

2. Dissolved Oxygen

Dissolved oxygen (DO) concentrations were lowest in July, dropping to 7.8 mg/ℓ (approximately 86% of saturation) during that month (Table IV-4). At no time was DO low enough to stress aquatic organisms. Oxygen levels were lower during summer because of decreased solubility of dissolved oxygen in the warmer water.

SECTION V
RESULTS AND DISCUSSION — IN PLANT STUDIES

A. INTRODUCTION

When a natural water body such as Lake Ontario is used by an electric power station for once-through cooling, debris, fish, and larger invertebrates are drawn into the cooling-water system, impinged on the bar racks and/or traveling screens, and consequently removed from the cooling water. Both the Nine Mile Point and James A. FitzPatrick power stations have once-through cooling systems with offshore submerged intakes and discharges. At maximum operation, the Nine Mile Point plant requires 597 cubic feet per second (cfs) of cooling water, while the James A. FitzPatrick plant requires 825 cfs. Water from Lake Ontario enters the cooling-water systems at the Nine Mile Point and James A. FitzPatrick plants through separate submerged intake structures at velocities of approximately 1.8 and 1.2 feet per second (fps) respectively, with all circulating pumps running. The intakes are located directly offshore of each plant near the 25-foot depth contour. Fish entering the cooling-water systems are impinged on traveling screens and subsequently backwashed from the screens into washwater sluiceways where the impingement collection baskets are located.

Specific studies of fish impingement at Nine Mile Point Unit-1 began in the spring of 1972 and were initiated at FitzPatrick when the plant began operating in 1975. The impingement of fish on the traveling screens at these two plants has been monitored to estimate yearly total loss of fish, in terms of species, numbers and weights. In addition to estimating annual impingement, the principal objectives of the 1980 impingement program were to:

- Determine species composition of impinged fish
- Describe seasonal patterns of impingement rates

Since plant operations could have a direct impact on the effects of impingement (i.e., changing intake velocities and discharge temperatures), certain parameters describing plant operation for each day of 1980 are presented in text Table V-1 and Appendix Tables B-1 and B-2.

Table V-1

Record of Outages during 1980 at the Two Power Stations on the Nine Mile Point Promontory

Nine Mile Point Unit-1		James A. FitzPatrick	
Start Date	Duration Generator Off* (days)	Start Date	Duration Generator Off* (days)
Mar 1	9	Feb 5	4
Jul 11	17	Feb 11	2
		Feb 21	2
		Mar 10	1
		Apr 28	2
		May 7	96
		Aug 12	4
		Oct 13	5

*Dates are inclusive in the outage duration.

The results presented in this section of the report document the impingement at both power stations during 1980, satisfying NRC and NPDES permit requirements to monitor the plants for potential effects on the aquatic biota.

B. IMPINGEMENT

1. Nine Mile Point Unit-I

a. Species Composition

Impingement sampling at Nine Mile Point during 1980 resulted in the collection of 36 fish taxa, 33 of which were identified to species (Table V-2). Approximately 94% of the total were comprised of rainbow smelt and alewife (Appendix Table B-3). Rainbow smelt dominated January through March, August and December samples, while alewives were dominant during every other month. Four species — alewife, rainbow smelt, yellow perch, and spottail shiner were consistently present in impingement samples while two other species — white perch and sculpins — were found during at least 10 of the 12 months.

Alewife, rainbow smelt, and gizzard shad comprised over 96 percent of the total fish biomass collected (Table V-2 and Appendix Table B-4) during impingement sampling. Alewife dominated during spring and summer (April-August) and in early fall (October), while gizzard shad were dominant in the winter months (January, November and December). Rainbow smelt and white sucker dominated collections (in terms of biomass) in February/March and September, respectively.

b. Temporal Distribution

The temporal distribution for total catch rate (number collected per 1000 cubic meters of cooling water used) during 1980 was characterized by peak periods of abundance (Figure V-1) in January, April, June, July, and early fall (October). Rainbow smelt accounted for nearly 80 percent of the fish impinged during January. During every other peak in fish impingement alewife comprised more than 90 percent of the total catch.

Table V-2

Number and Weight of Fish Collected during Impingement Sampling at Nine Mile Point I, 1980

Common Name*	Number Collected	Weight Collected (g)
Alewife	85,228	2,401,596.4
American eel	12	3,391.0
Black crappie	6	21.3
Bluegill	12	64.5
Brook stickleback	1	1.3
Brown bullhead	2	83.7
Burbot	2	2,075.0
Carp	2	3,425.9
Central mudminnow	32	134.9
Channel catfish	13	1,842.9
Centrachidae (unid)	4	NA
Coregonus spp.	1	351.3
Cottus spp. (sculpin)**	981	4,551.6
Emerald shiner	93	380.4
Freshwater drum	2	30.5
Gizzard shad	1,167	141,190.2
Golden shiner	29	76.7
Johnny darter	184	576.5
Lake chub	26	123.0
Largemouth bass	2	35.0
Log perch	1	18.0
Northern pike	2	53.3
Pumpkinseed	24	616.1
Rainbow smelt	12,655	174,161.3
Rainbow trout	1	825.5
Rock bass	53	1,353.8
Sea lamprey	6	224.0
Smallmouth bass	16	3,557.6
Spottail shiner	668	6,712.0
Stonecat	48	3,464.0
3-spine stickleback	14	15.8
Trout-perch	780	8,041.2
White bass	639	7,858.4
White perch	1,059	19,293.2
White sucker	16	11,603.1
Yellow perch	381	22,212.8
Unidentified	38	718.4
Total	104,200	2,820,680.6

*Common names are according to the American Fisheries Society list of common and scientific names of fishes from the United States and Canada (Robins et al 1980).

**Primarily mottled sculpin.

NA = Damaged specimen, weight not available.

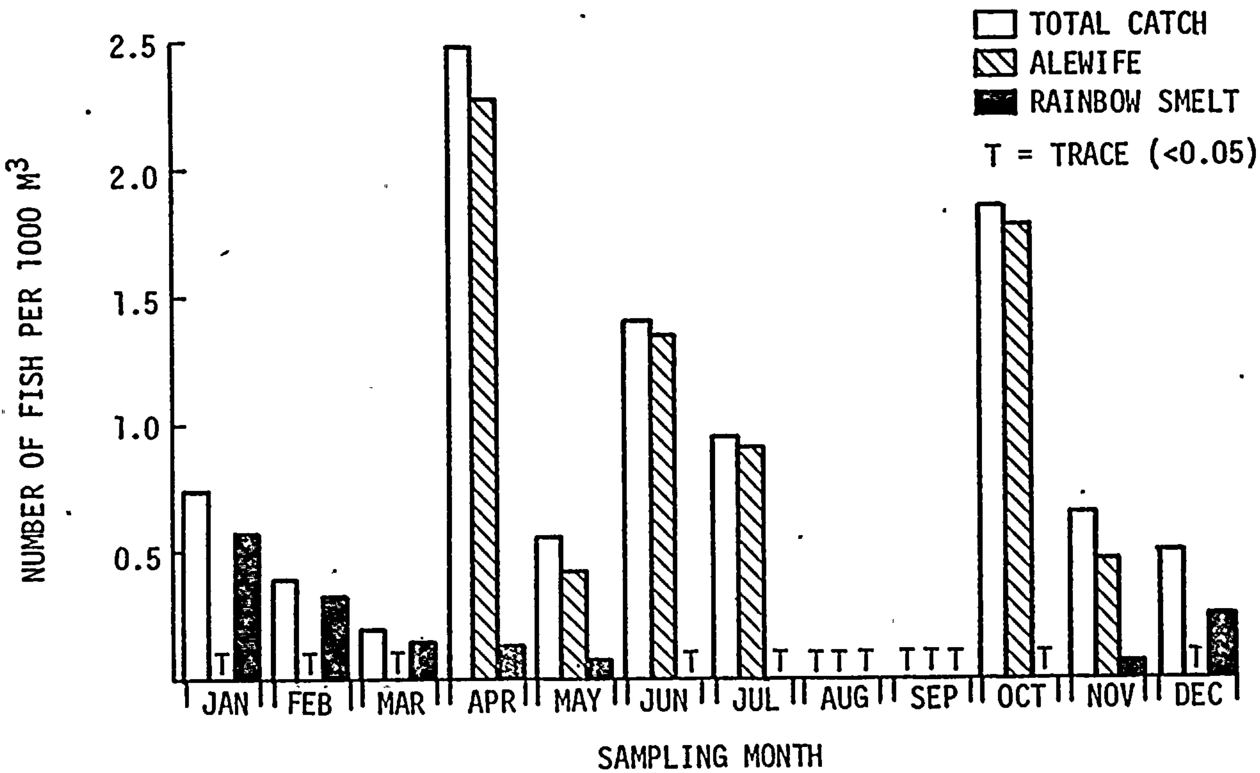


Figure V-1. Seasonal Variation in Impingement Rates at Nine Mile Point Unit-1, Jan-Dec, 1980

c. Estimated Impingement

The total number of fish impinged at Nine Mile Point Unit-1 during January - December 1980 was estimated to be approximately 401,000 over 75 percent of which were alewife. Total weight was estimated to be approximately 7,946 kilograms, with alewife, gizzard shad, and rainbow smelt contributing 94 percent (75, 12, and 7 percent respectively) of the total biomass. The estimated numbers and weights of fish impinged during each month of 1980 are presented in Appendix Table B-5.

d. Length Frequency

Alewife, rainbow smelt, smallmouth bass, threespine stickleback, white perch, and yellow perch length-frequency distributions are presented in Appendix Table B-6. As in 1979, length frequencies suggested that adults and subadults were generally impinged during the winter and spring seasons (January - June). Young-of-the-year fish were encountered in the summer and young-of-the-year alewife dominated late summer and fall samples.

2. James A. FitzPatrick Nuclear Plant

a. Species Composition

Impingement sampling at James A. FitzPatrick in 1980 resulted in the collection of 43 fish taxa, 38 of which were identified to species (Table V-3). Of the total number of fish collected, rainbow smelt and alewife comprised nearly 89 percent. Rainbow smelt dominated impingement samples from January through March and in December while alewife were most abundant during all other months (Appendix Table B-7). Five species — alewife, rainbow smelt, sculpin, yellow perch, and spottail shiner — were consistently present in impingement samples while two other species — rock bass and white perch — were found during at least 10 of the 12 months.

Rainbow smelt, gizzard shad, and alewife comprised approximately 92 percent of the total fish biomass collected at FitzPatrick (Table V-3 and Appendix Table B-8). Gizzard shad was the dominant species collected during January, March, and again in December. Alewives dominated samples during the spring and

Table V-3

Number and Weight of Fish Collected during Impingement Sampling, James A. FitzPatrick Nuclear Station, 1980

Common Name*	Number Collected	Weight Collected (g)
Alewife	39,098	994,322.2
American eel	5	820.6
Black crappie	1	4.4
Bluegill	24	169.6
Bluntnose minnow	3	6.0
Brook stickleback	5	4.9
Brown bullhead	14	1,693.5
Brown trout	5	5,336.9
Burbot	3	2,038.1
Carp	1	5.8
Central mudminnow	130	412.0
Channel catfish	7	619.4
Centrachidae (unidentified)	4	NA
Cottus spp. (sculpin)**	546	2,023.1
Creek chub	1	48.0
Cyprinidae		
Emerald shiner	167	380.2
Freshwater drum	2	29.2
Gizzard shad	1,785	202,678.2
Golden shiner	3	21.4
Goldfish	1	10.6
Johnny darter	301	653.1
Lake chub	14	216.6
Largemouth bass	1	9.4
Log perch	1	19.4
Morone spp.	1	NA
Northern pike	2	29.3
Pumpkinseed	27	908.9
Rainbow smelt	14,718	170,979.8
Rainbow trout	1	1,043.3
Rock bass	86	7,478.8
Salvelinus spp.***	4	15.0
Sea lamprey	1	340.5
Smallmouth bass	33	9,800.6
Spottail shiner	392	2,793.4
Stonecat	13	630.7
3-spine stickleback	11	13.1
Trout-perch	367	4,155.0
Walleye	2	1,089.0
White bass	1,406	14,799.0
White perch	927	20,384.9
White sucker	8	3,992.7
Yellow perch	319	18,823.2
Unidentified	37	NA
Total	60,477	1,468,799.5

*Common names are according to the American Fisheries Society list of common and scientific names of fishes from the United States and Canada (Robins et al 1980).

**Primarily mottled sculpin.

***Species identification of lake trout and splake remains tentative because of overlapping identifying characteristics of native and stocked populations.

NA = Damaged specimen, weight not available.

Total weight may not sum correctly due to rounding-off error.

summer (April - September) and in early fall (October). Rainbow smelt and gizzard shad were co-dominant during February and white bass was the most abundant species collected during November.

b. Temporal Distribution

The temporal distribution of impingement rates (number of fish impinged per 1000 cubic meters of water sampled) during 1980 was characterized (Figure V-2) by high catch in rates in January, June, July, and October. Most fish impinged during the January peak were rainbow smelt. Alewife comprised the majority of fish (over 80 percent) taken during the other peaks.

c. Estimated Impingement

The total number of fish impinged at James A. FitzPatrick during 1980 was estimated to be approximately 296,000, over half of which were alewife. The total weight of all impinged fish was estimated to be approximately 5,676 kilograms, with alewife, gizzard shad, and rainbow smelt contributing 88 percent of the total biomass (52, 25, and 11 percent, respectively). The estimated numbers and weights of fish impinged duirng each month of 1980 are presented in Appendix Table B-9 .

d. Length Frequency

Length-frequency distributions for alewife, rainbow smelt, smallmouth bass, threespine stickleback, white perch, and yellow perch impinged at FitzPatrick indicated trends similar to those observed at Nine Mile Point Unit-1 (Appendix Table B-10). Adults and subadults were generally impinged in winter and spring, while young-of-the-year were encountered during the summer and were frequently taken through the fall.

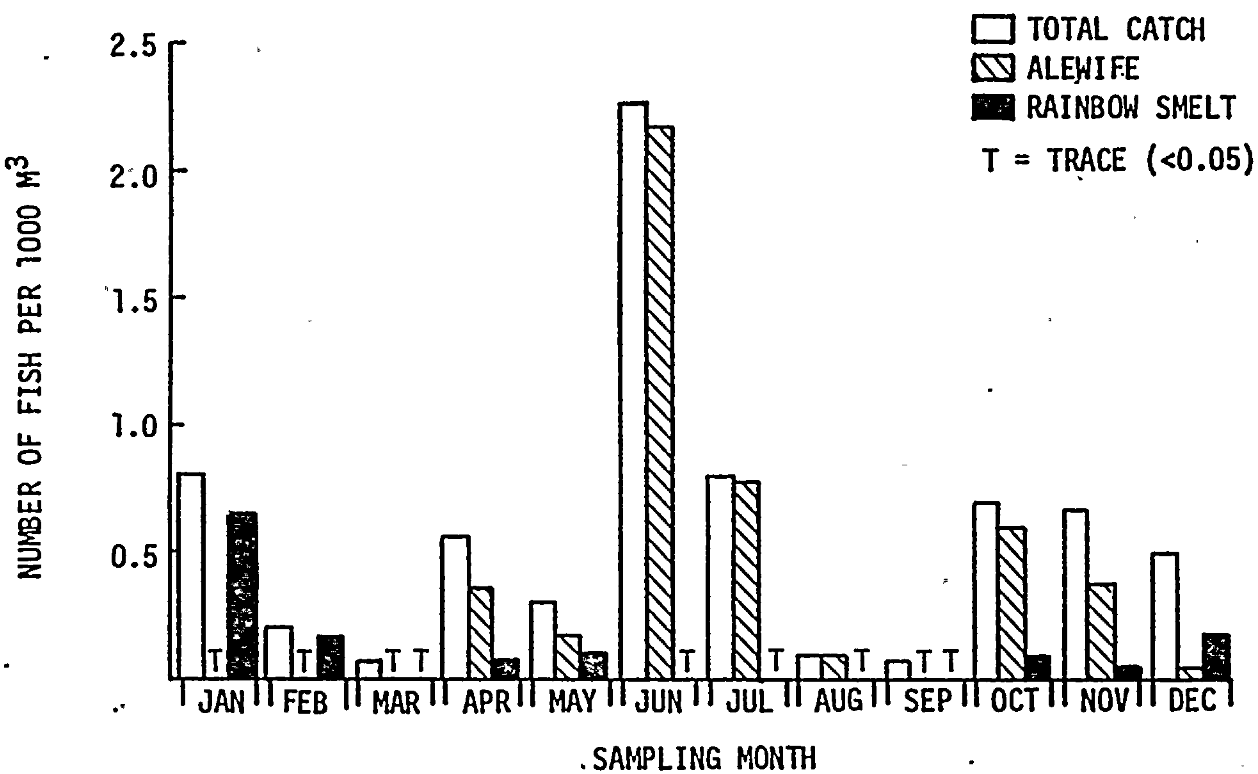


Figure V-2. Seasonal Variation in Impingement Rates at James A. FitzPatrick Nuclear Plant, Jan-Dec, 1980

SECTION VI

COMPARISON OF SPECIES COMPOSITION AND TEMPORAL DISTRIBUTION FOR FISH COLLECTED IN GILL NET AND IMPINGEMENT SAMPLES, 1980

Gill net catches made in the vicinity of Nine Mile Point from April through November, 1980 yielded 20 fish taxa. January through December impingement collections conducted at Nine Mile Point Unit 1 and James A. FitzPatrick yielded 36 and 43 fish taxa respectively. Largest gill net catches (catch per 12-hour set) were observed in April, June, and July while highest impingement collections (number per 1000 m^3 of water pumped) were observed in January, April, June, July and October at Nine Mile Point and in January, June, July and October at FitzPatrick.

Alewife dominated gill net catches during the peak abundance periods of April, June, and July. Alewife was also the dominant species during spring and summer impingement collections at Nine Mile Point Unit 1 and at James A. FitzPatrick. Rainbow smelt dominated Nine Mile Point Unit 1 and FitzPatrick impingement collections from January through March, and in December. Very few rainbow smelt were taken with gill nets during any season.

During the 1980 study alewife, rainbow smelt, gizzard shad and white perch were among the five most abundant species taken in impingement collections, while alewife, spottail shiner and yellow perch were among the most abundant in gill net collections. Some smaller fish species (e.g., three-spine stickleback), species preferring mid-depth and/or surface water strata, rather than near-bottom (e.g., rainbow smelt), and species common during the winter (no gill net collections made) were taken in impingement collections but were not represented or not represented in substantial numbers in gill net catches.

SECTION VII

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APPENDIX A

FISHERIES

- Catch Rate Data
- Length-Frequency

Table A-1

Temporal Abundance of Fish Collected by Gill Net, Nine Mile Point Vicinity, 1980

Common Name	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec*	Total
					Actual Catch					
Alewife	555	154	530	704	18	21	26	10		2,018
American eel			1							1
Brown bullhead				1	4	8				13
Brown trout		2	2	1	1					6
Burbot			2							2
Gizzard shad					5	3				8
Lake chub	1	3	4		2	4	2	1		17
Rainbow smelt	20	1	2		2		6	6		37
Rainbow trout					2					2
Rock bass	2		1	2	2	4				11
Salvelinus spp.	3	1					4	2		10
Shorthead redhorse								1		1
Smallmouth bass		1		1	5	3				10
Spottail shiner	31	36	175	297	97	21	100	10		767
Stonecat	2	1	1	2	4		1			11
Trout-perch	10	46	20	11			3			90
White bass	1									1
White perch	6	13	10	6	2	4	7	3		51
White sucker	5	6	6	36	11	5	17	12		98
Yellow perch	9	2	6	9	42	12	26	5		111
Total	645	266	760	1,070	197	85	192	50		3,265

*December samples not collected due to adverse weather.

Table A-2

Spatial Distribution of Fish Collected with Gill Nets,*
Nine Mile Point Vicinity, 1980

ALEWIFE

	Apr**	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec***	Annual Mean
NMPW	5	1	163	115	5	11	9	2		23.90
NMPP	21	2	121	123	1	7	0	1		21.20
FITZ	172	5	18	122	1	3	4	0		25.00
NMPE	90	84	20	66	3	0	11	6		21.50

RAINBOW SMELT

	Apr**	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec***	Annual Mean
NMPW	2	0	1	0	0	0	0	1		0.31
NMPP	0	0	0	0	1	0	0	0		0.08
FITZ	7	1	0	0	0	0	1	0		0.69
NMPE	2	0	1	0	1	0	4	4		0.92

SMALLMOUTH BASS

	Apr**	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec***	Annual Mean
NMPW	0	1	0	0	0	0	0	0		0.08
NMPP	0	0	0	0	3	2	0	0		0.38
FITZ	0	0	0	1	1	1	0	0		0.23
NMPE	0	0	0	0	1	0	0	0		0.08

WHITE PERCH

	Apr**	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec***	Annual Mean
NMPW	0	3	1	1	0	2	1	0		0.61
NMPP	1	3	4	2	1	1	2	0		1.00
FITZ	2	2	1	1	0	1	1	1		0.69
NMPE	1	0	0	0	1	0	3	2		0.54

YELLOW PERCH

	Apr**	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec***	Annual Mean
NMPW	1	0	2	1	5	1	9	1		1.54
NMPP	0	1	1	0	3	6	3	1	0	1.15
FITZ	4	0	1	2	4	5	7	2		1.92
NMPE	0	1	1	2	13	0	3	1		1.62

*Mean monthly catch per 12-hr set (rounded to nearest whole fish).

**Bi-monthly collection (twice per month) April through August.

***No collection in December.

Table A-3

Length Distribution of Fish Collected by Gill Net,
Nine Mile Point Vicinity, 1980

ALEWIFE

Length Range (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec*
61- 70									
71- 80									
81- 90									
91-100	1	1		2					
101-110	4	1		9					
111-120		1		3					
121-130				1	1				
131-140		2		2					
141-150	6	4	3	14			4		
151-160	59	16	22	50	1		3	1	
161-170	82	16	83	112	3	5	1	4	
171-180	38	11	55	49	5	4	11	1	
181-190	8	1	15	18		5	1	3	
191-200	7	3	7	6	1	2	1	1	
201-210	6	2	1	1	1	2	2		
211-220			1			1	1		
221-230	1				1		1		

RAINBOW SMELT

Length Range (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
61- 70									
71- 80									
81- 90									
91-100									
101-110									
111-120									
121-130	1								
131-140	5								
141-150	3	1							
151-160	7						2	2	
161-170	1				1		2	3	
171-180			2				1		
181-190							1		
191-200	2								
201-210									
211-220									
221-230								1	

SMALLMOUTH BASS

Length Range (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
261-270						1			
271-280									
281-290									
291-300				1					
201-310						1			
311-320									
321-330									
331-340									
341-350		1							
351-360					1				
361-370					1				
371-380					1				
381-390					1				
391-400									
401-410						1			
411-420									
421-430					1				

*No collection in December.

Table A-3 (Contd)

WHITE PERCH

Length Range (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec*
91-100							2		
101-110									
111-120									
121-130									
131-140									
141-150				1					
151-160	1	1							
161-170	2		2					2	
171-180						1	1		
181-190									
191-200							1		
201-210									
211-220	1	1				1	2		
221-230		2	2	1		1			
231-240		5	2	1			1		
241-250	1	1	2						
251-260				2					
261-270			1		1	1			
271-280	1	2	1	1					
281-290									
291-300		1							
301-310					1				

YELLOW PERCH

Length Range (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
101-110			1	1					
111-120		1		1			1		
121-130									
131-140	2								
141-150				1				1	
151-160	1		2		1		1		
161-170					4		1		
171-180			1		9		2	2	
181-190	1	1			7	2	6		
191-200	3			1	9		2	1	
201-210	2			1	2	3	7		
211-200					2	3	1	1	
221-230					6		1		
231-240				2	1		1		
241-250			1	1			1		
251-260						2			
261-270						1			
271-280			1		1				
281-290						1	2		
291-300									

*No collection in December.

APPENDIX B

IMPINGEMENT

- Nine Mile Point Unit-1
  - B-1 Plant Operating Conditions at the Nine Mile Point Unit-1 Nuclear Power Station during 1980
- James A. FitzPatrick
  - B-2 Plant Operating Conditions at the James A. FitzPatrick Nuclear Power Plant during 1980

Table B-1

Plant Operating Conditions at Nine Mile Point Nuclear Station Unit during 1980

Date Mo.	Date Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Jan	1	2	1	1,439,057.644	599	20.8	3.5	17.3
	2	2	1	1,439,057.644	592	20.1	2.9	17.2
	3	2	1	1,439,057.644	589	19.9	3.1	16.8
	4	2	1	1,439,057.644	601	20.3	3.1	17.2
	5	2	1	1,439,057.644	600	20.1	1.6	18.5
	6	2	1	1,362,744.000	603	20.7	2.6	18.1
	7	2	1	1,357,293.024	601	21.4	2.7	18.7
	8	2	1	1,357,293.024	602	18.9	0.4	18.5
	9	2	1	1,357,293.024	602	18.9	0.1	18.8
	10	2	1	1,270,077.408	601	20.9	1.5	19.4
	11	2	1	1,259,175.456	604	21.8	2.0	19.8
	12	2	1	1,242,822.528	420	14.9	0.0	14.9
	13	2	1	1,259,175.456	528	18.2	0.9	17.3
	14	2	1	1,242,822.528	586	21.6	2.3	19.3
	15	2	1	1,259,175.456	596	20.6	0.9	19.7
	16	2	1	1,253,724.480	600	21.2	1.8	19.4
	17	2	1	1,253,724.480	600	22.7	2.8	19.9
	18	2	1	1,270,077.408	598	22.4	3.0	19.4
	19	2	1	1,280,979.360	599	20.8	1.6	19.2
	20	2	1	1,280,979.360	601	20.4	1.1	19.3
	21	2	1	1,264,626.432	600	19.3	0.6	18.7
	22	2	1	1,264,626.432	699	20.7	2.3	18.4
	23	2	1	1,264,626.432	600	19.3	0.6	18.7
	24	2	1	1,264,626.432	585	16.2	5.7	10.5
	25	2	1	1,095,646.176	576	22.2	3.6	18.6
	26	2	1	1,139,253.984	598	22.8	0.4	22.4
	27	2	1	1,122,901.056	599	22.9	0.5	22.5
	28	2	1	1,139,253.984	591	22.6	0.3	22.3
	29	2	1	1,155,606.912	579	22.1	0.3	21.8
	30	2	1	1,117,450.080	561	9.8	15.6	5.8
	31	2	1	1,062,940.320	569	22.3	-0.2	22.5
Feb	1	2	1	1,062,940.320	582	22.7	-0.2	22.9
	2	2	1	1,062,940.320	583	22.9	0.1	22.8
	3	2	1	1,062,940.320	582	22.9	0.2	22.7
	4	2	1	1,068,391.296	576	24.6	2.0	22.6
	5	2	1	1,068,391.296	570	24.1	0.8	23.3
	6	2	1	1,090,195.200	570	22.4	0.2	22.2
	7	2	1	1,090,195.200	565	22.4	0.2	22.2
	8	2	1	1,090,195.200	560	22.4	0.4	22.0
	9	2	1	1,150,155.936	240	11.1	0.4	10.7
	10	2	1	1,150,155.936	405	15.6	0.3	15.3
	11	2	1	1,171,959.840	519	19.4	0.1	19.3
	12	2	1	1,171,959.840	581	20.5	-0.3	20.8
	13	2	1	1,171,959.840	589	20.7	-0.3	21.0
	14	2	1	1,171,959.840	593	20.8	-0.3	21.1
	15	2	1	1,177,410.816	593	21.2	0.1	21.1
	16	2	1	1,177,410.816	596	21.4	0.4	21.0
	17	2	1	1,177,410.816	593	21.3	0.3	21.0
	18	2	1	1,177,410.816	585	20.5	0.3	20.2
	19	2	1	1,177,410.816	557	20.4	0.4	20.0
	20	2	1	1,177,410.816	468	18.7	1.3	17.4
	21	2	1	1,177,410.816	471	18.2	0.8	17.4
	22	2	1	1,177,410.816	471	17.8	0.6	17.2
	23	2	1	1,177,410.816	472	18.5	1.2	17.3
	24	2	1	1,177,410.816	473	18.2	0.8	17.4
	25	2	1	1,177,410.816	473	18.1	0.0	18.1
	26	2	1	1,177,410.816	473	18.0	0.7	17.3
	27	2	1	1,177,410.816	472	17.6	0.2	17.4
	28	2	1	1,177,410.816	467	19.2	0.3	18.9
	29	2	1	1,177,410.816	469	20.0	0.3	19.7
Mar	1	2	1	1,177,410.816	0[3a]	NA	NA	NA
	2	2	1	1,177,410.816	212[3b]	5.6	0	5.6
	3	2	1	1,177,410.816	0	3.9	0	3.9
	4	2	1	1,177,410.816	0	0.1	-0.3	0.4
	5	2	1	1,177,410.816	0	0.2	-0.3	0.5
	6	2	1	1,177,010.816	0	4.6	4.1	0.5
	7	2	1	1,177,410.816	0	0.1	-0.2	0.3
	8	2	1	1,177,410.816	0	0.1	-0.2	0.3
	9	2	1	1,177,410.816	90[3c]	0.3	-0.2	0.5
	10	2	1	1,231,920.576	432	16.9	0.1	16.8
	11	2	1	1,231,920.576	537	18.4	-0.3	18.1
	12	2	1	1,231,920.576	586	19.3	-0.3	19.6
	13	2	1	1,231,920.576	584	19.6	0.1	19.5
	14	2	1	1,231,920.576	577	19.6	-0.2	19.4
	15	2	1	1,231,920.576	477	18.0	-0.2	18.2
	16	2	1	1,231,920.576	558	18.8	0.1	18.7
	17	2	1	1,237,371.552	578	20.2	1.7	18.5
	18	2	1	1,237,371.552	590	20.2	4.1	16.1
	19	2	1	1,237,371.554	586	20.6	3.5	17.1
	20	2	1	1,237,371.554	584	21.3	1.7	19.6
	21	2	1	1,237,371.552	580	21.6	2.1	19.5
	22	2	1	1,237,371.552	579	21.4	1.7	20.7
	23	2	1	1,237,371.552	579	20.6	1.2	19.4
	24	2	1	1,237,371.552	580	20.9	1.4	19.5
	25	2	1	1,242,822.528	584	21.7	2.1	19.6
	26	2	1	1,242,822.528	586	21.7	2.1	19.6
	27	2	1	1,242,822.528	586	22.4	2.8	19.6
	28	2	1	1,242,822.528	587	23.2	3.4	19.8
	29	2	1	1,242,822.528	594	22.1	2.1	20.0
	30	2	1	1,242,822.528	594	22.0	2.1	19.9
	31	2	1	1,242,822.528	600	23.3	3.2	20.1

Table B-1 (Contd)

Date Mo.	Date Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Arp	1	2	1	1,259,175.456	594	24.0	3.5	20.5
	2	2	1	1,275,528.384	595	22.8	2.8	20.0
	3	2	1	1,275,528.384	599	21.9	2.2	19.7
	4	2	1	1,275,528.384	604	23.1	3.2	19.9
	5	2	1	1,275,528.384	605	24.1	3.8	20.3
	6	2	1	1,291,881.312	603	23.8	3.6	20.2
	7	2	1	1,291,881.312	604	24.3	3.3	21.0
	8	2	1	1,291,881.312	603	24.9	4.8	20.1
	9	2	1	1,291,881.312	606	24.6	4.3	20.3
	10	2	1	1,291,881.312	603	24.6	4.4	20.2
	11	2	1	1,270,077.408	601	23.9	3.8	20.1
	12	2	1	1,270,077.408	605	24.7	4.4	20.3
	13	2	1	1,270,077.408	602	25.7	5.7	20.0
	14	2	1	1,270,077.408	605	24.7	4.6	20.1
	15	2	1	1,270,077.403	605	24.3	4.2	20.1
	16	2	1	1,313,685.216	601	24.4	4.8	19.6
	17	2	1	1,346,391.072	599	23.0	3.8	19.2
	18	2	1	1,335,489.120	599	23.9	4.8	19.1
	19	2	1	1,335,489.120	599	24.2	5.0	19.2
	20	2	1	1,351,842.048	599	24.1	4.9	19.2
	21	2	1	1,324,587.168	472	21.6	5.6	16.0
	22	2	1	1,324,587.168	238	14.9	5.9	9.0
	23	2	1	1,335,489.120	449	19.2	4.1	15.1
	24	2	1	1,335,489.120	548	23.1	5.4	17.7
	25	2	1	1,335,489.120	587	23.8	5.1	18.7
	26	2	1	1,351,842.048	378	18.4	4.4	14.0
	27	2	1	1,368,194.976	549	20.0	3.9	16.1
	28	2	1	1,368,194.976	594	22.8	4.7	18.1
	29	2	1	1,368,194.976	597	22.9	5.0	17.9
	30	2	1	1,384,547.904	600	22.9	4.9	18.0
May	1	2	1	1,379,096.928	600	23.4	5.3	18.1
	2	2	1	1,395,449.856	600	24.9	6.3	18.6
	3	2	1	1,395,449.856	598	25.8	7.7	18.2
	4	2	1	1,395,449.856	599	24.8	7.9	16.9
	5	2	1	1,400,900.832	599	26.3	8.2	18.1
	6	2	1	1,411,802.784	599	26.4	8.2	18.2
	7	2	1	1,389,998.880	599	25.6	7.4	18.2
	8	2	1	1,395,449.856	600	26.8	8.7	18.1
	9	2	1	1,395,449.856	599	27.4	9.3	18.1
	10	2	1	1,395,449.856	599	26.9	8.7	18.2
	11	2	1	1,395,449.856	601	24.8	6.6	18.2
	12	2	1	1,389,998.880	603	26.1	7.8	18.3
	13	2	1	1,389,998.880	605	26.4	8.2	18.2
	14	2	1	1,389,998.880	606	26.6	8.4	18.2
	15	2	1	1,389,998.880	606	27.3	9.3	18.0
	16	2	1	1,389,998.880	605	26.6	8.4	18.2
	17	2	1	1,389,998.880	391	23.2	8.0	15.2
	18	2	1	1,395,449.856	555	24.6	7.6	17.0
	19	2	1	1,395,449.856	594	26.6	8.8	17.8
	20	2	1	1,400,900.832	596	26.1	8.2	17.9
	21	2	1	1,400,900.832	597	26.8	8.7	18.1
	22	2	1	1,395,449.856	599	27.6	9.7	17.9
	23	2	1	1,395,449.856	606	28.3	10.2	18.1
	24	2	1	1,395,449.856	601	28.1	10.2	17.9
	25	2	1	1,395,449.856	603	28.8	10.1	17.9
	26	2	1	1,406,351.808	602	28.2	10.2	18.0
	27	2	1	1,395,449.856	602	29.5	11.4	18.1
	28	2	1	1,389,998.880	602	29.4	11.2	18.2
	29	2	1	1,400,900.832	600	29.3	11.1	18.2
	30	2	1	1,384,547.904	602	27.2	9.2	18.0
	31	2	1	1,400,900.832	603	28.7	10.2	18.5
Jun	1	2	1	1,400,900.832	599	30.0	11.8	18.2
	2	2	1	1,395,449.856	597	29.3	10.9	18.4
	3	2	1	1,379,096.928	596	30.2	11.9	18.3
	4	2	1	1,373,645.952	591	30.2	11.9	18.3
	5	2	1	1,373,645.952	595	29.8	11.8	18.0
	6	2	1	1,389,998.880	596	28.8	10.5	18.3
	7	2	1	1,362,744.000	397	23.7	11.7	12.0
	8	2	1	1,373,645.952	552	28.3	11.8	16.5
	9	2	1	1,389,998.880	590	29.2	11.1	18.1
	10	2	1	1,395,449.856	588	30.4	12.2	18.2
	11	2	1	1,400,900.832	591	30.0	11.7	18.3
	12	2	1	1,400,900.832	591	30.4	11.7	18.7
	13	2	1	1,384,547.904	592	30.0	11.6	18.4
	14	2	1	1,395,449.856	592	30.3	11.9	18.4
	15	2	1	1,395,449.856	592	30.7	12.2	18.5
	16	2	1	1,389,998.880	590	30.3	11.9	18.4
	17	2	1	1,389,998.880	592	30.7	12.3	18.4
	18	2	1	1,384,547.904	593	30.9	12.5	18.4
	19	2	1	1,379,096.928	593	31.4	12.5	18.9
	20	2	1	1,368,194.976	594	30.8	12.1	18.7
	21	2	1	1,384,547.904	592	31.6	12.9	18.7
	22	2	1	1,384,547.904	596	31.3	12.6	18.7
	23	2	1	1,368,194.976	580	32.3	13.6	18.7
	24	2	1	1,384,547.904	573	32.0	13.4	18.6
	25	2	1	1,379,096.928	564	32.0	13.6	18.4
	26	2	1	1,384,547.904	545	34.8	16.4	18.4
	27	2	1/2[d]	1,411,802.784	546	35.4	16.5	18.9
	28	2	2	1,114,704.960	34	12.1	12.1	0.0
	29	2	2	1,411,802.784	118	18.3	11.4	6.9
	30	2	2	1,504,469.376	456	27.5	12.7	14.8

Table B-1 (Contd)

Mo.	Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Jul	1	2	2	1,411,802.784	551	32.1	14.5	17.6
	2	2	2	1,411,802.784	550	32.3	14.6	17.7
	3	2	2	1,411,802.784	549	32.7	15.1	17.6
	4	2	2	1,406,351.808	544	34.4	16.2	18.2
	5	2	2	1,395,449.856	547	35.0	16.7	18.3
	6	2	2	1,395,449.856	549	35.7	17.5	18.2
	7	2	2	1,400,900.832	545	35.2	17.2	18.0
	8	2	2	1,411,802.784	552	34.5	16.5	18.0
	9	2	2	1,411,802.784	551	34.7	16.7	18.0
	10	2	2	1,411,802.784	555	35.4	17.3	18.1
	11	2	2	1,411,802.784	521[3e]	36.3	18.3	18.0
	12	2	2/1[3f]	1,384,547.904	0	19.1	18.5	0.6
	13	2	1	1,384,547.904	0	19.2	18.9	0.3
	14	2	1	1,379,096.928	0	19.4	19.1	0.3
	15	2	1	1,384,547.904	0	19.6	19.3	0.3
	16	2	1	1,395,449.856	0	19.4	19.3	0.1
	17	2	1	1,395,449.856	0	20.4	19.9	0.5
	18	2/0[3g]	1	1,395,449.856	0	20.1	20.3	0.2
	19	0	1	92,666.592	0	20.1	20.7	0.0
	20	0	1	92,666.592	0	20.1	21.7	0.0
	21	0	1	87,215.616	0	NA	21.8	NA
	22	0	1	87,215.616	0	NA	21.9	NA
	23	0	1	87,215.616	0	NA	21.9	NA
	24	0/1[3h]	1	812,195.424	0	NA	21.9	NA
	25	1	1	812,195.424	0	NA	21.9	NA
	26	1/2[3i]	1/2[3j]	1,488,116.448	0	22.6	21.9	0.7
	27	2	2	1,515,321.328	297[3k]	32.3	21.6	10.7
	28	2	2	1,515,371.328	421	33.9	21.3	12.6
	29	2	2	1,499,018.400	507	36.7	21.8	14.9
	30	2	2	1,504,469.376	551	39.0	22.4	16.6
	31	2	2	1,493,567.424	547	39.7	22.7	17.0
Aug	1	2	2	1,526,273.280	546	39.1	22.4	16.7
	2	2	2	1,526,273.280	546	39.8	22.9	16.9
	3	2	2	1,526,273.280	546	40.3	23.1	17.2
	4	2	2	1,526,273.280	544	39.7	23.1	16.6
	5	2	2	1,531,724.256	545	39.5	23.0	16.5
	6	2	2	1,526,273.280	542	40.1	23.3	16.8
	7	2	2	1,542,626.208	542	40.3	23.4	16.9
	8	2	2	1,542,626.208	540	40.8	23.9	16.9
	9	2	2	1,542,626.208	532	41.3	24.7	16.6
	10	2	2	1,548,077.184	540	40.3	23.7	16.6
	11	2	2	1,548,077.184	550	39.9	23.2	16.7
	12	2	2	1,537,175.232	553	40.2	23.3	16.9
	13	2	2	1,537,175.232	553	40.3	23.5	16.8
	14	2	2	1,520,822.304	558	40.3	23.3	17.0
	15	2	2	1,526,273.280	556	40.8	23.5	17.3
	16	2	2	1,526,273.280	557	39.9	23.1	16.8
	17	2	2	1,526,273.280	557	39.6	22.6	17.0
	18	2	2	1,537,175.232	563	39.3	22.2	17.1
	19	2	2	1,526,273.280	563	39.8	23.1	16.7
	20	2	2	1,526,273.280	560	39.9	22.7	17.2
	21	2	2	1,515,371.328	584	31.9	14.7	17.2
	22	2	2	1,520,822.304	578	25.8	8.4	17.4
	23	2	2	1,520,822.304	482	29.1	11.9	17.2
	24	2	2	1,526,273.280	522	28.8	12.7	16.1
	25	2	2	1,526,273.280	566	31.0	15.5	15.5
	26	2	2	1,526,273.280	579	36.4	19.2	17.2
	27	2	2	1,520,822.304	572	37.9	21.4	16.5
	28	2	2	1,520,822.304	580	34.2	17.4	16.8
	29	2	2	1,526,273.280	582	32.3	16.2	16.1
	30	2	2	1,526,273.280	574	36.3	19.6	16.7
	31	2	2	1,526,273.280	569	36.9	20.1	16.8
Sep	1	2	2	1,493,567.424	572	37.4	20.6	16.8
	2	2	2	1,493,567.424	567	38.4	21.4	17.0
	3	2	2	1,499,018.400	567	38.9	22.0	16.9
	4	2	2	1,499,018.400	569	38.7	21.8	16.9
	5	2	2	1,499,018.400	572	38.5	21.5	17.0
	6	2	2	1,499,018.400	571	38.7	22.0	16.7
	7	2	2	1,499,018.400	571	38.8	22.0	16.8
	8	2	2	1,499,018.400	568	38.8	21.8	17.0
	9	2	2	1,499,018.400	569	38.9	21.9	17.0
	10	2	2	1,499,018.400	568	38.9	21.7	17.2
	11	2	2	1,499,018.400	572	37.8	20.7	17.1
	12	2	2	1,499,018.400	568	38.1	21.0	17.1
	13	2	2	1,499,018.400	484	35.5	19.9	15.6
	14	2	2	1,499,018.400	553	37.3	20.2	17.1
	15	2	2	1,493,567.424	569	36.7	19.3	17.4
	16	2	2	1,499,018.400	571	36.5	19.8	16.7
	17	2	2	1,504,469.376	571	36.3	19.8	16.5
	18	2	2	1,504,469.376	573	35.9	19.2	16.7
	19	2	2	1,499,018.400	521	35.7	19.3	16.4
	20	2	2	1,499,018.400	0	19.2	18.8	0.4
	21	2	2	1,504,469.376	49	19.4	18.7	0.7
	22	2	2	1,499,018.400	401	35.2	18.7	16.5
	23	2	2	1,499,018.400	450	33.0	19.3	13.7
	24	2	2	1,499,018.400	566	35.2	18.6	16.6
	25	2	2	1,504,469.376	575	34.7	18.1	16.6
	26	2	2	1,504,469.376	581	33.8	17.2	16.6
	27	2	2	1,499,018.400	582	33.5	16.6	16.9
	28	2	2	1,504,469.376	579	33.7	17.0	16.7
	29	2	2	1,504,469.376	580	32.7	16.2	16.5
	30	2	2	1,504,469.376	576	32.9	16.3	16.6

Table B-1 (Contd)

Mo.	Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Oct	1	2	2	1,504,469.376	577	32.7	16.1	16.6
	2	2	2	1,504,469.376	577	33.2	16.5	16.7
	3	2	2	1,504,469.376	574	32.9	16.3	16.6
	4	2	2	1,504,469.376	574	33.3	16.4	16.9
	5	2	2	1,504,469.376	576	32.2	15.7	16.5
	6	2	2	1,499,018.400	578	32.1	15.2	16.9
	7	2	2	1,499,018.400	578	31.8	14.8	17.0
	8	2	2	1,499,018.400	580	31.6	14.7	16.9
	9	2	2	1,499,018.400	576	31.7	15.2	16.5
	10	2	2	1,499,018.400	578	31.4	14.7	16.7
	11	2	2	1,499,018.400	576	31.5	14.9	16.6
	12	2	2	1,499,018.400	580	30.9	13.8	17.1
	13	2	2	1,499,018.400	581	29.7	13.1	16.6
	14	2	2	1,504,469.376	578	29.7	13.1	16.6
	15	2	2	1,504,469.376	582	29.8	13.2	16.6
	16	2	2	1,504,469.376	582	29.8	13.1	16.7
	17	2	2	1,504,469.376	584	30.0	13.3	16.7
	18	2	2	1,504,469.376	581	30.5	13.6	16.9
	19	2	2	1,499,018.400	583	30.0	12.9	17.1
	20	2	2	1,493,567.424	583	29.5	12.6	16.9
	21	2	2	1,493,567.424	584	29.3	12.4	17.3
	22	2	2	1,493,567.424	583	28.7	12.4	16.3
	23	2	2	1,493,567.424	582	29.2	12.6	16.6
	24	2	2	1,493,567.424	581	28.9	12.2	16.7
	25	2	2	1,493,567.424	583	28.4	11.4	17.0
	26	2	2	1,488,116.448	586	26.9	10.1	16.8
	27	2	2/1	1,488,116.448	587	25.4	8.7	16.7
	28	2	1	1,504,469.376	586	27.4	10.8	16.6
	29	2	1	1,499,018.400	585	25.9	9.2	16.7
	30	2	1	1,499,018.400	582	26.3	9.7	16.6
	31	2	1	1,499,018.400	584	25.6	9.0	16.6
Nov	1	2	1	1,482,655.472	466	22.1	7.9	14.2
	2	2	1	1,504,469.376	552	24.8	8.7	16.1
	3	2	1	1,499,018.400	567	25.0	8.7	16.3
	4	2	1	1,488,116.448	564	24.8	8.6	16.2
	5	2	1	1,493,567.424	567	23.8	7.5	16.3
	6	2	1	1,493,567.424	566	24.2	7.8	16.4
	7	2	1	1,493,567.424	566	24.2	7.8	16.4
	8	2	1	1,493,567.424	563	24.9	8.8	16.1
	9	2	1	1,493,567.424	565	24.7	8.6	16.1
	10	2	1	1,493,566.424	568	23.6	7.4	16.2
	11	2	1	1,493,566.424	570	22.4	6.4	16.0
	12	2	1	1,493,567.424	566	23.0	6.9	16.1
	13	2	1	1,493,567.424	568	23.4	7.2	16.2
	14	2	1	1,493,567.424	569	23.4	7.4	16.0
	15	2	1	1,493,567.424	565	23.7	7.6	16.1
	16	2	1	1,493,567.424	566	24.4	7.9	16.5
	17	2	1	1,493,567.424	569	23.7	7.4	16.3
	18	2	1	1,493,567.424	562	22.8	6.8	16.0
	19	2	1	1,493,567.424	557	21.9	6.2	15.7
	20	2	1	1,493,567.424	558	21.8	6.0	15.8
	21	2	1	1,493,567.424	550	22.3	6.8	15.5
	22	2	1	1,493,567.424	554	21.2	5.5	15.7
	23	2	1	1,493,567.424	557	22.0	6.3	15.7
	24	2	1	1,493,567.424	555	22.5	6.5	16.0
	25	2	1	1,493,567.424	555	23.1	7.0	16.1
	26	2	1	1,493,567.424	557	22.3	6.4	15.9
	27	2	1	1,493,567.424	555	22.3	6.4	15.9
	28	2	1	1,493,567.424	552	21.8	6.5	15.3
	29	2	1	1,493,567.424	543	21.2	5.8	15.4
	30	2	1	1,493,567.424	556	20.1	4.1	16.0
Dec	1	2	1	1,493,567.424	558	21.1	5.3	15.8
	2	2	1	1,493,567.424	556	22.1	5.9	16.2
	3	2	1	1,493,567.424	556	20.7	4.8	15.9
	4	2	1	1,493,567.424	555	20.9	4.9	16.0
	5	2	1	1,493,567.424	556	21.9	5.8	16.1
	6	2	1	1,493,567.424	556	21.0	5.5	15.5
	7	2	1	1,493,567.424	558	21.4	5.5	15.9
	8	2	1	1,493,567.424	556	20.9	5.4	15.5
	9	2	1	1,493,567.424	555	20.9	5.3	15.6
	10	2	1	1,509,920.352	557	21.0	5.4	15.6
	11	2	1	1,493,567.424	554	20.6	5.2	15.4
	12	2	1	1,466,312.544	552	20.2	4.7	15.5
	13	2	1	1,460,861.568	550	17.9	1.9	16.0
	14	2	1	1,389,998.880	409	14.0	0.8	13.2
	15	2	1	1,395,449.856	485	18.0	2.4	15.6
	16	2	1	1,395,449.856	505	18.4	2.6	15.8
	17	2	1	1,379,096.928	548	18.1	1.3	16.8
	18	2	1	1,351,842.048	555	19.7	1.6	18.1
	19	2	1	1,357,391.072	516	17.7	0.6	17.1
	20	2	1	1,335,489.120	0	4.6	0.4	4.2
	21	2	1	1,340,940.096	196	6.6	-0.1	6.7
	22	2	1	1,346,391.072	423	14.1	0.2	13.9
	23	2	1	1,351,842.048	457	16.6	0.3	16.3
	24	2	1	1,351,842.048	540	17.6	0.3	17.3
	25	2	1	1,346,391.072	548	19.2	3.0	16.2
	26	2	1	1,346,391.072	551	19.5	2.7	16.8
	27	2	1	1,351,842.048	551	18.6	2.5	16.1
	28	2	1	1,351,842.048	552	17.3	0.3	17.0
	29	2	1	1,351,842.048	553	18.6	1.6	17.0
	30	2	1	1,346,391.072	552	18.0	0.6	17.4
	31	2	1	1,345,391.072	555	17.7	0.5	17.2

Table B-1 (Contd)

Footnotes for Table

[1]Volume of water pumped each day derived from net discharge flow data in Nine Mile Point Unit 1 "401" monthly report.

[2]Power production is daily average (net MWe) from Nine Mile Point Unit 1 "401" monthly reports.

[3]Water temperatures derived from Nine Mile Point Unit 1 "401" monthly reports or Nine Mile Point Unit 1 periodic logs.

[a]1 March unit off line.

[b]2 March unit on line; unit off line.

[c]9 March unit on line.

[d]27 June 2 of 2 service water pumps operating.

[e]11 July unit off line.

[f]12 July 1 of 2 service pumps operating.

[g]18 July 0 of 2 circulating water pumps operating at 1800 hr.

[h]24 July 1 of 2 circulating water pumps operating at 1120 hr.

[i]26 July 2 of 2 circulating water pumps operating at 1120 hr.

[j]26 July 2 of 2 service water pumps operating.

[k]27 July unit on line.

Table B-2

Plant Operating Conditions at the James A. FitzPatrick Nuclear Plant during 1980

Mo.	Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Jan	1	2/3[3a]	2	1,359,473.414	543	19.7	6.6	13.1
	2	3	2	1,856,384.386	671	18.1	5.8	12.3
	3	3	2	1,770,040.926	766	19.8	5.8	14.0
	4	3	2	1,856,384.386	807	19.6	4.6	15.0
	5	3	2	1,899,556.116	803	19.5	4.2	15.3
	6	3	2	1,899,556.116	802	18.4	3.5	14.9
	7	3	2	1,942,727.846	801	19.1	4.4	14.7
	8	3	2	2,007,485.441	799	17.3	2.6	14.7
	9	3	2	1,834,798.521	797	18.3	3.7	14.6
	10	3	2	1,877,970.251	794	18.8	4.1	14.7
	11	3	2	1,942,727.846	770	18.6	4.3	14.3
	12	3	2	1,899,556.116	531	12.1	2.6	9.5
	13	3	2	1,899,556.116	612	14.7	3.6	11.1
	14	3	2	1,877,970.251	720	18.4	5.1	13.3
	15	3	2	1,877,970.251	786	18.9	4.4	14.5
	16	3	2	1,877,970.251	818	18.0	3.9	14.1
	17	3	2	1,899,970.251	821	20.4	4.9	15.5
	18	3	2	1,964,313.711	818	20.8	5.3	15.5
	19	3	2	1,985,899.576	822	19.8	4.3	15.5
	20	3	2	1,985,899.576	821	19.6	4.1	15.5
	21	3	2	1,921,141.981	821	19.6	4.1	15.5
	22	3	2	1,899,556.116	823	20.2	4.8	15.4
	23	3	2	2,007,485.441	822	18.4	2.9	15.5
	24	3	2	1,791,626.791	822	19.1	3.8	15.3
	25	3	2	1,791,626.791	818	4.6	4.6	0.0
	26	3	2	1,813,212.656	815	4.7	4.7	0.0
	27	3	2	1,834,798.521	816	4.1	4.1	0.0
	28	3	2	1,834,798.521	815	4.1	4.1	0.0
	29	3	2	1,834,798.521	815	3.5	3.5	0.0
	30	3	2	1,813,212.656	814	3.5	3.5	0.0
	31	3	2	1,834,798.522	814	3.1	3.1	0.0
Feb	1	3	2	1,856,384.387	788	17.4	2.9	14.5
	2	3	2	1,705,283.332	520	12.9	3.3	9.6
	3	3	2	1,554,182.277	665	17.5	5.3	12.2
	4	3	2	1,554,182.277	762	18.8	4.9	13.9
	5	3/2[3b]	2/1[3c]	1,161,275.905	76	1.0	1.3	0.0
	6	2	1	947,161.590	0[3d]	0.6	2.6	0.0
	7	2/1[3e]	1	676,793.137	0	0.4	2.3	0.0
	8	1/3[3f]	1/2[3g]	1,123,751.365	72[3h]	5.6	4.2	1.4
	9	3	2	1,273,566.033	442	15.4	6.4	9.0
	10	3	2	1,403,081.222	670	19.4	7.2	12.2
	11	3	2	544,703.306	272	7.7	2.7	5.0
	12	3/1[3i]	2/1[3j]	858,110.812	65	4.2	0.7	3.5
	13	1/2[3k]	1/2[3l]	946,564.990	426	15.3	4.6	10.7
	14	2	2	1,113,307.338	536	17.3	4.3	13.0
	15	2	2	1,098,262.644	503	16.5	4.2	12.3
	16	2	2	1,098,262.644	431	14.7	3.8	10.9
	17	2/3[3m]	2	1,272,552.151	626	18.3	4.8	13.5
	18	3	2	1,575,768.142	720	20.8	4.4	16.4
	19	3	2	1,705,283.332	739	18.1	4.3	13.8
	20	3	2	1,813,212.657	731	16.6	2.7	13.9
	21	3/2[3n]	2/1[3o]	1,233,301.490	324	8.2	4.3	3.9
	22	2	1/2[p]	1,026,709.500	214	8.6	2.4	6.2
	23	2/3[3q]	2	1,423,653.206	575	17.4	5.3	12.1
	24	3	2	1,640,525.737	575	15.8	5.3	10.5
	25	3	2	1,640,525.737	632	16.6	4.6	12.0
	26	3	2	1,640,525.737	730	18.4	4.8	13.6
	27	3	2	1,640,525.737	745	18.6	4.9	13.7
	28	3	2	1,597,354.007	769	18.1	4.3	13.8
	29	3	2	1,575,768.142	779	17.8	4.1	13.7
Mar	1	3	2	1,575,768.142	781	17.9	4.1	13.8
	2	3	2	1,575,768.142	780	17.9	4.2	13.7
	3	3	2	1,575,768.142	778	18.0	4.2	13.8
	4	3	2	1,575,768.142	776	17.8	4.1	13.7
	5	3	2	1,575,768.142	773	17.8	4.2	13.6
	6	3	2	1,575,768.142	772	17.8	4.1	13.7
	7	3	2	1,554,182.277	747	17.3	4.1	13.2
	8	3	2	1,532,596.412	595	13.7	3.3	10.4
	9	3	2	1,532,596.412	740	17.2	4.1	13.1
	10	3	2	1,662,114.632	649	18.4	4.8	13.6
	11	3	2	1,511,010.547	522	13.3	3.4	9.9
	12	3	2	1,532,596.412	545	13.9	4.6	9.3
	13	3	2	1,662,114.632	612	14.9	4.1	10.8
	14	3	2	1,662,114.632	774	18.3	4.6	13.7
	15	3	2	1,662,114.632	777	18.3	4.6	13.7
	16	3	2	1,662,114.632	775	18.2	4.5	13.7
	17	3	2	1,662,114.632	772	18.8	5.2	13.6
	18	3	2	1,618,939.872	771	18.4	5.1	13.3
	19	3	2	1,575,768.142	769	18.3	4.7	13.6
	20	3	2	1,618,939.872	768	18.8	5.2	13.6
	21	3	2	1,618,939.872	766	18.9	5.3	13.6
	22	3	2	1,618,939.872	622	16.4	5.4	1.1
	23	3	2	1,705,283.332	758	17.9	4.4	13.5
	24	3	2	1,705,283.332	807	19.0	4.7	14.3
	25	3	2	1,770,040.927	732	19.8	4.2	15.6
	26	3	2	1,770,040.927	493	13.0	3.3	9.7
	27	3	2	1,813,212.657	629	14.7	3.3	11.4
	28	3	2	1,791,626.792	735	16.7	3.6	13.1
	29	3	2	1,791,626.792	801	18.6	4.3	14.3
	30	3	2	1,770,040.927	792	18.7	4.6	14.1
	31	3	2	1,791,626.792	790	19.2	5.1	14.1

Table B-2 (Contd)

Mo.	Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Apr	1	3	2	1,856,384.387	787	19.4	5.4	14.0
	2	3	2	1,899,556.116	783	18.3	4.9	13.4
	3	3	2	1,921,141.981	780	17.4	3.5	12.5
	4	3	2	1,899,556.116	761	18.1	4.4	13.7
	5	3	2	1,921,141.981	610	16.6	5.3	11.3
	6	3	2	1,942,727.846	709	17.2	4.4	12.8
	7	3	2	1,942,727.846	787	18.7	4.6	14.1
	8	3	2	1,942,727.846	795	19.4	5.1	14.3
	9	3	2	2,050,657.171	792	19.2	4.8	14.4
	10	3	2	2,072,243.036	791	18.9	4.6	14.3
	11	3	2	2,072,243.036	786	18.3	4.1	14.2
	12	3	2	2,093,828.901	786	18.3	4.0	14.3
	13	3	2	2,093,828.901	785	19.9	5.7	14.2
	14	3	2	2,093,828.901	781	19.6	5.3	14.1
	15	3	2	2,093,828.901	776	18.7	4.4	14.3
	16	3	2	2,093,828.901	775	18.8	4.6	14.2
	17	3	2	2,050,657.171	683	16.6	3.8	12.8
	18	3	2	2,029,071.306	485	14.8	5.3	9.5
	19	3	2	1,985,899.576	520	15.6	5.4	10.2
	20	3	2	2,050,657.171	574	15.0	4.7	10.3
	21	3	2	2,072,243.036	636	16.7	5.2	11.5
	22	3	2	2,072,243.036	651	17.1	5.2	11.9
	23	3	2	2,050,657.171	642	15.8	4.1	11.7
	24	3	2	2,050,657.171	645	17.2	5.5	11.7
	25	3	2	2,029,071.306	643	17.6	5.8	11.8
	26	3	2	2,007,485.441	648	19.9	4.7	15.2
	27	3	2	2,007,485.441	647	16.1	4.5	11.6
	28	3/2[3r]	2	2,011,410.144	393	12.2	5.4	6.8
	29	2	3	1,504,469.376	106	7.2	4.8	2.4
	30	2/3[3s]	2	1,902,308.859	475	14.6	5.9	8.7
May	1	3	2	1,942,727.846	566	15.5	6.0	9.5
	2	3	2	1,942,727.846	551	16.6	6.4	10.2
	3	3	2	1,942,727.846	557	17.7	7.3	10.4
	4	3	2	1,964,313.714	567	18.5	8.0	10.5
	5	3	2	1,964,313.714	565	18.9	8.4	10.5
	6	3	2	1,856,384.387	526	17.5	8.2	9.3
	7	3/2[3t]	2/1[3u]	1,315,502.208	0[3r]	7.1	7.3	0.0
	8	2	1	1,315,502.208	0	7.5	7.7	0.0
	9	2	1	1,315,502.208	0	8.6	9.0	0.0
	10	2	1	1,315,502.208	0	7.9	8.2	0.0
	11	2	1	1,315,502.208	0	6.3	6.8	0.0
	12	2	1	1,315,502.203	0	7.4	7.8	0.0
	13	2	1	1,315,502.208	0	8.1	8.4	0.0
	14	2	1	1,315,502.203	0	8.2	8.7	0.0
	15	2	1	1,315,502.208	0	8.5	8.6	0.0
	16	2	1	934,006.569	0	7.8	8.1	0.0
	17	2	1	1,315,502.208	0	7.9	8.8	0.0
	18	2	1	1,315,502.208	0	7.2	7.7	0.0
	19	2	1	1,315,502.208	0	7.6	7.9	0.0
	20	2	1	1,315,502.203	0	7.9	8.8	0.0
	21	2	1	1,315,502.208	0	8.5	9.4	0.0
	22	2	1	1,315,502.208	0	8.8	9.8	0.0
	23	2	1	1,315,502.208	0	9.4	11.1	0.0
	24	2	1	1,315,502.208	0	9.4	10.6	0.0
	25	2	1	1,315,502.208	0	10.5	11.6	0.0
	26	2	1	1,315,502.203	0	10.1	11.2	0.0
	27	2	1	1,315,502.208	0	10.0	10.7	0.0
	28	2	1	1,315,502.208	0	10.2	11.3	0.0
	29	2	1	1,315,502.208	0	10.7	11.8	0.0
	30	2	1	1,315,502.208	0	7.5	8.6	0.0
	31	2	1	1,315,502.208	0	9.2	10.3	0.0
Jun	1	2	1	1,315,502.208	0	10.6	11.8	0.0
	2	2	1	1,315,502.208	0	10.5	14.3	0.0
	3	2	1	1,315,502.208	0	11.0	12.1	0.0
	4	2	1	1,315,502.203	0	10.3	11.6	0.0
	5	2	1	1,315,502.208	0	10.6	11.8	0.0
	6	2	1	1,315,502.208	0	9.7	10.9	0.0
	7	2	1	1,315,502.208	0	10.5	11.6	0.0
	8	2/1[3w]	1	989,276.430	0	11.3	13.2	0.0
	9	1	1	752,234.688	0	NA	NA	NA
	10	1	1	752,234.688	0	11.3	12.9	0.0
	11	1	1	752,234.688	0	11.0	13.6	0.0
	12	1	1	752,234.688	0	12.9	13.9	0.0
	13	1	1	752,234.688	0	13.3	13.7	0.0
	14	1	1	752,234.688	0	13.2	13.8	0.0
	15	1	1	752,234.688	0	13.3	14.1	0.0
	16	1	1	752,234.688	0	13.9	14.6	0.0
	17	1	1	752,234.688	0	13.1	14.3	0.0
	18	1	1	752,234.688	0	13.2	14.3	0.0
	19	1	1	752,234.688	0	14.2	15.3	0.0
	20	1	1	752,234.688	0	12.3	14.3	0.0
	21	1	1	752,234.688	0	12.8	14.4	0.0
	22	1	1	752,234.688	0	12.4	14.6	0.0
	23	1	1	752,234.688	0	12.3	15.2	0.0
	24	1	1	752,234.688	0	14.1	15.7	0.0
	25	1	1	752,234.688	0	14.6	16.2	0.0
	26	1	1	752,234.688	0	19.0	19.3	0.0
	27	1	1	752,234.688	0	17.8	18.7	0.0
	28	1	1	752,234.688	0	13.3	15.0	0.0
	29	1	1	752,234.688	0	11.7	13.8	0.0
	30	1	1	752,234.688	0	13.2	14.6	0:0

Table B-2 (Contd)

Mo.	Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Jul	1	1	1	752,234.688	0	15.0	16.1	0.0
	2	1	1	752,234.688	0	15.0	16.2	0.0
	3	1	1	752,234.688	0	15.6	16.7	0.0
	4	1	1	752,234.688	0	16.5	17.4	0.0
	5	1	1	752,234.688	0	16.9	17.9	0.0
	6	1	1	752,234.688	0	17.8	18.7	0.0
	7	1	1	752,234.688	0	16.7	18.2	0.0
	8	1	1	752,234.688	0	16.6	17.6	0.0
	9	1	1	752,234.688	0	17.2	18.1	0.0
	10	1	1	752,234.688	0	18.4	19.1	0.0
	11	1	1	752,234.688	0	18.4	19.2	0.0
	12	1	1	752,234.688	0	18.7	19.1	0.0
	13	1	1	752,234.688	0	18.2	18.4	0.0
	14	1	1	752,234.688	0	18.9	20.0	0.0
	15	1	1	752,234.688	0	19.0	20.0	0.0
	16	1	1	752,234.688	0	19.5	20.6	0.0
	17	1	1/2[3x]	795,842.496	0	19.8	20.4	0.0
	18	1	2	850,352.256	0	20.3	20.8	0.0
	19	1	2	850,352.256	0	21.1	21.6	0.0
	20	1	2	850,352.256	0	22.8	22.7	0.0
	21	1	2	850,352.256	0	22.4	23.1	0.0
	22	1	2	850,352.256	0	21.8	23.3	0.0
	23	1	2	850,352.256	0	21.1	22.4	0.0
	24	1	2	850,352.256	0	21.2	23.1	0.0
	25	1	2	850,352.256	0	21.2	23.1	0.0
	26	1	2	850,352.256	0	20.5	23.0	0.0
	27	1	2	850,352.256	0	21.0	23.1	0.0
	28	1	2	850,352.256	0	20.9	23.1	0.0
	29	1	2	850,352.256	0	20.8	23.3	0.0
	30	1	2	850,352.256	0	21.7	23.8	0.0
	31	1	2	850,352.256	0	21.8	23.8	0.0
Aug	1	1	2	850,352.256	0	22.2	23.2	0.0
	2	1	2	850,352.256	0	23.5	23.5	0.0
	3	1	2	850,352.256	0	23.6	23.5	0.0
	4	1	2	850,352.256	0	23.6	23.7	0.0
	5	1	2	850,352.256	0	23.6	23.4	0.2
	6	1	2	850,352.256	0	24.7	24.0	0.7
	7	1	2	850,352.256	0	24.9	24.2	0.7
	8	1	2	850,352.256	0	25.1	24.3	0.8
	9	1/2[3y]	2	1,191,038.256	0	25.3	24.6	0.7
	10	2	2	1,504,469.376	0	25.2	24.0	1.2
	11	2	2	1,504,469.376	15[3z]	26.9	24.0	2.9
	12	2	2	1,504,468.376	0	24.4	23.7	0.7
	13	2	2	1,504,469.376	0	25.3	23.7	1.6
	14	2	2	1,504,469.376	105	29.1	23.8	5.3
	15	2	2	1,504,469.376	178	31.3	24.4	6.9
	16	2	2	1,504,469.376	250	31.9	23.6	8.3
	17	2	2	1,504,469.376	299	32.7	23.4	9.3
	18	2	2	1,504,469.376	342	33.1	22.9	10.2
	19	2	2	1,504,469.376	288	32.4	23.2	9.2
	20	2/3[3aa]	2	2,104,076.736	310	31.8	23.5	8.3
	21	3	2	2,158,586.496	420	27.3	17.9	9.4
	22	3	2	2,158,586.496	482	24.0	13.7	10.3
	23	3	2	2,158,586.496	468	32.2	22.2	10.0
	24	3	2	2,158,586.496	465	32.9	22.9	10.0
	25	3	2	2,158,586.496	462	32.9	22.7	10.2
	26	3	2	2,158,586.496	454	31.8	21.8	10.0
	27	3	2	2,158,586.496	451	33.0	22.9	10.1
	28	3	2	2,158,586.496	457	29.5	19.4	10.1
	29	3	2	2,158,586.496	547	29.7	18.0	11.7
	30	3	2	2,158,586.496	610	32.7	19.9	12.8
	31	3	2	2,158,586.496	579	33.2	20.9	12.3
Sep	1	3	2	2,158,586.496	554	32.8	21.3	11.5
	2	3	2	2,158,586.496	602	34.4	22.1	12.3
	3	3	2	2,158,586.496	670	36.5	22.9	13.6
	4	3	2	2,158,586.496	717	37.2	22.6	14.6
	5	3	2	2,158,586.496	563	34.2	22.6	11.6
	6	3	2	2,158,586.496	691	36.8	22.8	14.0
	7	3	2	2,158,586.496	786	39.3	23.3	16.0
	8	3	2	2,158,586.496	793	38.9	22.9	16.0
	9	3	2	2,158,586.496	792	37.8	22.4	15.4
	10	3	2	2,158,586.496	791	37.8	23.0	14.8
	11	3	2	2,158,586.496	794	36.4	21.9	14.5
	12	3	2	2,158,586.496	794	35.9	21.6	14.3
	13	3	2	2,158,586.496	790	35.2	21.1	14.1
	14	3	2	2,158,586.496	794	35.4	21.1	14.3
	15	3	2	2,158,586.496	796	34.7	20.1	14.6
	16	3	2	2,158,586.496	809	34.5	20.3	14.2
	17	3	2	2,158,586.496	822	34.4	20.0	14.4
	18	3	2	2,158,586.496	824	34.3	19.9	14.4
	19	3	2	2,158,586.496	824	34.0	19.7	14.3
	20	3	2	2,158,586.496	825	34.0	19.6	14.4
	21	3	2	2,158,586.496	824	34.3	19.9	14.4
	22	3	2	2,158,586.496	823	34.8	20.5	14.3
	23	3	2	2,158,586.496	824	34.6	20.1	14.5
	24	3	2	2,158,586.496	826	34.4	19.9	14.5
	25	3	2	2,158,586.496	829	33.5	19.0	14.5
	26	3	2	2,158,586.496	831	32.7	18.1	14.6
	27	3	2	2,158,586.496	836	32.1	17.4	14.7
	28	3	2	2,158,586.496	835	33.3	18.3	15.0
	29	3	2	2,158,586.496	837	33.1	17.3	15.8
	30	3	2	2,158,586.496	834	32.1	17.5	14.6

Table B-2 (Contd)

Mo.	Day	No. of Circulating Water Pumps	No. of Service Water Pumps	Total Volume of Water Pumped[1] (m^3)	Mean Electrical Output[2] (MWe)	Temperature (°C)[3] Discharge	Intake	Δt
Oct	1	3	2	2,007,485.441	835	31.9	17.2	14.7
	2	3	2	1,964,313.711	836	32.0	17.4	14.6
	3	3	2	2,007,485.441	835	32.0	17.5	14.7
	4	3	2	2,007,485.441	836	31.9	17.3	14.6
	5	3	2	2,007,485.441	838	31.3	16.7	14.6
	6	3	2	1,985,899.576	839	33.1	16.3	16.8
	7	3	2	1,985,899.576	839	33.0	16.1	16.9
	8	3	2	2,007,485.441	838	32.5	15.9	16.6
	9	3	2	2,007,485.441	837	32.7	16.0	16.7
	10	3	2	2,007,485.441	836	32.1	15.8	16.3
	11	3	2	2,029,071.306	838	32.3	15.9	16.4
	12	3	2	2,029,071.306	839	31.6	14.9	16.7
	13	3/2[3bb]	2	1,721,636.260	466	21.8	14.2	7.6
	14	2	2	1,414,201.213	0[3cc]	13.1	13.3	0.0
	15	2	2	1,414,201.213	0	12.9	13.3	0.0
	16	2	2	1,414,201.213	0	13.2	13.3	0.0
	17	2	2	1,414,201.213	148[3dd]	18.4	13.6	4.8
	18	2/3[3ee]	2	1,685,005.701	463	24.1	14.3	9.8
	19	3	2	2,007,485.441	572	25.7	14.2	11.5
	20	3	2	2,007,485.441	703	27.3	13.1	14.2
	21	3	2	2,007,485.441	798	29.0	13.6	15.4
	22	3	2	2,007,485.441	793	28.2	12.9	15.3
	23	3	2	2,007,485.441	797	28.8	13.4	15.4
	24	3	2	2,007,485.441	774	26.7	12.2	14.5
	25	3	2	2,007,485.441	558	21.9	11.7	10.2
	26	3	2	2,007,485.441	709	24.4	10.9	13.5
	27	3	2	2,007,485.441	829	26.1	9.9	16.2
	28	3	2	2,007,485.441	840	27.8	11.4	16.4
	29	3	2	2,007,485.441	845	26.7	10.3	16.4
	30	3	2	1,985,899.576	844	27.1	10.8	16.3
	31	3	2	2,007,485.441	843	26.7	10.3	16.4
Nov	1	3	2	2,007,485.441	848	25.3	8.7	16.6
	2	3	2	2,007,485.441	847	26.6	10.1	16.5
	3	3	2	2,007,485.441	846	26.3	9.7	16.6
	4	3	2	1,985,899.576	846	26.3	9.7	16.6
	5	3	2	2,007,485.441	845	25.2	8.6	16.6
	6	3	2	2,007,485.441	848	24.1	8.9	15.2
	7	3	2	2,007,485.441	846	25.3	8.8	16.5
	8	3	2	2,029,071.306	845	25.8	9.4	16.4
	9	3	2	2,007,485.441	848	25.7	9.2	16.5
	10	3	2	2,029,071.306	848	24.7	8.2	16.5
	11	3	2	2,007,485.441	849	24.0	7.2	16.8
	12	3	2	2,029,071.306	849	23.9	7.2	16.7
	13	3	2	2,007,485.441	848	24.4	7.8	16.6
	14	3	2	1,985,899.576	847	25.2	8.7	16.5
	15	3	2	1,985,899.576	848	25.1	8.6	16.5
	16	3	2	1,985,899.576	849	24.4	8.2	16.2
	17	3	2	1,985,899.576	849	24.6	8.0	16.6
	18	3	2	1,985,899.576	849	22.8	6.3	16.5
	19	3	2	1,985,899.576	850	23.4	6.7	16.7
	20	3	2	1,985,899.576	851	24.2	7.3	16.9
	21	3	2	1,985,899.576	846	24.1	7.6	16.5
	22	3	2	1,985,899.576	848	23.2	6.7	16.5
	23	3	2	1,964,313.711	849	23.6	7.2	16.4
	24	3	2	1,985,899.576	849	23.9	7.4	16.5
	25	3	2	1,964,313.711	849	24.2	7.7	16.5
	26	3	2	1,964,313.711	849	23.8	7.3	16.5
	27	3	2	1,985,899.576	849	23.6	7.1	16.5
	28	3	2	1,985,899.576	849	23.6	7.1	16.5
	29	3	2	1,985,899.576	850	23.6	7.1	16.5
	30	3	2	1,985,899.576	793	21.2	4.9	16.3
Dec	1	3	2	1,964,313.711	848	23.8	7.1	16.7
	2	3	2	1,964,313.711	849	23.7	7.1	16.6
	3	3	2	1,985,899.576	847	22.7	6.2	16.5
	4	3	2	1,985,899.576	849	23.1	6.3	16.8
	5	3	2	1,964,313.711	851	22.7	5.9	16.8
	6	3	2	1,964,313.711	848	22.4	5.9	16.5
	7	3	2	1,964,313.711	850	23.1	6.4	16.7
	8	3	2	1,985,899.576	849	23.7	7.1	16.6
	9	3	2	2,007,485.441	846	22.9	6.2	16.7
	10	3	2	1,985,899.576	845	23.1	6.4	16.7
	11	3	2	1,942,727.846	849	22.4	5.5	16.9
	12	3	2	1,964,313.711	849	21.6	4.7	16.9
	13	3	2	1,899,556.116	554	16.8	3.7	13.1
	14	3	2	1,791,626.791	670	16.6	2.9	12.9
	15	3	2	1,705,283.332	792	21.0	4.7	16.3
	16	3	2	1,705,283.332	846	22.1	4.9	17.2
	17	3	2	1,683,697.467	848	21.4	4.2	17.2
	18	3	2	1,662,111.602	850	23.0	6.1	16.9
	19	3	2	1,662,111.602	849	21.1	3.9	17.2
	20	3	2	1,640,525.737	848	21.2	3.7	17.5
	21	3	2	1,597,354.007	850	21.0	4.1	16.9
	22	3	2	1,597,354.007	850	21.5	4.7	16.8
	23	3	2	1,597,354.007	851	21.5	4.7	16.8
	24	3	2	1,597,354.007	852	21.6	4.8	16.8
	25	3	2	1,597,354.007	853	21.7	4.9	16.8
	26	3	2	1,597,354.007	852	22.2	5.5	16.7
	27	3	2	1,575,768.142	711	16.9	4.1	12.8
	28	3	2	1,618,939.872	849	21.8	5.3	16.5
	29	3	2	1,618,939.872	852	21.8	5.2	16.6
	30	3	2	1,618,939.872	851	21.0	4.0	17.0
	31	3	2	1,597,354.007	850	20.4	3.6	16.8

Footnotes for Table

[1]Volume of water pumped each day derived from gross circulating water flow data in James A. FitzPatrick "401" monthly reports. Water volumes have been corrected for tempering when data were available.

[2]Power production is daily average (gross MWe) from James A. FitzPatrick "401" monthly reports.

[3]Average water temperatures reported in James A. FitzPatrick "401" monthly reports.

[a]1 January – 3 of 3 circulating water pumps operating.

[b]5 February – 2 of 3 circulating water pumps operating.

[c]5 February – 1 of 3 service water pumps operating.

[d]6 February – plant shut down.

[e]7 February – 1 of 3 circulating water pumps operating.

[f]8 February – 3 of 3 circulating water pumps operating

[g]8 February – 2 of 3 service water pumps operating.

[h]8 February – plant on line.

[i]12 February – 1 of 3 circulating water pumps operating.

[j]12 February – 1 of 3 service water pumps operating.

[k]13 February – 2 of 3 circulating water pumps operating.

[l]13 February – 2 of 3 service water pumps operating.

[m]17 February – 3 of 3 circulating water pumps operating.

[n]21 February – 2 of 3 circulating water pumps operating.

[o]21 February – 1 of 3 service water pumps operating.

[p]22 February – 2 of 3 service water pumps operating.

[q]23 February – 3 of 3 circulating water pumps operating.

[r]28 April – 2 of 3 circulating water pumps operating.

[s]30 April – 3 of 3 circulating water pumps operating.

[t]7 May – 2 of 3 circulating water pumps operating.

[u]7 May – 1 of 3 service water pumps operating.

[v]7 May – plant shut down.

[w]8 June – 1 of 3 circulating water pumps operating.

[x]17 July – 2 of 3 service water pumps operating.

[y]9 August – 2 of 3 circulating water pumps operating.

[z]11 August – plant on line: plant off line (same day).

[aa]20 August – 3 of 3 circulating water pumps operating.

[bb]13 October – 2 of 3 circulating water pumps operating.

[cc]14 October – plant off line.

[dd]17 October – plant on line.

[ee]18 October – 3 of 3 circulating water pumps operating.

Table B-3

Numerical Abundance and Percent Composition of Impinged Fish Collected at Nine Mile Point Nuclear Plant, Jan-Dec 1980

Common Name	Jan No.	Jan %	Feb No.	Feb %	Mar No.	Mar %	Apr No.	Apr %	May No.	May %	Jun No.	Jun %	Jul No.	Jul %	Aug No.	Aug %	Sep No.	Sep %	Oct No.	Oct %	Nov No.	Nov %	Dec No.	Dec %	Total No.	Total %
Alewife	31	0.8	4	0.2	4	0.4	48,033	92.0	11,736	77.2	7,509	95.8	4,010	97.4	46	28.8	112	64.7	10,742	96.2	2,779	71.3	222	7.9	85,528	81.8
American eel	2	T	1	T	1	0.1	1	T			3	T	1	T	1	0.6	1	0.6	1	T					12	T
Black crappie	4	0.1																	2	T					6	T
Bluegill							1	T	1	T							1	0.6	8	0.1				T	12	T
Brook stickleback	1	T																							1	T
Brown bullhead							1	T	1	T															2	T
Burbot	1	T							1	T															2	T
Carp	1	T	1	T																					2	T
Central mudminnow					6	0.6	21	T	5	T															32	T
Channel catfish	1	T					11	T	1	T															13	T
Centrachidae (unident.)*																	4	2.3							4	T
Coregonus spp.	1	T																							1	T
Cottus spp. (sculpin)	47	1.2	132	7.4	64	6.4	364	0.7	265	1.7	22	0.2			6	3.8	7	4.0	47	0.4	13	0.33	14	0.5	981	0.9
Emerald shiner	17	0.4	13	0.7	22	2.2	17	T	10	T											1	T	13	0.5	93	0.1
Freshwater drum			1	T																			1	T	2	T
Gizzard shad	75	1.9	70	3.9	16	1.6	24	T											127	1.1	287	7.4	584	20.7	1,183	1.1
Golden shiner							11	T	2	T															13	T
Johnny darter							5	T	163	1.1	10	0.1			1	0.6	2	1.2	2	T	1	T			184	0.2
Lake chub	4	0.1			5	0.5	14	T	2	T															25	T
Largemouth bass	1	T																	2	T					3	T
Logperch							1	T																	1	T
Northern pike																			1	T			1	T	2	T
Pumpkinseed			1	T			4	T											15	0.1			4	0.1	24	T
Rainbow smelt	3,046	78.8	1,483	82.7	752	76.0	2,914	5.6	2,209	14.5	197	2.5	7	0.2.	67	41.9	27	15.6	152	1.4	396	10.2	1,405	49.8	12,655	12.1
Rainbow trout																					1	T			1	T
Rock bass	11	0.2	10	0.6	2	0.2	5	T			1	T	1	T					10	0.1	3	0.1	10	0.4	53	T
Sea lamprey	3	T	1	T			1	T					1	T											6	T
Smallmouth bass	2	T	1	T											1	0.6			7	0.1	3	0.1	2	0.1	16	T
Spottail shiner	75	1.9	9	0.5	28	2.8	215	0.4	156	1.0	58	0.7	59	1.4	14	8.8	13	7.5	11	0.1	10	0.3	20	0.7	668	0.6
Stonecat	3	T	1	T			32	T	4	T	1	T	2	T			1	0.6	2	T			2	0.1	48	T
3-spine stickleback	2	T	3	0.2	3	0.3													1	T	4	0.1	1	T	14	T
Trout perch	13	0.3	2	0.1	19	1.9	129	0.2	563	3.7	30	0.4	19	0.5					2	T			3	0.1	780	0.7
White bass	4	0.1	3	0.2	2	0.2													2	T	344	8.8	284	10.1	639	0.6
White perch	431	11.1	48	2.7	52	5.2	254	0.5	28	0.2			8	0.2	3	1.9	2	1.2	25	0.2	28	0.7	180	6.4	1,059	1.0
White sucker	1	T					1	T	3	T	1	T	5	0.1			1	0.6	2	T			2	0.1	16	T
Yellow perch	84	2.2	8	0.4	13	1.3	146	0.3	33	0.2	2	T	3	0.1	10	6.2	2	1.2	1	T	7	0.2	72	2.6	381	0.4
Unidentified*	1	T	1	T			1	T	3	T	1	T			11	6.9					20	0.5			38	T
Totals	3,862		1,793		989		52,206		15,186		7,835		4,116		160		173		11,162		3,897		2,821		104,200	
No. Fish/1000 m^3	0.740		0.392		0.199		2.488		0.544		1.416		0.947		0.017		0.029		1.860		0.652		0.507			

*Damaged specimens.

T = Trace.

Table B-4

Biomass (g) and Percent Composition of Impinged Fish Collected at Nine Mile Point Nuclear Plant Unit 1, Jan-Dec 1980

Common Name	Jan Wt.	Jan %	Feb Wt.	Feb %	Mar Wt.	Mar %	Apr Wt.	Apr %	May Wt.	May %	Jun Wt.	Jun %
Alewife	268.2	0.2	96.6	0.3	90.2	0.4	1,723,017.8	95.2	324,676.3	87.2	191,095.9	97.8
American eel	172.6	0.2	NA		NA		2,525.0	0.1			202.0	0.1
Black crappie	14.4	T										
Bluegill							18.2	T	21.1	T		
Brook stickleback	1.3	T										
Brown bullhead							44.1	T	39.6	T		
Burbot	2,075.0	1.9							NA			
Carp	3,400.0	3.1	25.9	0.1								
Central mudminnow					32.9	0.1	84.0	T	18.0	T		
Channel catfish	1.4	T					1,732.0	0.1	109.5	T		
Centrachidae (unid.)												
Coregonus spp.	351.3	0.3										
Cottus spp. (sculpin)	185.5	0.2	483.9	1.3	251.7	1.1	1,495.1	0.1	844.5	0.2	49.0	T
Emerald shiner	75.6	0.1	24.3	0.1	105.9	0.4	72.5	T	54.5	T		
Freshwater drum			24.5	0.1								
Gizzard shad	50,019.2	45.4	13,674.7	38.0	8,488.2	36.4	12,889.0	0.1				
Golden shiner							67.7	T	9.0	T		
Johnny darter							10.5	T	531.9	0.1	17.4	T
Lake chub	44.0	T			43.9	0.2	8.8	T	26.3	T		
Largemouth bass												
Logperch							18.0	T				
Northern pike												
Pumpkinseed			173.2	0.5			61.6	T				
Rainbow smelt	39,296.4	35.7	19,635.2	54.6	10,092.2	43.3	48,012.3	2.6	33,335.4	9.0	1,941.3	1.0
Rainbow trout												
Rock bass	652.2	0.6	41.6	0.1	18.4	0.1	5.1				305.2	0.2
Sea lamprey	53.4	T	NA				NA					
Smallmouth bass	1,197.0	1.1	810.7	2.2								
Spottail shiner	629.7	0.6	65.7	0.2	304.2	1.3	2,534.8	0.1	1,457.6	0.4	570.6	0.3
Stonecat	167.1	0.2	83.6	0.2			2,639.4	0.1	9.1	T	43.7	T
Three-spine stickleback	1.9	T	4.8	T	4.1	T						
Trout-perch	105.8	0.1	27.6	0.1	116.3	0.5	1,335.5	0.1	5,995.1	1.6	231.3	0.1
White bass	86.0	0.1	45.2	0.1	61.8	0.3						
White perch	5,388.3	4.9	313.1	0.9	2,351.6	10.1	5,037.0	0.3	1,093.0	0.3		
White sucker	1,325.3	1.2					1,315.2	0.1	2,786.6	0.8	780.0	0.4
Yellow perch	4,542.7	4.1	431.1	1.2	1,341.8	5.8	7,548.3	0.4	1,161.2	0.3	123.4	0.1
Unidentified	NA		NA				NA		NA		NA	
Total	110,054.3		35,961.7		23,303.2		1,810,471.9		372,168.7		195,359.8	

Common Name	Jul Wt.	Jul %	Aug Wt.	Aug %	Sep Wt.	Sep %	Oct Wt.	Oct %	Nov Wt.	Nov %	Dec Wt.	Dec %	Total Wt.	Total %
Alewife	112,224.2	95.6	731.3	34.6	727.8	24.4	32,745.8	66.1	8,481.1	23.7	7,441.2	11.3	2,401,596.4	85.1
American eel	106.4	0.1	61.6	2.9	215.3	7.2	108.1	0.2					3,391.0	0.1
Black crappie							6.9	T					21.3	T
Bluegill					1.9	0.1	10.8	T			12.5	T	64.5	T
Brook stickleback													1.3	T
Brown bullhead													83.7	T
Burbot													2,075.0	0.1
Carp													3,425.9	0.1
Central mudminnow													134.9	T
Channel catfish													1,842.9	0.1
Centrachidae (unid.)					NA								NA	
Coregonus spp.													351.3	T
Cottus spp. (sculpin)			13.9	0.7	21.5	0.7	1,122.7	2.3	33.6	0.1	50.2	0.1	4,551.6	0.2
Emerald shiner									4.4	T	43.2	0.1	390.4	T
Freshwater drum											6.0	T	30.5	T
Gizzard shad							8,708.7	17.6	14,848.0	41.6	32,562.4	49.6	141,190.2	5.0
Golden shiner													76.7	T
Johnny darter			8.3	0.4	4.9	0.2	3.5	T	NA				576.5	T
Lake chub													123.0	T
Largemouth bass							35.0	0.1					35.0	T
Logperch													18.0	T
Northern pike							11.6	T			41.7	0.1	53.3	T
Pumpkinseed							130.2	0.3			251.1	0.4	616.1	T
Rainbow smelt	72.6	0.1	271.5	12.8	201.0	6.7	2,502.5	5.0	5,966.0	16.7	12,834.9	19.6	174,161.3	6.2
Rainbow trout									825.5	2.3			825.5	
Rock bass	67.5	0.1					212.2	0.4	11.0	0.3	40.6	0.1	1,353.8	T
Sea lamprey	170.6	0.1											224.0	T
Smallmouth bass			NA				940.4	1.9	600.9	1.7	8.6	T	3,557.6	0.1
Spottail shiner	590.4	0.4	150.0	7.1	169.0	5.7	67.2	0.1	74.5	0.2	179.3	0.3	6,712.0	0.2
Stonecat	170.9	0.1			90.9	3.0	84.8	0.2			174.5	0.3	3,464.0	0.1
Three-spine stickleback							1.1	T	2.9	T	1.0	T	15.8	T
Trout-perch	172.9	0.2					27.3	0.1			29.4	T	8,041.2	0.3
White bass							480.6	1.0	3,235.8	9.1	3,949.0	6.0	7,858.4	0.3
White perch	1,758.3	1.5	158.3	7.5	290.2	9.7	84.3	0.2	1,125.8	3.2	1,693.3	2.6	19,293.2	0.7
White sucker	2,076.5	1.8			1,135.9	38.0	2,183.6	4.4					11,603.1	0.4
Yellow perch	100.5	0.1			128.7	4.3	36.0	0.1	503.7	1.4	6,295.4	9.6	22,212.8	0.8
Unidentified			718.4	34.0					NA				718.4	T
Total	117,429.8		2,113.3		2,987.1		49,503.3		35,713.2		65,614.3		2,820,680.6	

NA = Damaged specimen; weight not available.
T = Trace.

Table B-5

Estimated Numbers and Biomass (g)* of Fish Impinged at the Nine Mile Point Unit-I Nuclear Power Station, January-December 1980

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Total	
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
Alewife																										
ADE**	216	1,709.3	30	375.7	26	460.0	91,445	3,266,369.7	18,165	493,974.9	56,295	1,342,985.8	26,209	576,152.5	238	1,579.6	838	1,339.9	82,964	18,894.1	20,842	35,724.0	1,723	54,288.2	298.991	5,793,853.7
RRE***	234	1,876.9	29	351.1	20	459.5	90,083	3,215,730.5	18,173	494,232.9	56.299	1,343,109.7	33,494	736,488.5	238	1,585.7	839	1,341.6	83,185	18,930.7	20,842	35,724.0	1,749	54,778.2	305,185	5,904,609.3
URE****	240	1,938.9	29	343.0	15	459.0	89,992	3,212,370.5	18,173	494,246.6	56,301	1,343,151.0	34,931	768,112.4	238	1,587.0	839	1,342.2	83,258	18,942.9	20,842	35,724.0	1,757	54,931.0	306,615	5,933,148.5
American eel																										
ADE	18	1,599.2	7	NA	3	NA	2	4,868.6			22	1,515.3	7	697.2	5	318.9	8	1,609.9	8	834.8					80	11,443.9
RRE	15	1,302.1	7	NA	5	NA	2	4,735.8			22	1,514.5	8	888.7	5	318.7	8	1,612.8	8	837.1					80	11,209.7
URE	14	1,192.2	7	NA	8	NA	2	4,727.0			22	1,514.2	9	926.5	5	318.7	8	1,613.[illegible]	8	837.9					83	11,130.3
Black crappie																										
ADE	29	104.5																	15	53.3					44	157.8
RRE	30	108.6																	15	53.4					45	162.0
URE	31	110.2																	16	53.5					47	163.7
Bluegill																										
ADE							2	33.5	2	32.7							8	14.2	62	83.4			8	101.6	82	265.4
RRE							2	34.1	2	32.7							8	14.2	62	83.6			8	98.5	82	263.1
URE							2	34.2	2	32.7							8	14.2	62	83.7			8	97.5	82	262.3
Brook stickleback																										
ADE	7	8.9																							7	8.9
RRE	8	9.8																							8	9.8
URE	8	10.1																							8	10.1
Brown bullhead																										
ADE							2	84.0	2	61.6															4	145.6
RRE							2	82.7	2	61.3															4	144.0
URE							2	82.6	2	61.3															4	143.9
Burbot																										
ADE	9	19,225.7							2	NA															11	19,225.7
RRE	8	15,653.5							2	NA															10	15,653.5
URE	7	14,332.6							2	NA															9	14,332.6
Carp																										
ADE	7	23,268.7	7	182.8																					14	23,451.5
RRE	8	25,649.1	7	188.3																					15	25,837.4
URE	8	26,529.2	7	190.1																					15	26,719.3
Central mudminnow																										
ADE					36	197.5	40	161.6	8	27.9															84	387.0
RRE					31	167.6	39	157.5	8	27.9															78	353.0
URE					25	136.8	39	157.3	8	27.9															72	322.0
Centrarchidae (sunfishes)																										
ADE																	30	NA							30	NA
RRE																	30	NA							30	NA
URE																	30	NA							30	NA
Channel catfish																										
ADE	7	9.6					21	3,341.0	2	170.3															30	3,520.9
RRE	8	10.6					21	3,248.5	2	169.6															31	3,428.7
URE	8	10.9					21	3,242.3	2	169.6															31	3,422.8
Coregonus spp.																										
ADE	7	2,538.8																							7	2,538.8
RRE	8	2,650.2																							8	2,650.2
URE	8	2,691.3																							8	2,691.3
Cottus spp. (sculpin)																										
ADE	374	1,257.6	973	3,464.2	424	1,577.6	674	2,844.0	410	1,299.3	165	320.1			31	72.1	52	117.6	363	947.7	98	252.0	113	404.7	3,677	12,556.9
RRE	355	1,186.6	960	3,410.8	326	1,221.0	664	2,804.1	411	1,299.9	165	320.1			31	71.9	52	117.6	364	950.2	98	252.0	110	395.4	3,536	12,029.6
URE	347	1,160.4	955	3,393.2	225	854.3	663	2,801.5	411	1,299.9	165	320.2			31	71.9	52	117.6	364	951.0	98	252.0	109	392.6	3,420	11,614.6
Emerald shiner																										
ADE	138	444.5	95	162.7	153	717.2	32	136.9	16	84.5											8	33.0	104	300.0	546	1,878.8
RRE	128	445.8	94	162.8	112	539.4	32	136.0	16	84.4											8	33.0	102	293.0	492	1,694.4
URE	124	446.3	94	162.9	70	356.7	32	135.9	16	84.4											8	33.0	103	290.9	447	1,510.1
Freshwater drum																										
ADE			7	172.9																			8	48.6	15	221.5
RRE			7	178.1																			8	47.3	15	225.4
URE			7	179.8																			8	46.8	15	226.6
Gizzard shad																										
ADE	610	399,017.8	515	89,733.2	112	55,268.5	46	24,537.0											981	63,880.9	2,152	92,337.8	4,639	260,914.2	9,055	985,689.4
RRE	566	372,577.6	509	89,508.5	82	43,238.7	45	24,174.0											983	64,055.0	2,152	92,337.8	4,600	255,465.8	8,937	941,357.4
URE	550	362,800.7	507	89,434.4	50	30,865.7	45	24,149.9											984	64,113.2	2,152	92,337.8	4,588	253,767.2	8.876	917,468.9
Golden shiner																										
ADE							21	130.8	3	13.9															24	144.7
RRE							21	127.0	3	13.9															24	140.9
URE							21	126.7	3	13.9															24	140.6
Goldfish																										
ADE							195	3,828.0																	195	3,828.0
RRE							201	3,946.4																	201	3,946.4
URE							201	3,954.2																	201	3,954.2
Johnny darter																										
ADE							10	20.0	246	818.2	75	115.5			5	4.1	15	36.7	15	27.0	8	NA			374	1,021.5
RRE							9	19.7	246	818.4	75	115.5			5	4.1	15	36.7	15	27.1	8	NA			373	1,021.5
URE							9	19.7	246	818.4	75	115.4			5	4.1	15	36.7	16	27.1	8	NA			374	1,021.4
Lake chub																										
ADE	38	255.4			33	315.3	27	17.0	3	40.7															101	628.4
RRE	38	265.5			25	223.6	26	16.5	3	40.7															92	546.3
URE	38	269.3			17	129.3	26	16.5	3	40.7															84	455.8

Table B-5 (Contd)

	Jan		Feb		Mar		Apr		May		Jun	
	No.	Wt.	No.	Wt.	No.	Wt.*	No.	Wt.	No.	Wt.	No.	Wt.
Largemouth bass												
ADE												
RRE												
URE												
Logperch												
ADE							2	32.7				
RRE							2	33.8				
URE							2	33.8				
Northern pike												
ADE												
RRE												
URE												
Pumpkinseed												
ADE			8	1,347.4			8	118.8				
RRE			7	1,259.1			8	115.5				
URE			7	1,229.9			8	115.3				
Rainbow smelt												
ADE	23,022	207,184.1	11,007	107,261.2	5,360	53,759.4	5,309	78,798.5	3,421	46,994.9	1,477	9,155.9
RRE	22,978	209,162.1	10,780	105,235.8	3,831	38,649.6	5,265	78,257.9	3,422	46,999.5	1,477	9,156.7
URE	22,963	209,893.5	10,706	104,567.8	2,257	23,108.5	5,262	78,222.0	3,422	46,999.8	1,477	9,157.0
Rainbow trout												
ADE												
RRE												
URE												
Rock bass												
ADE	84	4,721.2	71	264.0	15	141.2	10	9.8			7	2,286.0
RRE	83	4,908.8	73	271.9	10	93.7	9	9.6			7	2,288.2
URE	83	4,978.1	73	274.5	5	44.9	9	9.5			8	2,289.0
Sea lamprey												
ADE	18	329.8	7	NA			2	NA				
RRE	15	268.6	7	NA			2	NA				
URE	14	245.9	7	NA			2	NA				
Smallmouth bass												
ADE	18	11,090.7	7	5,722.8								
RRE	15	9,030.0	7	5,893.3								
URE	14	8,268.0	7	5,949.5								
Spottail shiner												
ADE	559	4,453.2	64	473.2	189	1,792.9	410	4,802.7	242	2,168.4	435	3,040.6
RRE	566	4,547.4	65	477.6	143	1,412.1	403	4,719.8	242	2,167.7	435	3,041.0
URE	568	4,582.3	66	479.0	95	1,020.3	403	4,714.3	242	2,167.6	435	3,041.1
Stonecat												
ADE	28	1,548.2	8	650.4			61	5,038.5	6	14.1	7	327.3
RRE	23	1,260.6	7	607.7			60	4,950.3	6	14.1	7	327.6
URE	21	1,154.2	7	593.7			60	4,944.5	6	14.1	8	327.8
Threespine stickleback												
ADE	18	17.6	21	33.9	23	31.5						
RRE	15	14.3	22	34.9	15	20.9						
URE	14	13.1	22	35.2	7	10.0						
Trout-perch												
ADE	96	784.2	14	97.4	130	705.8	244	2,499.4	872	9,179.5	225	1,685.6
RRE	98	798.1	14	100.3	97	505.3	242	2,483.6	872	9,179.1	225	1,683.9
URE	99	803.3	15	101.3	62	299.1	242	2,482.6	872	9,179.1	225	1,683.4
Unidentified fish												
ADE	9	NA	7	NA			2	NA	5	29.4	8	NA
RRE	8	NA	7	NA			2	NA	5	29.4	8	NA
URE	7	NA	7	NA			2	NA	5	29.4	8	NA
White bass												
ADE	29	624.0	21	319.1	15	474.3						
RRE	30	648.8	22	328.6	10	314.8						
URE	31	657.9	22	331.7	5	150.8						
White perch												
ADE	3,167	38,858.8	350	2,172.9	394	18,013.6	483	9,301.6	42	1,671.0		
RRE	3,251	40,366.3	349	2,191.7	265	11,979.0	476	9,255.9	42	1,681.6		
URE	3,283	40,923.8	349	2,197.9	132	5,772.2	476	9,252.8	42	1,682.1		
White sucker												
ADE	9	12,279.4					2	2,422.0	5	4,334.5	8	5,842.3
RRE	8	9,997.8					2	2,466.7	5	4,316.8	8	5,848.1
URE	7	9,154.2					2	2,469.7	5	4,315.8	8	5,850.0
Yellow perch												
ADE	620	31,711.2	56	304.2	100	10,298.0	280	14,443.5	53	1,809.8	15	924.8
RRE	634	32,780.3	58	313.3	66	6,835.1	274	14,157.2	53	1,810.4	15	925.2
URE	639	33,175.6	59	316.3	32	3,273.4	273	14,138.2	53	1,810.5	15	925.3
Total												
ADE	29,137	763,042.4	13,275	212,738.0	7,013	143,752.8	99,330	3,423,839.6	23,505	562,725.6	58,739	1,368,199.2
RRE	29,130	735,519.4	13,031	210,513.8	5,038	105,660.3	97,892	3,371,663.1	23,515	562,980.3	58,743	1,368,330.5
URE	29,126	725,342.0	12,953	209,780.2	3,005	66,481.0	97,796	3,368,201.0	23,515	562,993.8	58,747	1,368,374.4

	Jul		Aug		Sep		Oct		Nov		Dec		Total	
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
Largemouth bass														
ADE							15	135.1					15	135.1
RRE							15	135.5					15	135.5
URE							16	135.6					16	135.6
Logperch														
ADE													2	32.7
RRE													2	33.8
URE													2	33.8
Northern pike														
ADE							8	89.6			8	339.1	16	428.7
RRE							8	89.8			8	328.5	16	418.3
URE							8	89.9			8	325.2	16	415.1
Pumpkinseed														
ADE							116	1,005.5			31	1,477.5	163	3,949.2
RRE							116	1,008.2			32	1,483.3	163	3,866.1
URE							116	1,009.2			32	1,485.1	163	3,839.5
Rainbow smelt														
ADE	46	347.3	344	964.5	202	1,008.7	1,175	13,907.9	2,970	24,784.5	11,217	84,201.1	65,550	628,368.0
RRE	58	442.7	347	960.8	202	1,010.5	1,177	13,940.5	2,970	24,784.5	11,068	82,554.9	63,575	611,155.5
URE	61	461.5	346	960.0	202	1,011.1	1,178	13,951.4	2,970	24,784.5	11,021	82,041.7	61,865	595,158.8
Rainbow trout														
ADE									8	6,191.2			8	6,191.2
RRE									8	6,191.2			8	6,191.2
URE									8	6,191.2			8	6,191.2
Rock bass														
ADE	7	442.3					77	1,639.1	22	82.5	79	262.7	372	9,848.8
RRE	8	563.8					77	1,643.2	22	82.5	79	263.9	368	10,125.6
URE	9	587.8					77	1,644.6	22	82.5	79	264.3	365	10,175.2
Sea lamprey														
ADE	8	NA											35	329.8
RRE	8	NA											32	268.6
URE	8	NA											31	245.9
Smallmouth bass														
ADE			5	NA			54	4,597.1	22	4,506.8	16	67.5	122	25,984.9
RRE			5	NA			54	4,593.7	22	4,506.8	16	67.7	119	24,091.5
URE			5	NA			54	4,592.5	22	4,506.8	16	67.8	118	23,384.6
Spottail shiner														
ADE	360	1,757.9	72	715.0	98	97.6	85	471.9	75	438.8	159	974.6	2,748	21,186.8
RRE	459	2,241.0	72	720.7	97	97.4	85	473.2	75	438.8	157	963.4	2,799	21,300.1
URE	479	2,336.3	72	721.8	97	97.3	85	473.6	75	438.8	157	958.9	2,774	21,032.3
Stonecat														
ADE	13	1,119.8			7	679.7	16	657.1			16	1,390.5	162	11,425.6
RRE	17	1,427.4			7	680.9	16	656.7			16	1,374.6	159	11,299.9
URE	17	1,488.1			7	681.3	16	656.5			16	1,369.7	158	11,229.9
Threespine stickleback														
ADE							8	8.5	30	21.8	8	8.1	108	121.4
RRE							8	8.5	30	21.8	8	7.9	98	108.3
URE							8	8.5	30	21.8	8	7.9	89	96.4
Trout-perch														
ADE	124	1,132.9					16	211.5			24	234.4	1,745	16,530.7
RRE	159	1,444.2					16	211.4			24	231.6	1,747	16,637.5
URE	166	1,505.6					16	211.4			24	230.7	1,721	16,496.5
Unidentified fish														
ADE			57	NA					136	NA			224	29.4
RRE			57	NA					136	NA			223	29.4
URE			57	NA					136	NA			222	29.4
White bass														
ADE							15	3,711.6	2,580	24,084.0	2,190	30,473.8	4,850	59,686.8
RRE							16	3,721.7	2,580	24,084.0	2,237	31,108.1	4,895	60,206.0
URE							16	3,725.1	2,580	24,084.0	2,252	31,305.8	4,906	60,255.3
White perch														
ADE	50	10,867.1	16	811.1	15	1,088.9	193	644.9	210	8,443.5	1,426	13,408.4	6,346	105,281.8
RRE	67	14,686.3	16	819.0	15	1,086.9	194	646.6	210	8,443.5	1,418	13,338.9	6,303	104,495.7
URE	70	15,439.6	16	820.6	15	1,086.3	194	647.2	210	8,443.5	1,416	13,317.2	6,203	99,583.2
White sucker														
ADE	32	7,890.6			7	8,524.4	15	16,889.2			16	NA	94	58,182.4
RRE	42	10,406.5			7	8,508.9	16	16,909.5			16	NA	104	58,454.3
URE	44	10,902.7			7	8,503.8	16	16,916.3			16	NA	105	58,112.5
Yellow perch														
ADE	20	658.5	52	2,601.6	15	965.8	8	280.1	52	3,251.2	573	50,140.8	1,844	117,389.5
RRE	25	839.4	52	2,601.9	15	964.1	8	278.8	52	3,251.2	567	49,591.7	1,819	114,348.6
URE	26	875.1	52	2,601.9	15	963.5	8	278.4	52	3,251.2	565	49,420.5	1,789	111,029.9
Total														
ADE	26,876	601,066.1	825	7,066.9	1,295	15,483.4	86,209	128,970.3	29,213	200,151.1	22,358	499,035.8	397,775	7,926,071.2
RRE	34,345	769,428.5	828	7,082.8	1,295	15,471.6	86,438	129,254.4	29,213	200,151.1	22,223	492,392.7	401,691	7,968,448.5
URE	35,820	802,635.6	827	7,086.0	1,295	15,467.8	86,516	129,349.5	29,213	200,151.1	32,183	490,321.7	400,996	7,946,184.1

*Biomass of damaged fish (designated as not available) not included in monthly or annual totals.
**ADE = Average density estimate.
***RRE = Regular ratio estimate.
****URE = Unbiased ratio estimate.
NA = Not available.

Table B-8

Biomass (g) and Percent Composition of Impinged Fish Collected at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1980

Common Name	Jan Wt.	Jan %	Feb Wt.	Feb %	Mar Wt.	Mar %	Apr Wt.	Apr %	May Wt.	May %	Jun Wt.	Jun %	Jul Wt.	Jul %	Aug Wt.	Aug %	Sep Wt.	Sep %	Oct Wt.	Oct %	Nov Wt.	Nov %	Dec Wt.	Dec %	Total Wt.	Total %
Alewife	2,045.8	1.0	34.0	0.1	133.4	1.7	410,119.5	86.7	135,720.1	66.3	328,872.8	98.0	66,125.5	98.0	12,586.7	73.5	3,687.6	47.1	15,661.9	52.7	9,283.7	25.3	10,051.2	14.6	994,322.2	67.6
American eel									586.5	0.3							234.1	3.0							820.6	T
Black crappie	4.4	T																							4.4	T
Bluegill	133.0	0.1					23.2	T	2.7	T									10.7	T					169.6	T
Bluntnose minnow	1.4	T					4.6	T																	6.0	T
Brook stickleback					1.1	T	3.8	T																	4.9	T
Brown bullhead	40.9	T	131.0	0.5			641.6	0.1	76.8	T							348.4	4.4	163.9	0.6	253.9	0.7	37.0	T	1,693.5	0.1
Brown trout									1,976.9	1.0					2,750.0	16.0			60.0	0.2			550.0	0.8	5,336.9	0.4
Burbot							637.4	0.1	1,273.9	0.6			126.8	0.2											2,038.1	0.1
Carp	2.3	T											3.5	T											5.8	T
Central mudminnow	9.3	T			21.1	0.3	379.8	0.1	1.8	T															412.0	T
Channel catfish	2.4	T			110.3	1.4	499.6	0.1															7.1	T	619.4	T
Centrachidae (unid.)																			NA						NA	
Cottus spp. (sculpin)	157.6	0.1	82.5	0.3	84.6	1.1	983.6	0.2	561.7	0.3	71.7	T			0.3	T	0.4	T	49.8	0.2	15.3	T	15.6	T	2,023.1	0.1
Creek chub											48.0	T													48.0	T
Emerald shiner	155.5	0.1	63.3	0.2	44.9	0.6	33.2	T	6.4	T											6.2	T	70.7	0.1	380.2	T
Freshwater drum																					10.0	T	19.2	T	29.2	T
Gizzard shad	126,869.0	65.3	11,516.1	44.0	3,276.8	42.6	10,525.6	2.2									27.5	0.4	6,469.1	21.8	8,882.5	24.2	35,111.6	51.2	202,678.2	13.8
Golden shiner							10.6	T	NA														10.8	T	21.4	T
Goldfish																							10.6	T	10.6	T
Johnny darter	17.3	T					16.7	T	203.1	0.1	376.2	0.1			3.7	T	14.9	0.2	18.8	0.1	2.4	T			653.1	T
Lake chub	103.8	T					75.9	T	36.9	T															216.6	T
Largemouth bass	9.4	T																							9.4	T
Logperch					19.1	0.2																			19.1	T
Morone spp.							NA																		NA	
Northern pike							29.3	T			NA														29.3	T
Pumpkinseed	466.8	0.2					NA		10.0	T	2.8	T			127.3	0.7			16.0	T			286.0	0.4	908.9	0.1
Rainbow smelt	51,241.7	26.4	11,528.2	44.0	3,049.6	39.6	29,163.6	6.2	49,982.1	24.4	1,680.2	0.5	68.9	0.1	378.4	2.2	504.8	6.4	3,676.7	12.4	6,105.3	16.6	13,600.3	19.8	170,979.8	11.6
Rainbow trout																							1,043.3	1.5	1,043.3	0.1
Rock bass	1,243.8	0.6	1,352.0	5.2			514.4	0.1	981.3	0.5	222.6	0.1	228.7	0.3			968.7	12.4	517.1	1.7	12.0	T	1,438.2	2.1	7,478.8	0.5
Salvelinus spp.	15.0	T					NA												NA						15.0	T
Salmonidae (unid.)													NA								340.5	0.9			340.5	T
Smallmouth bass	1,081.3	0.6	672.4	2.6					4,071.3	2.0	2,105.0	0.6	117.4	0.2			1,109.9	14.2	624.5	2.1	13.4	T	5.4	T	9,800.6	0.7
Spottail shiner	584.4	0.3	72.2	0.3	38.2	0.5	465.4	0.1	725.3	0.4	363.7	0.1	188.1	0.3	35.9	0.2	131.6	1.7	108.8	0.4	59.2	0.2	20.6	T	2,793.4	0.2
Stonecat	1.3	T					31.5	T	110.2	T	20.0	T	159.7	0.2	87.5	0.5	194.2	2.5	8.8	T			17.5	T	630.7	T
Three-spine stickleback	1.8	T	2.6	T	3.0	T															2.0	T	3.7	T	13.1	T
Trout-perch	10.6	T			26.2	0.3	288.6	0.1	3,127.7	1.5	681.1	0.2	17.7	T							3.1	T			4,155.0	0.3
Walleye							1,089.0	0.2																	1,089.0	0.1
White bass	918.5	0.5	28.6	0.1					537.7	0.3									462.3	1.6	11,081.4	30.2	1,770.5	2.6	14,799.0	1.0
White perch	5,024.4	2.6	437.2	1.7	713.0	9.2	11,167.1	2.4	2,047.1	1.0	47.0	T			1.7	T	9.2	0.1	127.0	0.4	32.2	0.1	779.0	1.1	20,384.9	1.4
White sucker							1,643.4	0.3	1,052.0	0.5									1,297.3	4.4	NA				3,922.7	0.3
Yellow perch	4,121.3	2.1	269.0	1.0	179.0	2.3	4,682.3	1.0	1,631.8	0.8	924.7	0.3	470.7	0.7	1,162.1	6.8	591.9	7.7	457.3	1.5	557.4	1.5	3,775.7	5.5	18,823.2	1.3
Unidentified	NA				NA		NA				NA		NA												NA	
Total	194,263.0		26,189.1		7,700.3		473,029.7		204,723.3		335,415.8		67,507.0		17,133.6		7,823.2		29,730.0		36,660.5		68,624.0		1,468,799.5	

NA = Damaged specimen; weight not available.
T = Trace

Table B-7

Numerical Abundance and Percent Composition of Impinged Fish Collected at James A. FitzPatrick Nuclear Plant, Jan-Dec 1980

Common Name	Jan No.	Jan %	Feb No.	Feb %	Mar No.	Mar %	Apr No.	Apr %	May No.	May %	Jun No.	Jun %	Jul No.	Jul %	Aug No.	Aug %	Sep No.	Sep %	Oct No.	Oct %	Nov No.	Nov %	Dec No.	Dec %	Total No.	Total %
Alewife	63	1.0	3	0.3	5	1.2	11,209	77.5	4,604	53.6	11,576	95.2	2,548	98.7	806	86.6	359	66.0	4,438	84.4	3,140	59.0	347	11.4	39,098	64.6
American eel									1	T							4	0.7							5	T
Black crappie	1	T																							1	T
Bluegill	13	0.2					4	T	1	T									6	0.1					24	T
Bluntnose minnow	1	T					2	T																	3	T
Brook stickleback					1	0.2	4	T																	5	T
Brown bullhead	1	T	1	0.1			6	T	2	T							1	T	1	T	1	T	1	T	14	T
Brown trout									1	T					1	0.1			1	T			2	0.1	5	T
Burbot							1	T	1	T			1	T											3	T
Carp	1	T																							1	T
Central mudminnow	4	T			5	1.2	119	0.8	2	T															130	0.2
Channel catfish	1	T			1	0.2	4	T															1	T	7	T
Centrachidae (unident.)*																			4	0.1					4	T
Cottus spp. (sculpin)	63	1.1	27	2.3	18	4.2	213	1.5	154	1.8	27	0.2	3	0.1	1	0.1	1	0.2	26	0.5	8	0.2	5	0.2	546	0.9
Creek chub											1	T													1	T
Emerald shiner	95	1.6	24	2.0	9	2.1	7	T	4	T											2	T	26	0.9	167	0.3
Freshwater drum																					.1	T	1	T	2	T
Gizzard shad	234	3.9	40	3.3	5	1.2	17	0.1									3	0.6	84	1.6	446	8.4	956	32.0	1,785	3.0
Golden shiner							1	T	1	T													1	T	3	T
Goldfish																							1	T	1	T
Johnny darter	7	0.1					12	T	77	0.9	185	1.5			3	0.3	9	1.6	6	0.1	2	T			301	0.5
Lake chub	6	0.1					5	T	3	T															14	T
Largemouth bass	1	T																							1	T
Logperch					1	0.2																			1	T
Morone spp.							1	T																	1	T
Northern pike							1	T			1	T													2	T
Pumpkinseed	6	0.1					1	T	1	T	1	T			1	0.1			12	0.2			5	0.2	27	T
Rainbow smelt	4,758	79.7	1,038	86.9	355	83.5	2,371	16.4	3,348	38.9	198	1.6	2	0.1	81	8.7	122	22.4	626	11.9	442	8.3	1,377	45.4	14,718	24.3
Rainbow trout																							1	T	1	T
Rock bass	40	0.7	9	0.8			8	T	4	T	1	T	1	T			3	0.6	4	0.1	3	0.1	13	0.4	86	0.1
Salvelinus spp.	1	T					1	T					1	T					1	T					4	T
Sea Lamprey																					1	T			1	T
Smallmouth bass	7	0.1	1	0.1					4	T	2	T	1	T			5	0.9	9	0.2	3	0.1	1	T	33	T
Spottail shiner	117	2.0	17	1.4	8	1.9	72	0.5	66	0.8	34	2.8	13	0.5	14	1.5	24	4.4	16	0.3	6	0.1	5	0.2	392	0.6
Stonecat	1	T					1	T	1	T	1	T	2	0.1	1	0.1	2	0.4	3	0.1			1	T	13	T
3-spine stickleback	1	T	2	0.2	2	0.5															2	T	4	0.1	11	T
Trout perch	4	T			4	0.9	31	0.2	253	2.9	72	0.6	2	0.1							1	T			367	0.6
Walleye							2	T																	2	T
White bass	8	0.1	4	0.3					1	T									2	T	1,249	23.4	142	4.7	1,406	2.3
White perch	433	7.3	20	1.7	9	2.1	290	2.0	39	0.5	7	0.1			1	0.1	4	0.7	14	0.3	12	0.2	98	3.2	927	1.5
White sucker							2.	T	2	T					1	0.1			2	T	1	T			8	T
White perch	86	1.4	8	0.7	1	0.2	83	0.6	26	0.3	22	0.2	7	0.3	21	2.2	7	1.3	4	0.1	6	0.1	48	1.6	319	0.5
Unidentified*	4	T	1	0.1	1	0.2	3	T			27	0.2	1	T											37	0.1
Totals	5,957		1,195		425		14,471		8,596		12,155		2,582		931		544		5,259		5,326		3,036		60,477	
No. Fish/1000 m^3	0.816		0.201		0.061		0.561		0.303		2.287		0.806		0.117		0.063		0.707		0.669		0.437			

*Damaged specimens.

T = Trace.

Table B-6 (Contd)

Threespine Stickleback

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
41- 50											3	
51- 60	2	3	3								1	1
61- 70												
71- 80												

White Perch

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
41- 50	1	1								4		1
51- 60	16	4						1		2	4	6
61- 70	26	15	3	2	1			1		9	3	22
71- 80	12	7	3	22	5					5	5	38
81- 90	16	12	6	24	7					3	7	39
91-100	5	6	5	9	2					1	5	14
101-110	1		5	5								1
111-120			3	5	1							
121-130			1	9	1							
131-140				6								
141-150			1	1								
151-160												
161-170			4	2	3							
171-180	1		5	5								
181-190			2	4								
191-200	2		2	4								
201-210		1		1	1						1	
211-220	1		1	2			2					
221-230			1		1		1					1
231-240	1		1	1			1				11	
241-250							2	1	1			
251-260												
261-270				1								
271-280												
281-290												
291-300											1	
301-310			1				1					
311-320							1					
321-330												
331-340												
341-350												
351-360					1							
361-370												
371-380												
381-390												
391-400												
401-410												
411-420												

Yellow Perch

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
61- 70	1											
71- 80												
81- 90	1				1							2
91-100				1								
101-110					1							2
111-120		2	2		1							2
121-130	3		1	7	2	1						
131-140	4	1	2	5	2		1	2				1
141-150	7			4	2		1					4
151-160	1	1	1	3	2		1		1	1		5
161-170	2	1		2	1			2			2	10
171-180		1		2	2			1				9
181-190	2	1		3							3	8
191-200	5			3							1	6
201-210	4	1		3				1	1			9
211-220			1		2	1						6
221-230	2		1									4
231-240			1									1
241-250			1									3
251-260			1									
261-270	1											
271-280												
281-290								1				
291-300												
301-310												
311-320												
321-330												
331-340												

Table B-6

Length Distribution of Fish Impinged, Nine Mile Point Nuclear Plant, Jan-Dec 1980

Alewife

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
41- 50								2	3	3		
51- 60								1	5	34	17	
61- 70					2				11	32	54	1
71- 80	1			2	19				2	25	29	5
81- 90	1			4	34	4	1		1	10	3	3
91-100	6			13	34	2	4			1	2	
101-110	6			6	56	4	5					
111-120	9	1	1	11	40	6	2					
121-130	2		1	8	30	2						
131-140	1		1	12	39	8	1					1
141-150				21	57	8	1					
151-160				49	73	18	12	1	1			4
161-170				160	159	45	28	2	3	3	8	14
171-180		1		169	140	33	32	3		2	1	31
181-190				103	83	23	17	4	1	1	4	18
191-200			1	48	44	14	14	2		5	1	8
201-210				12	12		3			1	1	3
211-220				1	1		1					
221-230				1								
231-240				1								
241-250												
251-260												

Rainbow Smelt

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
31- 40										1		
41- 50	1			1				2	2	1		1
51- 60	6	4	8	5	3				3	8		3
61- 70	11	2	10	11	37	2		1	6	2		12
71- 80	8	8	14	10	75	10		7		4	1	3
81- 90	4	5	14	16	62	18	1	16	1	4	6	9
91-100		1	4	6	22		1	10		2	7	7
101-110				7	12	3		5		3	6	15
111-120	14	6	7	18	22	8	1		1	4	7	28
121-130	14	23	12	44	27	10		1	1	3	10	40
131-140	36	36	27	73	64	9			1	1	12	12
141-150	35	40	29	124	106	10		1	1	6	21	13
151-160	19	19	21	118	135	6	1	1		3	20	4
161-170	9	15	15	93	108	13			3	7	9	6
171-180	3	4	11	48	81	1	1	1		5	7	3
181-190	3	1	5	14	24	2				4	9	1
191-200	1			6	15	3				3	3	
201-210		1	1	5	6						3	1
211-220										3	3	
221-230				1	2	1				1		
231-240				1	1							
241-250												
251-260				1								

Smallmouth Bass

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
51- 60										1		
61- 70										1	2	2
71- 80										3		
81- 90										1		
111-120												
121-130												
131-140												
211-220												
221-230												
231-240												
241-250												
311-320												
321-330	2											
331-340										1		
341-350												
351-360												
361-370												
371-380		1										
381-390												
391-400											1	

Table B-9

Estimated Numbers and Biomass (g)* of Fish Impinged
at the James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1980

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Total	
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
Alewife																										
ADE**	502	8,582.2	25	285.4	35	936.0	20,839	752,116.8	6,943	205,348.7	65,149	1,766,235.3	12,930	313,347.1	4,678	9,625.4	2,692	7,659.7	32,767	31,299.6	24,286	48,744.1	2,726	73,281.3	173,572	3,217,461.6
RRE***	500	8,602.9	26	290.0	36	967.4	21,198	765,241.3	7,154	209,114.5	58,269	1,553,284.3	12,711	305,427.6	4,972	8,726.1	2,692	7,659.8	35,321	32,870.1	24,370	48,882.6	2,835	73,486.8	170,084	3,014,553.4
URE****	499	8,609.2	26	290.6	37	980.7	21,220	766,038.8	7,164	209,303.0	56,948	1,512,398.4	12,646	303,085.5	5,170	8,118.8	2,692	7,659.8	36,083	33,338.7	24,397	48,928.5	2,868	73,549.4	169,750	2,972,301.4
Alosa sp.																										
ADE													7,407	193,193.8											7,407	193,193.8
RRE													6,954	181,365.7											6,954	181,365.7
URE													6,820	177,867.8											6,820	177,867.8
American eel																										
ADE									1	696.9							30	1,170.8							31	1,867.7
RRE									2	911.3							30	1,170.8							32	2,082.1
URE									2	922.0							30	1,170.8							32	2,092.8
Black crappie																										
ADE	8	36.0																							8	36.0
RRE	8	34.9																							8	34.9
URE	8	34.6																							8	34.6
Bluegill																										
ADE	102	336.5					7	42.0	2	4.5									44	78.9					155	461.9
RRE	103	338.7					8	43.7	2	4.2									48	85.2					161	471.8
URE	103	339.4					8	43.8	2	4.2									49	87.0					162	474.4
Bluntnose minnow																										
ADE	8	10.7					4	8.3																	12	19.0
RRE	8	11.1					4	8.7																	12	19.8
URE	8	11.2					4	8.7																	12	19.9
Brook stickleback																										
ADE					7	7.6	8	7.1																	15	14.7
RRE					7	8.0	8	7.2																	15	15.2
URE					7	8.1	8	7.2																	15	15.3
Brown bullhead																										
ADE	8	322.5	9	1,228.9			11	1,171.0	2	86.8							8	2,613.0	10	1,714.8	8	1,912.5	8	298.6	64	9,348.1
RRE	8	324.4	9	1,117.2			11	1,209.7	3	119.3							8	2,613.0	8	1,304.4	8	1,907.3	8	293.0	63	8,888.3
URE	8	325.0	8	1,102.3			11	1,212.0	3	121.0							8	2,613.0	7	1,182.0	8	1,905.6	8	391.3	61	8,752.2
Brown trout																										
ADE									2	3,315.1					8	22,340.0			7	442.2			16	27,753.7	33	53,851.0
RRE									2	3,071.7					8	16,962.4			8	477.5			16	27,123.4	32	47,635.0
URE									2	3,059.6					5	13,331.1			8	488.0			16	26,931.3	31	43,810.0
Burbot																										
ADE							2	1,226.6	2	2,136.2			7	922.1											11	4,284.9
RRE							2	1,201.8	2	1,979.4			8	978.6											12	4,159.8
URE							2	1,200.3	2	1,971.6			8	995.3											12	4,167.2
Carp																										
ADE	8	18.1																							8	18.1
RRE	8	18.2																							8	18.2
URE	8	18.3																							8	18.3
Central mudminnow																										
ADE	32	32.6			35	147.2	230	694.1	3	1.5															300	875.4
RRE	32	32.5			36	153.0	224	677.8	3	1.4															295	864.7
URE	32	32.5			37	155.5	224	676.8	3	1.4															296	866.2
Centrarchidae (sunfishes)																										
ADE																			29	NA					29	NA
RRE																			32	NA					32	NA
URE																			32	NA					32	NA
Channel catfish																										
ADE	8	18.9			7	775.8	8	944.9															8	60.4	31	1,800.0
RRE	8	19.0			7	799.8	8	942.0															8	56.2	31	1,817.0
URE	8	19.1			7	810.1	8	941.8															8	55.0	31	1,826.0
Cottus spp.																										
ADE	500	1,158.5	233	651.2	129	598.6	399	1,869.5	228	793.3	126	329.2	24	17.9	6	1.7	8	3.0	192	367.1	52	100.1	40	125.6	1,937	6,015.7
RRE	500	1,158.1	230	643.9	131	613.5	402	1,854.5	241	872.8	136	349.3	23	17.8	6	1.8	8	3.0	207	396.3	53	100.7	40	123.5	1,977	6,135.2
URE	500	1,157.9	230	642.9	131	619.8	402	1,853.6	242	876.8	138	353.2	23	17.7	6	2.0	8	3.0	212	405.1	53	100.8	39	122.9	1,984	6,155.7
Creek chub																										
ADE											3	162.7													3	162.7
RRE											5	241.6													5	241.6
URE											5	256.8													5	256.8
Emerald shiner																										
ADE	765	921.4	202	494.7	72	361.9	13	56.3	5	10.7											15	46.5	217	582.5	1,289	2,474.0
RRE	754	913.8	205	504.9	65	325.6	13	57.1	5	9.9											15	46.5	206	559.9	1,263	2,417.8
URE	750	911.4	205	506.2	62	310.1	13	57.2	5	9.9											15	46.6	202	553.0	1,252	2,394.4
Freshwater drum																										
ADE																					7	74.5	8	154.9	15	229.4
RRE																					8	75.1	8	152.0	16	227.1
URE																					8	75.3	8	151.2	16	226.5
Gizzard shad																										
ADE	1,862	898,832.8	340	90,504.9	37	17,736.3	32	19,970.2									22	131.2	622	45,698.7	3,354	63,675.2	7,143	253,058.3	13,412	1,389,613.6
RRE	1,856	892,704.8	341	90,789.6	36	17,302.2	32	19,845.8									22	131.2	668	49,344.5	3,350	63,603.5	7,570	260,275.9	13,875	1,394,003.5
URE	1,854	890,849.5	341	90,827.6	36	17,117.7	32	19,838.3									22	131.2	682	50,432.3	3,349	63,579.8	7,701	262,476.1	14,017	1,395,258.5

Table B-9 (Contd)

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Total	
	No.	Wt.	No.	Wt.	No.	Wt	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
Golden shiner																										
ADE							2	19.1	1	NA															3	19.1
RRE							2	20.0	2	NA															4	20.0
URE							2	20.0	2	NA															4	20.0
Goldfish																										
ADE																							16	177.3	16	177.3
RRE																							16	169.5	16	169.5
URE																							16	167.1	16	167.1
Johnny darter																										
ADE	55	114.5					22	31.2	125	314.6	835	1,515.0			17	20.9	68	111.8	44	69.3	15	18.1			1,181	2,195.4
RRE	56	115.0					23	31.5	120	303.9	931	1,692.3			18	22.8	68	111.8	48	74.8	15	18.0			1,279	2,370.1
URE	56	115.2					23	31.5	119	303.4	950	1,726.3			20	24.1	68	111.8	49	76.5	15	18.0			1,300	2,406.8
Lake chub																										
ADE	48	624.7					9	138.2	4	45.9															61	808.8
RRE	48	627.4					9	143.1	5	57.3															62	827.8
URE	48	628.2					9	143.4	5	57.9															62	829.5
Largemouth bass																										
ADE	8	75.9																							8	75.9
RRE	8	74.6																							8	74.6
URE	8	74.2																							8	74.2
Logperch																										
ADE					7	134.3																			7	134.3
RRE					7	138.5																			7	138.5
URE					7	140.3																			7	140.3
Morone sp.																										
ADE							2	NA																	2	NA
RRE							2	NA																	2	NA
URE							2	NA																	2	NA
Northern pike																										
ADE							2	56.4			4	NA													6	56.4
RRE							2	55.2			5	NA													7	55.2
URE							2	55.2			5	NA													7	55.2
Pumpkinseed																										
ADE	47	3,610.7					2	NA	2	16.8	4	12.6			8	1,034.1			88	117.9			42	2,367.5	193	7,159.6
RRE	48	3,702.6					2	NA	2	15.5	5	14.1			6	785.2			96	127.3			40	2,264.9	194	6,906.6
URE	48	3,730.4					2	NA	2	15.5	5	14.4			5	617.1			98	130.1			39	2,233.6	199	6,741.1
Rainbow smelt																										
ADE	36,261	259,681.6	8,819	86,594.7	2,758	18,766.9	4,495	47,117.9	5,275	67,172.9	878	4,633.2	16	566.4	459	2,142.5	915	2,500.5	4,629	13,240.9	2,536	32,243.8	10,601	102,111.4	77,642	636,772.7
RRE	36,281	259,085.1	8,852	86,870.0	2,574	17,856.2	4,470	47,042.6	5,668	74,142.3	997	5,021.5	15	531.7	500	2,334.0	915	2,500.5	4,982	14,242.8	2,539	32,304.7	10,406	100,296.6	78,199	642,228.0
URE	36,286	258,904.5	8,857	86,906.7	2,496	17,469.2	4,469	47,038.0	5,688	74,491.1	1,019	5,096.0	15	521.5	527	2,463.4	915	2,500.5	5,087	14,541.8	2,540	32,324.9	10,346	99,743.4	78,245	642,001.0
Rainbow trout																										
ADE																							8	8,419.0	8	8,419.0
RRE																							8	8,262.2	8	8,262.2
URE																							8	8,214.3	8	8,214.3
Rock bass																										
ADE	321	6,701.7	75	6,374.2			15	939.0	6	1,426.9	6	1,319.2	7	1,663.2			22	7,265.2	33	5,394.5	23	90.4	106	11,800.3	614	42,974.6
RRE	317	6,712.0	77	6,437.2			15	969.9	6	1,524.8	5	1,120.5	8	1,765.0			22	7,265.2	32	4,115.4	23	90.1	103	11,389.5	608	41,389.6
URE	316	6,715.1	77	6,445.6			15	971.7	6	1,529.6	5	1,082.3	8	1,795.1			22	7,265.2	32	3,733.8	23	90.1	102	11,264.2	606	40,892.7
Salmonidae (trouts)																										
ADE													7	NA											7	NA
RRE													8	NA											8	NA
URE													8	NA											8	NA
Salvelinus spp.																										
ADE	8	118.3					2	NA											7	NA					17	118.3
RRE	8	119.0					2	NA											8	NA					18	119.0
URE	8	119.2					2	NA											8	NA					18	119.2
Sea lamprey																										
ADE																					8	2,564.8			8	2,564.8
RRE																					8	2,557.9			8	2,557.9
URE																					8	2,555.6			8	2,555.6
Smallmouth bass																										
ADE	55	7,308.0	8	5,616.6					7	6,827.2	12	12,474.5	7	853.8			38	6,659.2	66	4,561.7	23	100.9	8	44.7	224	44,446.6
RRE	56	7,351.3	8	5,734.4					6	6,326.0	10	10,595.7	8	906.1			38	6,659.2	72	4,925.6	23	100.7	8	42.8	229	42,641.8
URE	56	7,364.4	9	5,750.1					6	6,301.0	10	10,234.9	8	921.5			38	6,659.2	73	5,034.2	23	100.6	8	42.2	231	42,408.1
Spottail shiner																										
ADE	925	3,265.6	142	602.9	63	293.2	137	836.9	109	1,157.3	159	832.7	61	613.3	82	224.2	172	694.5	121	808.4	45	371.4	40	166.3	2,056	9,866.7
RRE	928	3,285.4	145	615.7	58	277.0	136	828.8	103	1,079.3	171	833.1	62	620.5	86	221.4	172	694.5	127	814.2	45	370.4	40	163.1	2,073	9,803.4
URE	929	3,291.4	145	617.5	56	270.1	136	828.3	102	1,075.4	173	833.1	62	622.6	89	219.6	172	694.5	129	815.9	45	370.0	39	162.2	2,077	9,800.6
Stonecat																										
ADE	8	10.2					2	57.4	2	260.3	3	67.8	16	1,312.9	5	495.4	15	728.2	22	64.9			8	141.2	81	3,138.3
RRE	8	10.3					2	59.4	2	171.2	5	100.7	15	1,232.5	6	539.7	15	728.2	24	70.0			8	138.6	85	3,050.6
URE	8	10.3					2	59.5	2	166.8	5	107.0	15	1,208.7	6	569.6	15	728.2	24	71.6			8	137.8	85	3,059.5
Threespine stickleback																										
ADE	8	14.7	18	23.5	15	22.6															15	14.9	34	31.4	90	107.1
RRE	8	14.3	17	22.2	14	21.8															15	15.0	32	29.3	86	102.6
URE	8	14.1	17	22.0	14	21.4															15	15.1	31	28.6	85	101.2
Trout-perch																										
ADE	32	85.1			31	205.0	60	563.4	408	5,020.1	338	3,029.1	16	145.5							8	23.4			893	9,071.6
RRE	32	84.1			29	190.0	58	544.1	392	4,798.0	362	3,201.8	15	136.6							8	23.3			896	8,977.9
URE	32	83.8			28	183.6	58	543.0	391	4,786.9	367	3,235.0	15	134.0							8	23.3			899	8,989.6
Unidentified fish																										
ADE	32	NA	8	NA	7	NA	6	NA			123	NA	7	NA											183	NA
RRE	32	NA	8	NA	7	NA	6	NA			136	NA	8	NA											197	NA
URE	32	NA	9	NA	7	NA	6	NA			138	NA	8	NA											200	NA

Table B-9 (Contd)

	Jan No.	Jan Wt.	Feb No.	Feb Wt.	Mar No.	Mar Wt.	Apr No.	Apr Wt.	May No.	May Wt.	Jun No.	Jun Wt.
Walleye												
ADE							4	2,106.7				
RRE							4	2,053.2				
URE							4	2,050.0				
White bass												
ADE	64	5,510.8	34	240.7					2	901.7		
RRE	63	5,536.5	34	243.9					2	835.5		
URE	63	5,544.2	34	244.3					2	832.2		
White perch												
ADE	3,431	32,717.0	169	3,285.9	64	5,002.8	541	20,678.6	58	3,083.8	32	121.2
RRE	3,434	32,821.4	171	3,348.2	65	5,170.4	547	21,054.8	61	3,180.8	35	135.4
URE	3,436	32,853.0	171	3,356.5	66	5,241.5	547	21,077.6	61	3,185.7	36	138.1
White sucker												
ADE							4	2,996.0	3	1,764.1		
RRE							4	3,098.5	3	1,634.6		
URE							4	3,104.7	3	1,628.1		
Yellow perch												
ADE	684	21,672.6	67	2,247.0	8	1,451.3	157	8,902.5	40	2,374.5	102	4,299.3
RRE	682	21,769.1	68	2,294.1	7	1,298.0	156	8,828.2	40	2,535.5	111	4,473.8
URE	682	21,798.3	68	2,300.4	7	1,232.9	156	8,823.6	40	2,543.6	112	4,507.4
Total												
ADE	45,789	1,251,781.6	10,149	198,150.6	3,275	46,439.5	27,015	862,550.1	13,230	302,759.8	67,774	1,795,031.8
RRE	45,794	1,245,466.5	10,191	198,911.3	3,079	45,121.4	27,350	875,818.9	13,826	312,689.2	61,183	1,581,064.1
URE	45,794	1,243,554.4	10,197	199,012.7	2,998	44,561.0	27,371	876,625.0	13,854	313,186.7	59,916	1,539,982.9

	Jul No.	Jul Wt.	Aug No.	Aug Wt.	Sep No.	Sep Wt.	Oct No.	Oct Wt.	Nov No.	Nov Wt.	Dec No.	Dec Wt.	Total No.	Total Wt.
Walleye														
ADE													4	2,106.7
RRE													4	2,053.2
URE													4	2,050.0
White bass														
ADE							15	3,407.4	9,404	84,249.2	1,105	13,631.6	10,624	107,941.4
RRE							16	3,679.3	9,383	84,063.0	1,124	13,846.0	10,622	108,204.2
URE							16	3,760.4	9,376	84,001.3	1,130	13,911.4	10,621	108,293.8
White perch														
ADE			6	9.6	30	69.0	103	865.3	90	241.9	720	5,387.0	5,244	71,462.1
RRE			6	10.5	30	69.0	111	934.3	90	241.9	689	5,172.8	5,239	72,139.5
URE			6	11.1	30	69.0	114	954.9	90	241.9	679	5,107.6	5,236	72,236.9
White sucker														
ADE			6	NA			15	9,561.9	8	NA			36	14,322.0
RRE			6	NA			16	10,324.8	8	NA			37	15,057.9
URE			6	NA			16	10,552.4	8	NA			37	15,265.2
Yellow perch														
ADE	55	3,714.7	134	7,244.8	52	4,439.2	29	3,370.6	45	4,198.7	392	30,698.0	1,765	94,613.2
RRE	54	3,632.7	130	6,783.7	52	4,439.2	32	3,639.5	45	4,187.3	380	29,900.7	1,757	93,781.8
URE	54	3,608.5	126	6,472.4	52	4,439.2	32	3,719.7	45	4,183.5	376	29,657.7	1,750	93,287.2
Total														
ADE	20,560	516,350.7	5,409	43,138.8	4,072	34,051.3	38,843	121,064.1	39,942	238,670.4	23,246	530,291.0	299,305	5,940,279.7
RRE	19,889	496,614.8	5,742	36,387.8	4,072	34,051.4	41,856	127,426.0	40,006	238,588.1	23,545	533,746.7	296,533	5,725,886.2
URE	19,690	490,778.2	5,966	31,829.1	4,072	34,051.4	42,751	129,324.4	40,026	238,560.9	23,632	534,800.3	296,267	5,676,267.0

* Biomass of damaged fish (designated as not available) not included in monthly or annual totals.
** ADE = Average density estimate.
*** RRE = Regular ratio estimate.
**** URE = Unbiased ratio estimate.

NA = Not available.

Table B-10

Length Distribution of Fish Impinged
at James A. FitzPatrick Nuclear Plant, Jan-Dec 1980

RAINBOW SMELT

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
31- 40												
40- 50	3	4	7	5	3	1		1	4	10	2	1
51- 60	10	13	15	27	27	9			4	43	8	1
61- 70	14	9	12	47	70	13		1	7	20	5	1
71- 80	8	7	16	56	111	11		5	16	9	2	10
81- 90	2	3	7	48	47	7		12	20	2	7	7
91-100	3	1	4	16	5	1		9	16	8	17	7
101-110	4	2	5	10	3	1		3	2	7	19	17
111-120	7	8	5	22	10			2	2	5	14	44
121-130	20	17	7	47	15	6		1		3	12	31
131-140	24	26	12	67	41	5				5	12	22
141-150	19	44	15	91	108	7		2	2	5	21	10
151-160	21	19	17	94	117	12			5	6	15	2
161-170	8	2	7	80	128	11		1	1	4	12	4
171-180	6	7	1	35	73	9	1	1			9	14
181-190	5	2	1	17	32	3		1	1		3	1
191-200	8	4	1	3	13			1		3	4	1
201-210	1			2	3						3	
211-220					3							1
221-230				1	1		1					
231-240				1	1	1						
241-250		1										
251-260												1
261-270												
271-280												

ALEWIFE

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
31- 40								19	2	1		
41- 50									12	9	1	
51- 60								7	12	42	39	1
61- 70				2	2			4	18	20	70	16
71- 80		1	1	6	6	1			6	10	38	4
81- 90				7	12				2	7	6	4
91-100				21	23	3	1					1
101-110	5			13	30	1	1					1
111-120	4	1		16	34	3					1	
121-130	1			12	29	2						
131-140	1		1	9	42	10	1		1			
141-150		1	1	22	77	14	12	1	1			
151-160	2			24	95	37	19	3	4		1	2
161-170	1			94	158	66	50	15	10	13	4	15
171-180	4			138	161	64	47	14	11	13	8	22
181-190	7		2	149	98	31	21	12	2	7	5	18
191-200	5			85	46	16	9	5	3	3	1	8
201-210	1			23	7	4						
211-220				3	3		1	2				
221-230					2							
231-240												
241-250												
251-260												
261-270												
271-280												
281-290												
291-300												
301-310												

Table B-10 (Contd)

YELLOW PERCH

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
61- 70												
71- 80						1						
81- 90												2
91-100				1	1	1						
101-110	3			3	1	6						1
111-120	6	1		2		1	1	1	1			5
121-130	8	1		10	5	3		1				
131-140	7	1		12	4	2		3				1
141-150	12	2		11	3	1						4
151-160	9	1		6	2	1	1	4			1	3
161-170	4	1		6	1			3	1			2
171-180	3	1		5	3		1	2	2	1	2	9
181-190	4			6	1	1	1	3		1		3
191-200	5			9	1	1		2	1		1	7
201-210				7	1		1					4
210-220	3			1		2	1	1		1		3
221-230	2			3	1				2		1	1
231-240	2		1				1					
241-250										1	1	1
251-260					1	1						1
261-270												1
271-280					1							
281-290				1								
291-300												
301-310												

WHITE PERCH

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
41- 50	2								2	1		
51- 60	23	6		1				1		4	5	3
61- 70	28	3		11	2				1	3	4	19
71- 80	21	3		42	8	1			1		3	32
81- 90	20	1	1	41	7	1				1		31
91-100	6	2	2	21	4	1				2		6
101-110	1	1		9	6							2
111-120	1			11	2	1						
121-130				27	2							
131-140				25								
141-150				2								
151-160				6								
161-170	1		1	12	1					1		
171-180	2			13								
181-190	1		1	20	2							
191-200			1	12								
201-210			2	1	1							
211-220	1		1	2								1
221-230	1			4								
231-240				2	1							
241-250				2								
251-260					2							
261-270		1		1								
271-280												
281-290												
291-300					1							
301-310												
351-360				1								

Table B-10 (Contd)

SMALLMOUTH BASS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
51- 60	1										2	
61- 70	2									2		1
71- 80										4		
81- 90	2								11	1	1	
91-100									1			
241-250							1					
331-340					1							
341-350												
351-360		1										
371-380										1		
391-400						1						
401-410	1				1				1			
441-450					1	1						
451-460					1							

3-SPINE STICKLEBACK

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
41- 50											1	1
51- 60		2	1								1	3
61- 70	1		1									
71- 80												

APPENDIX C

EXCEPTIONS TO ESTABLISHED STANDARD OPERATING PROCEDURES AND/OR ENVIRONMENTAL TECHNICAL SPECIFICATIONS

EXCEPTIONS TO ESTABLISHED STANDARD OPERATING PROCEDURES AND/OR ENVIRONMENTAL TECHNICAL SPECIFICATIONS

O October 25, 1980 - The scheduled impingement sample at James A. FitzPatrick Plant was considered invalid due to the following:

1. Severity of weather conditions during sampling period were such that the sample was not representative of normal impingement during month of October.
2. The large quantity of biomass (cladophora) collected with the impingement sample rendered it almost physically impossible to work up as per established standard operating procedures for the FitzPatrick Plant.
3. Small, but undetermined portions of the sample were lost due to collection basket overflow resulting from plant operations and the heavy demand on the plant intake traveling screen system resulting from the tremendous quantity of cladophora impinged.

This sample was biased due to the abnormal weather conditions and would have resulted in data of poor quality A subsample (at approximately the 10% level) of fish impinged on 25 October was analyzed and unusually high numbers were not indicated. A make-up sample date was randomly selected and the sample was successfully repeated on October 28, 1980.

O October 27, 1980 - Fish contingency plan at James A. FitzPatrick implemented because more than the 60 fish per day limit of smallmouth bass was collected on October 26. The number of smallmouth bass decreased below 60 fish per day on October 28 and the fish contingency plan was suspended.

O December, 1980 - Lake collections (gill net, water temperature and dissolved oxygen) not made due to adverse weather and nearshore icing. As per established standard operating procedures gill net, water temperature and dissolved oxygen collections were to be made the night preceeding scheduled impingement collections.

Impingement Sample Date	Weather - night preceeding impingement sample
12 Dec.	N-NW wind, 15-24 knots, 4-7' waves
15 Dec.	N wind, 25-40 knots, 7-10' waves
18 Dec.	NW wind changing to SW, 5-15 knots increasing to 30-40 knots, gale warnings, 6-10' waves
30 Dec.	Boat launch and nearshore lake areas frozen hard - no open area to launch sampling vessel

APPENDIX D

ENVIRONMENTAL IMPACT ASSESSMENT

A. Introduction

Ecological studies in the vicinity of the Nine Mile Point promontory were initiated in the late 1960's by Niagara Mohawk Power Corporation (NMPC) and by the Power Authority of the State of New York (PASNY) in 1975. These studies were designed to evaluate potential effects of power station operations at Nine Mile Point on the near-field aquatic ecosystem of Lake Ontario.

Two nuclear electric generating stations are located on the Nine Mile Point promontory on the south shore of Lake Ontario: Nine Mile Point Nuclear Station Unit One, which has been operating since December 1969; and James A. FitzPatrick Nuclear Power Plant, which initiated operation in July 1975. A third nuclear station (Nine Mile Point Nuclear Station Unit Two) is under construction at this site.

This report is provided in reponse to Niagara Mohawk Power Corporation's and the Power Authority of the State of New York's requirements as ammeded by the U. S. Nuclear Regulatory Commission in the spring of 1979 to assess environmental impact in the event that total monthly impingement collections deviate from ranges specified in section 3.1.2 of the Nine Mile Point Unit-1 Environmental Technical Specification; or exceeds the monthly maximum limit by greater than 50 percent as specified in Section 4.1.1-B of the James A. FitzPatrick Nuclear Power Plant Environmental Technical Specification (Tables D-1 and D-2). Table D-1 lists the monthly range for impingement as specified on Table 3.1-4 of the Nine Mile Point Unit-1 Environmental Technical Specification and the corresponding actual 1980 sampling result. Table D-2 lists the monthly maximum limit for impingement collections as specified on Table 4.1.1-2 of the James A. FitzPatrick Nuclear Power Plant Environmental Technical Specification and the corresponding monthly estimated impingement for 1980.

The abundance of fish observed in impingement collections since 1976 has generally been lower than in the previous years (although on the increase) resulting in deviations from daily ranges at Nine Mile Point Unit-1 and from monthly ranges at the James A. FitzPatrick Nuclear Power Plant. During 1980, exceptions to the general occurance of actual impingement levels being lower than or within specified ranges were observed in January and October at Nine Mile Point Unit-1. At the FitzPatrick Plant during 1980, actual impingement collections did not exceed by 50 percent the monthly maximum on any occasion.

Impingement collections at Nine Mile Point Unit-1 during January were approximately one third greater than the specified range (Table D-1). These collections were comprised of 79 percent rainbow smelt, the population of which is believed to have increased elevenfold in Lake Ontario from 1972-78.

The October impingement collection at Nine Mile Point Unit-1 was nearly ten times greater than this month's specified range. Over 96 percent of the fish in this October collection were alewife, a species whose population is presently on the increase in Lake Ontario. Additionally, a large percentage of the alewife (91%) was collected during one 24 hour sampling period (16 October).

Secondary peaks in numbers of fish collected at Nine Mile Point Unit 1 (NMP-1) have been observed in fall impingement collections since 1974. These secondary peaks have often been composed of schooling young-of-the-year fish (primarily alewife), probably moving off-shore from their summer nursery grounds to over winter in deeper water. Alewife, for example, were the most abundant species collected during the fall of 1975*. In October 1979, impingement rates greater than the range specified by the Nuclear Regulatory Commission's Environmental Technical Specifications were also encountered at NMP-1 with alewife comprising over 90% of these impingements.

It seemed likely that the high impingement observed at NMP-1 on 16 October 1980 resulted from the passage of a school of young-of-the-year alewife in close proximity to the NMP-1 intake. Although warm water effluent from NMP-1 may have served as an attractant to these alewife, it should be noted that only on this occasion (out of 4 collection days in October when ambient lake temperature and NMP-1 discharge temperature were similar to those on October 16) was impingement unusually high.

Additionally, observations made by Texas Instruments personnel since 1977 have indicated an increase in impingement rates at the two Nine Mile Point power stations during specific weather conditions - in particular, strong west to northwest winds. In the fall of 1980 as in 1979, strong west to northwest winds were common (occurring on approximately one third of the days in the month of October 1980). Although the explanation for weather related impingement rate increases is unknown (periods of high wind and waves and associated turbid waters may result in spatial disorientation of fish) several years of observation have indicated the existence of this phenomenon in the Nine Mile Point vicinity.

*Lawler, Matusky, and Skelly (LMS). 1976. 1975 Nine Mile Point Aquatic Ecology Studies. LMS project Nos. 191-31, 32, 33. Prepared for NMPC and PASNY.

TABLE D-1
Comparison of Specified Monthly Impingement Ranges and Actual Sampling Results, Nine Mile Point Unit-1 Nuclear Power Station, 1980

Month	Daily Average Number of Fish*		Actual Daily Average Impingement (No. of Fish/Day)
	LOW	HIGH	
January	231	631	966
February	211	718	448
March	482	2,864	247
April	5,552	20,923	3,263
May	8,501	50,759	759
June	1,366	3,213	1,959
July	718	2,648	1,029
August	0	5,020	27
September	0	1,397	44
October	154	338	2,791
November	103	1,565	975
December	294	1,713	706

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

TABLE D-2
Comparison of Specified Monthly Maximum Impingement Ranges and Actual Sampling Results, James A. FitzPatrick Nuclear Power Plant, 1980

Month	Monthly Maximum Impingement*	Total Estimated Monthly Impingement
January	41,596	45,794
February	16,646	10,197
March	22,595	2,998
April	413,854	27,371
May	1,750,162	13,854
June	131,769	59,916
July	67,249	19,690
August	33,708	5,966
September	31,570	4,072
October	32,428	42,751
November	87,928	40,026
December	30,837	23,632

*From Table 4.1.1-2, Section 4.1.1-B of the James A. FitzPatrick Nuclear Power Plant's Environmental Technical Specifications. Maximum unreportable impingement is limit specified plus 50%.

B. Result of Impingement Collections at Nine Mile Point Nuclear Power Station Station Unit One and James A. FitzPatrick Nuclear Power Plant

Fish have been collected from traveling screens at Nine Mile Point Unit One since 1972 and from the James A. FitzPatrick Plant since late 1975. Nine Mile Point impingement collections have yielded between 37 and 48 species of fish each year since 1973; the FitzPatrick Plant has yielded between 43 and 54 species each year since 1976. Alewives consistently dominated impingement samples at both plants through 1977; they comprised at least 80 percent of the fish impinged annually at Nine Mile Point during 1973-76 and 90 percent of the 1976 catch at FitzPatrick. Rainbow smelt have been second in abundance at both power plants except in 1976 when threespine stickleback were second at Nine Mile Point. Rainbow smelt were relatively more abundant in 1977 than in earlier years, accounting for 27 percent and 30 percent, respectively, of the fish impinged annually at Nine Mile Point and FitzPatrick; alewives comprised 48 percent and 56 percent of the annual catch respectively at the plants in 1977. During 1978, threespine stickleback were very abundant in impingement samples, replacing alewife as the dominant species, while smelt again were second in abundance; e.g., stickleback, smelt, and alewives comprised 52, 22, and 7 percent, respectively, of the total 1978 catch at Nine Mile Point. Threespine stickleback abundance as indicated from Nine Mile Point Unit One impingement collections increased consistently from 1974 through 1976. Although collection of this species declined markedly in 1977; 1978 collections had increased to a level similar to that of 1975. Rainbow smelt was the most abundant species impinged in 1979, with alewife second in total abundance. Threespine stickleback were collected at very low levels at both plants during 1979. Alewife dominated 1980 impingement collections with this species representing 82 and 65 percent of the total catch at Nine Mile

Point Unit 1 and James A. FitzPatrick, respectively. Rainbow smelt was second in abundance in 1980 accounting for 12 and 24 percent respectively at Nine Mile Point Unit 1 and FitzPatrick.

Estimated annual impingement at Nine Mile Point Unit One from 1974-80 ranged from between 135,000 and 3.4 million fish, with 1976 establishing the largest impingement. James A. FitzPatrick also had its largest estimated annual impingement in 1976 (compared with subsequent years), when 4.3 million fish were impinged on the traveling screens.

Several methods were used to assess the impact of impingement on selected fish species, including comparing annual impingement estimates to standing-stock estimates, lake-stocking data, and commercial-fishing harvest. Based on individual species analysis using the above comparisions, the numbers of fish impinged at Nine Mile Point Unit One and James A. FitzPatrick represented a negligible portion of the Lake Ontario fish comunity. Existing fish populations are not expected to be altered by power plant operations.

Information concerning alewife population variations in Canadian waters of Lake Ontario generally supported that obtained from the Nine Mile Point and James A. FitzPatrick impingement collections, thus indicating a lake wide fluctuation in alewife numbers and not one solely in the vicinity of Nine Mile Point. It was believed that alewife impingement at Ontario Hydro power stations on Lake Ontario had also been dropping steadily since 1975 (personal communication with Harold Bolesic, Ontario Hydro). Additionally, although no published data were available, personnel of the Glenora Fisheries Station - Piction Ontario indicated that their "feeling" was 1977-78 constituted a low period for alewife, but the 1979 year class was showing somewhat of an upswing (personal communication, Dr. Harley).

C. Results of Nearshore Fish Collections Conducted in the Vicinity of Nine Mile Point

Temporal and spatial distribution of fishes in the vicinity of Nine Mile Point in Lake Ontario were monitored at varying levels of effort from 1969 through 1980. Preoperational and early postoperational studies (1969-72) utilized accoustic techniques, gill nets, and traps. Subsequent postoperational surveys (1973-79) of greater intensity, employed a combination of gear (gill nets, trawls, seines, and traps). These studies examined data from a thermally influenced area and control regions to the east and west of the discharge area.

Fish community structure in the Nine Mile Point vicinity was found to vary seasonally during any given year, changing from a simple system (few species) in winter and early spring to a highly complex community (many species) from late spring and fall. Data provided by preoperational and postoperational studies indicated that the fish community in Lake Ontario was not diverse; rather, for most of the year, it was dominated by one or two species and had a small number of other species in low and intermediate numbers. Species diversity proved to be highest in spring, resulting from an inshore movement of a number of lake fish. During months in which alewives were most abundant, typically June through August, diversity values remained low. Diversity usually rebounded in the fall, coinciding with offshore movement of alewives.

During the past ten years, lake monitoring in the vicinity of Nine Mile Point has yielded 72 fish species. Alewives comprised a major portion of the total catch at lake stations during a typical sampling year, with rainbow smelt, spottail shiners, yellow perch, and white perch accounting for the majority of the remaining catch.

Overall, normal life-cycle development patterns were observed for species designated as representative of the area (e.g., alewife, rainbow smelt, smallmouth bass, white perch, and yellow perch). Temporal and spatial distribution patterns depended on the species, the stage of development, and temperature patterns and gradients.

Seasonally, fish were collected in greatest numbers during the spring, coinciding with the shoreward migration of the two most abundant species, alewife and rainbow smelt. Abundance typically declined during the warmer summer months and increased during the fall, corresponding to increased catches of young-of-the-year fish.

During 1973-78, the shorezone fish community typically remained low in abundance and was dominated by young-of-the-year alewives. Cyprinids, primarly forage species such as spottail and emerald shiners, centrarchids, and white perch, comprised the other major community constituents. In the lake, fish concentrations were highest at the easternmost transects, and lowest at the westernmost transect.

Annual gill-net catch data for rainbow smelt, white perch, and smallmouth bass in the Nine Mile Point vicinity displayed no significant changes among years (1969-80). Alewife abundance oscillated, displaying highest numbers in 1974 and 1976, declining through 1979 and increasing again during 1980. Fish abundance trends based on gill net data generally mimicked the patterns displayed for impingement catches at the Nine Mile Point and FitzPatrick plants.

No incidents of cold-shock fish mortality due to plant shutdown at either Nine Mile Point Unit-1 or the James A. FitzPatrick Plant were reported. Additionally, no rare, endangered, or threatened fish species were collected in the Nine Mile Point area by Texas Instruments.

Nearshore fish collections conducted during 1977 by New York State Electric and Gas Corporation off New Haven, New York (east of Nine Mile Point) were similar to collections in the vicinity of Nine Mile Point during that same year (NYSEG, 1979). Species composition and relative composition of the fish community at both sites were similar, with alewife the major constituant.

An explanation for the reduced impingement collections since 1976 at power stations in the vicinity of Nine Mile Point was provided by the New York State Department of Environmental Conservation (NYSDEC) and the U. S. Fish and Wildlife Service (FWS). Following is a summary of results generated by the above agencies regarding alewife and rainbow smelt populations in Lake Ontario. These two species were generally dominant in impingement collections at the Nine Mile Point and FitzPatrick Plants between 1972 and 1980 and the decrease in their collection after 1976 was most noticeable.

D. Results of NYSDEC Trawling Efforts in Lake Ontario

During trawling efforts conducted by NYSDEC crews in the spring of 1977, many dead and decaying alewives were collected. It appeared to the NYSDEC that fewer live alewives were captured than at the same time the previous year. Data from trawling conducted in the fall of 1977 indicated a decline in abundance of several species including alewife and rainbow smelt at western and eastern Lake Ontario sampling locations (Schneider, 1978).

Substantial declines based on geometric mean catches were noted between the 1976 and 1977 catches of alewives in the western region of Lake Ontario. Mean total catches of alewife in 1977 were 89 percent lower than in

1976. A moderate (17 percent) reduction was also obseved in rainbow smelt collection during 1977 in western portions of the lake.

At the eastern end of Lake Ontario, a "dramatic" decline in the 1977 geometric mean of alewives was observed. Catches were reduced by 99 percent from 1976 levels. Rainbow smelt collections in the eastern end of Lake Ontario exhibited a moderate 28 percent reduction from the previous year.

The substantial declines observed in catches of alewife at both ends of the lake indicated a sizeable reduction in stock size. This decline in alewife stock was strongly suported by greatly increased condition based on weight-length regressions of alewife collected during fall trawling activities. Broun (1972) as reported by Schneider (1978) showed that alewife condition in Lake Michigan was closely related to stock density. During periods of high population density, intraspecific competition resulted in relatively poor condition, and poor condition in the fall increased probability of winter and spring alewife mortality. It was reported that below average winter temperatures could also cause appreciable mortality.

Relating Broun's findings to Lake Ontario, Schneider suggested that the winter of 1976-77, which was the coldest on record for the last 100 years, resulted in a serious winter mortality. The surviving portion of the alewife stock showed a dramatic increase in condition and growth response to reduced density. Whether this explanation related to the lesser decline noted for rainbow smelt was unknown.

E. Results of Coordinated FWS and NYSDEC Trawling Efforts in Lake Ontario

Trawling efforts conducted in 1978 and 1979 by the U. S. Fish and Wildlife Service (FWS) and the NYSDEC provided information that was compared with data obtained during the 1972, International Field Year for the Great Lakes (Elrod, O'Garman, Bergstedtand and Schneider, 1979 and 1980). A summary of findings from these coordinated efforts is provided below.

Since 1972 a substantial reduction in alewife numbers was found to have occurred in Lake Ontario. Biological information collected in 1972 and in 1976-79 by the FWS and NYSDEC indicated that the alewife stock of Lake Ontario had increased during the late 1960's and early 70's and was probably at a level near the lakes carrying capacity by the mid-70's. Additionally, during the harsh winter of 1976-77 as many as 60-75 percent of the alewives may have succumbed to temperature stress. The cold-induced mortality was undoubtedly made more severe by the poor condition of the fish, a result of the large population.

It was determined that the average size of Lake Ontario alewives in age groups II and older decreased as the population expanded during the early to mid-70's and then increased "dramatically" following the 1976-77 mass mortality. In the early and mid-70's the size of adults (fish that completed two or more growing seasons) decreased because of the progressively smaller juvenile fish entering the older age groups. Length increments during the third and fourth years of life were found to be stable from 1970 through 1976. Growth increments of yearling alewives, (probably in response to elevated population levels), decreased each year from 1969 to 1974 and then remained unchanged from 1974 through 1976. During 1977, after collapse of the alewife population increments of growth during the third and fourth years of life increased 250 and 375 percent, respectively. In 1978, growth decreased among four and five year old alewives to a rate like that observed during the mid-1970's. Growth rates for two year old alewives however, was greater in 1978 than in the mid-1970's.

Mean age of adult alewives collected with bottom trawls increased from 3.1 in spring of 1972 to 4.7 in spring of 1978. Difference in age structure was attributed to increased survival of older age groups at the lower population levels of 1977-78 and mortality rates that were inversely proportional to age during the winter of 1976-77. Overwinter mortality was so high for smaller alewives that it was believed few if any of the 1976 year class survived.

The condition of alewives was found to be poor in the early and mid 70's and annual overwinter and spring mortalities probably varied with the severity of the weather. At the much lower population levels of 1977, "dramatic" increases in body weight of mature alewives occurred and no die-offs were observed in 1978. By the fall of 1978 recruitment of the large 1977 year class to the offshore alewife stock was believed to have substantially increased the population, and conditon of Lake Ontario alewives declined noticeably. Accoustical and midwater trawl surveys conducted by FWS and NYSDEC in the summer of 1978 indicated substantial numbers of yearling alewives, supporting the indication of recruitment to offshore stocks. In 1979 the condition of larger alewives continued to decline and 1979-80 winter losses were expected to be greater than those observed during the previous year.

The spring die-off of alewives in 1979 was actually considerably larger than expected in southeastern Lake Ontario. During early May, 1979, dead alewives were found in near shore waters and by mid-month more than 31,000 alewives per kilometer were observed along beaches near Oswego. The prolonged period of hot, calm weather during spring 1979 probably precipitated the die-off. The rapid rise in near shore water temperatures and/or the sharp temperature differences encountered during the species spring shoreward migration probably were more than many alewives could tolerate.

Data on recent changes in the alewife population of Lake Ontario combined with information on historic changes in alewife populations in other Great Lakes enabled FWS and NYSDEC to make predictions regarding Lake Ontario alewife. Alewife numbers were expected to increase rapidly during the succeeding two or three years and the population would be dominated by the large 1977 year class. By 1981 alewife stock size would probably approach carrying capacity of the lake. The condition of alewives would slowly decline and annual die-offs would increase in severity. A large decrease in growth during 1978 would be followed by smaller, continuing decreases through the early 1980's. The magnitude and biological characteristics of the Lake Ontario alewife stock after 1981 would be influenced by climatic conditions and possibly by the numbers of salmonids stocked.

Investigations of rainbow smelt by FWS and NYSDEC indicated an eleven fold population increase from 1972 to 1978 in the U.S. waters of Lake Ontario and tentatively a population decrease from 1978 to the present. The largest concentration of smelt was found in the Cape Vincent Section of Lake Ontario. The FWS estimated that nearly half the smelt in all U.S. waters of Lake Ontario were in the Cape Vincent Section. Abundance of smelt in the Cape Vincent area was partly attributed to the larger proportion of that area which was of a depth (temperature) preferred by smelt.

Growth of smelt in Lake Ontario was found to be similar or slightly slower than in the upper Great Lakes. Mean total lengths of smelt in Lake Ontario were similar to those of Lake Huron except at age II. Growth for the second year of life in 1977, however, was considered unusually large for Lake Ontario. Rapid growth of I+ smelt in 1977 coincided with the reduced abundance and increased growth of alewives. The increased growth of smelt following the 1976-77 alewife die-off was probably the result of a larger food supply as typically, numbers of zooplankters increase following decreases in alewife populations. Growth of two and three year old smelt was less in 1978 than in 1977.

F. Summary

Fish abundance in the vicinity of Nine Mile Point as evidenced through impingement collections showed wide variation from year to year. Years of relatively low abundance were followed by years of great abundance through 1976. Generally, increasing numbers of fish have been collected in impingement sampling since the 1976-77 collapse of the alewife stock, suggesting that populations are again on the increase. Changes in fish abundance from 1972 through 1980 as observed in impingement collections were within bounds expected from natural variations (Scott and Crossman, 1973; Smith, 1970; Rothchild, 1967) and no alterations to existing fish populations due to plant operations were detected. Alewife population variations were also indicated in Canadian waters of Lake Ontario with impingement of this species at Ontario Hydro power stations dropping steadily from 1975 through 1978. Such variations in Canadian waters would suggest lake wide fluctuations-not limited to the vicinity of Nine Mile Point.

Comparisons of temporal and spatial abundance based on catch-per-effort data as well as length-frequency distribution, age and growth, gonad maturity, and diet analysis were made on fish in the vicinty of Nine Mile Point from 1969 through 1978. No distinct or consistent alterations to the normal seasonal life-cycle patterns of the fish community directly attributable to operations at the Nine Mile Point or James A. FitzPatrick Nuclear Stations were revealed from these comparisons. Similar data from a Lake Ontario area (Mexico Bay) adjacent to Nine Mile Point, but outside immediate influence of the Nine Mile Point and James A. FitzPatrick Stations reinforced the conclusion of no harm resulting from plant operations.

Trawling efforts conducted in 1977 by NYSDEC and during 1978 and 1979 by NYSDEC and FWS documented a lake wide (U.S. waters) reduction of alewife stocks and variations in rainbow smelt populations. Natural, environmental factor's were suggested as causative agents for these fish population fluctuations. From trawling activities and historic information the FWS provided a prediction of future Lake Ontario alewife abundance levels based on year class strength and climatic conditions. Considering information provided above, variations of fish abundance observed since 1976 in impingement collections at the Nine Mile Point and James A. FitzPatrick Power Stations can be attributed to natural, temporal variations in fish stocks (especially alewife and rainbow smelt) and not impact due to plant operations. Such fish population fluctuations are common in literature.

LMS (1975) reported natural concentrations of alewife to fluctuate from year to year by as much as 800 percent in the vicinity of Oswego Steam Station in Oswego, New York. Yearly variations of alewife population size in the vicinity of Nine Mile Point have been reported at half an order of magnituded (LMS, 1977). Christie (1974) reported that in Lake Ontario, alewife have shown two to three year oscillations resulting in 10-fold changes in abundance during spawning. Cyclic changes of a similar nature have been reported of alewife from other lake populations (Lackey, 1970; Rothschild, 1966; Smith, 1970).

In the Great Lakes rainbow smelt abundance has also fluctuated greatly as reported by Hubbs and Lagler (1958). This species has been reported sensitive to both temperature and light (Scott and Crossman, 1973) which may have contributed to the variations noted in smelt populations. Additionally, rainbow smelt have been noted to suffer substantial population losses in the great Lakes due to diseases. Van Oosten (1947) as cited in Scott and Crossman (1973) reported that Great Lakes smelt populations suffered from 1942-46 one of the most catastrophic natural mortalities ever recorded for a North American animal when huge stocks in Lake Huron and Lake Michigan died-off, presumably as a result of some communicable disease, possibly a virus. Severe losses of young-of-the-year smelt were also observed in Lake Erie as recently as 1969 (Scott and Crossman, 1973).

Very little information was available regarding population variations for the threespine stickleback. This species, however, has shown fluctuations in annual abundance as reported by LMS (1976b) for the Oswego, New York area. Such fluctuations were reported as possibly being related to the species schooling and spawing habits. Male threespines establish and defend territories during breeding season. They require bottom with vegetation in order to build a nest. Since area of such bottom is relatively small near Oswego as it is in the vicinity of Nine Mile Point, only a portion of the male population becomes established or fixed to a territory. The remaining males and non-reproductive females move about in groups and schools. Such movement may make a portion of the stock of this species unavailable to impingement cropping, and this portion may be extremely variable from year to year.

G. Conclusion

In conclusion, fish abundance changes documented since 1972 in the Nine Mile Point vicinity were not beyond ranges expected to occur as a result of natural fish stock variations. Similar, lake-wide fish population fluctuations have been observed indicating that such variations were not limited to the Nine Mile Point area and were not the result of power plant operations at Nine Mile Point. After nearly ten years of intensive environmental monitoring, no alteration to existing fish populations has been detected and no harm to the aquatic ecosystem resulting from operation of the Nine Mile Point Unit-1 and the James A. FitzPatrick Nuclear Power Plants has been observed.